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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Parts 1, 11, 47, 48, 89, 91, and 107

[Docket No.: FAA-2019-1100; Amdt. Nos. 1-75, 11-63, 47-31, 48-3, 89-1, 91-361, and 107-7]

RIN 2120–AL31

Remote Identification of Unmanned Aircraft

AGENCY: Federal Aviation Administration (FAA), Department of Transportation (DOT).

ACTION: Final rule.

SUMMARY: This action requires the remote identification of unmanned aircraft. The remote identification of unmanned aircraft in the airspace of the United States will address safety, national security, and law enforcement concerns regarding the further integration of these aircraft into the airspace of the United States, laying a foundation for enabling greater operational capabilities.

DATES: *Effective dates*: This rule is effective [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER], except for amendatory instruction 19, adding subpart C to part 89, which is effective September 16, 2022.

Incorporation by reference: The incorporation by reference of certain publications listed in the rule is approved by the Director of the Federal Register as of [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

Compliance dates: Compliance with §§ 89.510 and 89.515 is required September 16, 2022. Compliance with §§ 89.105, 89.110, and 89.115, and subpart C of part 89 is required September 16, 2023.

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SUPPLEMENTARY INFORMATION:

Table of Contents

I. Executive Summary
- A. Remote Identification Requirements
- B. Registration Requirements
- C. Elimination of the Network-Based Remote Identification Requirement
- D. Summary of Benefits and Costs

II. Authority for this Rulemaking

III. Background

IV. Remote Identification of Unmanned Aircraft
- A. Clarification of Use of the Term Unmanned Aircraft in this Rule
- B. Purpose for the Remote Identification of Unmanned Aircraft
- C. Public Comments and FAA Response

V. Terms Used in this Rule
- A. Definition of Unmanned Aircraft System
- B. Definition of Visual Line of Sight
- C. Definition of Broadcast
- D. Definition of Home-Built Unmanned Aircraft
- E. Definition of Declaration of Compliance
- F. Requests for other Definitions

VI. Applicability of Operating Requirements
- A. Discussion of the Final Rule
- B. Public Comments and FAA Response

VII. Operating Requirements for Remote Identification
- A. Elimination of Network-based Remote Identification Requirement
- B. Limited Remote Identification UAS
- C. Standard Remote Identification Unmanned Aircraft
- D. Remote Identification Broadcast Modules
- E. Other Broadcast Requirements Applicable to Standard Remote Identification Unmanned Aircraft and Unmanned Aircraft with Remote Identification Broadcast Modules
- F. Unmanned Aircraft without Remote Identification

VIII. Message Elements and Minimum Performance Requirements: Standard Remote Identification Unmanned Aircraft
- A. Message Elements for Standard Remote Identification Unmanned Aircraft

B. Minimum Performance Requirements for Standard Remote Identification Unmanned Aircraft

C. Message Elements Performance Requirements for Standard Remote Identification Unmanned Aircraft

IX. Message Elements and Minimum Performance Requirements: Remote Identification Broadcast Modules

X. Privacy Concerns on the Broadcast of Remote Identification Information

A. Discussion of the Final Rule

B. Public Comments and FAA Response

XI. Government and Law Enforcement Access to Remote Identification Information

A. Discussion of the Final Rule

B. Public Comments and FAA Response

XII. FAA-Recognized Identification Areas

A. Discussion of the Final Rule

B. Eligibility

C. Time Limit for Submitting an Application to Request an FAA-Recognized Identification Area

D. Process to Request an FAA-Recognized Identification Area and FAA Review for Approval

E. Official List of FAA-Recognized Identification Areas

F. Amendment of the FAA-Recognized Identification Area

G. Duration of an FAA-Recognized Identification Area, Expiration, and Renewal

H. Requests to Terminate an FAA-recognized Identification Area

I. Termination by FAA and Petitions to Reconsider the FAA's Decision to Terminate an FAA-Recognized Identification Area

XIII. Means of Compliance

A. Performance-Based Regulation

B. Applicability and General Comments

C. Submission of a Means of Compliance

D. Acceptance of a Means of Compliance

E. Rescission of FAA Acceptance of a Means of Compliance

F. Record Retention Requirements

XIV. Remote Identification Design and Production

A. Applicability of Design and Production Requirements

B. Exceptions to the Applicability of Design and Production Requirements

C. Requirement to Issue Serial Numbers

D. Labeling Requirements

E. Production Requirements

F. Accountability

G. Filing a Declaration of Compliance

H. Acceptance of a Declaration of Compliance
I. Rescission of FAA Acceptance of a Declaration of Compliance
J. Record Retention
XV. Registration
A. Aircraft Registration Requirements
B. Registration Fees for the Registration of Individual Aircraft
C. Information Included in the Application for Registration
D. Proposed Changes to the Registration Requirements to Require a Serial Number as Part of the Registration Process
E. Serial Number Marking
F. Compliance Dates
XVI. Foreign Registered Civil Unmanned Aircraft Operated in the United States
A. Discussion of the Final Rule
B. Public Comments and FAA Response
XVII. ADS-B Out and Transponders for Remote Identification
A. Discussion of the Final Rule
B. Public Comments and FAA Response
XVIII. Environmental Analysis
A. Public Comments and FAA Response
XIX. Effective and Compliance Dates
A. Effective Date of this Rule
B. Production Requirements Compliance Date
C. Operational Requirements Compliance Date
D. Incentives for Early Compliance
XX. Comments on the Regulatory Impact Analysis—Benefits and Costs
A. General Comments about Cost Impacts of the Rule
B. Comments on Benefits and Cost Savings
C. Comments on Data and Assumptions
D. Comments on Regulatory Alternatives
E. Miscellaneous Comments
XXI. Guidance Documents
XXII. Regulatory Notices and Analyses
A. Regulatory Evaluation
B. Regulatory Flexibility Act
C. International Trade Impact Assessment
D. Unfunded Mandates Assessment
E. Paperwork Reduction Act
F. International Compatibility and Cooperation

G. Environmental Analysis
XXIII. Executive Order Determinations
A. Executive Order 13132, Federalism
B. Executive Order 13175, Consultation and Coordination with Indian Tribal Governments
C. Executive Order 13211, Regulations that Significantly Affect Energy Supply, Distribution, or Use
D. Executive Order 13609, Promoting International Regulatory Cooperation
E. Executive Order 13771, Reducing Regulation and Controlling Regulatory Costs
XXIV. Additional Information
A. Availability of Rulemaking Documents
B. Small Business Regulatory Enforcement Fairness Act

List of Abbreviations Frequently Used in this Document

AC – Advisory Circular
ADS-B – Automatic Dependent Surveillance-Broadcast
AGL – above ground level
ARC – Aviation Rulemaking Committee
ATC – Air traffic control
BVLOS – Beyond visual line of sight
DOT – U.S. Department of Transportation
FAA – Federal Aviation Administration
GPS – Global Positioning System
ICAO – International Civil Aviation Organization
LAANC – Low Altitude Authorization and Notification Capability
LOS – line-of-sight
MOA – Memorandum of Agreement
NPRM – notice of proposed rulemaking
OMB – Office of Management and Budget
UAS – Unmanned aircraft system
UAS-ID ARC – UAS Identification and Tracking Aviation Rulemaking Committee
USS – UAS service supplier
UTM – Unmanned aircraft systems traffic management
VLOS – visual line of sight

I. Executive Summary

This rule establishes requirements for the remote identification of unmanned aircraft[1] operated in the airspace of the United States. Remote identification (commonly known as Remote ID) is the capability of an unmanned aircraft in flight to provide certain identification, location, and performance information that people on the ground and other airspace users can receive. The remote identification of unmanned aircraft is necessary to ensure public safety and the safety and efficiency of the airspace of the United States. Remote identification provides airspace awareness to the FAA, national security agencies, law enforcement entities, and other government officials. The information can be used to distinguish compliant airspace users from those potentially posing a safety or security risk. Remote identification will become increasingly important as the number of unmanned aircraft operations increases in all classes of airspace in the United States. While remote identification capability alone will not enable routine expanded operations, such as operations over people or beyond visual line of sight, it is the next incremental step toward enabling those operations.

Unmanned aircraft operating in the airspace of the United States are subject to the operating requirements of this rule, irrespective of whether they are operating for recreational or commercial purposes. The rule requires operators to seek special authorization to operate

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[1] The FAA does not use the terms unmanned aircraft system and unmanned aircraft interchangeably. The FAA uses the term unmanned aircraft as defined in 14 CFR 1.1 to refer specifically to the unmanned aircraft itself. The FAA uses the term unmanned aircraft system to refer to both the unmanned aircraft and any communication links and components that control the unmanned aircraft. As explained in section V.A of this rule, the FAA is adding the definition of unmanned aircraft system to 14 CFR part 1.

The FAA acknowledges that UAS may have components produced by different manufacturers (e.g., an unmanned aircraft could be manufactured by one manufacturer and the control station could be manufactured by another). In addition, unmanned aircraft that operate beyond the radio-line-of-sight may use third-party communication links. As finalized, the remote identification requirements in this final rule apply to the operation and the design and production of unmanned aircraft. Unmanned aircraft producers are responsible for ensuring that the unmanned aircraft comply with the design and production requirements of this rule even when the unmanned aircraft uses control station equipment (such as a smart phone) or communication links manufactured by a different person. The unmanned aircraft producer must address how any dependencies on control station functionality are incorporated as part of the remote identification design and production requirements.

unmanned aircraft without remote identification for aeronautical research and other limited purposes.

Unmanned aircraft produced for operation in the airspace of the United States are subject to the production requirements of this rule. There are limited exceptions allowing the production of unmanned aircraft without remote identification, which include home-built unmanned aircraft and unmanned aircraft of the United States Government, amongst others.

A. Remote Identification Requirements

There are three ways to comply with the operational requirements for remote identification. The first way is to operate a standard remote identification unmanned aircraft that broadcasts identification, location, and performance information of the unmanned aircraft and control station. The second way to comply is by operating an unmanned aircraft with a remote identification broadcast module. The broadcast module, which broadcasts identification, location, and take-off information, may be a separate device that is attached to an unmanned aircraft, or a feature built into the aircraft. The third way to comply allows for the operation of unmanned aircraft without any remote identification equipment, where the UAS is operated at specific FAA-recognized identification areas. The requirements for all three of these paths to compliance are specified in this rule.

Except in accordance with the requirements of this rule, no unmanned aircraft can be produced for operation in the airspace of the United States after September 16, 2022, and no unmanned aircraft can be operated in the airspace of the United States after September 16, 2023.

1. Standard Remote Identification Unmanned Aircraft

Standard remote identification unmanned aircraft broadcast the remote identification message elements directly from the unmanned aircraft from takeoff to shutdown. The required message elements include: (1) a unique identifier to establish the identity of the unmanned aircraft; (2) an indication of the unmanned aircraft latitude, longitude, geometric altitude, and

velocity; (3) an indication of the control station latitude, longitude, and geometric altitude; (4) a time mark; and (5) an emergency status indication. Operators may choose whether to use the serial number of the unmanned aircraft or a session ID (e.g., an alternative form of identification that provides additional privacy to the operator) as the unique identifier. The required message elements for standard remote identification unmanned aircraft are discussed in section VIII.A of this preamble.

A person can operate a standard remote identification unmanned aircraft only if: (1) it has a serial number that is listed on an FAA-accepted declaration of compliance; (2) its remote identification equipment is functional and complies with the requirements of the rule from takeoff to shutdown; (3) its remote identification equipment and functionality have not been disabled; and (4) the Certificate of Aircraft Registration of the unmanned aircraft used in the operation must include the serial number of the unmanned aircraft, as per applicable requirements of parts 47 and 48, or the serial number of the unmanned aircraft must be provided to the FAA in a notice of identification pursuant to § 89.130 prior to the operation.

Persons operating a standard remote identification unmanned aircraft in the airspace of the United States must comply with the operational rules in subpart B of part 89 by September 16, 2023.

Operating requirements for standard remote identification unmanned aircraft are discussed in greater detail in section VII.C of this preamble.

2. Remote Identification Broadcast Modules

An unmanned aircraft can be equipped with a remote identification broadcast module that broadcasts message elements from takeoff to shutdown. The required message elements include: (1) the serial number of the broadcast module assigned by the producer; (2) an indication of the latitude, longitude, geometric altitude, and velocity of the unmanned aircraft; (3) an indication of the latitude, longitude, and geometric altitude of the unmanned aircraft takeoff location; and (4) a

time mark. The required message elements for remote identification broadcast modules are discussed in section IX of this preamble.

Persons can operate an unmanned aircraft equipped with a remote identification broadcast module only if: (1) the remote identification broadcast module meets the requirements of this rule; (2) the serial number of the remote identification broadcast module is listed on an FAA-accepted declaration of compliance; (3) the Certificate of Aircraft Registration of the unmanned aircraft used in the operation includes the serial number of the remote identification broadcast module, or the serial number of the unmanned aircraft must be provided to the FAA in a notice of identification pursuant to § 89.130 prior to the operation; (4) from takeoff to shutdown the remote identification broadcast module broadcasts the remote identification message elements from the unmanned aircraft; and (5) the person manipulating the flight controls of the unmanned aircraft system must be able to see the unmanned aircraft at all times throughout the operation.

A person operating an unmanned aircraft equipped with a remote identification broadcast module in the airspace of the United States must comply with the operational rules in subpart B of part 89 by September 16, 2023.

The operating requirements for remote identification broadcast modules are discussed in greater detail in section VII.D of this preamble.

3. Unmanned Aircraft without Remote Identification Equipment

This rule requires all unmanned aircraft operating in the airspace of the United States to have remote identification capabilities, except as described below.

Upon full implementation of this rule, most unmanned aircraft will have to be produced as standard remote identification unmanned aircraft. However, there will be some unmanned aircraft (e.g., home-built unmanned aircraft and existing unmanned aircraft produced prior to the date of compliance of the production requirements of this rule) that might not meet the requirements for standard remote identification unmanned aircraft.

Persons operating an unmanned aircraft without remote identification in the airspace of the United States must comply with the operational rules in subpart B of part 89 by September 16, 2023. Unless operating under an exception to the remote identification operating requirements, a person operating an unmanned aircraft without remote identification must always operate within visual line of sight[2] and within an FAA-recognized identification area.

An FAA-recognized identification area is a defined geographic area where persons can operate UAS without remote identification, provided they maintain visual line of sight. Persons eligible to request establishment of FAA-recognized identification areas include community-based organizations recognized by the Administrator and educational institutions including primary and secondary educational institutions, trade schools, colleges, and universities. The FAA will begin accepting applications for FAA-recognized identification areas on September 16, 2022. The FAA will maintain a list of FAA-recognized identification areas at https://www.faa.gov. FAA-recognized identification areas are discussed further in section XII of this preamble.

4. Prohibition against the Use of ADS-B Out and Transponders

This rule prohibits use of ADS-B Out and transponders for UAS operations under 14 CFR part 107 unless otherwise authorized by the FAA, and defines when ADS-B Out is appropriate for UAS operating under part 91. The FAA is concerned the potential proliferation of ADS-B Out transmitters on unmanned aircraft may negatively affect the safe operation of manned aircraft in the airspace of the United States. The projected numbers of unmanned aircraft operations have the potential to saturate available ADS-B frequencies, affecting ADS-B capabilities for manned aircraft and potentially blinding ADS-B ground receivers. Therefore, unmanned aircraft operators, with limited exceptions, are prohibited from using ADS-B Out or

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[2] Part 89 limits unmanned aircraft without remote identification and unmanned aircraft with remote identification broadcast modules to visual line of sight operations. Nothing in part 89 authorizes beyond visual line of sight (BVLOS) operations for any unmanned aircraft; such authority will spring from other FAA regulations.

transponders. The prohibition against the use of ADS-B Out and transponders is discussed in section XVII of this preamble.

Persons must comply with the ADS-B Out and transponder prohibition as of [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

5. Design and Production

Standard remote identification unmanned aircraft and remote identification broadcast modules must be designed and produced to meet the requirements of this rule. The FAA recognizes that UAS technology is continually evolving, making it necessary to harmonize new regulatory action with technological advancements. To promote that harmonization, the FAA is implementing performance-based requirements to describe the desired outcomes, goals, and results for remote identification without establishing a specific means or process for regulated entities to follow.

A person designing or producing a standard remote identification unmanned aircraft or broadcast module for operation in the United States must show that the unmanned aircraft or broadcast module meets the requirements of an FAA-accepted means of compliance. A means of compliance describes the methods by which the person complies with the performance-based requirements for remote identification.

Under this rule, anyone can create a means of compliance; however, the FAA must accept that means of compliance before it can be used for the design or production of any standard remote identification unmanned aircraft or remote identification broadcast module. A person seeking acceptance by the FAA of a means of compliance for standard remote identification unmanned aircraft or remote identification broadcast modules is required to submit the means of compliance to the FAA. The FAA reviews the means of compliance to determine if it meets the minimum performance requirements and includes appropriate testing and validation procedures in accordance with the rule. Specifically, the person must submit a detailed description of the means of compliance, a justification for how the means of compliance meets

the minimum performance requirements of the rule, and any substantiating material the person wishes the FAA to consider as part of the application. FAA-accepted consensus standards are one way, but not the only way, to show compliance with the performance requirements of this rule. Accordingly, the FAA encourages consensus standards bodies to develop means of compliance and submit them to the FAA for acceptance.[3]

The FAA indicates acceptance of a means of compliance by notifying the submitter of the acceptance of the proposed means of compliance. The FAA also expects to notify the public that it has accepted the means of compliance by including it on a list of accepted means of compliance at https://www.faa.gov. The FAA will not disclose commercially sensitive information from the means of compliance that has been marked as such. The FAA may disclose the non-proprietary broadcast specification and radio frequency spectrum so that sufficient information is available to develop receiving and processing equipment and software for the FAA, law enforcement, and members of the public.

See section XIII of this preamble for more information on means of compliance and FAA acceptance.

In addition, a person responsible for the production of standard remote identification unmanned aircraft (with limited exceptions) or remote identification broadcast modules is required to:

- Issue each unmanned aircraft or remote identification broadcast module a serial number that complies with the ANSI/CTA-2063-A serial number standard.
- Label the unmanned aircraft or remote identification broadcast module to indicate that it is remote identification compliant.

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[3] A means of compliance is not considered to be "FAA-accepted" until the means of compliance has been evaluated by the FAA, the submitter has been notified of acceptance, and the means of compliance has been published at https://www.faa.gov as available for use in meeting the requirements of part 89.

- Submit a declaration of compliance for acceptance by the FAA, declaring that the standard remote identification unmanned aircraft or remote identification broadcast module complies with the requirements of the rule.

A person producing a standard remote identification unmanned aircraft for operation in the airspace of the United States must comply with the requirements of subpart F of part 89 by September 16, 2022.

A person producing a remote identification broadcast module must comply with the requirements of subpart F of part 89 by [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

See the design and production requirements in section XIV of this preamble for more information about the production requirements for standard remote identification unmanned aircraft and remote identification broadcast modules, and the process for declarations of compliance.

B. Registration Requirements

The FAA proposed requiring all unmanned aircraft, including those used for limited recreational operations, to obtain a unique registration number. After reviewing comments and further consideration, the FAA decided not to adopt this requirement. Owners of small unmanned aircraft used in civil operations (including commercial operations), limited recreational operations,[4] or public aircraft operations, among others, continue to be eligible to register the unmanned aircraft under part 48 in one of two ways: (1) under an individual registration number issued to each unmanned aircraft; or (2) under a single registration number issued to an owner of multiple unmanned aircraft used exclusively for limited recreational operations.

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[4] The FAA is revising its regulations and guidance documents to delete references to "model aircraft." Consistent with the exception for limited recreational operations of unmanned aircraft in 49 U.S.C. 44809, the FAA now refers to recreational unmanned aircraft or limited recreational operations of UAS.

The FAA adopts the requirement tying remote identification requirements to registration requirements and the requirements to submit the unmanned aircraft's serial number and other information.

This rule also revises and adopts certain requirements originally established in the interim final rule on Registration and Marking Requirements for Small Unmanned Aircraft.[5] These requirements directly affect registration-related proposals made in the Remote Identification of Unmanned Aircraft Systems NPRM ("the NPRM") (84 FR 72438, Dec. 31, 2019). See section XV of this preamble for more information about registration requirements.

C. Elimination of the Network-Based Remote Identification Requirement

In the NPRM, the FAA proposed requiring standard remote identification UAS and limited remote identification UAS to transmit remote identification message elements through a network connection.[6] To comply with this requirement, UAS would have had to transmit the remote identification message elements through the Internet to a third-party service provider, referred to as a Remote ID UAS Service Supplier (USS). Remote ID USS would have collected and, as appropriate, disseminated the remote identification information through the Internet.

In response to the NPRM, the FAA received significant feedback about the network requirement identifying both public opposition to, and technical challenges with, implementing the network requirements. The FAA had not foreseen or accounted for many of these challenges when it proposed using the network solution and USS framework. After careful consideration of these challenges, informed by public comment, the FAA decided to eliminate the requirement in this rulemaking to transmit remote identification messages through an Internet connection to a Remote ID USS.

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[5] 80 FR 78593.

[6] As used in this rule, terms such as "network," "network-based requirement," "network solution," "network framework," and "network transmission" typically refer to the transmission of remote identification message elements through an Internet connection to a Remote ID USS, as proposed in the NPRM.

Without the requirement to transmit remote identification through the Internet, limited remote identification UAS, as proposed, would have no means to disseminate remote identification information. As a result, limited remote identification UAS as proposed in the NPRM are no longer a viable concept. Nonetheless, the FAA recognizes the need for the existing unmanned aircraft fleet to be able to comply with remote identification requirements. To meet that need, the FAA incorporates a modified regulatory framework in this rule under which persons can retrofit unmanned aircraft with remote identification broadcast modules.

The FAA's decision to eliminate the network-based remote identification requirement is discussed in greater detail in section VII.A of this preamble.

D. Summary of Benefits and Costs

This rule requires remote identification of unmanned aircraft to address safety, security, and law enforcement concerns regarding the further integration of these aircraft into the airspace of the United States. The remote identification framework promotes compliance by operators of unmanned aircraft by providing UAS-specific data, which may be used in tandem with new technologies and infrastructure to provide airspace awareness to the FAA, national security agencies, law enforcement entities, and other government officials which can use the data to discern compliant airspace users from those potentially posing a safety or security risk. In addition, as being finalized, the rule reduces obsolescence of the existing unmanned aircraft fleet.

This rule results in additional costs for persons responsible for the production of unmanned aircraft, owners and operators of registered unmanned aircraft, entities requesting the establishment of an FAA-recognized identification area, and the FAA. This rule provides cost savings for the FAA from a reduction in hours and associated costs expended investigating unmanned aircraft incidents.[7]

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[7] This analysis includes quantified savings to the FAA only. A variety of other entities involved with airport operations, facility and infrastructure security, and law enforcement would also save time and resources involved with unmanned aircraft identification and incident reporting, response, and investigation.

The analysis of this rule is based on the fleet forecast for small unmanned aircraft as published in the FAA Aerospace Forecast 2020-2040.[8] The FAA forecast includes base, low, and high scenarios. This analysis provides a range of net impacts from low to high based on these forecast scenarios. The FAA considers the primary estimate of net impacts of the rule to be the base scenario. For the primary estimate, over a 10-year period of analysis this rule would result in present net value costs of about $227.1 million at a three percent discount rate with annualized net costs of about $26.6 million. At a seven percent discount rate, the present value net costs are about $186.5 million with annualized net costs of $26.6 million.

The following table presents a summary of the primary estimates of the quantified costs and cost savings of this rule, as well as estimates for the low and high forecast scenarios. Additional details are provided in the Regulatory Evaluation section of this rule and in the Regulatory Impact Analysis available in the docket for this rulemaking.

Table 1: Costs and Savings of Final Rule ($Millions)*

Forecast Scenario	10 Year Present Value (3%)	Annualized (3%)	10 Year Present Value (7%)	Annualized (7%)
Base Scenario—Primary Estimate				
Costs	230.69	27.04	189.38	26.96
Cost Savings	(3.58)	(0.42)	(2.85)	(0.41)
Net Costs	227.11	26.62	186.53	26.56
Low Scenario				
Costs	217.08	25.45	178.60	25.43
Cost Savings	(3.47)	(0.41)	(2.77)	(0.39)
Net Costs	213.61	25.04	175.83	25.03
High Scenario				
Costs	250.18	29.33	204.90	29.17
Cost Savings	(3.74)	(0.44)	(2.98)	(0.42)
Net Costs	246.44	28.89	201.92	28.75

*Table notes: Columns may not sum to total due to rounding. Savings are shown in parenthesis to distinguish from costs. Estimates are provided at three and seven percent discount rates per Office of Management and Budget (OMB) guidance.

[8] FAA Aerospace Forecast Fiscal Years 2020-2040, available at *https://www.faa.gov/data_research/aviation/aerospace_forecasts/media/FY2020-40_FAA_Aerospace_Forecast.pdf.* The forecast provides a base (i.e., likely) with high (or optimistic) and low (or pessimistic) scenarios.

The final rule incorporates several important changes that reduce costs and provide additional flexibilities compared to the proposed rule. These include simplifying the approach to remote identification by requiring only broadcast transmission of data, and authorizing a remote identification broadcast module option that enables retrofitting of unmanned aircraft that do not meet the requirements for standard remote identification unmanned aircraft. These changes allow unmanned aircraft built without remote identification (e.g., existing unmanned aircraft fleet, home built unmanned aircraft) to be operated outside of FAA-recognized identification areas. These changes also eliminate the requirement for a person to connect the unmanned aircraft to the Internet. This shift allows unmanned aircraft with remote identification broadcast modules to operate in areas where the Internet is unavailable. As a result, the final rule reduces compliance costs compared to the proposed rule.

The net costs of the final rule have decreased by about 60 percent as compared to the proposed rule. The NPRM stated that the primary estimate over a 10-year period of analysis for the proposed rule would have resulted in net present value costs of about $582 million at a three percent discount rate with annualized net costs of about $68 million. At a seven percent discount rate, the net present value costs for the proposed rule were about $474 million with annualized net costs of $67 million.

The FAA expects this rule will result in several important benefits and enhancements to support safety and security in the airspace of the United States. Remote identification provides information that helps address existing challenges faced by the FAA, law enforcement entities, and national security agencies responsible for the safety and security of the airspace of the United States. As unmanned aircraft operations increase, so does the risk of unmanned aircraft being operated in close proximity to manned aircraft, or people and property on the ground, or in airspace unsuitable for these operations. Remote identification provides a means to identify these aircraft and locate the person who controls them (e.g., operators, pilots in command). It allows the FAA, law enforcement, and national security agencies to distinguish compliant airspace users

from those potentially posing a safety or security risk. It permits the FAA and law enforcement to conduct oversight of persons operating UAS and to determine whether compliance actions, enforcement, educational, training, or other types of actions are needed to mitigate safety or security risks and foster increased compliance with regulations. Remote identification data also informs the public and users of the airspace of the United States of the local operations that are being conducted at any given moment.

II. Authority for this Rulemaking

The FAA's authority to issue rules on aviation safety is found in Title 49 of the United States Code (49 U.S.C.). Subtitle I, section 106 describes the authority of the FAA Administrator. Subtitle VII, Aviation Programs, describes the scope of the Agency's authority.

This rulemaking is promulgated pursuant to 49 U.S.C. 40103(b)(1) and (2), which direct the FAA to issue regulations: (1) to ensure the safety of aircraft and the efficient use of airspace; and (2) to govern the flight of aircraft for purposes of navigating, protecting and identifying aircraft, and protecting individuals and property on the ground. In addition, 49 U.S.C. 44701(a)(5) charges the FAA with promoting safe flight of civil aircraft by prescribing regulations the FAA finds necessary for safety in air commerce and national security.

Section 2202 of Pub. L. 114-190 requires the Administrator to convene industry stakeholders to facilitate the development of consensus standards for remotely identifying operators and owners of UAS and associated unmanned aircraft and to issue regulations or guidance based on any standards developed.

The Administrator has authority under 49 U.S.C. 44805 to establish a process for, among other things, accepting risk-based consensus safety standards related to the design and production of small UAS. Under 49 U.S.C. 44805(b)(7), one of the considerations the Administrator must take into account prior to accepting such standards is any consensus

identification standard regarding remote identification of unmanned aircraft developed pursuant to section 2202 of Pub. L. 114-190.

In addition, 49 U.S.C. 44809(f) provides that the Administrator is not prohibited from promulgating rules generally applicable to unmanned aircraft, including those UAS eligible for the exception for limited recreational operations of unmanned aircraft. Among other things, this authority extends to rules relating to the registration and marking of unmanned aircraft and the standards for remotely identifying owners and operators of UAS and associated unmanned aircraft.

The FAA has authority to regulate registration of aircraft under 49 U.S.C. 44101–44106 and 44110–44113, which require aircraft to be registered as a condition of operation, and to establish the registration requirements and registration processes.

This rulemaking is also promulgated under the authority described in 49 U.S.C. 106(f), which establishes the authority of the Administrator to promulgate regulations and rules, and 49 U.S.C. 40101(d), which authorizes the FAA to consider in the public interest, among other things, the enhancement of safety and security as the highest priorities in air commerce, the regulation of civil and military operations in the interest of safety and efficiency, and assistance to law enforcement agencies in the enforcement of laws related to regulation of controlled substances, to the extent consistent with aviation safety.

Finally, this rulemaking is also being issued consistent with DOT's regulatory policy which requires that DOT regulations "be technologically neutral, and, to the extent feasible, they should specify performance objectives, rather than prescribing specific conduct that regulated entities must adopt."[9]

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[9] 49 CFR 5.5(e).

III. Background

The rapid proliferation of unmanned aircraft has created significant opportunities and challenges for their integration into the airspace of the United States. The relatively low cost of highly capable UAS technology has allowed for hundreds of thousands of new operators to enter the aviation community.

The complexities surrounding the full integration of UAS into the airspace of the United States have led the FAA to engage in a phased, incremental, and risk-based approach to rulemaking based on the statutory authorities delegated to the Agency. On December 16, 2015, the Administrator and Secretary jointly published an interim final rule in the *Federal Register* titled Registration and Marking Requirements for Small Unmanned Aircraft ("Registration Rule"),[10] which provides for a web-based aircraft registration process for small unmanned aircraft in 14 CFR part 48 that serves as an alternative to the registration requirements for aircraft established in 14 CFR part 47. The Registration Rule imposes marking requirements on small unmanned aircraft registered under part 48, according to which the small unmanned aircraft must display a unique identifier in a manner that is visible upon inspection. The unique identifier could be the registration number issued to an individual or to the small unmanned aircraft by the FAA Registry or the small unmanned aircraft's serial number if authorized by the Administrator and provided with the application for the certificate of aircraft registration.

On June 28, 2016, the FAA and DOT jointly published the final rule for Operation and Certification of Small Unmanned Aircraft Systems ("the 2016 Rule") in the *Federal Register*.[11] This was an important step towards the integration of civil small UAS operations (for aircraft weighing less than 55 pounds) into the airspace of the United States. The 2016 Rule set the initial operational structure and certain restrictions to allow routine civil operations of small UAS in the

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[10] 80 FR 78594.

[11] 81 FR 42064.

airspace of the United States in a safe manner. Prior to the 2016 Rule, the FAA authorized commercial UAS operations, including but not limited to real estate photography, precision agriculture, and infrastructure inspection, under section 333 of Pub. L. 112-95. Over 5,500 operators received this authorization. The FAA also issued over 900 Certificates of Waiver or Authorization (COA), allowing Federal, State, and local governments, law enforcement agencies, and public universities to perform numerous tasks with UAS, including but not limited to search-and-rescue, border patrol, and research activities. The 2016 Rule allows certain operations of small UAS to be conducted in the airspace of the United States without an airworthiness certificate, exemption, or COA.

The 2016 Rule also imposed certain restrictions on small UAS operations. The restrictions included a prohibition on nighttime operations, limitations on operations conducted during civil twilight, restrictions on operations over people, a requirement for all operations to be conducted within visual line of sight, and other operational, airspace, and pilot certification requirements. Since the 2016 Rule took effect on August 29, 2016, most low-risk small UAS operations that were previously authorized on a case-by-case basis under section 333 of Pub. L. 112-95 became routine operations. With some exceptions,[12] these operations are now permitted without further interaction with the FAA if they comply with the requirements of part 107. Publishing part 107 was the first significant regulatory step to enable lower risk, less complex UAS operations in the airspace of the United States.

Part 107 opened the airspace of the United States to the vast majority of routine small UAS operations, allowing flight within visual line of sight while maintaining flexibility to accommodate future technological innovations. Part 107 allows individuals to request waivers from certain provisions, including those prohibiting operations over people and beyond visual

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[12] *See, e.g.,* 14 CFR 107.41 (requiring prior FAA authorization for small unmanned aircraft operation in certain types of airspace).

line of sight. Petitions for waivers from the provisions of part 107 must demonstrate that the petitioner has provided sufficient mitigations to safely conduct the requested operation.

On October 5, 2018, Congress enacted Pub. L. 115-254, also known as the FAA Reauthorization Act of 2018. The FAA Reauthorization Act of 2018 amended part A of subtitle VII of title 49, United States Code by inserting a new chapter 448 titled Unmanned Aircraft Systems and incorporating additional authorities and mandates to support the further integration of UAS into the airspace of the United States, including several provisions that specifically deal with the need for remote identification of UAS. Section 376 of the FAA Reauthorization Act of 2018 requires the FAA to perform testing of remote identification technology, and to assess the use of remote identification for the development of unmanned aircraft systems traffic management (UTM).

Additional congressional action supports the implementation of remote identification requirements for most UAS. Section 349 of the FAA Reauthorization Act of 2018 goes so far as to indicate that the Administrator may promulgate rules requiring remote identification of UAS and apply those rules to UAS used for limited recreational operations.[13] The provision denotes Congress' acknowledgment that remote identification is an essential part of the UAS regulatory framework.

On February 13, 2019, the FAA published three rulemaking documents in the *Federal Register* as part of the next phase of integrating small UAS into the airspace of the United States. The first of such documents was an interim final rule titled "External Marking Requirement for Small Unmanned Aircraft,"[14] in which the FAA required small unmanned aircraft owners to display the registration number assigned by the FAA on an external surface of the aircraft. The second rulemaking document was a notice of proposed rulemaking titled "Operation of Small

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[13] See 49 U.S.C. 44809.

[14] 84 FR 3669.

Unmanned Aircraft Systems Over People,"[15] in which the FAA proposed to allow operations of small unmanned aircraft over people in certain conditions and operations of small UAS at night without obtaining a waiver. The third rulemaking document was an advance notice of proposed rulemaking titled "Safe and Secure Operations of Small Unmanned Aircraft Systems,"[16] in which the FAA sought information from the public on whether, and under which circumstances, the FAA should promulgate new rules to require stand-off distances, additional operating and performance restrictions, the use of UTM, additional payload restrictions, and whether the Agency should prescribe UAS design requirements and require that unmanned aircraft be equipped with critical safety systems.

On December 31, 2019, the FAA published the Remote Identification of Unmanned Aircraft Systems NPRM. The FAA received approximately 53,000 comments on the NPRM. A significant amount of the comments were submitted by individuals, many of whom identified as recreational flyers. In addition, the FAA received numerous comments from UAS manufacturers, other aviation manufacturers, organizations representing UAS interest groups, organizations representing various sectors of manned aviation, State and local governments, news media organizations, academia, and others.

IV. Remote Identification of Unmanned Aircraft

A. Clarification of Use of the Term Unmanned Aircraft in this Rule

As a result of the comments concerning the use of the term unmanned aircraft system (UAS), the FAA clarifies that the term "unmanned aircraft" is used when referring to the aircraft, and UAS is used when referring to the entire system, including the control station.

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[15] 84 FR 3856.

[16] 84 FR 3732.

The FAA acknowledges that UAS may have components produced by different manufacturers (e.g., an unmanned aircraft could be manufactured by one manufacturer and the control station could be manufactured by another). In addition, unmanned aircraft that operate beyond the range of the radio signal being transmitted from the control station may use third-party communication links, such as the cellular network. As finalized, the remote identification requirements in this rule apply to the operation, and the design and production of unmanned aircraft. Unmanned aircraft producers are responsible for ensuring that the unmanned aircraft comply with the design and production requirements of this rule even when the unmanned aircraft uses control station equipment (such as a smart phone) or communication links manufactured by a different person. The unmanned aircraft producer must address how any dependencies on control station functionality are incorporated as part of the remote identification design and production requirements.

B. Purpose for the Remote Identification of Unmanned Aircraft

UAS are fundamentally changing aviation and the FAA is committed to working to fully integrate them into the airspace of the United States. The next step in that integration is enabling unmanned aircraft operations over people and at night. Remote identification of unmanned aircraft is a critical element to enable those operations that addresses safety and security concerns.

Remote identification is the capability of an unmanned aircraft in flight to provide identification, location, and performance information that people on the ground and other airspace users can receive. In its most basic form, remote identification can be described as an electronic identification or a "digital license plate" for UAS.

Remote identification provides information that helps address existing challenges of the FAA, law enforcement entities, and national security agencies responsible for the safety and security of the airspace of the United States. As a wider variety of UAS operations such as operations over people are made available, the risk of unmanned aircraft being operated in an

unsafe manner, such as in close proximity to people and property on the ground, is increased. Remote identification provides a means to identify these aircraft and locate the person who controls them (e.g., operators, pilots in command). It allows the FAA, law enforcement, and national security agencies to distinguish compliant airspace users from those potentially posing a safety or security risk. It permits the FAA and law enforcement to conduct oversight of persons operating unmanned aircraft and to determine whether compliance actions, enforcement, educational, training, or other types of actions are needed to mitigate safety or security risks and foster increased compliance with regulations.

The requirements for the identification of manned and unmanned aircraft form an integral part of the FAA's regulatory framework. Prior to this rule, the requirements included aircraft registration and marking and electronic identification using transponders and Automatic Dependent Surveillance-Broadcast (ADS-B). This rule creates a new regulation, 14 CFR part 89, which establishes the remote identification requirements for unmanned aircraft. These requirements are particularly important for unmanned aircraft because the person operating the unmanned aircraft is not onboard the aircraft, creating challenges for associating the aircraft with its operator. In addition, the small size of many unmanned aircraft means the registration marking is only visible upon close inspection, making visual identification of unmanned aircraft in flight difficult or impossible.

As discussed in the NPRM, the remote identification framework is necessary to enable expanded UAS operations and further integration. This final rule scales that framework to support the next steps in that integration: operations over people and operations at night. Though the NPRM discussed remote identification as a building block for UAS Traffic Management (UTM), the FAA has determined that, at this time, this rule will only finalize the broadcast-based remote identification requirements. See section VII.A of this preamble for a discussion on the FAA's decision to eliminate network-based remote identification requirements at this time. The

broadcast-based approach of this rule contains the minimum requirements necessary to allow for remote identification of unmanned aircraft under the current operational rules.

C. Public Comments and FAA Response

1. General Support for Remote Identification

Comments: Many commenters expressed general support for the NPRM, including the Helicopter Association International, the League of California Cities, and, commenting jointly, the Michigan Department of Transportation Office of Aeronautics, Michigan Aeronautics Commission, and Michigan Unmanned Aircraft Systems Task Force. Most commenters in support of the rule cited improvements to safety and privacy. Commenters expressed that with UAS becoming increasingly widespread, the rule would make identification easier, increase the safety of airspace, particularly for manned aircraft operating at the same altitudes as unmanned aircraft, and protect citizens' privacy.[17]

The International Association of Amusement Parks and Attractions supported the rule, stating that the rule would enhance situational awareness and foster accountability of the operator and improved knowledge for the FAA, law enforcement, and operators of certain facilities identified by Congress in section 2209 of the FAA Extension, Safety and Security Act of 2016.[18] The Edison Electric Institute, American Public Power Association, and National Rural Electric Association, commenting jointly, expressed support for the rule and for FAA's real-time access to UAS location information, particularly over energy infrastructure. Various institutions of higher education expressed support for remote identification and mentioned it would assist

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[17] Though remote identification potentially allows for greater ability of law enforcement to locate the person controlling an unmanned aircraft, this rule has not been promulgated for the purpose of addressing concerns about unmanned aircraft that violate privacy laws.

[18] Section 2209 requires "the Secretary of Transportation to establish a process to allow applicants to petition the Administrator of the Federal Aviation Administration to prohibit or restrict the operation of an unmanned aircraft in close proximity to a fixed site facility." The FAA Extension, Safety and Security Act of 2016, Pub. L. 114-190, sec. 2209, 130 Stat. 615, 633-635 (2016).

law enforcement agencies affiliated with said institutions to better identify UAS operators, particularly where the UAS poses risk or nuisance to bystanders, facilities, or other aircraft.

The National Transportation Safety Board stated it had no technical objections provided the FAA can ensure that remote identification functions do not interfere with aviation safety.

FAA Response: The FAA acknowledges the support of commenters and finalizes this rule and related policies to implement a remote identification framework that provides near-real time information regarding unmanned aircraft operations and increases situational awareness of unmanned aircraft to the public, operators of other aircraft, law enforcement and security officials, and other related entities.

2. General Opposition to Remote Identification

The FAA received a multitude of comments opposing remote identification. Many of the commenters opposed the concept, as a whole, while others expressed opposition to specific aspects, concepts, or proposed in the NPRM.

Comments: Among the comments expressing general disagreement with the proposed rule was one of the two form letters written and submitted by the First Person View Freedom Coalition (FPVFC) and 90 of its members. The commenters argued that the proposed rule would have many negative effects, including destroying the hobby of building and flying recreational remote controlled aircraft, making the sport of drone racing illegal, ending the "multi-million [dollar] cottage industry around home built drones," outlawing "acrobatic drone videography," imposing costs on both hobbyists and the drone industry by making current fleets obsolete, and making criminals of hobbyists. These commenters asked the FAA to rewrite the proposed rule with input from the FPVFC and Academy of Model Aeronautics (AMA). Similar concerns were common among many other commenters who opposed the NPRM in general terms. Instead of finalizing the rule as proposed, a member of the executive board for the AMA suggested the FAA adopt a "technology agnostic" approach to remote identification, so a variety of technical solutions could be used to meet the remote identification needs.

The most common objections to the proposed rule were that it would impose burdens and costs that would make it difficult or impossible for hobbyists to fly model aircraft; that it would impose an unnecessary financial burden on UAS or model aircraft owners; and that it would harm or end the recreational UAS hobby. Commenters noted that it would be very difficult to upgrade many existing UAS because of the burden of carrying and powering new equipment such as navigation receivers and remote identification transmitters. They argued that this would reduce available flight time and could affect safety of operations if the additional weight is excessive. The FPVFC form letter and many other comments included similar objections.

Many commenters, including 33 persons who submitted a form letter addressed as the "Traditional Hobbyist Form Letter Campaign," argued that the proposed rule would not achieve its objectives of providing safety for the airspace of the United States and protecting national security. Many of these commenters questioned whether the FAA provided an adequate justification for the proposed rule, with many commenters stating the FAA has not demonstrated that UAS are dangerous. The commenters questioned the need for the rule, often stating that existing regulations and standards are sufficient for protecting public safety. They mentioned that historically UAS have not been dangerous and have not caused fatalities and indicated the FAA should concentrate on enforcing current rules. A related and separate statement repeatedly made by commenters was that model aircraft are not dangerous. These comments often distinguish between model aircraft and other UAS, stating that model aircraft are not dangerous because they must remain in the pilot's visual line of sight to stay airborne due to lack of navigation equipment, flight planning capability, flight stabilization, first person view capability, or automation that is common on newer UAS. Some commenters saw the proposed rule as an attempt to privatize the airspace in which UAS and model aircraft operate.

Commenters indicated remote identification would have negative effects. Many stated the proposed rule would harm innovation in the UAS industry. Others believed it would harm the educational and research potential of UAS or model aviation. Commenters pointed to model

aviation driving young people's interest in science, technology, engineering, and math fields and aviation; and providing educational benefits that relate to these fields. Those commenters believed the rule would contribute to exacerbating a national shortage of manned aircraft pilots.

Many commenters believed the rule would be unenforceable. A related argument was that only lawful flyers would follow the rules and that the rule would do nothing to change the behavior of bad actors. Some expressed concerns for widespread noncompliance with the rule.

A significant number of commenters opposed any regulation of UAS used for recreational operations.

A number of commenters believed remote identification requirements for UAS are stricter than ADS-B Out or transponder requirements for manned aircraft. Several commenters suggested permitting UAS operations without remote identification in uncontrolled airspace and away from airports, similar to the requirements for ADS-B Out that only apply in certain airspace. Commenters also stated that manned aircraft should be required to broadcast ADS-B Out in all airspace if all UAS are required to transmit remote identification. Several commenters also noted that manned aircraft were offered grants and rebates to help cover the cost of ADS-B implementation and had over 10 years to equip for ADS-B Out compared to the shorter implementation time proposed for remote identification.

FAA Response: The FAA acknowledges the significant number of comments opposing the proposed regulation and related policies. After further consideration of public comments, the FAA has modified some of the remote identification policies in the final rule, as further discussed throughout this preamble, to reduce the burdens on unmanned aircraft operators and producers while maintaining the necessary requirements to address the safety and security needs of the FAA, law enforcement, and national security agencies. The FAA does not agree with commenters who believed remote identification will harm innovation in the UAS industry. On the contrary, the Agency believes that this performance-based regulation provides opportunities for innovation and growth of the UAS industry by addressing the security concerns associated

with unmanned aircraft flight at night and over people. In addition, the FAA does not agree that the remote identification requirements are stricter than ADS-B Out requirements. Remote identification has fewer technical requirements compared to ADS-B, and this rule provides accommodations for unmanned aircraft operations without remote identification.

The FAA does not agree that the requirements of this rule are unenforceable. In fact, the enforcement mechanism for this rule will in many respects parallel existing regulatory compliance activities for manned aviation. The Agency intends to meet its statutory and regulatory compliance and enforcement responsibilities by following a documented compliance and enforcement program that includes legal enforcement action, including civil penalties and certificate actions, as appropriate, to address violations and help deter future violations.

Many commenters opposed remote identification because they believed it would impact the recreational UAS community. The remote identification requirements apply to unmanned aircraft operating in the airspace of the United States irrespective of what the unmanned aircraft are being used for. However, the FAA has incorporated additional flexibilities into this rule to facilitate compliance with the remote identification requirements. For example, an operator of an unmanned aircraft without remote identification can now retrofit the unmanned aircraft with a remote identification broadcast module to identify remotely. See section VII.D of this preamble for further discussion of remote identification broadcast modules.

The Agency has also eliminated the requirement to transmit remote identification message elements through the Internet to a Remote ID USS, which will decrease costs to operators by eliminating the potential for subscription fees. See section VII.A of this preamble for further discussion on the elimination of the limited remote identification UAS concept. The revised rule also increases the availability of FAA-recognized identification areas where operations may occur without remote identification equipment. See section XII of this preamble for further discussion on FAA-recognized identification areas. The FAA also revised the

definition of amateur-built UAS as discussed in section V.D of this preamble. The term is now addressed in this rule as home-built unmanned aircraft.

3. Alternatives proposed by commenters

Many commenters, including the Academy of Model Aeronautics, AirMap, American Farm Bureau Federation, the Experimental Aircraft Association, Flite Test, Kittyhawk, and the Small UAV Coalition noted that the best path to widespread compliance is a simple, affordable solution. They recommended an application-based interface that would permit a UAS operator to self-declare an operational area and time either at the beginning, or in advance of, operations in areas where Internet service might not be available, similar to current LAANC implementations. Some commenters suggested either a smart phone application or phone-in option where UAS operators could reserve a small block of airspace so other non-participating UAS could voluntarily re-route around that operations area.

The Academy of Model Aeronautics recommended providing a path to compliance using ground-based or application-based remote identification for the pilot in command rather than specific equipment mandates applicable to manufacturers. For non-autonomous UAS which require continuous pilot input and visual line of sight (e.g., no programmable waypoints or other automation), the Charles River Radio Controllers also recommended a pre-flight registration via the Internet where operators would indicate their destination, flight parameters, and time of operation. Streamline Designs suggested permitting UAS that self-report location to operate in rural locations.

Wing Aviation suggested revising limited remote identification UAS to permit recreational operations within VLOS for UAS that are not highly automated and not available for sale to third parties, provided that operators declare their operational intent to a Remote ID USS. The intent information would include the flight area, maximum height AGL, earliest and latest operations times, and the actual or expected location of the ground control station, while also requiring the operator to share actual control station location if the Internet is available. SenseFly

also supported uploading a flight plan and stated that this type of identification would give adequate information, especially for a short-range flight, such as those limited to a 400-foot range. The U.S. Chamber of Commerce Technology Engagement Center recommended permitting remote identification UAS to continue to operate without a persistent connection to a Remote ID USS if operators declare their identifier and flight intent to provide situation awareness for other airspace users.

Kittyhawk stated that network-based solutions are the most agile, scalable, and information-rich, but also recommended providing a variety of options to better achieve remote identification compliance. They proposed a three-tier solution that would permit volume-based reservations without requiring network or broadcast remote identification information for UAS operations in VLOS below 200 feet in Class G airspace and 100 feet in controlled airspace, as well as UAS operations within VLOS below 400 feet with volume-based reservations and transmission of remote identification information by either broadcast or network.

One commenter suggested permitting the installation of Broadcom chips in UAS so they could be tracked similar to cellular phones. One commenter suggested the FAA supply RFID tags to track each UAS for a fee upon completion of their UAS knowledge test. Several commenters, including the American Property Casualty Insurance Association, suggested remote identification data could be stored locally and uploaded after flight in areas with no Internet coverage. The New Hampshire Department of Transportation assumed that many retrofit UAS would become limited remote identification UAS and recommended permitting those UAS to operate when the Internet is not available if equipped with an anti-collision beacon that is visible for at least 3 statute miles to increase conspicuity for manned aircraft.

FAA Response: The FAA considered the alternative approaches proposed by commenters and assessed whether they met the needs of the FAA, law enforcement, and national security agencies to ensure the safety and efficiency of the airspace of the United States sufficient to enable unmanned aircraft to fly over people and at night. The Agency agrees with commenters

that a retrofit option could enable operators to meet the remote identification requirements of this rule. Therefore, the FAA adopts the concept in this rule by incorporating operating requirements, discussed in section VII.D of this preamble, and production requirements, discussed in section XIV.E.3 of this preamble, to permit the production and use of remote identification broadcast modules. A person may now equip an unmanned aircraft without remote identification with a remote identification broadcast module to enable the unmanned aircraft to identify remotely.

At this time, the FAA has determined that the other options proposed by commenters do not meet the needs of the Agency or are outside the scope of this rule. For example, the volume-based reservation proposal from Kittyhawk would affect airspace access and is outside the scope of identification. The FAA declines to require the installation of Broadcom chips as suggested by one commenter because the FAA is committed to performance-based requirements that do not require using a specific manufacturer's equipment. The recommendation to require unmanned aircraft to be equipped with anti-collision lighting when not transmitting remote identification information is unacceptable because it does not provide information about the identity of the unmanned aircraft or the control station location. The FAA also notes that providing flight intent information as a means to satisfy the remote identification requirements would not ensure that flight information is available in areas where there is no Internet connectivity. However, the remote identification broadcast requirements in this rule ensure that remote identification information is available even in areas where the Internet may not be available.

V. Terms Used in this Rule

The NPRM proposed to define a number of terms to facilitate the implementation of the remote identification of unmanned aircraft. In part 1, definitions and abbreviations, the FAA proposed to add definitions of unmanned aircraft system and visual line of sight to § 1.1. The FAA also proposed several definitions to be included in § 89.1, including the definitions for broadcast, amateur-built unmanned aircraft system, and Remote ID USS.

A. Definition of Unmanned Aircraft System

1. Discussion of the Final Rule

The FAA proposed that the term *unmanned aircraft system (UAS)* means an unmanned aircraft and its associated elements (including communication links and the components that control the unmanned aircraft) that are required for the safe and efficient operation of the unmanned aircraft in the airspace of the United States. The FAA adopts the term "unmanned aircraft system" as proposed.

2. Public Comments and FAA Response

Comments: Many commenters suggested that the definition be changed for a variety of reasons including a need to distinguish between various categories of UAS, particularly to distinguish between drones, quadcopters, and remote control model aircraft. Commenters raised issues such as the interchangeable nature of home-built kits and models with interchangeable parts. Commenters also cited a lack of clarity regarding when the communication links are considered part of the UAS. In addition, some commenters stated the definition of UAS was not detailed enough and recommended it be amended to list the specific components that are covered.

FAA Response: Congress established the definition of unmanned aircraft system in 49 U.S.C. 44801(12). Therefore, the FAA adopts the definition of unmanned aircraft system as proposed. The FAA also considers that any kit containing all the parts and instructions necessary to assemble a UAS would meet this definition. As further explained in section XIV.B.2 of this preamble, producers of complete kits offered for sale are subject to the production requirements of this rule.

B. Definition of Visual Line of Sight

1. Discussion of the Final Rule

The FAA proposed that the term *visual line of sight* means the ability of a person manipulating the flight controls of the unmanned aircraft or a visual observer (if one is used) to see the unmanned aircraft throughout the entire flight with vision that is unaided by any device other than corrective lenses. The FAA recognized that this definition is consistent with how "visual line of sight" is currently used in part 107. The term is specifically described in § 107.31(a). The FAA proposed that because visual line of sight will now be used in multiple parts, providing a definition in § 1.1 would ensure that the term is used consistently throughout all FAA regulations. To account for the use of the term in proposed part 89 and the potential use of the term in other parts of 14 CFR, the FAA proposed to include a slightly modified version of the description used in part 107.

The FAA will not be adopting the definition in this rule because the concept may apply differently to various persons and conditions depending upon the type of operation. In addition, future rules, such as rules providing for routine unmanned aircraft BVLOS operations, may need to describe visual line of sight in a different manner or context in order to establish the difference between VLOS and BVLOS operations.

2. Public Comments and FAA Response

Comments: An individual commenter noted that the maximum distance one can operate under visual line of sight varies based on several factors such as the size and speed of the aircraft, terrain, and weather.

FAA Response: As noted, the FAA has determined not to adopt a definition for "visual line of sight" in this rule. The FAA recognizes that the concept of visual line of sight allows for variation in the distance to which an unmanned aircraft may fly and still be within visual line of

sight of the person manipulating the flight controls of the UAS or the visual observer. The FAA believes this is appropriate given the performance-based nature of current UAS regulations.

C. Definition of Broadcast

The FAA proposed to define *broadcast* in part 89 to mean "to send information from an unmanned aircraft using radio frequency spectrum." The definition was necessary to distinguish the concept from the transmission of remote identification information through the Internet to a Remote ID USS. As explained in section VII.A of this preamble, the Agency has determined there is no longer a need to draw a difference between the terms "broadcast" and "transmission" because the FAA is eliminating the network framework and focusing on a broadcast-only solution for the time being. Therefore, the FAA will not be adopting the definition in this rule.

D. Definition of Home-Built Unmanned Aircraft

1. Discussion of the Final Rule

The FAA proposed that *amateur-built unmanned aircraft system* be defined in part 89 as "an unmanned aircraft system, the major portion of which has been fabricated and assembled by a person who undertook the construction project solely for their own education or recreation." Under this proposal, the person building the amateur-built UAS would have been required to fabricate and assemble at least 50 percent of the UAS. After reviewing comments and further consideration, the FAA relabeled this definition as *home-built unmanned aircraft* and eliminated the fabrication and major portion requirements for the reasons explained in the responses to comments below. Accordingly, this rule finalizes the definition of home-built unmanned aircraft as an unmanned aircraft that an individual built solely for education or recreation.

This rule adopts the term home-built unmanned aircraft as opposed to home-built UAS to reflect the changes discussed in section IV.A of this preamble.

2. Public Comments and FAA Response

i. Fabrication and Assembly

Comments: The FAA received numerous comments arguing that the proposed definition of amateur-built unmanned aircraft system failed to account for common ways that amateur builders of unmanned aircraft put together UAS. These commenters noted that it is not common practice for builders of amateur unmanned aircraft to fabricate UAS components and that UAS are often assembled by hobbyists from a variety of different levels of kits or prefabricated components. Commenters also pointed out that many typical components of home-built UAS are electrical and difficult for the average hobbyist to fabricate on his or her own. Embry-Riddle Aeronautical University – Prescott Campus mentioned that its students assemble unmanned aircraft from parts purchased online but do not fabricate the parts that are necessary for the assembly of an unmanned aircraft. They noted that meeting the production requirements of the proposed rule would be overly burdensome for students.

Many commenters also requested a revised definition for amateur-built UAS that would account for changes to significant parts of a design of a UAS.

Many commenters took issue with the "major portion" (fabricating and assembling at least 50 percent or more of the UAS) requirement of the proposed definition for amateur-built UAS. The Small UAV Coalition believed manufacturer performance requirements should not apply to unmanned aircraft built for recreational operations or personal use. They believed these unmanned aircraft should not be defined based on what they perceived as an arbitrary percentage threshold, for parts or ambiguous "fabrication assessments." The Berks County Aero Modelers & Lehigh Valley Radio Control Society asserted the "51 percent rule for amateur build models" was not practical and agreed with the UAS Identification and Tracking Aviation Rulemaking Committee recommendations to exempt amateur-built, non-autonomous model aircraft from the remote identification requirements.

FAA Response: The FAA agrees with these commenters and has eliminated the major portion requirement from the definition of home-built unmanned aircraft.

Comments: Some commenters encouraged the FAA to replace the amateur-built definition with terms commonly used in the recreational hobby industry such as "bind and fly" or "ready to fly." Brands Hobby provided detailed descriptions of five levels of "manufactured" model aircraft in use today and noted concerns that the definition should include an "almost ready to fly" concept for amateur built aircraft. The Flite Test Community Association commented the definition would not accommodate the diverse types of products and kits in the model aviation community and suggested the FAA expand the definition of amateur-built UAS or allow the amateur-built community to comply with the rule through either an app-based solution or by installing a "compliant standalone device."

FAA Response: The FAA agrees that given the unique characteristics of UAS, the definition of home-built unmanned aircraft should cover the wide range of ways hobbyists build UAS. The FAA also believes that home-builders should have a method for remotely identifying so they can operate outside of FAA-recognized identification areas. The FAA has revised this rule to allow home-built unmanned aircraft to equip with remote identification broadcast modules to identify remotely. Section VII.D of this preamble discusses the remote identification broadcast modules in greater detail.

Comments: A few commenters proposed to expand the definition of amateur-built UAS to all incomplete UAS, including "scratch built from plans," models built from parts, or models built from kits of subassemblies and pieces that lack radio control receiver electronics. One commenter proposed focusing on intended use and asked the FAA to use the following definition: "any UAS that requires some final assembly before flight that requires continual input from the operator throughout the entire flight from launch to recovery." The New Hampshire Department of Transportation mentioned that the definition of "amateur built" UAS should be broadened to include UAS built entirely from pre-fabricated parts, including parts such as

electronics that cannot be fabricated. They also warned of compliance issues when operators replace a part for a UAS that they originally assembled from a kit containing 100 percent of the parts necessary to assemble a complete and functional UAS. The Academy of Model Aeronautics recommended the definition of amateur-built UAS should include UAS with parts purchased and assembled by an individual. In their view, there is no verifiable increase in safety risk for aircraft with less than 50 percent fabrication and construction by the builder and the rule should eliminate or greatly reduce the required percentage of self-manufactured components.

FAA Response: The FAA agrees with commenters that unmanned aircraft are not built by hobbyists with the same degrees of fabrication as amateur-built manned aircraft. This rule removes the major portion requirement; the definition now includes any unmanned aircraft that an individual built solely for education or recreation. This definition would include any level of assembly of the unmanned aircraft so long as that assembly was done solely for education or recreation of the individual building the UAS. The FAA considers that the individual constructing the home-built unmanned aircraft, even if through assembly alone, is not responsible for meeting the production requirements of the final rule. A hobbyist assembling an unmanned aircraft from a complete kit that contains all the parts and instructions to assemble an unmanned aircraft would not be responsible for meeting the production requirements of this rule. However, the company that produced that complete kit would be required to meet the production requirements. As discussed in section VII of this preamble, persons operating these unmanned aircraft continue to be subject to the operating rules of part 89, so a home-built unmanned aircraft without remote identification can only be operated in an FAA-recognized identification area, unless it can identify remotely in accordance with this rule (e.g., by equipping the home-built unmanned aircraft with a remote identification broadcast module).

To distinguish this type of unmanned aircraft from its manned aircraft counterpart, this rule adopts the definition as *home-built unmanned aircraft* rather than as amateur-built unmanned aircraft system. As explained in section IV.A of this preamble, the remote

identification requirements apply to the operation, and the design and production of unmanned aircraft. Therefore, this adopted definition is specific to unmanned aircraft, not the entire UAS.

ii. Education or Recreation

Comments: Commenters generally supported the requirement that amateur-built UAS be produced for educational or recreational purposes only. One commenter felt the term "amateur-built" should be replaced with the term "STEM built." This commenter felt the change in terminology would establish a better mindset for the extensive revisions needed in the proposed rule to address the needs of the remote-controlled aviation community. Some commenters suggested that amateur-built be defined as UAS restricted to non-commercial use or with no flights over people or with limited weight. Several commenters felt the FAA should define "amateur-built UAS" based upon restricted operation such as limiting to recreational or educational flights with "non-autonomous" flight control, flights within line of sight, and flights restricted to uncontrolled airspace or requiring Low Altitude Authorization and Notification Capability (LAANC) approval for controlled airspace.

FAA Response: The FAA adopts the requirement that the unmanned aircraft be built for the education or recreation of the builder, as proposed. The FAA declines to add operating restrictions on the use of home-built unmanned aircraft, finding that existing operating rules are sufficient to ensure safety. For example, when a home built aircraft is flown under part 107, it is restricted in being able to fly over people, its weight cannot exceed 55 pounds, and it cannot enter certain classes of airspace without authorization. Similarly, a home-built unmanned aircraft flown recreationally under 49 U.S.C. 44809 remains subject to the requirements of that section, such as remaining within visual line of sight and complying with the requirement to receive authorization for flights in certain classes of airspace. In addition, home-built unmanned aircraft remain subject to the remote identification operating requirements of this rule.

iii. Other Comments Received

Comments: Some commenters suggested the definition of amateur-built UAS should include any UAS with limited capability or any model aircraft operated exclusively at an FAA-recognized identification area.

FAA Response: The FAA finds that commenters' definition would create far too wide of an exception to the remote identification production requirements, undermining the effectiveness of remote identification.

Comments: One commenter suggested changing the "amateur-built" definition to include any model aircraft produced without a radio receiver or flight control system.

FAA Response: The FAA considers that such aircraft would be considered home-built unmanned aircraft if they were assembled for educational and recreational purposes but does not choose to limit home-built unmanned aircraft to only the model aircraft mentioned by the commenter.

Comments: One commenter proposed the amateur-built definition should be based around the language used by the Academy of Model Aeronautics for radio-controlled aircraft.

FAA Response: Though the FAA expects many home-built unmanned aircraft will be similar to the radio-controlled aircraft described by the commenter, the FAA finds that the definition of home-built unmanned aircraft as adopted can encompass those aircraft as well as a wider range of unmanned aircraft, as long as such unmanned aircraft are built solely for education or recreation.

Comments: Many commenters expressed concern that the proposed definition of amateur-built unmanned aircraft would prohibit them from flying their existing model aircraft.

FAA Response: The FAA does not agree. Unmanned aircraft produced without remote identification (e.g., those produced prior to the production compliance date of this rule) may be flown in an FAA-recognized identification area or may be upgraded or retrofitted to meet the remote identification requirements of this rule. FAA has also amended the final rule to allow for

less costly compliance by allowing unmanned aircraft to be equipped with a remote identification broadcast module.

Comments: One commenter suggested the rule differentiate between three classes of producers: "mass manufacturers," "small commercial," and "experimental/hobbyist." The proposed description of "experimental/hobbyist" included three characteristics: 1) "may build or buy dozens of aircraft, many for purposes of education, experimentation, or recreation"; 2) "life span of the unmanned aircraft may be as little as one flight or it may last decades"; 3) "components are regularly recycled."

Wing Aviation LLC commented that in their view, there is no need for an amateur-built definition if the limited UAS concept is implemented with the changes they proposed.

FAA Response: Though the requirements for unmanned aircraft equipped with remote identification broadcast modules finalized in this rule are an option for people constructing home-built unmanned aircraft, the FAA considers that there may always be home-built unmanned aircraft that cannot be equipped with broadcast modules and may be used solely for flights within FAA-recognized identification areas, and therefore a definition for those unmanned aircraft built for educational or recreational purposes is still necessary.

For the foregoing reasons, the FAA will adopt the definition of home-built unmanned aircraft as an unmanned aircraft that an individual built solely for education or recreation.

E. Definition of Declaration of Compliance

The FAA did not propose to add a definition for declaration of compliance. However, to avoid potential confusion given the use of the term in both this final rule and in the part 107 rules for operations over people, the FAA determines that incorporating a new definition in § 89.1 is necessary to ensure sufficient clarity for the term as it is used in part 89. A *declaration of compliance* means a record submitted to the FAA by the producer of a standard remote identification unmanned aircraft or remote identification broadcast module to attest that all the requirements of subpart F of this part have been met.

F. Requests for other Definitions

1. Discussion of the Final Rule

The FAA received comments on other terms that were not defined in the NPRM, but did not include them in the final rule for the reasons explained below.

2. Public Comments and FAA Response

Comments: The Experimental Aircraft Association proposed adding the terms "traditional model aircraft," "control line," and "free flight" to this rule.

FAA Response: The FAA declines to add these definitions in this rulemaking because these terms are not used in part 89 or any regulation modified by this rule.

Comments: The International Association of Fire Fighters and the American Farm Bureau Federation requested the FAA define Internet availability and "sufficient signal strength," citing a lack of clarity when determining whether a UAS would be required to connect to the Internet or when a UAS would be expected to lose connection to the Internet.

FAA Response: The FAA has decided not to include definitions for these terms because this rule does not adopt requirements related to Internet connection.

VI. Applicability of Operating Requirements

A. Discussion of the Final Rule

The NPRM proposed to apply the remote identification operating requirements to all persons operating unmanned aircraft registered or required to be registered under part 47 or 48. The NPRM also proposed that the remote identification operating rules apply to all persons operating foreign civil unmanned aircraft in the United States. The proposed applicability did not include exceptions for specific types of operations (e.g., recreational operations, operations conducted by governmental entities) but the operating rules did include deviation authority through which the Administrator would be able to authorize persons to conduct certain

operations without remote identification. In addition, the operating rules would allow certain unmanned aircraft without remote identification to be operated in FAA-recognized identification areas.

The FAA received a significant number of comments recommending changes to the applicability of the operating requirements for remote identification. Commenters identified types of operations that they believed should be excepted from the requirement to identify remotely. After consideration of those comments, the FAA continues to support linking the remote identification rule with the registration rule. Because most unmanned aircraft are required by law to meet the aircraft registration requirements, the FAA determined that linking the remote identification and registration requirements is necessary to ensure that there is widespread coverage of the remote identification requirements of this rule. In § 89.101 the FAA adopts the requirement that all unmanned aircraft registered or required to be registered under part 47 or 48 must comply with the operating requirements of part 89. Persons operating foreign civil unmanned aircraft in the United States must also comply with the operating requirements.

In response to comments received, the FAA is clarifying in § 89.101 that the operating requirements do not apply to unmanned aircraft operations under part 91 that are transmitting ADS-B Out pursuant to § 91.225.

B. Public Comments and FAA Response

Comments: Many commenters supported the FAA's proposal to require unmanned aircraft operating in the airspace of the United States to have remote identification.

Many commenters requested revisions to the registration requirements so that unmanned aircraft of a particular size or weight do not have to be registered.

A number of commenters requested the applicability of the operating requirements in part 89 be determined based on the type of operation conducted. Many commenters specifically sought "blanket exceptions" from the operating requirements for operations that meet certain criteria (e.g., safety record, weight, altitude, line of sight, airspace) and for operations conducted

for specific purposes (e.g., governmental, recreational, aeronautical research, education, public safety, and emergency operations). Others suggested that all UAS, regardless of size, should comply with remote identification.

Many commenters stated that any exception to the operating requirement should be based on the intended use, application, or capability of the unmanned aircraft rather than its size or weight. Some commenters recommended excepting UAS based on the terrain or areas of operation. Some commenters proposed requiring remote identification only within a specific distance of airports, large cities, and critical infrastructure, or where certain population density exists.

Some commenters requested the FAA except UAS used in agricultural operations from the requirements of the rule, and others asked for flexibility for UAS used in farming, ranching, and other business related operations.

Some commenters supported excepting Federal, State, or local government operations from the applicability of the operating requirements, while others opposed excepting any government UAS. The FAA received many comments supporting and opposing broad exemptions for public safety and critical infrastructure operations. Many commenters indicated that a government exception is necessary because the transmission and broadcast of message elements could compromise the safety or security of public safety and emergency operations. Others believed that only sensitive governmental operations should be excepted from the remote identification requirements. The National Public Safety Telecommunications Council, AiRXOS, the Civil Air Patrol/ United States Air Force Auxiliary, the International Association of Fire Fighters, and DRONERESPONDERS Public Safety Alliance, asked for a remote identification solution for "trusted users" such as State and local public safety agencies instead of excepting certain parties (e.g., DOD) from having to comply with the operating requirements.

Multiple commenters requested the FAA except certain commercial operations from the operating requirements in subpart B. For example, several small businesses asked for an

exception for operations limited to a certain altitude or conducted for a specific scope or purpose. Commenters also requested the FAA except operations conducted by persons with remote pilot certificates issued under part 107 because they are trained to follow aviation regulations and are certificated.

A significant number of commenters expressed opposition to requiring recreational unmanned aircraft to identify remotely.

A number of commenters requested an operational exception for UAS used for educational purposes, aeronautical research activities, and non-aviation related research done with a UAS for testing and filmmaking.

Many private UAS operators, small business, and governmental entities asked the FAA to except UAS operations in class G airspace from having to identify remotely. A number of commenters asked the FAA to consider the distance above ground level where the UAS are operating when determining the applicability of the rule.

Some commenters mentioned that UAS operations receiving air traffic services should be required to use ADS-B Out. Other commenters such as the Aerospace Industries Association, Airbus UTM, the Association for Unmanned Vehicle Systems International (AUVSI), General Atomics Aeronautical Systems, and Northeast UAS Airspace Integration Research mentioned that the proposed rule did not clearly state that UAS authorized by the FAA to use ADS-B Out or transponders are excepted from meeting the operating rules in part 89.

A number of commenters asked the FAA to clarify whether the remote identification requirements apply to operations occurring indoors, underground, or within a contained space, such as a netted outdoor enclosure.

FAA Response: The FAA's rationale for linking the applicability of the operating requirements to the registration requirements is the need to identify aircraft operating in the airspace of the United States, regardless of the type or purpose of the operation. Parts 47 and 48 implement the registration requirements codified in 49 U.S.C. 44101–44103. According to these

statutory and regulatory requirements, no person may operate an unmanned aircraft in the airspace of the United States unless it has been registered by its owner, or unless the aircraft is excepted from registration (e.g., aircraft of the national defense forces of the United States or unmanned aircraft weighing 0.55 pounds or less). Congress also clarified in 49 U.S.C. 44809(a)(8) that UAS used in limited recreational operations must be registered and marked in accordance with chapter 441 of Title 49 of the United States Code. Because most unmanned aircraft that will be operated in the airspace of the United States are required to meet the aircraft registration requirements, by law, the FAA determined linking remote identification to the registration requirements is in the interest of the safety and security of the United States airspace. In light of the above, as of September 16, 2023, all persons operating unmanned aircraft registered or required to be registered under part 47 or 48 must follow the remote identification operating requirements unless the operation meets one of the following: 1) the operation is not subject to the operating requirement in accordance with § 89.101(b); 2) the Administrator authorizes a deviation for aeronautical research or to show compliance with regulations, in accordance with § 89.120; or 3) the Administrator authorizes the operator to deviate from the operating requirements, in accordance with § 89.105. To ensure that there is appropriate identification of civil unmanned aircraft operated in United States airspace, these requirements also extend to all persons operating foreign civil unmanned aircraft in the United States.

Exception for Recreational Unmanned Aircraft. The FAA considered public comments requesting the Agency to except recreational unmanned aircraft operations from the remote identification operating requirements. The FAA does not agree with such a request. The FAA believes that successfully integrating unmanned aircraft into the airspace of the United States requires the identification of unmanned aircraft. Recreational unmanned aircraft represent a significant portion of unmanned aircraft operating in the airspace of the United States and, in accordance with 49 U.S.C. 44809(f), the FAA is not prohibited from promulgating rules generally applicable to unmanned aircraft, including those unmanned aircraft eligible for the

exception for limited recreational operations of UAS. Among other things, the authority extends to rules relating to the standards for the remote identification of owners and operators of UAS and associated unmanned aircraft. Broad applicability of remote identification is necessary to ensure public safety and the safety and efficiency of the airspace of the United States. The remote identification framework provides UAS-specific data, which allows the FAA, national security agencies, and law enforcement entities to identify the pilots of UAS that are posing safety or security risks.

While the FAA is not excepting recreational unmanned aircraft from the remote identification requirements, this final rule allows persons to retrofit unmanned aircraft by equipping them with remote identification broadcast modules to allow them to identify remotely. This concept will facilitate compliance with the remote identification requirements for recreational and other operators. In addition, this rule also finalizes the FAA-recognized identification areas concept where unmanned aircraft without remote identification can be operated.

Other types of exceptions requested. The FAA carefully considered the requests to include exceptions for other types of operations (e.g., operations below a specific altitude or in certain airspace, UAS without advanced capabilities, agricultural operations) and determined that granting such "blanket exceptions" is not appropriate The FAA has determined that the remote identification requirements should apply to unmanned aircraft to address safety, national security, and law enforcement concerns regarding expanded unmanned aircraft operations at night and over people. A broad applicability of the remote identification requirements enhances the FAA's ability to monitor compliance with applicable regulations, assists the FAA in undertaking compliance, enforcement, and educational actions required to mitigate safety risk, and advances the safe and secure integration of UAS into the airspace of the United States. Though the FAA is not including additional "blanket exceptions" to the applicability of subpart B, the Agency has revised the rule to add flexibility and to provide various options to

make it simpler for operators to comply with the remote identification requirements. For example, based on comments received, the FAA eliminated the limited remote identification concept and replaced it with the ability for unmanned aircraft to equip with remote identification broadcast modules. In § 89.105, the rule allows the Administrator to authorize deviations from the operating requirements. The Administrator could issue such deviations when he or she determines that there is a need, and that the deviation would not adversely affect safety or that appropriate mitigations are in place to provide a level of safety at least equal to that provided by this rule.

Weight-based applicability. While some of the registration requirements are driven by the weight of an aircraft, the FAA does not believe it is appropriate to use the unmanned aircraft size or weight, apart from the weight standards already incorporated into the registration requirements, as a basis for applicability of the remote identification requirements. As discussed earlier, tying remote identification to registration requirements ensures the broad coverage necessary to address the safety and security concerns associated with unmanned aircraft operations being performed at this time.

Unmanned aircraft operated by government entities. The operating requirements of subpart B of part 89 do not apply to aircraft of the Armed Forces of the United States because these aircraft are not required to be registered under part 47 or 48. Aircraft operated by other government entities (e.g., Federal, State, the District of Columbia, territories, possessions, or Indian Tribal governments) are subject to the registration requirements in part 47 or 48 regardless of whether the aircraft is used in civil aircraft operations or public aircraft operations. Therefore, unmanned aircraft operations conducted by such government entities must comply with the operating requirements of this rule. Nevertheless, any covered government entity that wishes to use an unmanned aircraft without remote identification at a location other than FAA-recognized identification areas may request authorization from the Administrator under § 89.105

to deviate from the operating requirements or under § 89.120 to conduct aeronautical research or to show compliance with regulations.

Educational activities. The FAA does not agree with commenters that supported an operational exception for unmanned aircraft used for educational purposes. As previously mentioned, the applicability of the operating requirements is not based on the type or purpose of operation. Remote identification is necessary regardless of the operation or intended use of the unmanned aircraft. However, the FAA recognizes the need for educational institutions to be able to conduct unmanned aircraft activities, and has expanded the list of persons eligible to request establishment of an FAA-recognized identification area to include educational institutions. The FAA believes this change appropriately addresses the concerns expressed by educators regarding unmanned aircraft activities. In addition, the Agency is now allowing persons to equip unmanned aircraft with remote identification broadcast modules, which will facilitate compliance with the operating requirements.

Aeronautical research. The FAA considered comments requesting that aeronautical research activities be excluded from the operating requirements of part 89 and agrees with commenters because the deviation would contribute to the further development and improvement of UAS equipment and technologies. Therefore, as finalized, § 89.120 allows the Administrator to authorize operations without remote identification where the operation is solely for the purpose of aeronautical research or to show compliance with regulations.

Unmanned aircraft operated indoors, underground, or in enclosed spaces. The FAA regulates the navigable airspace of the United States. Therefore, this rule does not apply to unmanned aircraft operations conducted entirely indoors, underground, or inside an enclosed space such as a netted enclosure. The remote identification requirements apply when the unmanned aircraft exits the interior of a building or structure and is operated outside. While the remote identification operating requirements do not apply to unmanned aircraft operating indoors, certain design requirements for unmanned aircraft with remote identification, especially

standard remote identification unmanned aircraft, may create operational challenges in these environments. For example, standard remote identification unmanned aircraft will not take off unless broadcasting the remote identification message elements. Depending on the particular design, some unmanned aircraft with remote identification may not be able to operate if they cannot broadcast the unmanned aircraft position because GPS is not available. Operators of unmanned aircraft intended to be used both indoors and outdoors should understand how their unmanned aircraft will perform when services like GPS may be unavailable.

Unmanned aircraft equipped with ADS-B Out. The FAA agrees with the commenters who stated that certain UAS operating under air traffic control and equipped with ADS-B Out and ATC transponders are already meeting the intent of the remote identification rule, and that remote identification may be redundant for such operations. The FAA adopts an exception to the remote identification operating requirements in § 89.101(b) for persons conducting unmanned aircraft operations under part 91 that are transmitting ADS-B Out pursuant to § 91.225. Operators of unmanned aircraft that meet the criteria are not required to comply with the operating requirements of part 89. The operation may be conducted under any type of flight plan that is acceptable for the intended operation. The FAA has provided a similar exception from the remote identification production requirements for unmanned aircraft certified under a part 21 design or production approval that are equipped with ADS-B Out. Notwithstanding the exception in § 89.101(b), nothing in this rule precludes unmanned aircraft from being equipped with both ADS-B Out and remote identification equipment. However, to ensure that unmanned aircraft do not place a strain on the ADS-B system, ADS-B Out may not be used to meet remote identification requirements outside of those unmanned aircraft operations for which it is required. The use of ADS-B Out in transmit mode is restricted to those unmanned aircraft operations for which it is required.

VII. Operating Requirements for Remote Identification

This rule establishes requirements for the remote identification of unmanned aircraft operated in the airspace of the United States. Remote identification is the capability of an unmanned aircraft, in flight, to provide certain identification, location, and performance information that people on the ground and other airspace users can receive. An operator of an unmanned aircraft can comply with the operating requirements for remote identification in one of three ways:

1) *Standard remote identification unmanned aircraft*. The first way to comply is referred to as "standard remote identification" and requires the operator to use an unmanned aircraft that broadcasts identification, location, and performance information for both the unmanned aircraft and the control station. *See* § 89.110 of this rule.

2) *Remote identification broadcast module*. The second way to comply is for the operator to equip an unmanned aircraft with a "remote identification broadcast module" that broadcasts identification, location, and performance information about the unmanned aircraft, and the unmanned aircraft's takeoff location. *See* § 89.115(a) of this rule.

3) *FAA-recognized identification* area. The third way to comply, and the only option available for most unmanned aircraft without remote identification capabilities (e.g., an unmanned aircraft manufactured without remote identification equipment or an unmanned aircraft whose remote identification equipment or remote identification broadcast module is not working) is for the operator to fly his or her unmanned aircraft in certain specific geographic areas called "FAA-recognized identification areas." These areas are established under this rule specifically to accommodate UAS that do not identify remotely. *See* § 89.115(b) of this rule.

The NPRM proposed various ways for an operator of UAS to identify remotely: (1) operating a limited remote identification UAS; (2) operating a standard remote identification UAS; or (3) operating unmanned aircraft without remote identification at an FAA-recognized identification area. After reviewing public comments and giving further consideration, the FAA

decided to eliminate the concept of a limited remote identification UAS and incorporate the ability to retrofit unmanned aircraft with remote identification broadcast modules that broadcast the remote identification information required by this rule. The FAA also decided to revise some of the parameters and requirements for operations of standard remote identification UAS and operations at FAA-recognized identification areas, as discussed below.

A significant change from the proposal is that the FAA decided to eliminate the requirement for UAS with remote identification to connect to the Internet and to transmit the remote identification message elements through the Internet connection to a Remote ID USS. While the FAA recognizes that there are potential benefits associated with establishing a network of Remote ID USS, the FAA believes that, for the time being and given the types of unmanned aircraft operations that are currently allowed, the broadcast remote identification solution fulfills agency and law enforcement needs to maintain the safety and security of the airspace of the United States. Accordingly, this rule now generally requires unmanned aircraft operators outside of an FAA-recognized identification area to use either standard remote identification unmanned aircraft or unmanned aircraft with remote identification broadcast modules to broadcast remote identification message elements.

A. Elimination of Network-based Remote Identification Requirement

1. Discussion of the Final Rule

The FAA initially proposed requiring both standard remote identification UAS and limited remote identification UAS to transmit the remote identification message elements through an Internet connection to a Remote ID USS. After careful consideration of public comments and the implementation challenges associated with requiring UAS to transmit to Remote ID USS, the FAA decided to eliminate this proposed requirement in this rule. Without the requirement to transmit remote identification through the Internet, limited remote identification UAS as proposed is no longer a viable concept. In its place, the FAA is

incorporating a regulatory framework under which persons can retrofit an unmanned aircraft with a remote identification broadcast module to satisfy the remote identification requirements of this rule. The requirements for remote identification broadcast modules are described in section VII.D of this preamble. The effects of this change on standard remote identification unmanned aircraft are discussed in section VII.A of this preamble.

Though the FAA recognizes that there are potential benefits associated with establishing a network of Remote ID USS, the FAA believes that, for the time being and given the types of unmanned aircraft operations that are currently allowed, the broadcast remote identification solution fulfills agency and law enforcement needs to maintain the safety and security of the airspace of the United States.

Original Concept for Internet-Based Network. During the UAS-ID ARC, industry representatives proposed a concept for an Internet-based network to complement the core functionality of a digital "license plate" broadcast-based solution. Under this concept, the aircraft's control station (often a mobile phone) would connect to the Internet and transmit remote identification information to a third-party service provider. The network concept was attractive for several reasons, but primarily because of the ability to receive remote identification information through existing mobile telephony infrastructure without having to deploy equipment to "listen" for a radio frequency broadcast. The primary challenge with this concept is its reliance on Wi-Fi or cellular network service being available where an aircraft is flying; the concept would not work in areas lacking cellular telephone coverage. The ARC did not reach consensus on a single remote identification concept—broadcast or network.

Ultimately, the FAA proposed both broadcast and network requirements in the NPRM, in an attempt to balance the interests of all stakeholders. As part of the proposed network requirement, UAS would have had to transmit the remote identification message elements through the Internet to a third-party service provider, referred to as a "Remote ID USS." Remote

ID USS would have collected and, as appropriate, disseminated the remote identification information through the Internet.

The Remote ID USS concept was a critical component to the successful implementation of the network requirement, as a commercial endeavor at no cost to the United States Government. Prospective Remote ID USS would have been required to meet technical requirements and contractually agree to abide by certain performance standards and other requirements on matters including, but not limited to, privacy protections of data collected pursuant to part 89, disclosure or dissemination of data, and data retention. The successful implementation of the network concept relied on prospective USS' willingness to enter into no-cost contracts with the FAA to provide these services. The FAA has successfully used a similar construct to authorize small UAS operations around airports through its Low Altitude Authorization and Notification Capability (LAANC) program. Through this public-private partnership arrangement, the government benefits from the speed and quality of industry innovation while industry benefits from profits derived from marketing other services or products.

Emerging Problems with the Concept for Internet-Based Network. The FAA received significant feedback about the network requirements in response to the NPRM. Commenters expressed concerns that the network component could enable nefarious actors to perform a coordinated Distributed Denial of Service (DDoS) attack on Remote ID USS. Industry commenters also highlighted concerns about implementing the network requirement in the absence of a standardized interface for network connection and raised concerns about giving potential business intelligence to competitors or third parties with access to network information. Many commenters also expressed valid concerns about privacy, cybersecurity, and other security-related issues. Others expressed concerns about access and protection of data transmitted to, and stored by, a Remote ID USS. Some law enforcement agencies mentioned they

would or could rely, for the time being, on a broadcast solution, rather than a network solution, for threat discrimination.

It has become apparent to the FAA that Remote ID USS may struggle in facing significant technical and regulatory requirements that go beyond existing industry consensus standards. Early in 2020, the FAA convened a Remote ID USS cohort to explore developing the network solution that is necessary to implement the proposed network requirements. The cohort identified several challenges with implementing the network requirements, which the FAA acknowledges it had not foreseen or accounted for when it proposed the network solution and Remote ID USS framework. For example, the cohort raised the challenge of developing and issuing technical specifications to govern remote identification interoperability when producers of UAS have not yet designed UAS with remote identification.

Based on the above, the FAA decided to take a simplified approach at this time to remote identification by only adopting the broadcast requirements in this rule. As adopted, this broadcast-only rule provides an initial remote identification framework and sets the foundation for future regulatory actions. As the FAA builds the regulatory constructs that support increasingly advanced concepts, such as BVLOS and UTM, the United States Government will be prepared to solve safety and security issues related to those concepts based on more mature understandings. At this stage, however, the unknowns regarding UAS integration make it impractical to expand this rule beyond a broadcast-only solution.

For these reasons, the Agency is revising all of part 89, including but not limited to the operating requirements and minimum performance requirements for standard remote identification unmanned aircraft, to eliminate all references to the network capability.

2. Public Comments and FAA Responses

Comments: Many commenters, including individuals, associations, and government organizations, expressed concerns with requiring UAS to connect to the Internet and transmit to a Remote ID USS without a suitable alternative to continue operations when the Internet is

unavailable. Commenters noted that there are many areas in the United States, particularly remote and rural areas that do not have reliable Internet access. Commenters mentioned that these are often some of the safest places to fly UAS due to low population density on the ground and less manned aircraft traffic.

Many commenters asked the FAA to provide a better explanation for why an Internet connection would be required at all, particularly because under certain circumstances, the proposal allowed for a UAS to fly when not connected to the Internet.

Depth from Above and others noted that network-based solutions provide an incomplete picture for the safety and security of standard remote identification UAS operations because standard remote identification UAS could operate, in certain scenarios, without Internet access using only broadcast remote identification. The commenters suggested removing the network requirement to reduce cost and improve compliance.

The European Union Aviation Safety Agency noted that unmanned aircraft designed and manufactured to be compliant with the EU regulations may not be able to comply with this proposed rule because under the EU's regulations, broadcast remote identification is mandatory, whereas the network remote identification is optional.

Many commenters had questions about the meaning of Internet availability. Commenters noted that many geographic areas might have Internet connectivity but that the signal in some of those areas may not have enough strength to adequately support Internet connected applications. Many commenters expressed concerns that rural UAS operators who have limited broadband or cellular access could be required to purchase increasingly expensive data plans or multiple data plans to ensure adequate coverage, which may increase costs and lead to compliance issues.

The National Rural Electric Cooperative Association (NRECA) mentioned the FAA was assuming there would be a network of Remote ID USS able to provide services in rural areas and indicated that deficiencies exist when market forces are left to provide services to rural areas.

NRECA recommended the FAA consider an FAA-provided service for at least some parts of the country and a longer implementation timetable or pilot program.

Many commenters, including the American Civil Liberties Union, opposed the requirement to transmit to a Remote ID USS and expressed concerns with the security of UAS operations using network remote identification. The commenters listed a number of privacy and security concerns, including: hacking into the controls of one or multiple UAS; deliberate interference with remote identification or Command and Control (C2) frequencies utilizing unlicensed spectrum; interference amongst the remote identification and C2 equipment; and cellular high speed packet access (HSPA) and long term evolution (LTE) interference with frequencies used for C2 or to downlink video from the unmanned aircraft to the control station. The American Civil Liberties Union suggested that requiring UAS to connect to the Internet as a condition of takeoff is not justified because there is insufficient benefit relative to the related costs and privacy issues. Several commenters suggested ensuring that network remote identification is isolated from C2 frequencies to prevent the hijacking of UAS.

Many commenters, including the Medina County Office of Emergency Management and Homeland Security, expressed concerns about the potential to ground hundreds or thousands of UAS nationwide, including UAS performing public safety operations, if there is a dedicated denial of service or similar cyberattack which causes an outage of Remote ID USS. Other commenters expressed concerns about someone hacking a Remote ID USS or spoofing broadcast remote identification to make it appear erroneously as if there are UAS in flight. Several commenters stated that some government agencies have discontinued their use of some foreign-made UAS due to security concerns and mentioned that it is not in the best interests of national security to require private users to transmit similar surveillance information through the Internet. In some cases, operators are operating the types of UAS that the government has stopped using for security reasons.

Commenters expressed concerns about non-State actors as well as adversarial nations. Various commenters highlighted the national security implications of certain remote identification data becoming available to the public. Unmanned Systems Canada asked for the network requirement to be optional until each Remote ID USS can demonstrate sufficient security and reliability and stated that a properly licensed and registered UAS operation should not be grounded if a connection to a Remote ID USS is not available.

Commenters such as Juniper Unmanned mentioned that some commercial operations supporting critical infrastructure involve strict cybersecurity rules and prohibit Internet connectivity during flight operations.

Many commenters involved in emergency response expressed concerns with relying on the Internet to comply with the requirement to transmit. Similarly, several state government agencies and universities noted that their UAS enforcement and research activities would be greatly restricted if the FAA were to adopt the requirement for the UAS to connect to the Internet and transmit to a Remote ID USS without a suitable alternative means of compliance that would permit the UAS to take off and operate when Internet access is not available.

Zipline and the Alabama Department of Transportation noted that the requirement to connect to a Remote ID USS if the Internet is available would prevent a person from using a UAS to support emergency response operations if the Internet is available but the UAS cannot reliably interface with a Remote ID USS.

Many commenters expressed concerns with the requirement that Remote ID USS retain the remote identification message elements for 6 months from the date the remote identification message elements are received. Some commenters cited shorter FAA record retention periods for other information while others contended the 6-month term was not long enough. Various commenters expressed support for the record retention requirements, noting that access to the data is useful for law enforcement, regulatory compliance, and legitimate safety, security, compliance, accident, and incident investigation purposes.

The Consumer Technology Association and Wing Aviation, LLC stated that the final rule should restrict access to historical data by government, limit the collection and aggregation of remote identification data by third parties, and ensure privacy. The Small UAV Coalition urged the FAA to prohibit Remote ID USS from sharing information with Federal, State, or local governments absent a law enforcement or national security interest or consent of the UAS operator.

Many commenters noted the potential costs, complexity, and operational restrictions associated with network remote identification requirements and expressed concerns that they may foster a culture of non-compliance. Many commenters observed that the use of a subscription-based service would prove costly for some UAS operators. Many commenters stated that monthly subscription fees would be unfair to those who do not fly that regularly for a variety of reasons.

Many commenters expressed concerns about the cost of depending on Internet service via cellular phones or other enabled devices that would be required to support network remote identification. They also expressed concerns about the costs of subscribing to a Remote ID USS. Both recreational and commercial operators expressed concerns about the cost of the data plans that would be required to serve multiple UAS. One UAS services company estimated increased monthly costs of $360 to $500 a month for cellular services. Several commenters noted that adding an additional device, such as an unmanned aircraft, to a cellular data plan to support direct transmission to the Internet generally costs $30 to $70 a month, and one commenter noted this is likely to be the largest part of many users' overall operating costs.

The Alliance for Drone Innovation opposed a network requirement for remote identification, noting that many UAS in use today, including model aircraft, model helicopters, and racing aircraft, would be burdened with increased costs for equipment, data plans, and USS subscriptions because they do not currently have a way to connect to the Internet. SenseFly

expressed concerns about the cost that designers and producers of remote identification UAS will incur if they are required to make UAS compatible with different Internet providers.

A significant number of commenters expressed privacy concerns with the proposed requirement to have UAS transmit remote identification data to Remote ID USS. Many individuals opposed having third parties collect information including, but not limited to, their name, address, and location. Some commenters also mentioned that the requirement to transmit their location could cause business and tactical issues, particularly for businesses or persons that want or need to ensure their flight data remains confidential or out of reach of most parties. Many commenters indicated that the pilot and flight data should only be made available to law enforcement and Federal entities.

Many commenters contended that the best way to ensure privacy is to encrypt certain remote identification data (e.g., control station or unmanned aircraft location) and to make it available only to the FAA and law enforcement. Amazon Prime Air commented that the FAA could mitigate the potential loss of user privacy by requiring position and velocity data to be encrypted or by requiring security protocols that can provide law enforcement with real time access while enhancing privacy. A significant number of commenters opposed making the data transmitted to a Remote ID USS available to the general public.

Commenters expressed concerns that a UAS operator's data could be sold or provided to third parties. Other commenters were concerned about requiring companies to provide sensitive information to a Remote ID USS. Many expressed concerns that the information could be hacked. Other commenters expressed concern over where the privacy data would reside and what regulations would be in place to prohibit United States citizens' data from being sent and sold overseas.

Multiple commenters expressed the view that unfettered access by law enforcement to remote identification data could lead to specific monitoring of the media by law enforcement agencies and impact the freedom of the press.

Several commenters noted that cellular networks are optimized to work with ground-based equipment rather than airborne equipment and suggested that it is not practical to provide an Internet connection to a UAS using terrestrial cellular networks due to reliability that is much lower than typical aviation requirements; the potential for numerous UAS to interfere with ground-based users; and the downward tilt and narrow vertical beam width of the cellular base transceiver station used to optimize battery life for ground-based user equipment.

Several commenters noted that their control stations connect to their unmanned aircraft only through Wi-Fi which makes an Internet connection impossible when away from Wi-Fi access and others noted that they fly using tablets or unique monitors which do not include cellular access.

A number of commenters generally supported the broadcast requirement for remote identification. The commenters noted that many UAS are already capable of broadcasting UAS information or could be upgraded with equipment or software to meet the remote identification requirements, for a one-time cost. Commenters noted the various benefits of broadcast remote identification, such as independence; ease of compliance due to the capabilities of existing systems; tamper resistance; and simplicity regarding account management, data plans needed for large fleets, and cost. Commenters noted that broadcast remote identification is sufficient for law enforcement to determine the identity and location of the operator in VLOS operations.

Many commenters suggested the FAA should view broadcast-only remote identification as sufficiently safe and secure for achieving remote identification. The commenters stated that broadcast-only should be sufficient because standard remote identification UAS operations are permitted when the Internet is not available, or when the UAS loses its connection to the Remote ID USS, as long as the unmanned aircraft is broadcasting. Many commenters also noted that broadcast remote identification may provide an affordable and effective path to compliance for many existing UAS that currently have the ability to broadcast telemetry data in the proposed radio frequency spectrum via the command-and-control link.

Various commenters noted that a broadcast solution is less expensive, simpler, and provides increased privacy when compared to network solutions; and that other UAS or manned aircraft without an Internet connection will not be able to detect a limited remote identification UAS using only network remote identification.

Many commenters noted that European Union requirements permit operations with only broadcast remote identification. The EU Aviation Safety Agency noted that under EU regulations, "broadcast" is mandatory, while the "network" or "limited" remote identification is optional.

Discover Flying Club and Phirst Technologies suggested permitting a broadcast-only option for remote identification UAS, with governments or third party companies responsible for receiving and collecting remote identification data, as needed, in specific locations. The American Civil Liberties Union mentioned that broadcast remote identification is sufficient to meet security needs to identify hostile UAS and for public awareness.

In further support of a broadcast-only option, many commenters, such as Motorola Solutions, Inc., stated that natural disasters and search and rescue operations often take place in areas of limited Internet coverage. They mentioned that instead of requiring "trusted users" to comply with remote identification, the FAA should allow them to operate broadcast-only. The Edison Electric Institute and other electric and power associations stressed the importance of broadcast remote identification to ensure the UAS continues to send out the message elements in the event of lost Internet connectivity. The National Rural Electric Cooperative Association and the Northwest Electric Power Cooperative recommended creating a broadcast-only option for limited remote identification UAS to permit safe operation in remote areas.

Other commenters opposed a broadcast-only remote identification solution, stating that it could introduce unnecessary risks to law enforcement due to the potential for frequency congestion on unlicensed spectrum. Amazon Prime Air, Verizon, Skyward, and others noted weaknesses of the broadcast solution, such as broadcast coverage limitations due to altitude,

terrain, interference, and power. Most of these commenters also recognized that broadcast may still be required for specific operations, such as in areas with no Internet access or areas where a local, independent source of remote identification information is required for safety or security purposes. Many industry commenters were concerned with the requirement to broadcast their data, because it could impact their ability to keep their customers' flight information private and could potentially be used by their competitors.

Some commenters expressed support for a network-only remote identification solution, noting the advantages of network remote identification such as the capability for stronger authentication, availability regardless of proximity to the UAS, ability to share additional message elements, availability of Internet access, and importance to further development of UTM and traffic deconfliction. AirMap agreed that network remote identification is appropriate when the Internet is available, to support UTM, and to enable a greater volume of flights. AirMap indicated that operations with only network remote identification would permit tighter control of personally identifiable information (PII), eliminate the possibility of data scraping from aircraft broadcasts, help with operator location security, maintain the privacy of UAS delivery service customers, and offer tiered data access so that law enforcement has access to different data than the general public.

AT&T Services, CTIA – The Wireless Association, GSMA, and Qualcomm supported network remote identification, noting benefits such as greater security than broadcast on unlicensed frequencies, encryption, available cellular infrastructure already driven by external demand for increased data service, device authentication to support positive identification, and support for the development of UTM.

Some commenters supported the role of Remote ID USS to receive the required message elements, the framework of using a contractual MOA to govern the Remote ID USS, and the idea that LAANC served as a model for the concept.

FAA Response: The FAA has carefully considered the wide variety of perspectives received in public comments as well as the need for remote identification of unmanned aircraft. Throughout the process of integrating unmanned aircraft into the airspace of the United States, the FAA has taken a phased, incremental approach that fosters industry innovation while meeting the corresponding safety and security needs that are presented. The FAA believes this should be the case with remote identification of unmanned aircraft as well.

The FAA continues to work toward full integration of UAS into the airspace of the United States by partnering with industry to develop UTM and facilitate advanced unmanned aircraft operations, like BVLOS. However, the FAA has determined that a broadcast-based remote identification system that provides for immediate awareness of unmanned aircraft in the widest variety of settings will be adequate to support the phased, incremental approach, while allowing the UAS industry additional time to continue developing the network-based UTM ecosystem.

The FAA recognizes concerns related to an Internet connectivity requirement, such as Internet availability or connectivity issues; increased costs for UAS upgrades; Internet data plans; Remote ID USS subscriptions; and reduced air and ground risk when operating in remote areas with less air traffic and lower population density. The FAA acknowledges the ability to connect to the Internet is dependent on a variety of factors including geographic coverage of cellular Internet networks, wide-scale network disruptions, or natural disasters. The FAA agrees with commenters that unmanned aircraft operations should not be unnecessarily restricted when the Internet is not available or not sufficient to establish and maintain a connection to a Remote ID USS provided the unmanned aircraft is broadcasting the required message elements.

There are some remote areas where an operator cannot connect to the Internet, such as locations where cellular or other Internet signals are not available or sufficient to establish and maintain a connection to a Remote ID USS. While loss of the broadcast capability is an indication of a remote identification equipment failure, loss of connectivity to the Internet or a

Remote ID USS could be attributed to a lack of Internet availability that is outside the control of the unmanned aircraft operator. A functioning broadcast capability is necessary for remote identification information to be available in areas that do not have Internet availability.

The FAA is not adopting the requirement to transmit message elements through the Internet to a Remote ID USS in this rule at this time. While the FAA recognizes the potential benefits of network remote identification as stated by several commenters, the FAA believes a broadcast-only solution is sufficient, for the time being and given the types of unmanned aircraft operations that are currently allowed, to maintain the safety and security of the airspace of the United States given the types of operations that are authorized in the operating and airspace regulations.

Certain commenters suggested allowing unmanned aircraft operators to choose between either broadcast or network remote identification. These commenters suggested that while a Remote ID USS-dependent solution might be overly burdensome to certain types of recreational or small-scale commercial operators, some operators may prefer network remote identification. These commenters noted that network remote identification allows operators to better protect the privacy of their operations from the general public, which may have benefits for consumers receiving sensitive deliveries or to protect a company's confidential business information regarding where they operate. According to these commenters, allowing either broadcast or network remote identification would permit operators to transmit remote identification information via the mechanism most appropriate for their use, while ensuring that the public still had the capability of rapidly identifying nearby unmanned aircraft.

The FAA notes that this rule does not preclude industry from establishing Remote ID USS-like networks where entities can exchange remote identification information to facilitate a safer and more efficient airspace of the United States. The FAA encourages further development and maturation of UTM concepts, especially those that consider aviation safety national security, and law enforcement needs. However, as indicated in the NPRM, broadcasting the message

elements has always been considered a critical aspect of remote identification, even in situations when the NPRM also allowed for network transmission. The FAA believes that broadcasting the message elements is fundamental to ensuring that remote identification information is always accessible to members of the public, and as such, the FAA does not agree with commenters' suggestions to allow unmanned aircraft operators to choose between broadcast and network remote identification.

The FAA agrees with the commenters who proposed that broadcast remote identification is sufficient to provide the required remote identification message elements to support typical unmanned aircraft operations and satisfy security requirements. Broadcast remote identification does not rely on Internet availability, and is a secure method that is less susceptible to widespread failure caused by malicious actors or systems outages. Broadcast remote identification is also an independent, less expensive, and less complex method of providing the required remote identification message elements. The FAA has determined that a requirement for unmanned aircraft to broadcast remote identification information will provide the FAA, law enforcement, the general public, and other parts of the aviation community with real-time information about unmanned aircraft operations in any area in which broadcast signals can be received. The broadcast will permit detection of unmanned aircraft and will permit law enforcement and the general public that receives the broadcasted message elements to have information about the unmanned aircraft location as well as information about the control station or takeoff location. Personal wireless devices that are capable of receiving 47 CFR part 15 frequencies, such as smart phones, tablets, or other similar commercially available devices, will be able to receive broadcast remote identification information directly without reliance on an Internet connection.

After reviewing the comments and further consideration, the FAA decided to modify the proposal and, as finalized, this rule only requires unmanned aircraft to broadcast the message

elements. Accordingly, the FAA has eliminated all requirements for unmanned aircraft to connect to the Internet to transmit to a Remote ID USS.

B. Limited Remote Identification UAS

1. Discussion of the Final Rule

The NPRM proposed that limited remote identification UAS would only have to transmit the remote identification message elements through an Internet connection to a Remote ID USS. As discussed in section VII.A of this preamble, limited remote identification UAS are no longer a viable concept for this rule. Accordingly, this final rule has eliminated all proposed requirements related to limited remote identification UAS.

2. Public Comments and FAA Response

Comments: Only a few commenters supported the proposed limited remote identification UAS. Commenters who supported the proposed requirements wanted the FAA to move forward with implementing its proposed policies.

Many commenters were opposed to the concept and requirements for limited remote identification UAS and believed the FAA should not adopt those requirements. Commenters noted that many areas in the United States, particularly remote and rural areas, do not have reliable Internet access due to cellular coverage limitations, signal obstructions caused by terrain and obstacles, poor connection quality, or temporary outages. Many commenters noted that the costs, complexity, and operational restrictions associated with network remote identification requirements may foster a culture of non-compliance. As a result, many commenters suggested eliminating or substantially altering limited remote identification UAS.

Several commenters suggested there was no need for the limited remote identification concept. DJI Technology appreciated the attempt to create a concept intended to impose a lower burden and ease for compliance for less capable UAS that pose less risk but suggested the limited remote identification UAS concept is virtually useless as proposed. Degenkolb Engineers

noted that any controller designed to meet limited remote identification UAS requirements could be upgraded to meet the standard remote identification UAS requirements at trivial cost.

Other commenters suggested the limited remote identification UAS concept would create unnecessary complexity and would not contribute to flight safety. They recommended permitting broadcast options for limited remote identification UAS, which could provide the unmanned aircraft location information to suitably equipped manned aircraft at any altitude without dependency on network solutions or command and control links.

Many commenters weighed in on specific aspects of limited remote identification UAS, including the proposed 400-foot range limitation, the requirement to fly within visual line of sight, and the requirement to land the aircraft in the event the connection with the Remote ID USS was lost.

FAA Response: A common theme in the public comments received regarding the limited remote identification UAS concept was a general dissatisfaction and disagreement with the operating and design requirements of the proposed concept. The FAA attempted to provide a regulatory framework to accommodate existing unmanned aircraft without remote identification so they could be modified or retrofitted in a manner to provide remote identification capabilities. The FAA agrees with the commenters who argued that limiting unmanned aircraft to operating only where Internet connectivity is available limits the utility and marketability of such unmanned aircraft. However, the FAA does not agree with commenters who supported only a single concept for remote identification. The FAA believes that a remote identification option is necessary for owners of existing unmanned aircraft without built-in remote identification capability who do not wish to operate solely at FAA-recognized identification areas. For that reason, the FAA is incorporating into this rule a concept known as "remote identification broadcast module" to allow persons to retrofit an unmanned aircraft by equipping it with a broadcast module that enables compliance with the operating requirements of this rule. The remote identification broadcast module concept is discussed in section VII.D of this preamble.

The FAA acknowledges all of the comments related to limited remote identification UAS and took them into consideration as a part of its decision to eliminate the concept.

C. Standard Remote Identification Unmanned Aircraft

1. Discussion of the Final Rule

The FAA is adopting the requirements for standard remote identification unmanned aircraft in § 89.110, as discussed below. A key difference from the NPRM is that the Agency has decided to eliminate the requirement for the standard remote identification unmanned aircraft to transmit the remote identification message elements through the Internet to a Remote ID USS. This rule only requires the standard remote identification unmanned aircraft to broadcast the remote identification message elements directly from the unmanned aircraft from takeoff to shutdown. The FAA is also updating the term to "standard remote identification unmanned aircraft, as opposed to "standard remote identification UAS" for clarity purposes. See section IV.A for an in-depth discussion regarding the use of unmanned aircraft instead of UAS. The modifications in § 89.110 mainly reflect the change to the broadcast-only solution, or changes made for clarity purposes.

The FAA clarifies that unmanned aircraft without remote identification may be upgraded to standard remote identification unmanned aircraft if the upgrade enables the unmanned aircraft to meet all of the remote identification requirements of this rule.

i. Use of Standard Remote Identification Unmanned Aircraft

A person operating a standard remote identification unmanned aircraft that complies with § 89.110 can operate the unmanned aircraft outside of FAA-recognized identification areas. Standard remote identification unmanned aircraft can be used irrespective of the operating rules that apply to the specific flight. For example, a standard remote identification unmanned aircraft could be used in limited recreational operations conducted under 49 U.S.C. 44809, or operations conducted under part 91, part 107, part 135, or any other operating part.

ii. Elimination of Network Transmission Requirement

As previously stated, the FAA proposed to require standard remote identification UAS to transmit the remote identification message elements through the Internet to a Remote ID USS and to broadcast the same message elements directly from the unmanned aircraft using radio frequency spectrum. After reviewing public comments and further consideration of a significant amount of comments, the FAA decided to amend the regulatory framework for standard remote identification unmanned aircraft by eliminating the requirement to transmit the message elements through the Internet to a Remote ID USS. As adopted, § 89.110 is now a broadcast-only solution where standard remote identification unmanned aircraft are required to broadcast the message elements directly from the unmanned aircraft. The FAA determined that the requirement, as adopted, facilitates compliance with this rule and, at this time, meets the safety and security needs of the FAA, national security agencies, and law enforcement.

iii. Remote Identification Equipment and Message Elements

The person operating a standard remote identification unmanned aircraft must ensure the unmanned aircraft is broadcasting the standard remote identification unmanned aircraft message elements. This broadcast equipment must be functional from takeoff to shutdown of the unmanned aircraft and must not be disabled.

The operator of a standard remote identification unmanned aircraft must ensure the unmanned aircraft is broadcasting the message elements listed in § 89.305. The message elements broadcast by standard remote identification unmanned aircraft include a unique identifier; an indication of the control station's latitude, longitude, and geometric altitude; an indication of the unmanned aircraft's latitude, longitude, and geometric altitude; an indication of the velocity of the unmanned aircraft; a time mark; and an indication of the emergency status of the unmanned aircraft. The requirement to broadcast the remote identification message elements applies from takeoff to shutdown of the unmanned aircraft. The message elements for standard remote identification unmanned aircraft are discussed in more detail in section VIII.A of this

preamble. The minimum performance requirements for standard remote identification unmanned aircraft are discussed in more detail in section VIII.B of this preamble.

The FAA adopts design and production requirements for standard remote identification unmanned aircraft in subpart F of part 89. The production requirements are meant to help a person comply with the operational requirements that apply to standard remote identification unmanned aircraft. The Agency intends for compliance with the remote identification requirements to be simple and straightforward for individuals operating standard remote identification unmanned aircraft produced in accordance with an FAA-accepted means of compliance. For example, a standard remote identification unmanned aircraft must automatically broadcast the remote identification message elements, and its design must prohibit it from taking off if the broadcast equipment is not functional.

iv. Serial Number Requirements

A person may operate a standard remote identification unmanned aircraft if its serial number is listed on an FAA-accepted declaration of compliance, or the standard remote identification unmanned aircraft is covered by a design approval or production approval issued under part 21.

The serial number issued to the standard remote identification unmanned aircraft must be included in the application for registration of the unmanned aircraft under part 47 or 48 and may not be duplicative of a serial number associated with a different certificate of aircraft registration. For owners registering small unmanned aircraft exclusively for limited recreational operations under 49 U.S.C. 44809, more than one serial number may be included on a single Certificate of Aircraft Registration. The registration requirements that apply to standard remote identification unmanned aircraft are discussed in more detail in section XV of this preamble. Alternatively, the serial number of the unmanned aircraft must be provided to the FAA in a notice of identification pursuant to § 89.130 prior to the operation. The requirements that apply to foreign registered

civil unmanned aircraft operating in the airspace of the United States are discussed in section XVI of this preamble.

2. Public Comments and FAA Response

Comments: The Air Line Pilots Association, International mentioned that only standard remote identification UAS should be permitted to access LAANC airspace.

FAA Response: Considering the requirement for all unmanned aircraft to broadcast remote identification information, the FAA finds that access to controlled airspace via the LAANC process does not require additional restrictions.

Comments: Some commenters strongly supported the requirement for standard remote identification UAS to transmit via a network and broadcast, noting that each system has strengths that address the other system's weaknesses to support safety, security, and future operational capabilities. Others supported the standard remote identification UAS requirements provided the rule maintains the option to continue to operate when there is no connection to the Internet or transmission to a Remote ID USS.

FAA Response: For the reasons explained in section VII.A of the preamble, the FAA has decided to eliminate the network-based requirements from this rule at this time. Accordingly, in accordance with § 89.110(a), standard remote identification unmanned aircraft must broadcast the remote identification message elements directly from the unmanned aircraft.

Comments: Some commenters suggested the FAA consider requiring operators to comply with either a broadcast or a network requirement, but not both, unless requiring both is necessary for specific operations such as BVLOS. Commenters suggested the requirement to simultaneously broadcast remote identification data that is transmitted to the network does not add any substantial public safety or security benefit.

FAA Response: The FAA is not adopting the requirement to transmit message elements through the Internet to a Remote ID USS in this rule. While the FAA recognizes the potential benefits of network remote identification, as stated by several commenters, the FAA believes a

broadcast-only solution is sufficient, at this time, to maintain the safety and security of the airspace of the United States. The FAA agrees with the commenters who proposed that a broadcast-only solution is sufficient at this time to provide the required remote identification message elements to support typical unmanned aircraft operations and satisfy security concerns.

D. Remote Identification Broadcast Modules

1. Discussion of the Final Rule

This rule finalizes the regulatory framework that allows persons to equip unmanned aircraft with remote identification broadcast modules to enable them to identify remotely. *See* § 89.115(a) of this rule. As previously mentioned in section VII.D of this preamble, the remote identification broadcast module concept is a retrofit option that replaces the limited remote identification UAS regulatory framework of the proposed rule and provides flexibility to operators of unmanned aircraft that do not meet the requirements for standard remote identification unmanned aircraft. The concept allows unmanned aircraft built without remote identification (e.g., existing unmanned aircraft fleet, home-built unmanned aircraft) to be operated outside of FAA-recognized identification areas because the broadcast modules enable the unmanned aircraft to broadcast the remote identification message elements required by this rule. Through this regulatory framework, the FAA is also allowing a pathway for existing unmanned aircraft that have certain broadcast capabilities and equipment already integrated to be upgraded to meet the requirements of a remote identification broadcast module.

The FAA decided to incorporate this concept into this rule after reviewing public comments and considering the significant concerns raised with respect to the limited remote identification UAS framework. The FAA determined a remote identification broadcast module facilitates compliance with this rule and, at this time, meets the safety and security needs of the FAA, national security agencies, and law enforcement. The concept is broadcast-based and does not require a person to connect to the Internet to identify remotely, as the limited remote

identification UAS proposal did. This shift allows unmanned aircraft with remote identification broadcast modules to operate in areas where the Internet is unavailable. In addition, by making this a broadcast solution, the FAA has determined that the 400-foot range limitation included in the proposed requirements for limited remote identification UAS is no longer warranted and has removed the design constraint. However, the FAA has determined that persons manipulating the flight controls of UAS where the unmanned aircraft is equipped with remote identification broadcast modules must be able to see the unmanned aircraft at all times throughout the operation. Commenters generally supported a visual line of sight requirement for unmanned aircraft operations that do not meet the requirements for standard remote identification unmanned aircraft and therefore FAA is incorporating the restriction into the operating requirements for unmanned aircraft with remote identification broadcast modules.[19]

The requirements for unmanned aircraft with remote identification broadcast modules are discussed below.

i. Use of Remote Identification Broadcast Modules

The FAA adopts the requirements in § 89.115(a) for the operation of unmanned aircraft equipped with remote identification broadcast modules. A person may equip an unmanned aircraft with a remote identification broadcast module by securing or integrating a remote identification broadcast module to the unmanned aircraft or by other means (e.g., software upgrade). The operating requirements for unmanned aircraft equipped with remote identification broadcast modules are the same irrespective of how the broadcast module is secured to the unmanned aircraft or integrated into the unmanned aircraft.

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[19] The FAA emphasizes that this rule does not relieve any existing visual-line-of-sight requirements. *See, e.g.,* 49 U.S.C. 44809(a)(3); 14 CFR 107.31 and 107.33. The purpose of the visual-line-of-sight provision of this rule is to impose a separate visual-line-of-sight requirement on unmanned aircraft operated with remote broadcast modules to ensure that these aircraft are operated within visual line of sight even if the existing operating requirements are changed through future integration efforts.

Remote identification broadcast modules allow operators of unmanned aircraft without remote identification (e.g., existing unmanned aircraft and unmanned aircraft excepted under § 89.501(c) from the design and production requirements of this rule) to operate outside of an FAA-recognized identification area. For example, a home-built unmanned aircraft can be produced without remote identification and can be operated without remote identification in an FAA-recognized identification area. However, if an operator wishes to operate a home-built unmanned aircraft outside of an FAA-recognized identification area, he or she can do so by equipping the unmanned aircraft with a remote identification broadcast module.

A person may use an unmanned aircraft equipped with a remote identification broadcast module in operations conducted under any operating rule (e.g., limited recreational operations conducted under 49 U.S.C. 44809, or operations conducted under part 91, part 107, part 135, or any other operating part). However, as discussed below, operations of unmanned aircraft equipped with remote identification broadcast modules are limited to visual line of sight of the person manipulating the flight controls of the UAS.

ii. Remote Identification Equipment and Message Elements

The operator of an unmanned aircraft with a remote identification broadcast module must ensure that the remote identification broadcast module is broadcasting the message elements listed in § 89.315 of this rule and that the remote identification broadcast module is listed on an FAA-accepted declaration of compliance. The message elements broadcast by remote identification broadcast modules include a unique identifier; an indication of the unmanned aircraft latitude, longitude, and geometric altitude; an indication of the unmanned aircraft take-off location latitude, longitude, and geometric altitude; an indication of the unmanned aircraft velocity; and a time mark. The requirement to broadcast the remote identification message elements applies from takeoff until shutdown of the unmanned aircraft.

The remote identification broadcast module message elements are identical to those for standard remote identification unmanned aircraft, with the exception of the unmanned aircraft

take-off location and altitude, which replaces the control station location and altitude, and the emergency status which is only a required message element for the standard remote identification unmanned aircraft. The take-off location and altitude indications are intended to provide an approximate location of the UAS operator, based on an expectation that the UAS operator is located in close proximity to the unmanned aircraft take-off location and altitude. The FAA believes this is an appropriate assumption for VLOS operations. The requirement to indicate the take-off location and altitude enables the retrofit installation of remote identification broadcast modules on unmanned aircraft because the take-off location and altitude can be measured by a stand-alone broadcast module without any dependency on external systems or equipment.

Further, the FAA is not requiring that an unmanned aircraft with a remote identification broadcast module broadcast an indication of the emergency status of the unmanned aircraft. To indicate an emergency status, the remote identification equipment would likely need to be integrated into the unmanned aircraft and designed to recognize specific aircraft failure modes or off-nominal situations. Because remote identification broadcast modules can be installed on existing unmanned aircraft with different characteristics, the FAA finds that an emergency status indication for remote identification broadcast modules presents too many technological challenges to require at this time.

The message elements and minimum performance requirements for remote identification broadcast modules are discussed in more detail in section IX of this preamble.

iii. Broadcast Module Installation and Instructions

As previously mentioned, this rule allows a person to use an unmanned aircraft equipped with a remote identification broadcast module. The person installing the remote identification broadcast module must perform the retrofit in accordance with the instructions provided by the producer of the remote identification broadcast module to ensure that the broadcast module is

compatible with the unmanned aircraft, that the installation is completed successfully, and that the remote identification functionality is compliant with all the requirements of this rule.

iv. Serial Number Requirements

The producer of remote identification broadcast modules must issue each module a serial number that complies with ANSI/CTA-2063-A in accordance with § 89.505. The serial number must be listed on an FAA-accepted declaration of compliance.

The serial number must be included in the application for registration of the unmanned aircraft under part 47 or 48 and may not be duplicative of a serial number associated with a different certificate of aircraft registration. For owners registering small unmanned aircraft exclusively for limited recreational operations under 49 U.S.C. 44809, more than one serial number may be included on a single Certificate of Aircraft Registration. The registration requirements that apply to unmanned aircraft with remote identification broadcast modules are discussed in more detail in section XV.A of this preamble. Foreign registered civil unmanned aircraft must provide the serial number of the unmanned aircraft or remote identification broadcast module to the FAA in a notice of identification pursuant to § 89.130 prior to the operation in the airspace of the United States. The requirements that apply to foreign registered civil unmanned aircraft operating in the airspace of the United States are discussed in section XVI of this preamble.

v. Operations restricted to Visual Line of Sight

Operations of unmanned aircraft with remote identification broadcast modules must be conducted so that the person manipulating the flight controls of the UAS is able to see the unmanned aircraft at all times throughout the operation. Commenters generally supported a visual line of sight requirement for unmanned aircraft operations that do not meet the requirements for standard remote identification unmanned aircraft and therefore the FAA is

incorporating the restriction into the operating requirements for unmanned aircraft with remote identification broadcast modules.

2. Public Comments and FAA Response

Comments: Many commenters recommended that the FAA permit an add-on component or module that comes from an FAA-approved manufacturer. These commenters recommended permitting stand-alone broadcast modules that could be serialized to enable off the shelf solutions and lower the cost for existing UAS and amateur-built UAS to meet the remote identification requirements via broadcast, network, or both. Some suggested a beacon or broadcast remote identification requirement with no network requirement.

Many commenters suggested the FAA allow remote identification add-on equipment that can be mounted on UAS that were originally manufactured without remote identification. Many commenters also recommended permitting modules that could be registered to a specific user and swapped between multiple UAS so existing UAS and amateur-built UAS can meet remote identification requirements. One commenter suggested the FAA move forward with a simple and minimally burdensome solution such as an add-on broadcast module for limited remote identification UAS instead of the proposed requirements. Another commenter suggested allowing the use of an external broadcast module that could be changed as technology changes or additional airspace is available and noted that the European Union and France permit external modules.

Many commenters supported a broadcast remote identification option that would permit operations in areas with no Internet access or in the event of Remote ID USS outages.

The National Transportation Safety Board noted that broadcast remote identification may support aircraft-to-aircraft collision avoidance capability, but it was unclear whether a network remote identification could as well.

FAA Response: The FAA agrees with public comments and has revised this rule to include the remote identification broadcast module concept. An unmanned aircraft produced,

built, or assembled without remote identification can now be equipped with a remote identification broadcast module that broadcasts the message elements required by this rule. Since an unmanned aircraft with a remote identification broadcast module is able to identify remotely, the unmanned aircraft can be operated outside of an FAA-recognized identification area.

E. Other Broadcast Requirements Applicable to Standard Remote Identification Unmanned Aircraft and Unmanned Aircraft with Remote Identification Broadcast Modules

1. Broadcast Directly from the Unmanned Aircraft

i. Discussion of the Final Rule

This rule requires standard remote identification unmanned aircraft and unmanned aircraft with remote identification broadcast modules to broadcast the remote identification message elements directly from the unmanned aircraft.

ii. Public Comments and FAA Response

Comments: Several commenters suggested permitting the control station to broadcast the required message elements.

FAA Response: The FAA does not agree with commenters because of the likelihood of decreased reception range caused by terrain or ground obstacles. In addition, if the unmanned aircraft were to go outside the range of the remote identification broadcast from the control station, persons near the unmanned aircraft may not be able to identify it. Therefore, the FAA maintains the requirement that the remote identification message elements must be broadcast directly from the unmanned aircraft.

2. Broadcast from Takeoff to Shutdown

i. Discussion of the Final Rule

The FAA proposed that a person would be able to operate a UAS with remote identification only if the UAS sends the remote identification message elements from takeoff to

shutdown. The FAA requested comments regarding when automatic Remote ID USS connections should be required. Though the Remote ID USS connection is no longer required in this rule, the responses were instructive and helped inform the Agency's decision to modify the requirement, as it applies to the broadcast of message elements by standard remote identification unmanned aircraft and remote identification broadcast modules.

The FAA is finalizing this rule to require the broadcast of message elements directly from the unmanned aircraft from takeoff to shutdown.

ii. Public Comments and FAA Response

Comments: Commenters stated the remote identification requirements should only apply for the duration of the flight and should not apply to unmanned aircraft that are active but not flying. Many of these commenters cited difficulties in performing maintenance on unmanned aircraft if the connection was required at power up when the UAS is not intended to be flown. One individual suggested the connection requirement should apply when the unmanned aircraft is in motion.

Many commenters offered options to the proposed requirement. They proposed requiring UAS to broadcast from takeoff to landing, from start up to shutdown, and start up to landing. The responses were generally divided into two main considerations: when the UAS should start to broadcast and when it should cease to broadcast.

Commenters who believed the UAS should transmit the message elements from the time the UAS is started up mentioned that a certain amount of time is needed to establish connectivity to the network. Some suggested there is a need or value for law enforcement to gain awareness of the operation prior to flight. Others mentioned a UAS should not be required to broadcast any message elements while powered on, as long as actual flight is not intended or commenced (e.g., when a person powers on the UAS to conduct maintenance or download data.)

Some commenters believed the UAS should continue to broadcast until the UAS lands while others believed it should broadcast until the UAS is shutdown. Those supporting the

landing cutoff noted the unmanned aircraft is no longer in the airspace of the United States upon landing and there is no longer a safety risk because the unmanned aircraft is no longer in the air. They also mentioned a person may want to keep the power on (e.g., to conduct maintenance or download data) for some time prior to shutdown. Other commenters mentioned the broadcast should end upon shutdown because it would grant additional time for law enforcement and other security partners to locate the unmanned aircraft, after it lands, which could help identify an operator.

FAA Response: The FAA agrees with comments supporting a broadcast requirement that begins at takeoff rather than start up because different unmanned aircraft have different startup sequences and may not all be capable of broadcasting remote identification elements at the same point in their startup process. Takeoff is the first part of an unmanned aircraft operation that is common to all unmanned aircraft, which is why FAA has decided to tie the requirement to begin broadcasting to takeoff. In addition, unmanned aircraft are often powered on for purposes other than flight, such as conducting maintenance or configuring the unmanned aircraft hardware and software. Finally, unmanned aircraft that are powered on indoors, where maintenance typically occurs, would likely not be able to generate some of the remote identification message elements, making such a requirement ineffective.

The FAA also agrees with comments supporting the extension of the broadcast requirement until the unmanned aircraft is shutdown because the additional data can assist the Agency and law enforcement to identify unmanned aircraft or operators engaged in unsafe or illegal operation. The FAA does not agree with commenters that believe once an unmanned aircraft lands there is no longer the potential for safety risk because in many cases, the safety risk is the result of careless or clueless operators that will continue the potentially unsafe behavior without FAA or law enforcement intervention. Requiring unmanned aircraft to broadcast the message elements until the unmanned aircraft is shutdown provides additional time for the FAA or law enforcement to locate an unmanned aircraft operator, even after the unmanned aircraft has

landed. Therefore, after reviewing public comments and giving further consideration, the FAA decided to modify the proposal and adopts the requirement so unmanned aircraft must broadcast the required message elements from takeoff to shutdown.

3. In-flight Loss of Remote Identification Broadcast

i. Discussion of the Final Rule

A standard remote identification unmanned aircraft must perform a self-test and provide a notification to the person manipulating the flight controls of the UAS if the remote identification equipment is not functioning properly. In addition, a standard remote identification unmanned aircraft must be designed to not take off if it fails the self-test.

A remote identification broadcast module must also perform a self-test and provide a notification to the person manipulating the flight controls of the UAS if the remote identification equipment is not functioning properly. Unmanned aircraft operators may only use remote identification broadcast modules that pass the self-test.

Both standard remote identification unmanned aircraft and remote identification broadcast modules must continuously monitor their performance while in use and provide an indication if the remote identification equipment is not functioning properly. If the remote identification equipment provides an indication of failure or malfunction during flight, the unmanned aircraft operator must land the unmanned aircraft as soon as practicable. The FAA notes that it does not expect unavailability of GPS or other types of location services (as the rule does not require GPS specifically) to result in a notification to the unmanned aircraft operator nor require the operator to land the unmanned aircraft as soon as practicable. The FAA expects that means of compliance will stipulate that only equipment failures or malfunctions would trigger a notification to the operator that the unmanned aircraft was no longer broadcasting the message elements.

When determining how and when to land the unmanned aircraft as soon as practicable, the FAA expects the person manipulating the flight controls of the UAS to operate in a manner that minimizes risk to other users of the airspace and people and property on the ground, while using aeronautical decision making to quickly and safely land the unmanned aircraft at a suitable landing area. The FAA recommends including UAS remote identification contingency planning, including plans for landing as soon as practicable, as part of a pre-flight assessment.

ii. Public Comments and FAA Response

Comments: Many commenters recommended clarification of the proposed requirement to "land as soon as practicable" in the event that remote identification information does not transmit or broadcast. Many other commenters noted it is more appropriate to notify the operator that remote identification equipment is not working properly than to forcibly ground a UAS by design.

To reduce the need for case-by-case authorizations, the Association of American Railroads and the United States Rail Subsidiaries of the Canadian National Railway Company requested amending proposed § 89.110(b) to state that "land as soon as practicable" does not apply when remote identification cannot be transmitted because there is a potential to interfere with critical communication systems, when law enforcement is responding to an emergency situation, disaster response, critical infrastructure protection, or in other situations with the potential to jeopardize public safety. Commenters suggested permitting emergency operations with specific stipulations, such as operating within VLOS, determining there is no undue risk to persons or property on the ground or risk to UAS or manned aircraft in flight, and notifying local law enforcement. A few commenters were concerned that improper application of these requirements would result in automatic power shut down in flight.

FAA Response: The requirement to "land as soon as practicable" does not require an immediate landing upon notification of a failure of the broadcast equipment, but instead requires remote pilots to use aeronautical decision making to quickly and safely land the unmanned

aircraft while considering the suitability of the landing area and the safety of other aircraft, as well as persons and property on the ground.

While there may be some operations, such as emergency or disaster response, where continued unmanned aircraft operations, even in the presence of a broadcast equipment failure, may provide significant societal benefit, the FAA does not find that any particular activity warrants a specifically stated exception in the regulation from the requirement to land as soon as practicable. Instead, authorizations may be granted on a case-by-case basis if there is sufficient justification and an acceptable level of safety.

F. Unmanned Aircraft without Remote Identification

1. Discussion of the Final Rule

The FAA proposed to allow unmanned aircraft without remote identification capabilities to operate in specific areas, referred to as FAA-recognized identification areas, or under a deviation authority granted by the Administrator. The FAA adopts the substance of this requirement with minor adjustments. Accordingly, the vast majority of unmanned aircraft operated in the airspace of the United States must identify remotely; however, unmanned aircraft without remote identification may operate if they meet certain requirements. Mainly, the operation of unmanned aircraft without remote identification is allowed: 1) under § 89.115(b) if the person manipulating the flight controls of the UAS is able to see the unmanned aircraft at all times throughout the operation, and within the boundaries of an FAA-recognized identification area; or 2) under § 89.120 when the Administrator authorizes operations without remote identification where the operation is solely for the purpose of aeronautical research or to show compliance with regulations.

2. Operations at FAA-recognized identification areas

A person may operate an unmanned aircraft without remote identification if that operation is within the boundaries of an FAA-recognized identification area and the person

manipulating the flight controls of the UAS is able to see the unmanned aircraft at all times throughout the operation. As the FAA explained in the NPRM, the phrase "operated within an FAA-recognized identification area" means that both the unmanned aircraft and the person manipulating the flight controls of the UAS must be located within the boundaries of the FAA-recognized identification area from takeoff to landing. However, this rule does not allow for the remote identification capability to be disabled, unless otherwise authorized by the Administrator. Therefore, a person operating a standard remote identification unmanned aircraft or an unmanned aircraft with a remote identification broadcast module must continue to identify remotely when operating in an FAA-recognized identification area.

i. Public Comments regarding operations at FAA-recognized identification areas

Many commenters agreed with the concept of FAA-recognized identification areas. Others expressed concerns, however, that the FAA-recognized identification areas would be too limited to address adequately the needs of hobbyists who primarily fly amateur-built or home-built UAS. The commenters noted that these operators tend to have dozens of UAS, many of which do not have navigation equipment to determine location. Commenters also expressed concerns about increased cost of travel and membership in national and local community-based organizations. Many commenters, including commercial operators, modelers, UAS racers, and educational groups, believed the FAA-recognized identification areas would be the only option for certain persons to continue to fly UAS and stated the cost of upgrading a UAS to one with built-in remote identification could be cost prohibitive.

Many commenters expressed concerns that they will be confined to operating their existing UAS at an FAA-recognized identification area due to prohibitions or complexities of adding remote identification equipment to their existing UAS. Commenters expressed concerns about continued operations of existing UAS, particularly for recreational users operating under current rules, and asked the FAA to consider how to provide a cost-effective path to compliance, or otherwise "grandfather" those UAS, including amateur-built UAS and model aircraft, to

support operations outside of FAA-recognized identification areas and otherwise prevent obsolescence.

Commenters also noted specific types of UAS are not permitted to operate at many existing flying fields that are likely to be FAA-recognized identification areas. These UAS include quad copters, racing UAS, and UAS conducting first person view (FPV) operations. Many commenters noted that crowding a large number of existing unmanned aircraft operators into a limited number of FAA-recognized identification areas could make it difficult to have sufficient space to fly or could increase collision and crash risk due to radio interference and proximity of aircraft when numerous unmanned aircraft are flown at once. The commenters noted the likely number of FAA-recognized identification areas would not provide sufficient capacity to accommodate operations of hundreds of thousands of current UAS that would not be permitted to fly elsewhere. In addition, several commenters noted increased UAS activity and noise at flying fields is likely to increase tension with neighboring communities. Some commenters also noted many existing flying fields have limited hours.

Dragonfly UAS and many other commenters noted many flying fields are consumed by surrounding development and recommended permitting a greater number of FAA-recognized identification areas to be approved over time and at private property sites.

Some commenters expressed concerns that existing recreational flying fields might not be eligible to become FAA-recognized identification areas and that this would negatively affect recreational flyers.

The government of the District of Columbia objected to permitting operations in an FAA-recognized identification area because there would be no mechanism to ensure those UAS without remote identification cannot be operated illegally in other locations. The National Business Aviation Association contended that limiting operations to FAA-recognized identification areas seems unrealistic and unmanageable.

A few commenters objected to relying on FAA-recognized identification areas and questioned whether this requirement would conflict with 49 U.S.C. 44809. Many individual, industry, and organizational commenters recommended eliminating the FAA-recognized identification area concept altogether. Others suggested that the FAA provide alternative paths for existing UAS without remote identification, including recreational UAS and traditional model aircraft, to comply with the remote identification requirements.

Many commenters believed the FAA-recognized identification area concept does not adequately address model aircraft events and other UAS competitions, including those that raise money for charity and impromptu flight events. These commenters noted many events take place in locations that are unlikely to request a designation or that are unlikely to be approved as an FAA-recognized identification area, such as airports serving manned aircraft or other public locations that are likely to be ineligible. Many commenters suggested the FAA implement a simple authorization process for UAS events, with some commenters recommending an application-based request and approval system similar to LAANC. The Drone Racing League noted they would be unable to provide any first-person view racing events in the United States due to the VLOS and FAA-recognized identification area requirements. They also requested the final rule permit commercial UAS events with input and specific authorization by the FAA, similar to other aviation events such as air shows.

Instead of being limited to operating in FAA-recognized identification areas, UAS Colorado recommended allowing community-based organizations to self-verify their fields and permit letters of agreement to operate on airports, and recommended developing a LAANC-style system to allow self-reporting of location for non-compliant UAS as well as organized events that are not in FAA-recognized identification areas.

ii. FAA Response

The FAA does not agree with the feedback from commenters who believe FAA-recognized identification areas are unnecessary to accommodate operations of unmanned aircraft

without remote identification or believe there are better pathways for accommodating the operation of UAS without remote identification. Other proposals for enabling operations without remote identification do not enable an observer to determine readily which unmanned aircraft are expected to be broadcasting, and which are not. The Agency determined there is a need for a space for unmanned aircraft without remote identification to continue to operate and therefore adopts a policy to allow operations of unmanned aircraft without remote identification when operated within the boundaries of an FAA-recognized identification area and within visual line of sight.

To address the commenters who expressed concerns with the policy that limited the types of entities that could request to establish an FAA-recognized identification area and the available time for making such requests, this rule expands the types of entities that can apply for the establishment of FAA-recognized identification area and removes the deadline for applications. These changes are discussed in sections XII.B and XII.C of the preamble. The FAA is effecting these changes in response to concerns regarding the availability and utility of FAA-recognized identification areas that allow continued operations of unmanned aircraft without remote identification. In addition, the FAA believes the concept incorporated into this rule allowing unmanned aircraft to equip with remote identification broadcast modules provides a practical way for unmanned aircraft without remote identification to be upgraded or modified to meet the remote identification requirements, which reduces the need to operate at FAA-recognized identification areas.

FAA-recognized identification areas are locations where unmanned aircraft without remote identification can operate, but these areas are not limited to only unmanned aircraft without remote identification; other unmanned aircraft may also be operated in these areas to the extent otherwise permitted in accordance with all applicable regulations. Therefore, unmanned aircraft with remote identification can also be operated within the boundaries of an FAA-recognized identification area.

Though FAA-recognized identification areas would not be authorized for temporary use, the FAA expects that instances such as air shows or temporary drone racing events would be handled, where warranted, through authorization from the Administrator to deviate from the remote identification operating rules.

3. Operations for Aeronautical Research

The second way a person can operate an unmanned aircraft without remote identification is pursuant to an authorization from the FAA Administrator for the purpose of aeronautical research or to show compliance with regulations. As explained in the NPRM, the FAA considers aeronautical research to be limited to the research and testing of the unmanned aircraft, the control systems, equipment that is part of the unmanned aircraft (such as sensors), and flight profiles, or development of specific functions and capabilities for the UAS. Producers and other persons authorized by the Administrator have the ability to operate unmanned aircraft prototypes without remote identification exclusively for researching and testing the unmanned aircraft design, equipment, or capabilities; or to conduct research, development, and testing necessary for UAS infrastructure, systems, and technologies, including but not limited future UTM and United States Government counter-UAS capabilities. A person may also be authorized by the Administrator to conduct flight tests and other operations with non-compliant remote identification equipment to show compliance with an FAA-accepted means of compliance for remote identification or airworthiness regulations. These types of unmanned aircraft operations could include flights to show compliance for issuance of type certificates and supplemental type certificates, flights to substantiate major design changes, and flights to show compliance with the function and reliability requirements of the regulations. This deviation authority does not extend to any other type of research using an unmanned aircraft.

As discussed in section XIV.B.5, UAS designed or produced exclusively for the purpose of aeronautical research are excepted from the production requirements of subpart F of this rule. The production exceptions are discussed in section XIV.B of this preamble.

i. Public Comments regarding operations for aeronautical research

Though some commenters objected to allowing UAS without remote identification to operate outside of FAA-recognized identification areas for only aeronautical research purposes, many organizations, companies, and individual commenters generally supported the concept, with numerous suggestions to ensure research, development, and innovation are not unnecessarily restricted. Other commenters noted that only permitting aeronautical research was unnecessarily stifling for UAS research initiatives that are ongoing in multiple fields, such as forestry, wildlife biology, geology, agriculture, hydrology, and other fields utilizing geographic information systems.

Some commenters suggested adding exceptions to accommodate education, such as training students, model airshows, and other educational events. Ax Enterprize mentioned that work testing UAS situation awareness systems should be permitted. Wing Aviation recommended the FAA to outline factors that weigh in favor of this authorization, such as a controlled access location with effective mitigations to ensure operation containment. SRP Aero asked how long it will take to grant an authorization to permit test flights of prototype UAS. A commenter from Evergreen State College asked the FAA to consider permitting research and emergency operations in remote areas.

The Association for Unmanned Vehicle Systems International, the General Aviation Manufacturers Association, the University of Maryland UAS Test Site, and the University of Alabama in Huntsville requested that the FAA specifically clarify what kinds of operations qualify under the "aeronautical research" exception to ensure it is not too restrictive, such as development activities, non-production and experimental prototypes, avionics interfaces, and concept of operations development. AiRXOS, the Commercial Drone Alliance, FlyGuys Inc., and others requested that commercial research be expressly listed as permitted under "aeronautical research," and requested the FAA to clarify that research conducted in an FAA-recognized identification area does not require FAA approval. To prevent the restriction of

research activities, the University of Texas - Austin recommended expanding the aeronautical research exception to cover other educational uses, and the Small UAV Coalition recommended expanding this exception to include commercial and academic research and development activities. Verizon and Skyward suggested FAA approval should not be required for research activities and suggested permitting FAA-recognized identification area applications for the purpose of research, development, testing, and product evaluation.

ii. FAA Response

In this rule, the FAA adopts the deviation authority to allow persons authorized by the Administrator to conduct operations without remote identification where the operation is solely for the purpose of aeronautical research or to show compliance with regulations. At this time, the FAA has decided that there is no need to expand the types of operations that qualify for a deviation from the operating rules and notes that the examples provided by commenters (e.g., non-aeronautical research, data collection, or educational activities) can be conducted using unmanned aircraft with remote identification, or using unmanned aircraft without remote identification at an FAA-recognized identification area.

The FAA envisions that UAS operated for aeronautical research would typically be experimental, prototype, or testbed systems operated for specific purposes under special operating conditions and limited durations. These types of unmanned aircraft are not typically available to the general public for purchase or use.

The FAA does not believe it is necessary to provide additional information regarding what types of operations constitute “aeronautical research” beyond what was provided in the NPRM and this rule. FAA notes that intending to conduct aeronautical research simply authorizes the operator to apply for a deviation; if requests for a deviation show confusion as to the meaning of this term in spite of the guidance in this rule, FAA may issue additional guidance at that time.

VIII. Message Elements and Minimum Performance Requirements: Standard Remote Identification Unmanned Aircraft

The FAA proposed certain requirements for remote identification message elements and minimum performance requirements for standard remote identification UAS. The FAA adopts those requirements with the changes and adjustments described below.

A. Message Elements for Standard Remote Identification Unmanned Aircraft

The FAA proposed requiring certain minimum message elements necessary to meet the objectives of this rule. The proposed message elements were: (1) the UAS Identification; (2) an indication of the control station's latitude and longitude; (3) an indication of the control station's barometric pressure altitude; (4) an indication of the unmanned aircraft's latitude and longitude; (5) an indication of the unmanned aircraft's barometric pressure altitude; (6) a time mark; and (7) an indication of the emergency status of the UAS.

After reviewing public comments and further consideration, the FAA adopts the seven message elements proposed with some modifications and adds an eighth message element: velocity. The FAA explains these requirements, including changes from the NPRM, in the following subsections.

1. Unmanned Aircraft Unique Identifier

i. Discussion of the Final Rule

The NPRM discussed that the UAS Identification message element establishes the unique identity of UAS operating in the airspace of the United States. The FAA proposed that this message element would consist of one of the following: 1) a serial number assigned to the unmanned aircraft by the person responsible for the production of the standard remote identification UAS; or 2) a session identification number (session ID) assigned by a Remote ID USS.

The FAA proposed to allow UAS operators to use a session ID assigned by a Remote ID USS as the UAS Identification instead of the unmanned aircraft serial number. The FAA explained that the association between a given session ID and the unmanned aircraft serial number would not be available to the public through the broadcast message. This association would be available to the issuing Remote ID USS, the FAA, and other authorized entities, such as law enforcement. Where a session ID would have been issued, the FAA explained that the Agency and authorized entities would have the means to correlate the session ID to the UAS serial number and would consequently be able to correlate the unmanned aircraft serial number to its registration data. The FAA also proposed that a UAS would be designed to broadcast its serial number regardless of whether the unmanned aircraft has been registered or not.

The FAA adopts the UAS Identification message element concept, but instead uses the more general term "unique identifier" in this rule and clarifies that the unique identifier is applicable to the unmanned aircraft and not the UAS. However, because the FAA has eliminated the Remote ID USS-related requirements, the FAA plans to develop an alternative strategy for assignment of session ID to UAS operators. The FAA is retaining the concept that the session ID will be uniquely identifiable such that law enforcement and the FAA will be able to correlate each session ID to a specific unmanned aircraft serial number, but that this ability will not be publicly available. The FAA will consider existing policies, such as the Privacy ICAO Address (PIA) program for aircraft equipped with ADS-B Out, when developing the session ID policy.

ii. Public Comments and FAA Response

Comments: Many commenters expressed support for the session ID concept to protect the privacy of operations while deterring irresponsible operators. Pierce Aerospace recommended a unique session ID be created by default to protect privacy. Qualcomm and Streamline Designs both supported session IDs assigned by a Remote ID USS but suggested permitting the operator to cycle through a set of temporary IDs or have a session ID assigned with a time limit rather

than requiring a unique session ID for each flight, to minimize the burden of assigning unique identifiers for short flights typical of many UAS.

Kittyhawk supported the concept of assigning a session ID, and submitted survey data showing the importance of privacy for the majority of those pilots surveyed. Sky Eye Network recommended permitting the session ID option without an additional charge for operators due to the required Remote ID USS subscription to receive a session ID. The News Media Coalition supported the session ID concept to protect the privacy of journalists operating UAS, but was concerned about how to generate a unique session ID when operating in an area with no Internet availability.

Some commenters, including the New Hampshire Department of Transportation and Unifly, suggested permitting registration numbers to be broadcast or transmitted for aircraft identification as well as serial numbers or session ID while controlling access to the UAS and pilot registration database, similar to vehicle license plates and current manned aircraft requirements. Unifly also noted that this would be consistent with European Regulation 2019/945 and the ASTM F3411-19 Standard Specification for Remote ID and Tracking.

One commenter was concerned about the requirement to broadcast or transmit the serial number as it may be difficult to keep the same serial number due to quality control issues in the event of major repairs to the UAS, such as repairs to the UAS or control station transmitters, or other parts.

AiRXOS and Motorola supported the session ID concept for most missions, but further recommended developing a “trusted user” process to allow law enforcement to flag missions for which Remote ID USS should not provide information to the general public. The Alabama Department of Transportation and the District of Columbia office of the Deputy Mayor for Public Safety and Justice commented that while session ID offers privacy to the UAS operator, it could be a hindrance for identification that unscrupulous operators may exploit, which may negate the security benefit.

Airlines for America (A4A) opposed the option for Remote ID USS to issue and assign session IDs. A4A thought session ID was not justified, stating that the combination of session ID and the UAS pilot being at a different location than the UAS provided additional privacy for UAS operators than other airspace users, which may be a disincentive to safe operating practices. Several other commenters suggested that the Session ID option could reduce accountability and inadvertently increase unsafe and irresponsible operations due to the added privacy.

The American Civil Liberties Union noted that session ID will not shield individuals from tracking by the government but will likely shield corporate operators from public scrutiny by removing public ability to track a UAS across multiple flight sessions. They suggested permitting session ID for individuals but not commercial operators, and that government UAS be subject to a higher level of scrutiny and disclosure. The Electronic Privacy Information Center (EPIC) suggested the FAA avoid session IDs to reduce potential UAS identification problems for the public and ensure that UAS identity is not masked.

FAA Response: Many commenters provided suggestions on how to implement the session ID concept, including cost models, how operators could use a session ID, or how Remote ID USS could issue them. The FAA finds that the performance-based requirements allow the unmanned aircraft community to innovate and find the solutions that work best but still meet the safety and security objectives of the rule.

Some commenters suggested the registration number also be allowed as a UAS Identification message element. The addition of the registration number would likely require operator input and be susceptible to misuse, omission, or errors, and would require validation by an external system and require the external system to have access to registration information, which would create privacy and security concerns. As noted by a commenter, sharing of the registration data might lead others to misuse that information. Hence, the FAA finds that adding the registration number to the identification message element does not provide enough benefits to warrant the added complexity and potential for misuse of its addition.

An individual commenter noted the difficulty of having the unmanned aircraft and control station both transmit the same serial number if a repair was needed that necessitated the remote identification equipment of one element needing replacement. The FAA expects that standard remote identification unmanned aircraft will incorporate remote identification equipment that is highly integrated into the various unmanned aircraft components. Therefore, such repair actions would be undertaken by a specialist or someone trained by the manufacturer and that person would be capable of ensuring the proper functionality of the remote identification equipment post repair.

The FAA agrees with many commenters that the session ID option strikes a balance between protecting the privacy of individual operations while still deterring irresponsible operators. The public can use remote identification messages with a session ID to report suspicious UAS operations to law enforcement, and law enforcement can, in coordination with the FAA, establish the identity of the responsible persons. The FAA agrees with commenters that session IDs must be traceable to enable the FAA and authorized entities to know the corresponding unmanned aircraft serial number or registration number for each individual session ID. The FAA does not agree, however, that session ID be the default option, and instead finds that both session ID and the serial number are equally acceptable. Thus, industry and individual operators are free to choose the option that best meets their needs.

The FAA proposed that a session ID would be assigned by a Remote ID USS. Because this rule does not retain the requirement for standard remote identification unmanned aircraft to have an Internet connection to a Remote ID USS, the FAA plans to develop an alternative strategy for assignment of session ID to unmanned aircraft operators. The FAA will consider existing policies, such as the Privacy ICAO Address (PIA) program for aircraft equipped with ADS-B Out, when developing the session ID policy. Pursuant to the Department of

Transportation's procedures regarding significant guidance documents,[20] FAA will seek public comment on the session ID policy prior to finalizing it.

2. An Indication of the Control Station's Latitude and Longitude

i. Discussion of the Final Rule

The FAA proposed that standard remote identification UAS broadcast and transmit to a Remote ID USS the latitude and longitude of its control station. The FAA did not propose a specific type of position source used to determine this information, to allow the greatest flexibility to designers and producers of UAS. The FAA proposed to require that the person manipulating the flight controls of the UAS be co-located with the control station; therefore, knowing the control station location would also provide the location of the person manipulating the flight controls of the UAS. This message element would be used by the FAA and authorized entities to locate the UAS operator when necessary for the safety, security, or efficiency of aircraft operations in the airspace of the United States. The FAA adopts this message element as proposed.

ii. Public Comments and FAA Response

Comments: A significant number of commenters, representing manned and unmanned aviation, manufacturers, users of unmanned aircraft, some State and local law enforcement agencies, and numerous individuals opposed the proposed requirement to provide the location of the control station to the public and cited a number of reasons including ensuring the safety of the person manipulating the flight controls of the UAS. Commenters expressed concerns about the privacy of their operations and that this information could increase the dangers for UAS operators and their property potentially resulting in assault, home invasion, and theft of their UAS and other equipment. Other commenters who opposed providing the ground control station

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[20] *See* 49 CFR 5.41(a).

location provided examples of confrontations, threats (including threats with firearms), and assaults that they or others have received during operations or referenced media reports of incidents involving confrontations, assaults of UAS operators, and people shooting at unmanned aircraft if their location becomes public. Many of these commenters supported the FAA and properly authorized law enforcement or government agencies gaining access to control station location information, but were concerned that making this information available to the public would increase the danger for UAS operators and their property. See section X of this preamble for a discussion of privacy issues raised by commenters, and section XI of this preamble for a discussion of law enforcement access to remote identification information.

Commenters suggested that requiring the control station location would reduce the compliance rate. Others expressed concern for the safety of UAS operations if the remote pilot in command is distracted due to questions or a confrontation from a member of the public who has tracked the pilot using control station location information. Commenters noted that public availability of control station location information is contrary to current practices for manned aircraft pilots, such as locked cockpit doors as well as takeoffs and landings that occur at secure locations on airport property.

Many commenters suggested that instead of making the control station location publicly available, issues regarding UAS operations are best addressed by noting the session ID or operator ID and contacting appropriate law enforcement agencies who can use that information to initiate an investigation. Many commenters suggested that the location of the control station should be encrypted and available only to the FAA and law enforcement but not to the general public, or location data should be degraded or obfuscated if the general public is permitted access. Several commenters were concerned about the safety of UAS operators and other support staff engaged in law enforcement or emergency management operations, and asked the FAA to justify the safety or security reason for the public to have access to the control station location. Many commenters referenced the UAS Identification and Tracking Aviation Rulemaking

Committee (UAS-ID ARC) recommendation that only the unmanned aircraft unique identifier should be available to the public and asked the FAA to explain why that recommendation was discarded.

Some commenters referred to the ASTM F3411-19 Standard Specification for Remote ID and Tracking, which supports making control station location available only to authorized users and permits the use of takeoff location in lieu of control station location. Others referenced international standards with similar requirements. Ax Enterprize suggested that UAS operator contact information is generally preferable to control station location information.

Several commenters expressed alternatives for providing the location of the control station. Instead of providing the control station location as proposed, Digital Aerolus recommended requiring the location of the control station "when available" to permit UAS operations in areas of poor GPS coverage, such as indoors, underground, or under bridges. Qualcomm suggested masking the control station location or assigning a separate session ID to the control station, so that this information is only available to the Remote ID USS, FAA, and law enforcement. The North Carolina Department of Transportation commented that control station location information should be available not only to law enforcement, but also to other first responders so UAS interference can be addressed quickly in emergency response situations such as hurricanes.

The Association for Unmanned Vehicle Systems International broadly supported making operator location publicly available but suggested the FAA consider ways to protect this potentially private or confidential information, such as an opt-out or a trusted operator status that would only reveal the location to law enforcement and government agencies.

FAA Response: While many commenters from a variety of backgrounds opposed the requirement to share the control station location publicly, the FAA finds that the requirement, as proposed, is necessary to meet the core objectives of this rulemaking effort to promote the safety and efficiency of the airspace of the United States. The inclusion of the control station location

enables the remote identification message to create a direct link between an unmanned aircraft and its operator; promoting the accountability inherent in manned aviation. Some commenters raised the issue that the availability of this information could put remote pilots at greater risk of assault, theft, or other crimes. Though the FAA acknowledges the concerns expressed by commenters regarding personal safety, the FAA emphasizes that there are rules against interfering with an aircraft. The FAA finds that removal of the proposed requirement is not the appropriate solution, rather community outreach and other precautions are better suited to tackle these issues. Some commenters noted that sharing of the control station location is counter to the current practice of locking aircraft doors; however, the FAA finds that the analogous and appropriate practice would be to operate from a secure or restricted access location as necessary.

Many commenters suggested the FAA modify the proposed regulation to allow for the control station location to only be available to specific entities such as the FAA and law enforcement. Though some commenters suggested using encryption techniques to accomplish this, the FAA finds that implementation of such a nuanced requirement would be highly complex, costly, and impractical. The FAA does not intend to limit who can receive the broadcast messages, and allowing encryption of certain message elements would limit who can receive the broadcast messages only to those with the capability to decrypt the messages. Allowing encryption is inconsistent with the FAA's policy that the remote identification message elements should be publicly available information. Further, as some commenters suggested, different situations may necessitate certain emergency responders or other individuals to make contact with a remote pilot. In these situations, a privacy or encryption implementation may prohibit the on-scene individuals from having the critically needed information. In addition, an encryption requirement would present technical challenges leading to increased cost and complexity. For example, encryption key management could require standard remote identification unmanned aircraft, broadcast modules, and authorized receivers to have internet connectivity and specialized software, increasing the cost of this rule and potentially creating

cybersecurity vulnerabilities. Therefore, the FAA adopts the control station location requirement as proposed.

The FAA acknowledges that location sensors such as GPS systems have physical limitations such as not being operational in certain urban environments. While some intermittent loss of position data is acceptable, this rule is being finalized in a performance-based manner and the FAA expects that industry will use a variety of inputs (such as GPS and cellular signals) to estimate position such that the unmanned aircraft is able to generate the complete remote identification message in its intended operating environment.

The FAA acknowledges that the UAS industry is rapidly evolving and that unmanned aircraft are controlled using a multitude of methods. The FAA, however, continues to require all unmanned aircraft operating in the airspace of the United States be controllable by a responsible person or remote pilot. Therefore, the FAA adopts this rule in a performance-based manner that allows industry to innovate and use the appropriate solution that meets the requirements, yet is adapted to the control scheme of the particular unmanned aircraft. If the person is controlling the flight through non-physical flight controls, then that person's location would be used as the control station location. For example, if the UAS utilizes a wrist device, then the location of the wrist device could be used as the control station location. For camera tracking technologies, the unmanned aircraft could use its own location estimate plus the same tracking system to calculate the location of the remote pilot.

3. An Indication of the Control Station's Altitude

i. Discussion of the Final Rule

The FAA proposed that standard remote identification UAS have an indication of the control station's barometric pressure altitude, referenced to standard sea level pressure of 29.92 inches of mercury or 1013.2 hectopascals. This information can be used to approximate the control station's height above ground level. Understanding height above ground level is

necessary to help locate an operator in circumstances under which the person manipulating the flight controls of the UAS is not at ground level, such as a person operating a UAS from the roof of a building.

In the NPRM, the FAA considered and rejected a requirement to indicate the control station's geometric altitude, which is a measure of altitude provided by GPS that is not affected by atmospheric pressure. The FAA stated that barometric pressure altitude is a more precise measurement than geometric altitude and is the standard altitude reference for aviation. The FAA requested comments regarding whether both barometric pressure altitude and geometric altitude of the control station should be part of the remote identification message elements.

After considering comments and engaging in further analysis, the FAA is finalizing the requirement that standard remote identification unmanned aircraft include an indication of control station altitude as a required message element, but replaces the requirement to indicate barometric pressure altitude with geometric altitude. There are several reasons for this change from the proposal. First, barometric pressure sensors are not as common on unmanned aircraft control stations as GPS-based altitude sensors, and they also require more calibration, testing, and maintenance. Second, geometric altitude is more compatible with the GPS technologies integrated into smart devices, which are often used as the control station for recreational unmanned aircraft. Third, a performance-based geometric altitude requirement allows industry to use the right combination of technologies to produce a sufficiently accurate altitude estimate for the intended environment. The FAA expects that UAS will use GPS to determine geometric altitude measured as height above ellipsoid referenced to the WGS-84 datum. The FAA also anticipates UAS could utilize cellular and other signals to complement the GPS signal and provide for a robust solution.

ii. Public Comments and FAA Response

Several commenters suggested that control station location provides sufficient detail and that identifying altitude is unnecessary and could render many devices such as tablets and cell

phones obsolete for use as a control station. Other commenters supported the need to understand whether an operator is on the ground or on the roof.

Many commenters recommended that control station barometric altitude not be a required message element because many control stations do not have the capability to report this information accurately and compliance will be difficult and costly. UAS Colorado and Wing Aviation also noted the lack of available barometric pressure settings to adjust a sensitive altimeter as well as stating that this capability does not exist for UAS ground stations.

Many commenters recommended using geometric altitude for control stations, suggesting that it would be of greater usefulness, reliability, and less technically complex to integrate into UAS. One commenter suggested that barometric altitude is appropriate because geometric altitude may encounter difficulties with coverage and multipath errors in urban areas or areas with rising terrain or other obstacles.

Some commenters suggested requiring geometric altitude while permitting but not requiring barometric pressure altitude. Others suggesting permitting one or the other, while others recommended requiring both. Several commenters recommended a performance-based altitude requirement rather than specifying either barometric or geometric. Others recommended different requirements depending on whether the operation was for recreational or commercial purposes. One commenter suggested permitting use of the barometric pressure altitude of the unmanned aircraft at takeoff as a substitute to providing real time barometric pressure altitude.

FAA Response: After reviewing public comments and giving further consideration, the FAA adopts this message element to require geometric altitude for the control station instead of barometric pressure altitude, for the reasons described above.

The FAA declines to require both barometric pressure and geometric altitude as there are no significant benefits associated with such a requirement. Geometric altitude alone is sufficient to meet the safety and security needs being addressed by this rule. Further, requiring both forms of altitude indications would necessitate additional equipment, testing, and maintenance that

would increase UAS costs. Also, the FAA declines to use the take-off altitude instead of the control station altitude as standard remote identification unmanned aircraft will already have a means to indicate the control station latitude and longitude. The FAA expects that providing an indication of the control station geometric altitude will not add significant cost or complexity to the remote identification equipment, and provides a substantially higher safety and security benefit, especially in urban areas.

4. An Indication of the Unmanned Aircraft's Latitude and Longitude

i. Discussion of the Final Rule

The FAA proposed that standard remote identification UAS provide the position of the unmanned aircraft using its latitude and longitude, which could be derived from a position source, such as a GPS receiver. The purpose of this message element is to associate a specific unmanned aircraft with its associated control station position. It would also be used to provide situational awareness to other aircraft, both manned and unmanned, operating nearby.

The FAA adopts this message element as proposed.

ii. Public Comments and FAA Response

Comments: Many commenters, including commenters from manned and unmanned aviation, manufacturers, users of unmanned aircraft, some State and local law enforcement agencies, and numerous individuals opposed the proposed requirement to provide the location of the unmanned aircraft to the public. Commenters expressed concerns about the privacy of their operations and that this information could increase the dangers for UAS operators and their property potentially resulting in assault, home invasion, and theft of their UAS and other equipment. Other commenters who opposed providing the unmanned aircraft location provided examples of confrontations, threats (including threats with firearms), and assaults that they or others have received during operations or referenced media reports of incidents involving confrontations, assaults of UAS operators, and people shooting at unmanned aircraft if their

location becomes public. Robotic Research opposed the requirement to share unmanned aircraft location, and stated they cannot publicly broadcast the position of their unmanned aircraft due to the sensitivity of their platforms and missions.

Instead of making the unmanned aircraft location public, many commenters, suggested the public should only have access to the UAS session ID or other identification to support reporting unsafe operations to the appropriate authorities. Some of these commenters suggested, if unmanned aircraft location is available to the public, it should be an approximated or obfuscated location and only available within a limited distance of the public requestor. Other commenters suggested using technology to limit the information available to the public. The Experimental Aircraft Association recommended permitting operators to opt-out of providing remote identification data accessible to the public if that data is only needed by the FAA and law enforcement.

Many commenters agreed that FAA, law enforcement, and other appropriate government agencies, including first responders should have access to unmanned aircraft location information. A few commenters noted that this proposed requirement would be similar to making airline information available. Some commenters supported sharing unmanned aircraft location information even if they are concerned about public access to control station location.

Airbus UTM and the Electronic Privacy Information Center recommended standardizing message formats for standard and limited remote identification UAS by requiring unmanned aircraft location information, to support better identification and operational capabilities. Pierce Aerospace recommended requiring unmanned aircraft and control station location for standard remote identification UAS, though they suggested an exception for amateur and recreational operations that abide by a volume-based UTM capability.

Many commenters stated transmitting unmanned aircraft location information would be burdensome because most model aircraft are not equipped with GPS or other navigation equipment and there are not many solutions currently available.

Commenters expressed concern about how this would affect indoor UAS operations, noting that GPS is not available or reliable indoors, and that these activities are not currently regulated but will become regulated by default, because new commercially built unmanned aircraft would be prohibited from flight, even indoors, by the manufacturing regulations proposed. American Fuel and Petrochemical Manufacturers were concerned this proposed requirement would eliminate unmanned aircraft tank inspections, which is one of the best use cases for UAS in the oil and gas industry.

Other commenters expressed concern about the effect of this requirement on operations that take place in locations with limited GPS. Digital Aerolus recommended requiring the location of the unmanned aircraft "when available" to permit UAS operations in areas of poor GPS coverage, such as indoors, underground, or under bridges. A commenter recommended either permitting transmission of the last known unmanned aircraft location or operator location, permitting operators to manually specify they are indoors to override the remote identification requirement when GPS is not available.

FAA Response: Though many commenters opposed the inclusion of the unmanned aircraft location message element due to privacy and safety concerns, the FAA finds this message element is a foundational part of remote identification. By including this message element, the remote identification message allows the FAA, law enforcement, and the public to have awareness of unmanned aircraft operations and correlate the location of unmanned aircraft with the location of their respective operators. The availability of this information will promote accountability and trust in the unmanned aircraft community overall. Further, remote identification in combination with community outreach will foster a better public understanding of the important role unmanned aircraft play in the economy and society overall. Some commenters raised the issue that the availability of this information could put remote pilots at greater risk of assault, theft, or other crimes. As noted previously, though the FAA acknowledges the concerns expressed by commenters regarding personal safety and the marginal risk created

by broadcasting a control station's location, the FAA emphasizes that there are statutory prohibitions against interfering with an aircraft. Additionally, there are local, State, and Federal laws against assault, theft, and other crimes.

Many commenters suggested that this message element should only be available to specific entities and not be publicly available, but the FAA finds this would adversely impact the intended transparency of remote identification information and the effectiveness of this rule. The public availability of the unmanned aircraft location as well as all the other message elements allows persons to associate each element of the unmanned aircraft and control station with a unique identifier. The FAA notes that the broadcast range of remote identification information will have a finite limit based on signal strength limitations for unlicensed devices.

The FAA agrees with the comments that supported the inclusion of this message element and found the sharing of the unmanned aircraft location is similar to how airlines and other pilots share their aircraft locations publicly through ADS-B Out broadcasts. The FAA further agrees with these commenters that the accountability, safety, and security benefits exceed the suggested privacy impacts.

The FAA does not agree with the commenters who suggested that inclusion of this message element would hinder their ability to fly unmanned aircraft indoors or in specific outdoor environments due to lack of GPS coverage. The FAA expects that there will be a variety of ways for industry to implement the requirement to indicate the unmanned aircraft's latitude and longitude under different environmental conditions, including when a position source such as GPS, is unavailable. For example, when position information is not available, a means of compliance may specify that the remote identification equipment broadcast all zeros for the indication of latitude and longitude to show that the position is unknown. This would allow an unmanned aircraft to take off even when position information is unavailable. These design options will be described in each FAA-accepted means of compliance. Because of this flexibility, the FAA does not consider that this message element will negatively impact

operations indoors. In addition, for unmanned aircraft intended to routinely operate in areas where there is no GPS coverage, operators may choose to use an unmanned aircraft that relies on a position source other than GPS. The FAA declines to include a requirement where the unmanned aircraft only broadcasts the message element of latitude and longitude when the position source is "available." The location of the unmanned aircraft is an essential element of remote identification, and the FAA considers that the addition of this language would add unnecessary design complexity and uncertainty over whether the unmanned aircraft was required to broadcast the position information. However, as noted previously, the FAA would consider means of compliance that include a standardized message for when that position source is unavailable.

The applicability of this rule does not extend to unmanned aircraft manufactured solely for indoor use. Further, the FAA adopts this requirement using a performance-based approach that allows industry to use technologies best suited for the intended environment. Location estimation can be done using GPS in combination with cellular and other signals to work in a greater number of urban and even indoor environments. Smart device manufacturers commonly employ these techniques. The FAA thus finds that the inclusion of this message element will not significantly hinder the ability for people to conduct operations in areas with poor GPS coverage.

5. An Indication of the Unmanned Aircraft's Altitude

i. Discussion of the Final Rule

The FAA proposed to require standard remote identification UAS indicate the unmanned aircraft's barometric pressure altitude referenced to standard sea level pressure of 29.92 inches of mercury or 1013.2 hectopascals. The purpose of this information would be to establish a standard altitude reference for UAS operating in the airspace of the United States. It can also be used to provide situational awareness to other aircraft, both manned and unmanned, operating nearby. As

with control station altitude, the FAA requested comments on whether to require barometric pressure or geometric altitude.

After considering comments and engaging in further analysis, the FAA adopts the requirement that standard remote identification unmanned aircraft include an indication of the unmanned aircraft's altitude as a required message element. As with the message element indicating control station altitude, the FAA replaces the requirement to indicate barometric pressure altitude with geometric altitude. This change is made for the same reasons explained in the discussion of control station altitude message elements, above.

ii. Public Comments and FAA Response

Comments: Commenters provided many of the same comments for unmanned aircraft altitude as they did for control station altitude, including support for barometric, geometric, either barometric or geometric, both barometric and geometric, and neither. Airbus UTM agreed with the use of barometric rather than geometric altitude, because barometry is how altitude is typically defined in the airspace of the United States today, and the control station, Remote ID USS, or other service provider will be able to make adjustments based on locally reported barometric pressure to make more accurate comparisons to manned aircraft. One other commenter suggested that barometric altitude is more appropriate than geometric altitude, which may encounter difficulties with coverage and multipath errors in urban areas or areas with rising terrain or other obstacles.

Several commenters, including AirMap, suggested that geometric or GPS altitude be required instead of barometric pressure altitude. Commenters suggested that barometric pressure altitude should not be required or should be optional. The Small UAV Coalition and Streamline Designs suggested that FAA should not require unmanned aircraft barometric pressure altitude because most unmanned aircraft use geometric altitude almost exclusively, and many unmanned aircraft do not have barometric pressure altitude capability so compliance will be difficult and costly. ANRA Technologies noted that many unmanned aircraft use geometric altitude as their

primary reference and suggested that should be the requirement, with barometric pressure altitude as an optional element. Because remote identification is not being used to ensure aircraft separation, Amazon Prime Air commented that permitting geometric altitude for standard remote identification UAS would not negatively impact safety or accountability, and would improve compliance by leveraging current designs in smart phones and other equipment with GPS receivers.

The Virginia Tech Mid-Atlantic Aviation Partnership recommended using geometric altitude instead of barometric pressure altitude due to errors in static pressure systems, complexity of adding those to the unmanned aircraft, and lack of critical need when remote identification is not intended for navigation or deconfliction. Another commenter asked the FAA not to require new sensors that would add more weight or require more power for the UAS, such as barometric sensors or a coordinated universal time clock, when similar information is already provided on UAS that have navigation and telemetry information.

Airlines for America and AiRXOS recommended requiring both the barometric and the geometric altitude to provide redundancy and better ensure safe separation of unmanned and manned aircraft; one commenter noted that manned aircraft use both barometric and geometric altitude, so these elements should be transmitted if the unmanned aircraft is capable. Wingcopter recommended using barometric altitude as the main information source but also using geometric altitude for comparison and error detection, especially to provide a higher level of safety for higher risk operations.

A commenter from the Johns Hopkins University noted that ground users, such as law enforcement, will need remote identification altitude information presented in a different format because they may not be experienced with barometric pressure altitudes. They recommended the FAA require transmission of both barometric and geometric altitude as well as a containment value and probability of exceedance, which could be met by fusing altitude and position data from multiple sources.

FAA Response: The FAA agrees with the commenters that supported using geometric altitude instead of barometric pressure altitude for the unmanned aircraft. The FAA believes that an indication of the unmanned aircraft geometric altitude provides sufficient information to meet the safety and accountability goals of remote identification. Further, the FAA agrees that barometric altimetry equipment is less prevalent than GPS-based geometric altimetry in UAS and could add unnecessary complexity both in integration as well as operation. To align with the change from barometric pressure altitude to geometric altitude for the control station altitude message element, the FAA adopts a requirement to indicate the geometric altitude of the unmanned aircraft rather than the barometric pressure altitude.

The FAA declines to require both geometric and barometric altitude reporting because geometric altitude alone meets the safety and security needs for this rule. While both forms of altitude reporting would add a layer of redundancy, the additional cost and complexity is not warranted for the core intended functions of remote identification information.

The FAA agrees with a performance-based requirement that is technology agnostic. The FAA envisions that industry could meet the altitude requirement by using a variety of technologies and signals including GPS and cellular, and still report geometric altitude using a common reference frame.

The FAA acknowledges that users of remote identification information such as law enforcement may not be experienced with different types of altitude reporting. The FAA envisions that standardized software would be available to these users to display the data in an easy to understand format that suits their unique needs. The FAA also finds that the requirements are sufficient to ensure standardized reporting by UAS in a manner that is processed by software to support display applications.

6. Time Mark

i. Discussion of the Final Rule

The FAA proposed to require a time mark identifying the Coordinated Universal Time (UTC) time of applicability of a position source output. A position source output is the latitude and longitude coordinates of the unmanned aircraft or control station, as applicable. The time of applicability is a record of the UTC time when the unmanned aircraft or control station was at a particular set of coordinates. The FAA adopts this requirement as proposed.

ii. Public Comments and FAA Response

Comments: No commenters objected to the FAA proposal to require a time mark as a remote identification message element. The Small UAV Coalition agreed with the requirement for a time mark. Digital Aerolus noted that internal UAS systems will gradually lose synchronization when location services are not available, and recommended updating the requirements to reflect this possibility by adding "when location services are available" or similar language. Unifly recommended permitting external "add-on" equipment such as a remote identification module that provides remote identification, GNSS, and time information.

FAA Response: The FAA agrees that synchronization may be a problem when location services are not available but finds that this situation would not be a limiting factor to the generation of remote identification messages because the message also includes location information. The FAA adopts the requirement as proposed.

7. An Indication of the Emergency Status of the UAS

i. Discussion of the Final Rule

The FAA proposed to require standard remote identification UAS to include a message element that specifies a code indicating the emergency status, which could include lost-link, downed aircraft, or other abnormal status of the UAS. The FAA adopts this requirement as proposed.

The FAA anticipates that an industry standard for remote identification would specify the different emergency codes applicable to unmanned aircraft affected by this rule. This message element could be initiated manually by the person manipulating the flight controls of the UAS or automatically by the UAS, depending on the nature of the emergency and the UAS capabilities. The purpose of this message element would alert others that the UAS is experiencing an emergency condition and would indicate the type of emergency.

The FAA expects that this message element may provide an indication of UAS that are lost-link, are in a low battery or low fuel state, or are in other off-nominal or failure modes that might result in unexpected behaviors that other airspace users or people in the vicinity would benefit from knowing. The FAA anticipates that the emergency status indication would be used by display applications available to pilots and the general public to indicate when a UAS is experiencing an off-nominal event, such as lost-link, that may not be clear by visual observation alone.

The FAA envisions that industry, through consensus standards bodies, will develop and incorporate specific implementations of the message element into a means of compliance that balances utility, safety, and privacy.

ii. Public Comments and FAA Response

Comments: One commenter supported sharing the emergency status of the UAS as proposed. Another commented recommended removing this requirement, questioning its utility. Other commenters requested that the requirement be explained in greater detail and specificity. Wing Aviation suggested UAS not be required to transmit non-critical, off-nominal conditions that do not affect compliance or security, and recommended amending the requirement to "critical emergency status." Theia recommended that the emergency status of a downed UAS should not be shared with the public because of the safety and security risks.

FAA Response: The FAA acknowledges the request for greater specificity regarding what types of off-nominal situations should be included in the emergency status indication, but the

FAA believes that the UAS industry is in the best position to determine this criteria, and any specificity provided by the FAA at this time may not provide flexibility for future changes as UAS technology evolves. As such, the FAA adopts the requirement as proposed without requiring any specific implementation.

8. Velocity

In the NPRM, the FAA asked for public comments on whether standard remote identification UAS should broadcast other message elements. A number of commenters recommended requiring speed or velocity as required message elements.

After reviewing these comments and further consideration, the FAA decided to require velocity as an additional message element for standard remote identification unmanned aircraft. By adding an indication of the unmanned aircraft's velocity, the remote identification message set will better align with existing remote identification standards, such as ASTM F3411-19 and international implementations, as well as provide a complete description of an unmanned aircraft's state to the FAA, law enforcement, and the public. The FAA envisions that the velocity message element would be a three-dimensional vector that conveys horizontal and vertical speed, as well as the direction of movement of the aircraft. The FAA notes that the velocity message element, when used to display unmanned aircraft flight information, includes both speed and direction information. The FAA is not prescribing specific requirements for UAS velocity, and expects this message element to be incorporated into a means of compliance which will be reviewed and evaluated as a part of the acceptance process.

9. Other Message Elements

As stated above, in the NPRM, the FAA asked for public comments on whether standard remote identification UAS should broadcast other message elements. As described below, the FAA received a number of comments on different message elements that could be included.

After review and careful consideration, the FAA determined that, except for velocity (described above), the FAA would not adopt requirements for additional message elements.

Comments: Johns Hopkins University Applied Physics Lab supported the concept of a common message structure and recommended this be further applied to Remote ID USS as well, to ensure that UAS are not compatible with only one Remote ID USS. One commenter agreed that message elements other than those proposed did not yield enough benefit to necessitate recording and transmitting. Wing Aviation recommended that required message elements be aligned to the ASTM F3411-19 Standard Specification for Remote ID and Tracking to reflect established industry consensus, specifically mentioning barometric altitude and emergency status.

A few commenters suggested requiring message elements to note if the remote pilot is part 107 certified, if the UAS is properly registered, and to add the LAANC approval code or COA identification. UPS Flight Forward suggested adding the direction of flight and mode of flight (manual, automated, autonomous) to the required message elements. The Stadium Managers Association also recommended adding message element(s) to help future-proof remote identification in the event of a UAS operating automatically or autonomously miles away from the control station, such as mode of flight, flight path, and intended destination. The Utah Department of Transportation recommended requiring speed, UAS attitude (pitch, roll, and yaw), and power status as a message element. The Air Line Pilots Association International, the Consumer Technology Association, the Port of Long Beach, and the Small UAV Coalition recommended requiring message elements reporting current velocity, direction, and route, such as magnetic course and ground speed, with the Small UAV Coalition noting that this would be consistent with remote identification proposals in the European Union. A few commenters suggested adding message elements for horizontal and vertical uncertainty estimates, and another suggested aircraft direction, speed, and vertical speed. Ax Enterprize suggested a message element to specify which Remote ID USS the UAS is connected to. SeeScan recommended

requiring a detailed flight plan to be submitted to the Remote ID USS, including flight plan, name, certificate number, contact number, flight volume polygon, maximum altitude, nearest airport, date, time, and duration of flight.

The National Association of State Aviation Officials recommended the creation of options that provide flight data including airspeed, altitude, directional tracking, and battery or fuel life status information.

The American Association of Airport Executives suggested a message element to convey if the UAS has obtained an FAA airspace authorization. The Alabama Department of Transportation asked why LAANC authorizations and COA information were not included as message elements, believing that this information would help law enforcement and public safety agencies better differentiate illegal UAS operations from those with specific authorization to conduct operations in certain areas. Airports Council International-North America asked how UAS remote identification information would be fused with other critical UAS operational information, notably LAANC data, which would enable local authorities to determine whether UAS had received FAA approval to operate in the airspace where it is necessary.

The Electronic Privacy Information Center (EPIC) suggested several message elements to better convey the characteristics of all UAS and their missions, such as surveillance capabilities (audio, infrared, thermal sensors) and UAS purpose (recreational, commercial, government) with further subcategories such as commercial-delivery, media, or infrastructure inspection.

FAA Response: The FAA agrees that a common message structure is critical to the successful implementation of this rule. The FAA is committed to utilizing a performance-based approach to rulemaking where industry can develop and update means of compliance as needed.

The FAA agrees with the commenters that suggested adding unmanned aircraft velocity as a required message element, for the reasons explained above. The FAA finds that the other message elements proposed by commenters, while valuable in specific situations, are not essential to meeting the safety and security needs being addressed by this rule. Some of the

message elements proposed by commenters are better aligned with remote pilots sharing their flight intent. The FAA agrees that the sharing of flight intent is valuable in promoting the safety and efficiency of the airspace of the United States, but finds that such a requirement is appropriate to consider once UTM has been further developed and implemented. Flight intent is a foundational concept of UTM, and the FAA envisions such requirements may be a part of a future rulemaking to enable wide scale use of the UTM ecosystem.

Some commenters suggested that FAA waiver and authorization information be included as a message element. The FAA declines to include this information for two reasons. First, part 89 applies to unmanned aircraft regardless of the operating rules that apply to the operation of that aircraft. Operations under 49 U.S.C. 44809 may not have any waiver or authorization information that would be applicable. In addition, requiring that this information be included would be technologically challenging because the remote identification capability is tied to the unmanned aircraft or broadcast module being used whereas waivers and authorizations are issued for a specific operation. An unmanned aircraft may be used for an operation that has been granted a waiver one day and then used under other circumstances in which the waiver would not apply. Similarly, airspace authorizations are granted for specific times and airspace and would be challenging to encode into the remote identification capability for either the standard remote identification unmanned aircraft or the remote identification broadcast module. Instead of requiring that this information be included in a remote identification transmission, the FAA envisions that authorized entities will be able to access this type of information through the FAA based on the unique identifier and other message elements included in the broadcast.

B. Minimum Performance Requirements for Standard Remote Identification Unmanned Aircraft

The FAA proposed to require standard remote identification UAS to meet the minimum performance requirements established in proposed § 89.310 by using an FAA-accepted means of compliance. Those requirements related to the control station location, automatic connection to a Remote ID USS, time mark, self-testing and monitoring, tamper resistance, connectivity, error

correction, interference considerations, message transmission, message element performance requirements, and cybersecurity.

After reviewing public comments and further consideration, the FAA adopts these minimum performance requirements with some modifications to reflect, among other things, the elimination of Remote ID USS requirements. The FAA explains the adopted requirements, identifies changes from the NPRM, and responds to public comments in the following subsections.

1. Control Station Location

i. Discussion of the Final Rule

The FAA proposed to require all UAS with remote identification to generate and encode a control station location that corresponds to the location of the person manipulating the flight controls of the UAS. The rationale for this requirement is to assist the FAA and law enforcement to locate the person manipulating the flight controls of the UAS. The FAA intended for an FAA-accepted means of compliance to outline a process for UAS designers and producers to determine which part or element of the control station should be incorporated into the remote identification message due to its close proximity to the person manipulating the flight controls of the UAS. The FAA adopts this requirement as proposed.

ii. Public Comments and FAA Response

Comments: Unmanned Systems Canada commented the requirement to encode the ground control station could be problematic for dual-pilot operations. This could conceivably require the installation of more than one remote identification device. Many commenters stated transmitting unmanned aircraft location information would be burdensome because most model aircraft are not equipped with GPS or other navigation equipment and there are not many solutions currently available. A few commenters stated there are gaps in GPS coverage that could prevent operators from complying with the requirement to provide control station

information. An individual commenter suggested limiting the remote pilot in command to 100 feet of the takeoff point if the UAS cannot transmit control station location.

FAA Response: While a small number of commenters noted the confusion that may arise with multiple operators of the same unmanned aircraft or multiple unmanned aircraft operating in a relatively small area, the FAA finds that the inclusion of a unique identifier, which is part of the remote identification message, is sufficient to prevent such confusion. The FAA did not find a need to make changes to this requirement and will adopt it as proposed.

With respect to concerns regarding gaps in GPS coverage, the FAA acknowledges that location sensors such as GPS systems have physical limitations such as not being operational in certain urban environments. While some intermittent loss of position data is acceptable, the FAA adopts this rule in a performance-based manner and expects that industry will use a variety of inputs (such as GPS and cellular signals) to estimate position such that the UAS is able to generate the complete remote identification message in its intended operating environment.

The FAA declines to specify conditions, such as remaining within 100 feet of the take-off location, when standard remote identification unmanned aircraft cannot broadcast an indication of the control station location. If the unmanned aircraft can no longer broadcast the message elements, the person operating the unmanned aircraft must land as soon as practicable.

2. Automatic Remote ID USS Connection

The FAA proposed that from takeoff to landing, standard remote identification UAS would be required to maintain a connection to the Internet automatically when available and would be required to transmit the message elements to a Remote ID USS through that connection. This minimum performance requirement is no longer applicable with the removal of the Remote ID USS connection requirements and has been removed.

3. Time Mark

i. Discussion of the Final Rule

The FAA proposed that standard remote identification UAS would be required to generate and transmit remote identification messages with the time mark message element. The FAA proposed that the time mark message element be synchronized to the time when all other message elements are generated. The purpose of this requirement is to ensure that position and other data contained in remote identification messages would have a usable time reference for the purposes of reconstructing unmanned aircraft flight profiles. The FAA adopts this requirement as proposed.

ii. Public Comments and FAA Response

The FAA did not receive any comments opposing this requirement.

4. Self-Testing and Monitoring

i. Discussion of the Final Rule

The FAA proposed to require UAS with remote identification to test the remote identification functionality automatically when the UAS is powered on and to notify the person manipulating the flight controls of the UAS of the result of the test. Further, the FAA proposed to prohibit these UAS from taking off if the remote identification equipment is not fully functional. Because a person would only be allowed to operate a standard remote identification UAS if its remote identification equipment is functional, the FAA envisioned that UAS designers and producers would build a notification system to alert potential operators of any remote identification equipment-related malfunction. This notification requirement would help operators comply with the operating requirements of part 89.

The FAA also proposed that the UAS be required to self-monitor the remote identification functionality continuously throughout the flight and provide notification of malfunction or failure to the person manipulating the flight controls of the UAS. With this

capability, the person manipulating the flight controls of the UAS can make informed decisions about what actions to take to minimize risk to other users of the airspace and people and property on the ground. This requirement is necessary because a standard remote identification unmanned aircraft would be required to land as soon as practicable if it loses broadcast capability in-flight.

The FAA adopts this requirement with modifications. In the NPRM, the FAA proposed that the automatic test must occur when the UAS is powered on. This rule modifies the proposal to require the automatic self-test to occur prior to takeoff. The FAA believes this change provides greater flexibility to developers of means of compliance as well as UAS producers when meeting this requirement. In addition, the requirement to monitor the remote identification equipment functionality has been expanded from takeoff to landing to takeoff to shutdown to reflect the changes to the operating rules that require persons operating UAS with remote identification to broadcast the message elements from takeoff to shutdown, as discussed in section VII.E.2 of this preamble.

ii. Public Comments and FAA Response

Comments: Even though this requirement only specified a notification for equipment that fails or malfunctions during flight, many commenters emphasized that it is appropriate to notify the operator that remote identification equipment is not working properly rather than to forcibly ground an unmanned aircraft by design. The University of California, Irvine recommended restricting UAS from takeoff by operational regulation instead of hardware regulation. Unifly noted that in the event of loss of broadcast capability, the person manipulating the flight controls of the UAS should be responsible to not take off. Ax Enterprize agreed that the monitoring function should notify the remote pilot if remote identification fails. The FPVFC suggested an equipment solution for an indicator system, and recommended permitting the unmanned aircraft to be flown as a non-equipped UAS if the self-test failed.

The Small UAV Coalition and one individual were concerned this requirement could add a potential failure point with possible loss of control during flight. In addition, they noted the

proposed rule required remote identification equipment to be functional for any operation, even if that operation occurs within an FAA-recognized identification area. One individual suggested eliminating the requirement that UAS disable themselves under certain conditions, as it could introduce a hazardous situation if a UAS is performing multiple takeoffs and landings, as it would be required to detect a landing, check the Internet connection, and prohibit takeoff if the connection is lost. This could cause a loss of power at a critical phase of flight.

DJI Technology, Inc. commented on its view that the NPRM reflected a fundamental change in philosophy, specifically that Americans cannot be trusted to act responsibly or in compliance with regulations. In addition, they stated the requirement raises technical challenges regarding design, application, and upgrades. They also noted potential legal liability concerns with the shift of responsibilities from the pilot to the manufacturer.

FAA Response: The FAA does not agree that the requirements represent a fundamental shift of responsibility from the operator to the manufacturer. Rather, the two requirements are complementary. A failed self-test at start up would result in the operator being notified that the remote identification equipment is not functioning properly, and the unmanned aircraft would not be able to take off. Though this may introduce a possible failure point if the self-test feature produces errors, the FAA does not agree that this requirement could introduce a loss of control situation. The requirement would inhibit take-off in the event of a remote identification equipment failure, but not prohibit an operator from having control of the unmanned aircraft mid-flight given the same failure. This design feature will help operators fulfill their responsibility to not takeoff with malfunctioning or failed remote identification equipment. Overall, the FAA anticipates that the manufacturing and operator requirements will significantly reduce instances of UAS operating in the airspace of the United States without properly functioning remote identification equipment.

5. Tamper Resistance

i. Discussion of the Final Rule

The FAA proposed to require that UAS with remote identification be designed and produced in a way that reduces the ability of a person to tamper with the remote identification functionality. The FAA envisioned the UAS would have tamper-resistant design features to hinder the ability to make unauthorized changes to the remote identification equipment or messages. The FAA adopts this requirement as proposed.

ii. Public Comments and FAA Response

Comments: Many commenters supported the inclusion of a tamper resistance requirement. Qualcomm Incorporated stated that a secure UAS should respond to a tamper event by noting the event and/or ceasing to operate. Airlines for America urged the FAA to include a provision to protect against deactivation of the remote identification system. Some commenters requested the FAA provide additional detail on tamper resistance requirements. Other commenters raised concerns about added weight and costs.

Some commenters opposed including tamper resistance requirements. Several commenters raised concerns about how this requirement would affect repairs, hardware upgrades, or home-built UAS. Other commenters raised concerns that the requirement for a tamper resistance remote identification UAS will create a cybersecurity threat because many commercially available UAS are made in foreign countries such as China. They also suggested this requirement will make it difficult or impossible to assess any cybersecurity threat.

FAA Response: Analysis of the comments regarding tamper resistance of the remote identification functionality found that while most commenters supported the requirement, a small number of commenters were against it. Several commenters favored the tamper resistance of the remote identification functionality, but argued that the requirement would result in UAS that could not be repaired, maintained, or receive hardware upgrades as this could constitute

tampering with the UAS. This appears to be a misunderstanding, as only the remote identification equipment and functionality is covered by the tamper resistance requirement. Commenters opposed to the tamper resistance requirement mentioned additional weight or cost, while others speculated that tamper resistance may introduce a cybersecurity threat. The FAA does not agree with these assertions because the FAA considers this requirement to be performance-based. The FAA envisions industry will find ways to comply without increasing the weight or cost significantly (for example, anti-tamper stickers), or introducing additional cybersecurity or other threats.

6. Connectivity

For standard remote identification UAS, the FAA proposed that the UAS would be designed to not take off unless it is connected to the Internet and transmitting the message elements to a Remote ID USS if the Internet was available. As a part of this proposal, a standard remote identification UAS would have to continuously monitor its connection to the Internet and the transmission of remote identification message elements to a Remote ID USS. If either is lost, the UAS would have to notify the person manipulating the flight controls of the UAS so he or she may take appropriate action, such as landing as soon as practicable. As discussed above in section VII.A of this preamble, the requirement for the UAS to be designed to connect to the Internet is not included in this rule. Accordingly, the requirement to monitor the connection to the Internet is no longer necessary and is not included in this rule.

7. Error Correction

i. Discussion of the Final Rule

The FAA proposed to require all UAS with remote identification equipment to incorporate error correction in the transmission and broadcast of the message elements. Error correction allows remote identification broadcast receivers, such as smart phones, and Remote ID USS to detect potential errors that may exist in the message and take the appropriate action.

The FAA adopts this requirement as proposed, with a modification to remove references to transmitting message elements through the Internet to a Remote ID USS.

ii. Public Comments and FAA Response

Comments: Most commenters agreed with the error correction requirements with some requesting additional specificity. Some offered slight changes in semantics, but still supported the requirement. One commenter stated the NPRM confused two concepts from wireless communications engineering. The first is error correction, which encompasses techniques intended to increase the sensitivity of the receiver, and focuses on minimizing rather than detecting errors. The second is error detection, which includes techniques intended to detect when a message is correctly received, and focuses on detecting rather than minimizing errors.

FAA Response: The FAA declines to provide additional specificity regarding the error correction requirement because a performance-based requirement is appropriate to allow for flexibility in meeting this requirement as well as incorporating new techniques as technology evolves. Any specific error correction capabilities incorporated into a proposed means of compliance would be reviewed and evaluated as a part of the acceptance process.

The FAA appreciates the comment that highlighted the differences between error correction and error detection techniques, and suggested the FAA may have confused the two concepts. The FAA confirms that "error correction" was the intended minimum performance requirement in the NPRM and adopts this requirement.

8. Interference Considerations

i. Discussion of the Final Rule

Consistent with FCC regulations, which include exempted devices under 47 CFR 15.103, the FAA proposed to prohibit the remote identification equipment used in standard remote identification UAS from causing harmful interference to other systems or equipment installed on the unmanned aircraft or control station. The FAA adopts this requirement as proposed.

The design of the UAS must ensure that the broadcast remote identification equipment is independent of command and control interfaces. The FAA explained that, for example, the remote identification equipment could not cause harmful interference to the UAS command and control datalink and could not otherwise be in violation of FCC regulations. In addition, the remote identification equipment would not meet the requirements of this rule if its operation would be adversely affected by interference from other systems or equipment installed on the unmanned aircraft or control station, such as the UAS command and control datalink or a camera feed from the unmanned aircraft to a display at the control station. Therefore, the FAA expects that producers under subpart F will provide secure and reliable interfaces well protected from interference or attacks by malicious entities, and will validate minimum performance via the means of compliance acceptance process as well as through ongoing oversight, auditing, and monitoring of UAS producers that have an FAA-accepted declaration of compliance.

The FAA explained that a specific means of compliance may include requirements to use specific radio frequency emitters and receivers. The FAA envisioned that a proposed means of compliance could include an analysis of frequency congestion and interference considerations. The FAA did not propose a particular method by which interference considerations are identified or mitigated by designers or producers. Instead, the FAA would consider proposed methods for dealing with interference considerations and would verify that they are appropriate for the types of equipment and operations applicable to those means of compliance and do not run counter to any applicable regulations, including FCC regulations.[21]

ii. Public Comments and FAA Response

Comments: Commenters were generally supportive of this provision. One commenter suggested the FAA set the level of interference that rises to the level of 'harmful.'

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[21] FCC regulatory requirements are enforced by the FCC. It is the producer's responsibility to ensure that broadcast equipment meets all applicable FCC regulatory requirements.

FAA Response: As used in this rule, interference is considered harmful if it adversely affects a system's ability to operate safely. The FAA declines to specify a level of interference that would be considered "harmful" because different systems may be able to tolerate different levels of interference before their performance is adversely affected. Instead, FAA will allow developers of means of compliance to incorporate the appropriate interference requirements as needed. This approach is in line with the FAA's continued commitment to a performance-based rulemaking.

9. Message transmission

i. Discussion of the Final Rule

The FAA proposed that standard remote identification UAS be capable of transmitting message elements through an Internet connection to a Remote ID USS. In addition, the FAA proposed to require that standard remote identification UAS be capable of broadcasting the message elements using a non-proprietary broadcast specification and radio frequency spectrum compatible with personal wireless devices in accordance with 47 CFR part 15. The FAA envisioned that remote identification would be broadcast using spectrum similar to that used by Wi-Fi and Bluetooth devices. The FAA did not, however, propose a specific frequency band. Rather, the FAA envisioned industry stakeholders would identify the appropriate spectrum to use for this capability and would propose solutions through the means of compliance acceptance process. The purpose of this requirement is to ensure that the public has the capability, using existing commonly available and 47 CFR part 15 compliant devices, such as cellular phones, smart devices, tablet computers, or laptop computers, to receive these broadcast messages.

The FAA considered the conditions of operation, the general technical requirements, and the performance limitations associated with the use of 47 CFR part 15 devices and has determined that these conditions, requirements, and limitations would be acceptable and compatible with the proposed use and expected performance of the broadcast capability of

standard remote identification UAS. The FAA acknowledged that, under FCC regulation, 47 CFR part 15 devices, including those used for the remote identification broadcast, may not cause harmful interference and must accept any interference received.

To meet the proposed requirement of compatibility with personal wireless devices, the FAA explained that a means of compliance may take into consideration whether the remote identification capability would be compatible with current and older models of personal wireless devices still in common usage. The FAA intended the proposed requirement to ensure that the broadcast message from standard remote identification UAS would be accessible by most personal wireless devices in use.

In addition, for standard remote identification UAS, the FAA proposed that the broadcast device use radio frequency spectrum in accordance with 47 CFR part 15 that is compatible with personal wireless devices and must be designed to maximize the range at which the broadcast can be received, while complying with the 47 CFR part 15 and any other laws in effect as of the date the declaration of compliance is submitted for FAA acceptance, and must be integrated into the unmanned aircraft or control station without modification to its authorized radio frequency parameters. The purpose of this requirement is to ensure that producers use a means of compliance that specifies a broadcast technology or broadcast technology characteristics that maximize the broadcast range while still meeting the other minimum performance requirements under this rule. Maximizing the broadcast range would ensure that remote identification information would be available to the largest number of potential receiving devices within the limits permitted by law.

The FAA adopts the substance of this requirement as proposed, with modifications to reflect the removal of the network transmission requirement (see section VII.A of this preamble for a discussion of the removal of the network requirement). Accordingly, this rule changes the title of this requirement from “message transmission” to “message broadcast” in § 89.310(g).

ii. Public Comments and FAA Response

Comments: The FAA received numerous comments on the use of radio frequency spectrum in accordance with 47 CFR part 15 for the remote identification broadcast, including recommendations to require or allow the use of licensed spectrum as well as establishing government-allocated spectrum.

Many commenters expressed concerns regarding the broadcasting requirement, noting potential radio frequency spectrum issues, including potential for interference with UAS systems and other systems. A number of commenters suggested using licensed instead of, or in addition to, unlicensed spectrum for a variety of reasons, including distance and reliability.

FAA Response: The FAA acknowledges that the use of part 15 devices for remote identification broadcasts may result in reduced distance and reliability as compared to solutions leveraging licensed spectrum. The FAA finds that such solutions, however, would necessitate specialized equipment to receive the broadcasts that would be incompatible with the concept of remote identification data being widely accessible to the public using existing smart devices.

Comments: The Alliance for Telecommunications Industry Solutions recommended the FAA confirm the broadcast identification concept is a local broadcast directly from the unmanned aircraft to receivers in physical proximity without a network requirement. CTIA – The Wireless Association also asked the FAA to consider requiring an interoperable encryption and authorization mechanism for all remote identification broadcasts, and to consider incorporating a 15 digit IMEI number as the ANSI standard serial number, which could support tracking lost or stolen UAS and registration within a central equipment identity register.

FAA Response: The FAA reaffirms the remote identification broadcast requirement, as adopted, is a local broadcast that would be receivable to smart devices and other compatible receivers within a limited proximity to the aircraft.

The FAA declines to include additional capabilities specifically to facilitate the tracking of lost or stolen UAS to the remote identification rules, but does acknowledge a limited

capability might exist based on the rules as adopted. This use-case is not the focus of this rule, and any changes as suggested would be out of scope of this rulemaking.

Comments: AERO Corporation supported the requirement to broadcast, and suggested a remote identification transponder similar to ADS-B Out.

FAA Response: The FAA notes that broadcast equipment, while somewhat similar in general concept to ADS-B Out, is also different in many significant ways. Moreover, as detailed in section XVII of this preamble, ADS-B Out is not a form of remote identification.

Comments: The Small UAV Coalition recommended removing the requirement for the broadcast device to be designed to maximize the range and replacing it with a performance-based requirement for minimum range for the intended operation.

FAA Response: The FAA considered all comments regarding the use of licensed spectrum and determined that using unlicensed 47 CFR part 15 frequencies is the most practical way to ensure interoperability and access to the greatest number of potential users.

The FAA does not agree with the recommendation to remove the requirement that the broadcasting device be designed to maximize range, as removal of this requirement would allow systems to be designed that broadcast at short ranges that are incompatible with the objective of providing remote identification information to as many receivers as possible located nearby the unmanned aircraft. The method of compliance must address how it maximizes range for the applicable unmanned aircraft and expected operating environments.

10. Interoperability

i. Discussion of the Final Rule

To achieve interoperability among standard remote identification UAS that may be produced using different means of compliance, the FAA proposed that for standard remote identification UAS, a means of compliance must require that the message elements be broadcast using a non-proprietary specification for remote identification. For the broadcast to be

interoperable with personal wireless devices, the message elements for standard remote identification UAS would have to be broadcast using a message format available to the public. The FAA explained that a known message format is necessary for the receiving personal wireless devices to decode the messages and make the message elements available for use by software applications on the receiving devices.

The FAA adopts this requirement as proposed.

ii. Public Comments and FAA Response

Comments: Some commenters suggested using existing broadcast-based systems, such as Wi-Fi Aware or similar systems rather than network-based systems. Others requested additional specificity. One commenter suggested that the FAA specify all aspects of the link, to include frequency, power, antenna patterns, modulation and data format. Other commenters were concerned that the interoperability requirement would limit the acceptable types of broadcast to Wi-Fi and Bluetooth and that this could limit operational deployment in the short term. AiRXOS recommended an additional performance requirement related to interoperability. The Small UAV Coalition suggested that the rule make clear that message encryption is permitted.

FAA Response: Interoperability for standard remote identification UAS and the requirement that the message elements be broadcast using a non-proprietary specification for remote identification are necessary for the receiving wireless devices to decode the messages and make the contents of the remote identification messages usable to the public. The FAA does not require a specific message format because the current performance-based requirement allows the UAS industry to collaborate and innovate to optimize the message format. As broadcast technologies evolve, the specified message format may need to evolve as well, and the requirement adopted in this rule allows for that without a need to update the regulations. In addition, reflecting the removal of the network transmission requirement, and to provide the necessary interoperability to ensure publicly receivable remote identification information, the FAA clarifies that encryption of the required message elements is not permitted.

11. Cybersecurity

i. Discussion of the Final Rule

The FAA proposed to require all UAS with remote identification equipment to incorporate cybersecurity protections for the transmission and broadcast of the message elements, as appropriate. The FAA did not propose any specific cybersecurity protection methods that would be required to be incorporated into an FAA-accepted means of compliance. Instead, the cybersecurity protection methods incorporated into a proposed means of compliance would be reviewed and evaluated as a part of the acceptance process.

The proposed minimum performance requirement related to cybersecurity is removed from this rule because of the deletion of the requirement for standard remote identification UAS to connect to the Internet and transmit information to a Remote ID USS. As discussed in the NPRM, the cybersecurity requirement applied to both the transmission and broadcast of the remote identification message elements, and the requirement to broadcast the remote identification messages is retained in this rule. However, the FAA believes that with the removal of the Internet connectivity requirement, cybersecurity requirements for the broadcast functionality are no longer warranted.

While this rule no longer requires standard remote identification UAS to have an Internet connection for the purpose of remote identification, the FAA acknowledges that many UAS could have Internet connection capabilities to support other design features or capabilities not related to remote identification. The FAA encourages designers and producers of remote identification UAS that can connect to the Internet to incorporate cybersecurity protections to ensure that those other design features or capabilities are protected from cyber threats.

ii. Public Comments and FAA Response

Comments: The FAA received many comments supporting cybersecurity in general, but that also requested the FAA provide greater specificity or adopt specific standards. The vast

majority of these comments related to transmission of message elements through the Internet to the Remote ID USS.

The FPVFC noted that if a radio frequency broadcast remote identification system is used, there are no cybersecurity concerns.

FAA Response: As described in section VII.A of this preamble, this rule does not require transmission of message elements through the Internet to a Remote ID USS. In addition, the FAA agrees with the FPFVC that broadcasting the message elements does not raise cybersecurity concerns. Accordingly, the proposed minimum performance requirement related to cybersecurity is removed from this rule, for the reasons described above.

12. Other Performance Requirements

i. Discussion of the Final Rule

In the NPRM, the FAA identified several potential requirements that it considered, but ultimately decided were not necessary to include in the proposed minimum performance requirements, and requested comments on whether and why any of those should be required. The list included:

- Other message elements such as certain UAS operator contact information or other aircraft or control station information such as velocity, direction, route, or altitude above ground level.
- Equipment interface requirements such as the appropriate connections between GPS receivers, altimeters, and the remote identification message compiler; the communication protocol between the aircraft and the control station through which remote identification message data is exchanged; or protocols and interfaces between UAS, Internet providers, and Remote ID USS.
- Flight data recording features to store remote identification information within the UAS.

- Requirements for connection indications such as a separate indication of whether the UAS is connected to the Internet and its connection to a specific Remote ID USS, an indication of the transmission latency, or a notification of the specific Remote ID USS to which the UAS is connected.
- Transmission or broadcast requirements during a command and control lost-link event.

After reviewing comments and further consideration, the FAA decided to require velocity as an additional message element for standard remote identification unmanned aircraft, as discussed in section VIII.A.8 of this preamble. The FAA is not adopting in this rule any of the other minimum performance requirements described in this section that were identified for potential inclusion.

ii. Public Comments and FAA Response

Comments: Airbus UTM suggested minimum performance requirements for the remote identification broadcast to include range, reliability, and authenticity. uAvionix suggested a requirement for minimum broadcast power. Ciconia Aviation Services suggested a minimum radio transmission range of 1.5 to 2 kilometers for UTM and possibly other manned interfaces. Wing Aviation LLC suggested defining loss to mean persistent (not temporary) loss of signal, contending that remote identification is not critical to flight safety and a brief interruption should not trigger an immediate contingency. The Aviators Code Initiative recommended establishing a maximum power output for broadcast equipment. Droneport Texas LLC requested that any additional performance requirements beyond those in the NPRM undergo a public comment process in accordance with the Administrative Procedure Act.

DroneBusiness Center suggested changing the performance standard requirement to a consensus standard approach. ANRA Technologies and Small UAV Coalition suggested using ASTM standards. Ax Enterprize noted that that ASTM F3411-19 Standard Specification for Remote ID and Tracking has taken the position that remote identification is strictly for security, not safety functions, thereby excluding detect-and-avoid. They suggested a prescriptive

definition of “real-time” and “near real-time.” They also proposed Trustworthy Multipurpose Remote Identification Protocol which is intended to satisfy several requirements including, but not limited to, verifying that messages are from the stated sender and the UAS Identification is in a registry, looking up public and private information, and structuring that information for readability.

The FPVFC suggested UAS equipment interfaces should be determined by industry, and the performance requirements for self-testing and monitoring, error correction, interference considerations, message element performance requirements, and cybersecurity are too vague. They were also concerned that UAS would be grounded if the requirements are too rigid. Unmanned Systems Canada stated the performance standard is unreasonable and more restrictive than altitude requirements on manned aviation. One individual commenter stated that requirements on modelers is greater than the requirements on manned aircraft operations, and others stated the proposed rule mandates technology that is not yet available or mature.

FAA Response: The FAA finds that the message elements proposed by commenters, while valuable in specific situations, are not essential to meeting the safety and security needs being addressed by this rule. In addition, the performance requirements as finalized meet the needs of remote identification while remaining sufficiently performance-based to allow for technological innovation.

C. Message Elements Performance Requirements for Standard Remote Identification Unmanned Aircraft

The FAA proposed to require that all UAS with remote identification meet certain minimum requirements regarding the transmission of the message elements including the minimum performance requirements related to positional accuracy, barometric pressure accuracy, message latency, and message transmission rate. The FAA invited comments on whether the proposed minimum performance requirements for the message elements are appropriate and requested that commenters provide feedback and recommendations, supported

by data, to sustain their position. The FAA also proposed that standard remote identification UAS must transmit and broadcast identical message elements.

The message element minimum performance requirements proposed in the NPRM are considered design requirements, not operational performance requirements. A standard remote identification UAS must demonstrate that it meets minimum performance requirements for these message elements under test conditions specified in an FAA-accepted means of compliance. The test conditions must be representative of those that are likely to be encountered during typical UAS operations. The FAA acknowledges and accepts that the actual in-service performance may vary from the performance established under test conditions. The operator of a standard remote identification is not required to monitor the actual in-service performance of the UAS.

After reviewing public comments and further consideration, the FAA is adopting the message element performance requirements that were proposed, with some modifications. The FAA explains these requirements, including changes from the NPRM, in the following subsections.

1. Transmit and Broadcast Identical Message Elements

The FAA proposed that the UAS be required to transmit through the Internet to a Remote ID USS and broadcast identical message elements. As described above, the FAA eliminated the requirement to transmit remote identification message elements to a Remote ID USS. As a result, performance requirements related to the requirement to transmit and broadcast identical message elements have been removed from this rule.

2. Positional Accuracy

i. Discussion of the Final Rule

The FAA proposed positional accuracy requirements that are compatible with commercial off the shelf position sources, such as GPS receivers integrated into many existing UAS, smart phones, or other smart devices. For an unmanned aircraft, the position source is

considered to be equipment onboard the aircraft that computes a geometric position (latitude and longitude). The position source can be a separate sensor or can be integrated into other systems. While the FAA anticipated that most unmanned aircraft would use a GPS receiver as the position source, other equipment could be used as long as it is capable of producing the required message elements and meets the proposed accuracy requirement. For a control station, the position source is considered to be equipment that is either integrated into the control station or separate from, but in close proximity to, the control station.

For standard remote identification UAS, the FAA proposed that the reported position of the unmanned aircraft and control station would have to be accurate to within 100 feet of the true position, with 95 percent probability.

The FAA is adopting this requirement as proposed.

ii. Public Comments and FAA Response

Skydio commented that the proposed unmanned aircraft location accuracy and latency requirements, including the prohibition on takeoff and the requirement to land as soon as practicable, are unjustified in areas of limited or degraded GPS based on the known deficiencies of GPS and the advantages of computer vision-enabled UAS, and recommended increasing the accuracy requirement from 100 feet to 500 feet to accommodate these UAS operations. Ciconia Aviation Services suggested that current devices are capable of greater than 100 feet accuracy for UAS position, and suggested requiring 30-foot accuracy as well as 0.1 seconds latency and a 4 Hz transmission rate to support conflict management and collision avoidance.

FAA Response: The FAA considered comments that suggested both increased and decreased positional accuracy compared to the proposed requirement, while still other comments asserted that the positional accuracy proposed was not possible under certain conditions where GPS was limited or degraded. The FAA emphasizes that GPS is one possible position source, but using GPS is not a requirement and there may be other types of position sources that perform better in different operating environments. As such, this rule adopts the proposed requirement

that the reported position of the control station and unmanned aircraft be accurate to within 100 feet of the true location, with 95 percent probability.

The positional accuracy requirement is a design requirement and not an operational performance requirement, and the specific test method for ensuring that the UAS design meets this accuracy requirement will be reviewed and evaluated as a part of the means of compliance acceptance process. Depending on the unmanned aircraft operating environment, the actual in-service accuracy may be better or worse than accuracy demonstrated under the test conditions of an FAA-accepted means of compliance.

3. Geometric Altitude Accuracy

i. Discussion of the Final Rule

The FAA proposed that for standard remote identification UAS, the reported barometric pressure altitude for the unmanned aircraft and the control station must be accurate to within 20 feet of the true barometric pressure altitude for pressure altitudes ranging from 0 to 10,000 feet. The FAA sought comments from UAS designers and producers and other interested individuals on whether the proposed barometric pressure altitude accuracy requirement is consistent with current and anticipated future UAS performance capabilities. As discussed in section VIII.A.3 of this preamble, after considering comments and engaging in further analysis, the FAA decided to adopt the requirement that standard remote identification include an indication of control station altitude as a required message element, replacing the requirement to indicate barometric pressure altitude with geometric altitude. As a result, the FAA removed the minimum performance requirements for an indication of barometric pressure altitude and instead adopts minimum performance requirements for an indication of geometric altitude as follows.

Though the barometric pressure altitude accuracy requirement was the same for both the control station and the unmanned aircraft, the transition to a geometric altitude indication warrants different accuracy requirements for the control station and the unmanned aircraft. For

the unmanned aircraft, the FAA is adopting a geometric altitude accuracy requirement that is compatible with commercial off the shelf position sources, such as GPS receivers integrated into many existing unmanned aircraft. The reported geometric altitude for the unmanned aircraft must be accurate to within 150 feet of the true geometric altitude, with 95 percent probability. The FAA expects that future unmanned aircraft will take advantage of technological advancements in geometric altitude accuracy to provide even greater accuracies as technologies evolve.

For the control station, the FAA is adopting a geometric altitude accuracy requirement that is compatible with the performance requirements being established for cellular service providers under the E911 mandate that allows emergency service providers to accurately locate the geographic position of the mobile device. The reported geometric altitude for the unmanned aircraft must be accurate to within 15 feet of the true geometric altitude, with 95 percent probability. The FAA anticipates that most standard remote identification unmanned aircraft will be designed to be paired with an existing smart phone or smart device to provide the control station location information. If the unmanned aircraft design does not use a smart phone or smart device as the position source for the control station location, the FAA believes the geometric altitude accuracy requirement is compatible with the performance of modern GPS receivers.

The geometric altitude accuracy requirement is a design requirement and not an operational performance requirement, and the specific test method for ensuring that the unmanned aircraft design meets this accuracy requirement will be reviewed and evaluated as a part of the means of compliance acceptance process.

ii. Public Comments and FAA Response

Many commenters weighed in on various aspects of the barometric pressure altitude accuracy, including technical capabilities of currently available technology. These comments are no longer applicable because the FAA eliminated this requirement. The FAA appreciates these comments, however, because they helped inform the FAA's analysis with respect to the accuracy requirement for the geometric altitude indication for the control station and unmanned aircraft.

4. Remote Identification Message Latency

i. Discussion of the Final Rule

The FAA proposed a latency of no more than one second for the remote identification message set for standard remote identification UAS. This is the time between when a position is measured by the unmanned aircraft or control station position source and when it is emitted by the remote identification equipment. The FAA proposed the latency requirement to apply to both the transmitted message set and the broadcast message set. The FAA noted that the latency requirement does not apply to any systems external to the UAS, such as broadcast receivers or information display devices.

The FAA is adopting this requirement as proposed with respect to the broadcast message set. As discussed in section VII.A of this preamble, the FAA eliminated the requirement to transmit message elements through the Internet to a Remote ID USS. Accordingly, the FAA is promulgating this rule without reference to latency requirements for Internet-based transmissions.

ii. Public Comments and FAA Response

Comments: The majority of the comments the FAA received regarding latency raised concerns about the technical feasibility or cost associated with Internet-based transmission latency. An individual commented that latency in transmitting data, particularly regarding the location of the UA, would render such data immediately obsolete.

FAA Response: With the removal of the requirement for a standard remote identification UAS to connect to the Internet and transmit the message elements to a Remote ID USS, the majority of these comments are not applicable. The FAA finds that this requirement is appropriate for the broadcast of the remote identification message elements and is adopting the requirement as proposed.

The FAA does not agree with the individual commenter who expressed concern regarding the latency issues in transmitting data. The FAA notes that remote identification messages that meet the requirements must be transmitted no more than one second after being generated, and a message must be transmitted at least every second. The FAA finds that these two requirements ensure that the data is sufficiently current for purposes of remote identification.

5. Remote Identification Message Transmission Rate

i. Discussion of the Final Rule

The FAA proposed a transmission rate of at least 1 message per second (1 hertz) as the minimum transmission rate for the remote identification message elements for standard remote identification UAS. The proposed transmission rate applied to both the message elements transmitted to a Remote ID USS and broadcast, and is the minimum rate at which the remote identification message would be either broadcast or transmitted to a Remote ID USS by the remote identification equipment.

The FAA is adopting this requirement as proposed with respect to the broadcast message set. As discussed in section VII.A of this preamble, the FAA eliminated the requirement to transmit message elements through the Internet to a Remote ID USS. Accordingly, the FAA is adopting this rule without reference to a transmission rate requirement for Internet-based transmissions.

ii. Public Comments and FAA Response

The FAA did not receive any comments with data to support a change from the proposal.

IX. Message Elements and Minimum Performance Requirements: Remote Identification Broadcast Modules

The FAA is promulgating this rule with a regulatory framework that allows persons to equip unmanned aircraft with remote identification broadcast modules to enable them to identify

remotely. Further discussion on the operational requirements for remote identification broadcast modules is available in § 89.115(a) of this rule.

As previously discussed in section VII.D of this preamble, the remote identification broadcast module is a retrofit-option that replaces the limited remote identification UAS regulatory framework and provides flexibility to achieve remote identification for operators of unmanned aircraft that do not qualify as standard remote identification unmanned aircraft. The required message elements and minimum performance requirements for remote identification broadcast modules are discussed in this section.

A remote identification broadcast module must broadcast the following message elements: a unique identifier (the serial number assigned to the remote identification broadcast module); an indication of the unmanned aircraft latitude, longitude, and geometric altitude; an indication of the unmanned aircraft take-off location latitude, longitude, and geometric altitude; an indication of the unmanned aircraft velocity; and a time mark. The message elements for remote identification broadcast modules are the same as those for standard remote identification unmanned aircraft, with the exception of the control station location and altitude, the emergency status indication, and the Session ID. Remote identification broadcast modules must include the unmanned aircraft take-off location and altitude as a message element instead of control station location and altitude. In addition, remote identification broadcast modules cannot use a Session ID as the unique identifier.

Otherwise, the following required message elements are identical to those required for standard remote identification unmanned aircraft:

- A unique identifier.
- An indication of the unmanned aircraft latitude, longitude, and geometric altitude.
- An indication of the unmanned aircraft velocity.
- A time mark.

A discussion of the message elements and the need for them is in section VIII.A of this preamble.

The minimum performance requirements and message elements performance requirements for remote identification broadcast modules are similar to those for standard remote identification unmanned aircraft, but are modified to accommodate the use of broadcast modules on unmanned aircraft produced without remote identification. For a discussion of the minimum performance requirements and the need for them see section VIII.B of this preamble. For a discussion of the message elements performance requirements and the need for them see section VIII.C of this preamble.

One of the differences between the requirements for standard remote identification unmanned aircraft and remote identification broadcast modules is that the latter includes takeoff location as a message element in lieu of control station location. Because the remote identification broadcast module may be a separate module secured to the unmanned aircraft or implemented through a software upgrade using existing equipment on the unmanned aircraft, a requirement to broadcast an indication of the control station location may not be feasible. However, the FAA maintains that knowledge of the remote pilot's location is a necessary component of remote identification. Therefore, the FAA is requiring that the remote identification broadcast module provide an indication of the unmanned aircraft takeoff location as a proxy for the remote pilot's location.

The FAA expects this message element to be a static message element that does not change for the duration of the unmanned aircraft flight operation. The FAA declines to prescribe how the takeoff location is determined by the remote identification broadcast module, but anticipates the equipment will be designed in a manner that allows the latitude and longitude of the takeoff location to be determined and stored as part of the broadcast module initialization prior to takeoff. The FAA is also adopting a requirement to indicate the geometric altitude of the unmanned aircraft take-off location—instead of the altitude of the control station. This

information will help to determine whether the takeoff location was from ground level or some other elevation.

Under the final rule, the takeoff location message element broadcast by remote identification broadcast modules may not be distinguishable from the control station location message element broadcast by standard remote identification unmanned aircraft. As such, a smart phone app being used by a member of the public to display remote identification information may not be able to immediately distinguish between whether an indication is a takeoff location or control station location solely from FAA's requirements. The FAA notes, however, that smart device apps that display remote identification information may be able to recognize this distinction by detecting the emergency status message element which is only broadcast by standard remote identification unmanned aircraft. Moreover, as discussed elsewhere in the preamble, the FAA notes that industry consensus standards may include message element requirements above and beyond the FAA's minimum performance requirements, and such a standard could include methods for differentiating these message elements.

Other differences between the minimum performance requirements for standard remote identification unmanned aircraft and remote identification broadcast modules include removing the design requirement that the unmanned aircraft cannot take off if it fails the self-test or is not broadcasting the message elements. There are also changes to the interference considerations to accommodate use of broadcast modules on compatible types of unmanned aircraft, and adjustments to the accuracy requirement for the indication of the take-off location geometric altitude.

To meet the minimum performance requirements established in this rule, the equipment must be capable of recording the geometric position and geometric altitude of the unmanned aircraft takeoff location for these indications to be broadcast by the remote identification equipment. The aircraft takeoff location must meet the positional accuracy requirements as discussed in section VIII.C.2 of this preamble. The takeoff location altitude must meet the

geometric altitude accuracy requirements applicable to the unmanned aircraft as discussed in section VIII.C.3 of this preamble.

X. Privacy Concerns on the Broadcast of Remote Identification Information

A. Discussion of the Final Rule

As explained in the proposed rule, remote identification message elements that are broadcast would be publicly available to any device capable of receiving the broadcast. The proposed rule explained that though the message elements themselves would be publicly accessible information, the ability to cross-reference that information with non-public registry data would not be publicly available. This information would be limited to the FAA and available only to government agencies for the purpose of security or enforcement of laws, unless otherwise required by law to be released. This policy remains unchanged for this rule.

B. Public Comments and FAA Response

Comments: Many commenters were confused regarding the accessibility of certain registration information. Commenters expressed concerns over access to registration information potentially being open to the general public and wanted to restrict access to law enforcement. Other individuals commented that the registration system should not divulge the name of the registrant, and should include only the unmanned aircraft serial number, FAA aircraft registration number, phone number, and location of the UAS pilot. A commenter was concerned that using a serial number issued under ANSI/CTA-2063-A poses a concern for potential Personal Identifying Information (PII) leakage. Commenters mentioned that the serial number would allow an unmanned aircraft to be linked back to prior owners after resale. They also argued that competitors could track historical information on UAS usage (e.g., by a delivery company). The Consumer Technology Association expressed the importance of protecting the

privacy, confidentiality, and data of users through the proper storage of personally identifiable information.

Many commenters felt that both the registration and remote identification broadcast information should only be available to government, law enforcement, and emergency services. Some commenters specifically referenced the 1989 murder of Rebecca Schaeffer, which led to passage of the 1994 Driver's Privacy Protection Act. Several commenters offered the example of the privacy protections required for automobile license plate numbers as well as manned aircraft registry privacy provisions, and suggested that UAS identification should be afforded similar protections. A commenter suggested that sharing remote identification information with the public should be a Federal crime similar to driver's license and license plate information. Qualcomm suggested only granting public access to a limited set of message elements.

Several commenters suggested the FAA consider the privacy of commercial and recreational users differently. These commenters suggested doing so by requesting recreational operators to provide less information in comparison to commercial ones, noting the potential security and safety resources available to large commercial operators.

Though the Small UAV Coalition expected the accountability that comes with the remote identification final rule would deter irresponsible operations, including invasions of privacy by UAS, it mentioned the privacy interests of both UAS end-users and operators should also be protected. The Small UAV Coalition suggested the rule include limitations on: (1) the type of entities that can access historical message element data stored by a Remote ID USS (directly or indirectly); (2) the purposes for accessing this data; and (3) the correlation of public information such as remote identification message elements with non-public information like registration data.

Numerous commenters believed remote identification of UAS does not include privacy and personally identifiable information protection, and others commented that the NPRM conflicted with existing privacy regulations at the State or Federal levels and could violate

Constitutional rights. Kittyhawk submitted survey data showing the importance of privacy for the majority of those pilots surveyed. The Consumer Technology Association submitted survey results showing 90 percent of UAS owners were not comfortable with publicly sharing remote identification information such as pilot location, identification information, and historical flight data; and nearly 40 percent were less likely to purchase a UAS if that is required. Some commenters expressed fear that their personal data could be misused by those who are "enraged by drones" and otherwise harbor antipathy toward UAS operators. Other comments were concerned about the possibility of the broadcasted information being vulnerable to hackers or available for data mining and misuse of registrants' information, as well as the need to properly protect the data because of proprietary techniques and maneuvers of a company. Several commenters were also concerned about protecting the safety of young pilots and women, and were concerned that criminals may use the data to track them. Many commenters expressed privacy concerns if remote identification message elements became public, including issues related to confrontation leading to assaults or thefts as well as concerns that persons may be able to track where delivery unmanned aircraft have dropped packages.

One commenter suggested that if FAA makes the real-time location data available to the public, they should also have a data log that shows who looked up the pilot's location. Another commenter also wanted FAA to use an open standard of flight logs, and adherence to the flight regulations set by the FAA, stating that "like operating a motor vehicle, we do not need private companies tracking our movements to create a safe and orderly system."

FAA Response: Though the remote identification message elements broadcast from unmanned aircraft are publicly available information, registration data pertaining to individuals is protected in accordance with the requirements of the Privacy Act (5 U.S.C. 552a). Therefore, registry information pertaining to individuals will only be disclosed outside DOT if a Privacy Act exception applies. In addition to other disclosures generally permitted under the Privacy Act, DOT has published System of Records Notice (SORN) DOT/FAA 801, which identifies the

specific circumstances under which the DOT discloses individuals' registry information to the public under the Privacy Act's routine use exception. 81 FR 54187, August 15, 2016.

For those individuals who register small unmanned aircraft under 14 CFR part 48, the only registration information generally available to the public includes the registrant's country, state, city, postal code, and number of unmanned aircraft registered. For individuals and entities who register unmanned aircraft, including small unmanned aircraft, under part 47, the registry information generally available to the public includes the registrant's name, street address, country, state, city, postal code, and additional information about the registered unmanned aircraft. For both categories of unmanned aircraft registration, these are the same data elements that have always been publicly available, and are unchanged by this rule. Serial numbers of unmanned aircraft are not included in the information publicly available from the registry for those who register under part 48. As with all other information maintained within the registry, the FAA has implemented the required privacy and security measures to protect data maintained in the registry system. Therefore, the FAA does not believe that there are compelling concerns regarding PII data leakage from serial numbers.

Because the serial number is not generally available to the public, members of the public will be unable to correlate a broadcasted serial number with identifying information of the individual who owns the UAS through the public facing registry. In addition, in accordance with routine use (1) contained in SORN DOT/FAA 801, the FAA will not routinely disclose identifying information of individuals who register under 14 CFR part 48 to the public unless a member of the public provides the unmanned aircraft registration number, which is not one of the data elements that the unmanned aircraft will broadcast. Members of the public cannot generally receive a part 48 registrant's name or address if their request to the FAA identifies only the serial number, rather than the registration number.

Any correlation of other information held by the FAA that would identify any individual member of the public beyond the public remote identification message elements will be strictly

limited to authorized FAA and other government and law enforcement personnel who are operating in their official capacities pursuant to all legal limitations and authorized use of the information. This correlation may occur with data such as unmanned aircraft registration information held by the FAA, authorizations to operate UAS under 14 CFR part 107 and 49 U.S.C. 44809, and any waivers from the operating requirements of 14 CFR part 107. All personnel, whether FAA or other government or law enforcement, allowed to access the data will need to be authorized and will access the information only through approved, secured channels when necessary to perform proper actions authorized by law in accordance with all due process and other legal and constitutional requirements.

UAS operators will broadcast the serial number or session ID of their unmanned aircraft. However, that serial number is non-identifying unless it is correlated with the information in the FAA aircraft registration databases. Access to the part 48 database is strictly controlled, and no member of the public may have access to FAA's database; information within the database is disclosed to members of the public only in accordance with the Privacy Act. As with correlating information related to session IDs, access will be limited to authorized official personnel who are engaged in approved duties with proper legal foundation and authority. For persons with concerns about broadcasting the unmanned aircraft serial number, a session ID may be used and broadcasted instead of the serial number to help protect the privacy of the individual user or the confidentiality of a business. These message elements for standard remote identification unmanned aircraft are discussed in more detail in section VIII.A of this preamble.

The only information that will be broadcast or otherwise available publicly is the remote identification message elements as described in subpart D of part 89. As these message elements will be broadcast directly from the unmanned aircraft, they are public data.

In connection with this rule, DOT has conducted a Privacy Impact Assessment (PIA) further analyzing the privacy impact of this rule on individuals. This PIA is published on the DOT website and has been included in the docket for this rulemaking.

XI. Government and Law Enforcement Access to Remote Identification Information

A. Discussion of the Final Rule

In addition to aiding the FAA in its civil enforcement of FAA regulations, the FAA anticipates that law enforcement and Federal agencies will find remote identification information useful for enforcement of laws, public safety, and security purposes. The FAA envisions pairing remote identification data with certain registration data, when necessary, for accredited and verified law enforcement and Federal agencies. The information could be used to identify, locate, or contact the person manipulating the flight controls of the UAS during an incident response. This information will help with preliminary threat discrimination.

For example, when correlated with registration information, remote identification of UAS also enables law enforcement officers to determine some information about who the unmanned aircraft owner is before engaging with the person manipulating the flight controls of the UAS. In addition, once located, a law enforcement officer can speak with the person manipulating the flight controls of the UAS to gain potential insight into his or her intentions, and allow the officer to either educate the person manipulating the flight controls of the UAS or begin an investigation. Though remote identification of UAS may not deter all nefarious actors, this rule allows the swift interdiction of clueless and careless persons manipulating the flight controls of the UAS and can help law enforcement and security partners focus their efforts on truly nefarious actors. This information will also aid in any subsequent criminal or civil enforcement action.

B. Public Comments and FAA Response

1. Law Enforcement Access to Remote Identification Information

Comments: Several commenters expressed support for law enforcement – including Federal, State, and local agencies – as well as the FAA, having access to remote identification information. The Stadium Managers Association commented that remote identification

information should be made available to law enforcement and that information available to the general public should be limited, particularly in the case of stadiums. The University of Washington - NSF RAPID Facility, Pierce Aerospace, and many individual commenters believed the remote identification message should be encrypted or otherwise protected to ensure that only law enforcement, and not the general public, had access to the information. A number of commenters, including the American Association of Airport Executives, supported the need for law enforcement to have access to remote identification information, but believed that the proposed rule did not outline in enough detail how, when, why, and to what extent the data would be available to law enforcement or even to the general public.

A few commenters expressed support for law enforcement and other entities having access to remote identification information in controlled airspace or while operating near sensitive security locations, but opposed having information other than aircraft location made available while operating in Class G airspace.

Commenters mentioned a need to clarify who would grant access to the information. Airlines for America stated the FAA should provide details of the standard(s) and processes verifying and accrediting law enforcement for UAS enforcement and allow the public to provide comments on such standards and processes. Some commenters believed that no one should have access to their remote identification information, including law enforcement.

A form letter from the Academy of Model Aeronautics stated the safety of law enforcement officers depends on having remote identification information available in real-time. The Academy of Model Aeronautics expressed concerns that many local law enforcement agencies do not have the resources to outfit their officers with smart phones or other technology capable of receiving remote identification information.

A significant number of commenters, while not necessarily objecting to having information provided to law enforcement, questioned the value of the remote identification rule entirely. These commenters asserted that only law-abiding UAS operators would comply with

remote identification requirements and those persons who intend to violate the law will not comply with remote identification requirements at all. Based on this assumption, these commenters questioned the value of the rule and its necessity. The Stadium Managers Association was skeptical of remote identification's ability to assist law enforcement in locating and apprehending UAS pilots given the amount of time they believed it will take to identify the unmanned aircraft and then locate the pilot some distance away from the aircraft.

FAA Response: A remote identification broadcast is, by nature and intent, public. Though remote identification provides situational awareness to law enforcement, it will also provide the public with basic information about a particular unmanned aircraft to facilitate reporting to law enforcement, if appropriate. This information will be anonymous, however. Under this rule, the FAA will not grant members of the public access to information that could be correlated to a particular unmanned aircraft or operation. This is similar to the public ADS-B Out broadcast emitted by manned aircraft. As in the case with ADS-B Out, it is possible that members of the public could develop systems for tracking and aggregating information about UAS flights, but those systems would not include personal information from the FAA's databases.

The FAA finds that remote identification information plays a critical role in threat discrimination by law enforcement and national security entities regardless of class of airspace. Law enforcement officials have made clear that it can be very difficult to make a decision about the risk posed by a person manipulating the flight controls of the UAS with the limited information available from visually observing an unmanned aircraft. Remote identification information will enable better threat discrimination, an immediate and appropriate law enforcement response, and a more effective follow-on investigation. This is because remote identification information can be correlated with unmanned aircraft registry information to inform law enforcement officers about the registered owner. This information, along with the real-time location of the unmanned aircraft operator, provides critical input to a law enforcement officer's decision on whether intervention is appropriate. The remote identification message is

broadcast over unlicensed radio frequency spectrum and therefore would be accessible by any device capable of receiving that broadcast. Though the FAA does not consider that such a device would be costly, this rule does not place any compliance requirements on local law enforcement agencies, leaving them free to choose not to use remote identification as a tool.

The FAA's regulatory approach is based on the fundamental assumption that regulated entities will comply with the rules; the FAA does not assume noncompliance. Acknowledging that not all entities will comply with regulations, the FAA is promulgating this rule to be a tool to help relevant authorities distinguish between compliant and noncompliant actors. The FAA recognizes that certain nefarious actors may not comply with remote identification requirements; however, the fact that an unmanned aircraft or an unmanned aircraft operation is noncompliant is an important data point for law enforcement to consider as they engage in a threat analysis. A noncompliant actor will stand out, allowing law enforcement to shift its attention appropriately. Even if the noncompliant actor has no nefarious intent, there is value in this type of threat discrimination. A careless or clueless operator may be introducing unnecessary risk into the airspace of the United States without realizing it. Remote identification allows appropriate authorities to identify the operator for follow up or education on how to operate safely and in compliance with the FAA's rules.

2. Law Enforcement Uses of Remote Identification Information

Comments: Commenters expressed concerns regarding potential abuse of remote identification information by law enforcement. Some commenters described the proposed remote identification system as a central database, and believed that the information would be used inappropriately when provided to local law enforcement. The Academy of Model Aeronautics expressed concern that there is nothing in the NPRM about how remote identification information will be integrated with the rest of the data that law enforcement routinely uses. The Academy of Model Aeronautics believed this is a critical point because law enforcement officers are trained to use personal identifying information about the person they have in front of them.

Many commenters believed that all remote identification information for all unmanned aircraft flights would be provided to all law enforcement organizations regardless of need. These commenters argued that law enforcement, particularly local law enforcement, does not need this type of information for every pilot and every flight regardless of origin, destination, and other factors. Other commenters argued that law enforcement does not need information regarding every flight in real time, noting that law enforcement does not have access to real-time driving information for every vehicle on the roads. Commenters questioned local law enforcement agencies' need for this information, particularly as the Federal Government is the sole regulator of airspace.

Wing Aviation asserted that persistent surveillance without cause is not consistent with community expectations of privacy and due process, nor is it necessary to support compliance, accident investigation, or security. If agencies intend to use retained data for other purposes, Wing Aviation believed that request should be subject to administrative, civil, or criminal procedures.

Many commenters believed that Federal, State, and local law enforcement agencies would use the data provided to identify, harass, and arrest remote operators. Some commenters believed this was a particular possibility if law enforcement believed that the UAS operator was using unmanned aircraft-mounted camera systems to expose law enforcement's behavior or activities to the public. Still other commenters believed that the proposal creates the potential for illegal tracking, unwarranted surveillance, and harassment of American citizens by Federal, State, and local law enforcement. An individual commenter asked the FAA to clarify if remote pilots operating small UAS under part 107 have the same protection as manned pilots from outside interference, and if such interference would carry "hefty penalties." The commenter noted that he had been "accosted by law enforcement even when operating [his] UAS responsibly." The commenter suggested that an emphasis be placed on ensuring that law enforcement officers do not interfere with remote pilots during flight operations. Multiple

commenters expressed the view that unfettered access by law enforcement to remote identification information could lead to both a compromise of personally identifiable information and potential abuses. Many individual commenters believed that law enforcement should not be granted access to any remote identification information without probable cause and a warrant.

The Consumer Technology Association stated that remote identification requirements should include due process protections and articulate a legal standard for law enforcement and security officials seeking access to database information, if they will have access with less than a subpoena or warrant. To ensure accountability and prevent abuse, the Consumer Technology Association advocated the FAA should maintain a record that documents every instance where officials access the remote identification database, with this information (who requested access, when was it requested, and for what purpose) subject to the Freedom of Information Act.

Other commenters were concerned about the inappropriate policing of UAS activities. Several commenters used examples of having incorrect altitude readings above the 400-foot limit for part 107 operations of unmanned aircraft broadcast and questioned what type of enforcement action would result at the Federal, State, or local level. Commenters also asked who would validate the data, determine whether violations had been committed, and assess fines or other penalties.

Further, several commenters expressed the view that unfettered access by law enforcement to remote identification information could lead to specific monitoring of the media by law enforcement agencies, impacting freedom of the press.

FAA Response: The FAA emphasizes that any use of remote identification data by law enforcement agencies is bound by all Constitutional restrictions and any other applicable legal restrictions. The purpose of this rule is to provide a tool for identifying an unmanned aircraft and locating its operator. One of those uses is to help local law enforcement engage in threat discrimination while discharging their lawful law enforcement duties. This rulemaking does not speak to the use of information by law enforcement agencies or how remote identification data

will be correlated with other law enforcement data. Real-time information is critical for law enforcement and national security purposes because compliance is a useful tool for threat discrimination.

The FAA considers that the remote identification requirements are analogous to surface transportation vehicles. Though real-time driving information is not available for every vehicle on the road, an indication of certain compliance status is viewable to law enforcement for all vehicles by way of visible markings such as a license plate, registration marking, and inspection marking. Similarly, a vehicle not in compliance with license plate display, registration, or inspection would be apparent to law enforcement, and the driver is co-located with the vehicle. There is currently no standardized system to query such information for unmanned aircraft for law enforcement and national security purposes, and this rule would meet that need.

3. Law Enforcement Training on Remote Identification Information

Comments: A number of commenters discussed the necessity for public safety training to recognize questionable operations. Several commenters, including the National Sheriffs' Association, were concerned that law enforcement will need training as to what is, and is not, a legal UAS operation. Some commenters believed that information gathered from remote identification would be used by local law enforcement to enforce local regulations that conflict with FAA regulations pertaining to use of the airspace of the United States. Individual commenters discussed the confusion of local law enforcement regarding operations permitted under part 107 and believed that access by these organizations to remote identification information would be used to further harass persons conducting such legitimate operations.

Several individual commenters also raised concerns about flight safety if they were interrupted, interfered with, interrogated, or harassed by law enforcement while conducting a lawful unmanned aircraft operation. These commenters believed the FAA needed to provide greater training to law enforcement. Commenters emphasized the need for law enforcement to learn how to interact with a UAS pilot appropriately to ensure the safety of the operation,

including the safe landing of the aircraft if necessary. The National Sheriffs' Association called specifically on the FAA to work with more than Federal law enforcement agencies, by providing training or assistance to State and local agencies as to what is, and is not, a UAS threat. One commenter also cited the need for an easy-to-use system to report illegal UAS operations.

The executive director of the Academy of Model Aeronautics (AMA) asked who was going to fund, train, and equip law enforcement to use the remote identification system. AMA believes that the remote identification rule should not be implemented without further research and data, to include the impact on privacy.

The Coconino County Sheriff's Office asked the FAA, prior to adoption of any rule on remote identification, to seek further clarification in consultation with Federal, State, local, and tribal law enforcement representatives regarding the provision of equipment and training for local law enforcement for access to remote identification information.

FAA Response: The FAA is actively engaged in significant outreach and education to law enforcement on many matters related to UAS, including educating the public safety community on understanding how to distinguish between, and respond to, authorized and unauthorized or unsafe UAS operations. The FAA also maintains an updated toolkit for public safety and government users. Further, law enforcement personnel can contact Law Enforcement Assistance Program (LEAP) Special Agents, who regularly assist law enforcement on matters related to FAA regulations. The desire of a commenter for an easy-to-use system to report illegal unmanned aircraft operations is outside the scope of this rulemaking. The purpose of this rule is to provide a tool for locating and identifying an unmanned aircraft and locate its operator. One of those uses is to help local law enforcement engage in threat discrimination while discharging their law enforcement duties. This rulemaking does not speak to the use of information by law enforcement agencies, or how remote identification data will be correlated with other law enforcement data.

XII. FAA-Recognized Identification Areas

A. Discussion of the Final Rule

As discussed in section VII.F.2 of this preamble, FAA-recognized identification areas are locations where unmanned aircraft may operate without remote identification equipment. The FAA proposed subpart C to outline the requirements for establishment of FAA-recognized identification areas. After consideration, the FAA is making changes to this subpart in the final rule. This rule expands eligibility to apply for establishment of an FAA-recognized identification area to include educational institutions in addition to community-based organizations (CBOs), and also removes the 12-month limitation on time to submit applications. The FAA is also clarifying the application review criteria and required information for application. The criteria will be described in greater detail in the advisory circular on FAA-recognized identification areas, which will be published following this rulemaking.

Finally, this rule removes the prohibition on re-application for FAA-recognized identification areas for (1) locations that have expired, or (2) locations that have been terminated, so long as the conditions that led to termination are no longer in effect.

This rule promulgates the other provisions of subpart C as proposed.

B. Eligibility

1. Discussion of the Final Rule

In the NPRM, the FAA discussed the purpose of FAA-recognized identification areas and acknowledged that after the production compliance date, unless a UAS fell into an exception such as amateur-built UAS, most UAS would have remote identification. Because the FAA recognized that certain UAS, such as amateur or home-built UAS, would not be able to equip, the FAA proposed that a CBO recognized by the Administrator would be eligible to apply for the establishment of a flying site as an FAA-recognized identification area to enable operations of

UAS without remote identification within those areas.[22] This rule maintains eligibility for CBOs. In addition, to better accommodate science, technology, engineering, and math programs and encourage participation in aviation for educational purposes, the rule expands that eligibility to also include education institutions, including institutions of primary and secondary education, trade schools, colleges, and universities.

2. Public Comments and FAA Response

Comments: Commenters, including AOPA, the Massachusetts Department of Transportation and the Air Line Pilots Association, supported the idea of FAA-recognized identification areas generally. Many commenters, including the National Agricultural Aviation Association supported CBOs being eligible to apply for FAA-recognized identification areas. However, some commenters raised concerns that limiting eligibility to CBOs was too restrictive, and that many individuals would not want to join a CBO to fly. Flite Test Community Association said they have surveyed hobbyists and 65 percent of respondents indicated they would not join a CBO even if it were free.

Many commenters such as Signatory Higher Education Associations and Institutions of Higher Education, Wing Aviation LLC, and the North Carolina Department of Transportation supported the idea that in addition to CBOs, other persons should be eligible to apply for FAA-recognized identification areas. Several commenters, including State and local governments, such as the Minnesota Department of Transportation, and several individual commenters suggested that educational institutions and State and local governments should be eligible to apply for FAA-recognized identification areas. Commenters reasoned that educational institutions are well-positioned to ensure UAS operations comply with regulations and campus safety, security, and privacy policies. In addition, commenters argued that not allowing

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[22] The FAA clarified in the proposed rule that the concept of FAA-recognized identification areas is different and independent from the fixed-site concept in 49 U.S.C. 44809(c)(1) and a fixed site would not automatically be approved as an FAA-recognized identification area.

universities to request and control FAA-recognized identification areas would pose an unnecessary impediment to science and engineering opportunities for university students, faculty, and staff. Some commenters such as the Alliance for Drone Innovation and AiRXOS contended that expanding eligibility to educational institutions is necessary to spur innovation and promote workforce development and public safety.

Commenters emphasized that certain universities and other entities such as State and local governments could not qualify to become CBOs in accordance with 49 U.S.C. 44809(h) due to the 501(c)(3) requirement and because they are not membership-based associations. Organizations such as the National Association of State Aviation Officials, City of Albuquerque Parks and Recreation Department, Experimental Aircraft Association, Southern Company, The Commercial Drone Alliance, and University of Texas Austin UAV Committee made similar comments in support of expanding eligibility. Some commenters highlighted section 350 of the FAA Reauthorization Act of 2018 as evidence that Congress intended for the FAA to create allowances for recreational UAS that are operated by an institution of higher education for educational purposes.

FAA Response: The FAA agrees with commenters that eligibility to apply for establishment of an FAA-recognized identification area should be expanded to include educational institutions. Community-based organizations will continue to be eligible to apply.

The FAA is including educational institutions – including primary and secondary educational institutions, trade schools, colleges, and universities – in recognition of the critical role they play in providing pathways to aviation careers, whether through science, technology, engineering, and math curricula; the building and flight of unmanned aircraft; or other educational activities. The FAA determined it is appropriate to allow educational institutions to request the establishment of FAA-recognized identification areas. The FAA believes that extending the ability to request establishment of FAA-recognized identification areas to educational institutions will provide additional convenient locations for those associated with the

educational institution to be able to operate unmanned aircraft without remote identification and reduce costs associated with travel time to other FAA-recognized identification areas.

Comments: Several commenters advocated for wider expansion of eligibility for FAA-recognized identification areas beyond just CBOs and educational institutions. Several commenters requested the FAA consider expanding eligibility to State and local governments. Many individual respondents believed the proposed eligibility criteria would force local governments and schools to work through a non-governmental organization to request FAA-recognized identification area designations on public property. One commenter noted there are many local organizations not affiliated with a CBO that operate from local private and municipal fields. Commenters stated that limiting eligibility to CBOs would discourage student model flyers who predominately learn at parks, schools, and gyms, and could disadvantage low-income and urban enthusiasts who cannot afford CBO dues.

FAA Response: The FAA considers that expanding eligibility to CBOs and educational institutions at all levels is sufficient to meet the needs of student model flyers and declines to expand eligibility to State and local governments. Expanding eligibility to State and local governments could expand the scope of FAA-recognized identification areas to an extent that would undermine the effectiveness of remote identification. The purpose of FAA-recognized identification areas is to help accommodate traditional model aircraft, many of which are home-built unmanned aircraft and may not meet remote identification requirements, and not to provide sites for State or local governments to operate.

Comments: The New Hampshire Department of Transportation stated that anyone should be able to request an FAA-recognized identification area by certifying that they are responsible for the area and will operate within FAA regulations. A large number of individual commenters believed that private individuals should be able to register their private property as an FAA-recognized identification area. Some commenters also asserted this restriction infringes on private property rights. The American Association of Airport Executives recommended that local

governments should control the use of FAA-recognized identification areas through local laws and ordinances. The Experimental Aircraft Association suggested that if the FAA adopted a system like the FAA's Web-based Operations Safety System (WebOPSS) to automate the application process, a CBO intermediary would be unnecessary.

FAA Response: The FAA declines to extend eligibility to request FAA-recognized identification areas to any individual or individual property owner, regardless of affiliation. As discussed in the NPRM, the FAA intends most UAS to identify remotely. The operation of unmanned aircraft without remote identification equipment at FAA-recognized identification areas is primarily for those who are truly unable to use either standard remote identification UAS or remote identification broadcast modules. The benefits of requiring remote identification generally are undermined if the FAA-recognized identification area eligibility criteria are expanded to a point where every backyard could be a potential site. Permitting private individuals to seek FAA-recognized identification areas would undermine the FAA's primary goal in establishing the remote identification requirements: enabling the identification of unmanned aircraft operating in the airspace of the United States by the FAA, law enforcement, and other government officials. That goal cannot be met if every individual is able to operate without remote identification by requesting an FAA-recognized identification area.

Comments: Many commenters equated a "community-based organization" with the Academy of Model Aeronautics (AMA) and expressed concern that the FAA would favor the AMA when establishing FAA-recognized identification areas. These commenters argued that model aircraft flyers would be compelled to join Academy of Model Aeronautics-affiliated clubs to pursue their hobby. Some commenters requested the FAA automatically establish FAA-recognized identification areas at all existing AMA flying sites.

FAA Response: The FAA considers that CBOs and educational institutions can perform an important function in promoting safety in recreational UAS flying. These organizations must submit applications for any sites for which they request establishment of FAA-recognized

identification areas. Only by submitting an application and providing the FAA with the information requested will the FAA be able to appropriately and objectively evaluate each site to determine its eligibility. The FAA is not pre-approving any existing flying sites as FAA-recognized identification areas with the publication of this rule.

C. Time Limit for Submitting an Application to Request an FAA-Recognized Identification Area

1. Discussion of the Final Rule

The FAA proposed that applications for establishment of an FAA-recognized identification area would have to be submitted within 12 calendar months from the effective date of a final rule. Under the proposal, at the end of that 12-calendar month period, no new applications for FAA-recognized identification areas would be accepted. This rule eliminates the 12 calendar month limitation on applications, and the FAA will begin accepting applications September 16, 2022.

2. Public Comments and FAA Response

Comments: Though a few commenters suggested varying timeframes over 12 months for the application period, the vast majority of commenters opposed the 12-month application time period limitation. Commenters including the Airports Council International-North America, AiRXOS, AirMap, the Consumer Technology Association, DJI, New Frontier Airspace, the North Carolina Department of Transportation, Wing Aviation, and others strongly opposed the 12-month application period. Some commenters, including AUVSI and AOPA, expressed concern that the 12-month limit on new FAA-recognized identification areas would adversely affect science, technology, engineering, and mathematics access, especially for those young persons interested in aviation as a career. Academic respondents, such as the Mobile County Public School, Mobile County Public School JROTC, the University of Maryland UAS Test Site, the Virginia Tech Mid-Atlantic Aviation Partnership, University of Texas at Austin, the Minnesota Department of Transportation, and Embry-Riddle Aeronautical University opposed

the 12-month limit on similar grounds—as did a number of private organizations. The New Hampshire Department of Transportation and many individual respondents opposed the 12-month window as potentially limiting not only recreational opportunity, but also economic growth.

Many commenters pointed out that the need to establish and change the parameters of an FAA-recognized identification area would continue after the 12-month period had passed, asserting that land development, re-zoning, community encroachment, sale of property or loss of lease, demographics, and other factors regularly necessitated that flying clubs cease operations and re-locate. Commenters also expressed concern that the 12-month period would result in the elimination of traditional radio controlled flying through attrition. Nearly all commenters felt that the 12-month limit should be eliminated, and that recreational UAS without remote identification should be permitted to operate—at least at selected sites—in perpetuity.

FAA Response: Based on the comments received, the FAA has determined that there will be a continued need for FAA-recognized identification areas for certain types of unmanned aircraft such as home-built unmanned aircraft and that these areas will not phase out as originally conceived. Though the FAA considered that the addition of the remote identification broadcast module option and elimination of the proposed network requirements would reduce the need for FAA-recognized identification areas, the FAA still foresees an ongoing need for these areas for some operators such as some home-built UAS that cannot equip and educational science, technology, engineering, and math programs. Due to this ongoing need, the FAA has decided to remove the 12 calendar month limitation on applications to establish an FAA-recognized identification area.

In addition, comments about the potential impacts on education and the recreational community were persuasive.

The FAA will begin accepting applications for FAA-recognized identification areas September 16, 2022.

D. Process to Request an FAA-Recognized Identification Area and FAA Review for Approval

1. Discussion of the Final Rule

The NPRM proposed in § 89.210 that certain information be provided to the FAA as part of an application for an FAA-recognized identification area. With the exception of minor adjustments to reflect the expansion of organizations eligible to apply as discussed previously in this section, the FAA will adopt this list as proposed. Applications for establishment of an FAA-recognized identification area must include: (1) the name of the community based organization or educational institution eligible under § 89.205; (2) the name of the individual making the request on behalf of eligible persons (*i.e.,* the CBO or educational institution per § 89.205); (3) a declaration that the individual making the request has the authority to act on behalf of the community-based organization or educational institution; (4) the name and contact information, including telephone number(s), of the primary point of contact for communications with the FAA; (5) the physical address of the proposed FAA-recognized identification area; (6) the location of the FAA-recognized identification area in a form and manner prescribed by the Administrator; (7) if applicable, a copy of any existing letter of agreement regarding the flying site; (8) a description of the intended purpose of the FAA-recognized identification area and why the proposed FAA-recognized identification areas is necessary for that purpose; and (9) any other information required by the Administrator. The advisory circular on the FAA-recognized identification area application process will be published following this rulemaking.

In § 89.215 of the NPRM, the FAA proposed that the Administrator may consider certain criteria when reviewing a request for establishment of an FAA-recognized identification area. This rule clarifies the criteria proposed in § 89.215 to explain how the FAA may evaluate the requested location of an FAA-recognized identification area. In § 89.215(a), the FAA clarifies that it may consider the existence of flight or airspace restrictions and special flight rules, including any restrictions or regulations limiting UAS flight for safety, efficiency, national security, or homeland security, which may overlap with a requested or established FAA-

recognized identification area. The Agency may also consider the need for an FAA-recognized identification area in the proposed location and proximity of other FAA-recognized identification areas to determine whether to grant or deny an application. The effectiveness of remote identification relies upon the majority of operators remotely identifying, therefore, these considerations are necessary to prevent undermining of that effectivity. The FAA has removed the separate criteria of the effects on airspace capacity, determining that the criteria is already encompassed in the consideration of the safe and efficient use of the airspace by other aircraft.

The FAA is adopting the other criteria (e.g., the safe and efficient use of airspace by other aircraft and the safety and security of persons or property on the ground) as proposed.
The FAA will issue an advisory circular to provide additional guidance on FAA-recognized identification areas, which will be published following this rulemaking.

2. Public Comments and FAA Response

Comments: The FAA received comments on the information required for application as well as the criteria used to evaluate potential FAA-recognized identification areas. Some commenters, including the Airports Council International-North America, requested that FAA-recognized identification areas also be bound by height above ground level and that information be required in addition to latitude and longitude boundaries.

FAA Response: The FAA declines to include height above ground level in the required application criteria as unnecessary. Operations in FAA-recognized identification areas will continue to be bound by the constraints of the operating rules followed by each UAS operator in those areas (e.g., part 107, 49 U.S.C. 44809, etc.). These operating rules contain altitude restrictions and adherence to airspace requirements that sufficiently bound the maximum altitude in which UAS would be operating in these areas without including height above ground level.

Comments: Some commenters argued that geographic boundaries are too complex a request and that the default boundary shape should be circular. They suggested that the

application should only require the latitude and longitude coordinates of the center point of the circular area for the FAA-recognized identification area boundary.

FAA Response: The advisory circular on FAA-Recognized Identification Areas will provide additional guidance for how the FAA may accept descriptions of the location and boundary shapes. The FAA adopts this application requirement for geographic boundaries as "the location of the FAA-recognized identification area in a form and manner prescribed by the Administrator." The FAA expects that a CBO or educational institution requesting establishment of an FAA-recognized identification area would need to have a clear understanding of the boundaries of the area they are requesting and that the FAA may require specific details about that location's geographic boundaries. The application information and criteria established in this rule do not preclude circular FAA-recognized identification areas; however, the FAA foresees a need for increasingly specific boundary information to depict these areas accurately for the public. The advisory circular for FAA-recognized identification areas will provide additional guidance, and will be published following this rulemaking.

Comments: Some commenters including the Commercial Drone Alliance supported the criteria for evaluation proposed in the NPRM and recommended that FAA take all four factors into consideration for every application. Other commenters requested additional requirements prior to the establishment of an FAA-recognized identification area. The Association of American Railroads and Association of Airport Executives recommended that critical infrastructure operators be allowed to review and comment on FAA-recognized identification area applications near critical infrastructure, for example within 5 miles of an airport. Multiple organizations including The Airports Council International-North America and International Association of Amusement Parks and Attractions recommended FAA use a public notification process such as the Federal Register along with a 30 day public comment period, as part of the FAA review and approval process for FAA-recognized identification areas to get input from local communities, citizens, and other stakeholders such as existing airspace users, critical

infrastructure operators, public and private infrastructure owners, and neighborhoods affected by FAA-recognized identification areas.

FAA Response: The FAA does not consider that public notice and comment is appropriate for the approval of FAA-recognized identification areas. The existence of an FAA-recognized identification area does not change airspace requirements for the area; all operating rules and airspace requirements and restrictions remain in effect whether an FAA-recognized identification area is established or not. The FAA-recognized identification area merely indicates that unmanned aircraft in that location are not required to be equipped with remote identification broadcast. Because the decision to establish an FAA-recognized identification area does not alter airspace requirements, the FAA finds that public notice and comment is not necessary.

Comments: Flite Test Community Association recommended that the application process for FAA-recognized identification areas could be implemented similarly to the process for part 107 waivers. Commenters mentioned the FAA could identify default risk and safety thresholds and if the requested locations of the FAA-recognized identification areas meet those thresholds the location could be granted automatic approval.

FAA Response: The FAA notes the granting of part 107 waivers is not automatic and operational waivers are reviewed on a case-by-case basis. The Small UAV Coalition recommended the FAA should not simply approve or disapprove applications as submitted, but should grant approval if attributes of the proposed FAA-recognized identification area such as geographic boundaries can be altered to address FAA concerns. The FAA considers this to be unnecessary because applicants for FAA-recognized identification areas would be able to re-apply with different geographic boundaries if the initial application is denied.

Comments: Many other commenters looked for greater specificity in the criteria and processes for requesting and approving an FAA-recognized identification area. Commenters argued that it is more effective for them to build an FAA-recognized identification area to FAA-established requirements than to risk FAA disapproval because their application did not meet the

generalized criteria of § 89.215. In particular, commenters sought clarity regarding the term "critical infrastructure."

FAA Response: The FAA has revised the criteria to clearly state that the FAA may consider the existence of flight or airspace restrictions and special flight rules, including any restrictions or regulations limiting UAS flight for safety, efficiency, national security, or homeland security that overlap with the request. The FAA considers that this criteria would include any airspace restrictions over critical infrastructure. The advisory circular on FAA-Recognized Identification Areas will provide greater specificity in the criteria and process for establishment of an FAA-recognized identification area, and will be published following this rulemaking.

E. Official List of FAA-Recognized Identification Areas

1. Discussion of the Final Rule

The FAA stated it would maintain a list of FAA-recognized identification areas at https://www.faa.gov, and that the location of FAA-recognized identification areas would be made available to the public. The list would enable operators of unmanned aircraft without remote identification, and the public, to stay informed about these locations where unmanned aircraft without remote identification may be flown. In addition, law enforcement and security personnel would be able to identify if a suspect unmanned aircraft without remote identification is legally operating within an FAA-recognized identification area. Though no comments were received on this aspect of the proposal, the FAA believes it is appropriate to retain flexibility concerning the means by which FAA will publish the locations of approved FAA-recognized identification areas and ensure the information is made available in a useful format for the flying public and other stakeholders. The FAA clarifies in this rule that it will publish the location of FAA-recognized identification areas on a publicly accessible website in a form and manner to be prescribed by the Administrator. This may take the form of a list or another format, such as a

graphical depiction. Additional guidance will be provided in the advisory circular on FAA-Recognized Identification Areas, which will be published following this rulemaking.

2. Public Comments and FAA Response

The FAA received no public comments on this topic.

F. Amendment of the FAA-Recognized Identification Area

1. Discussion of the Final Rule

In § 89.220 the FAA proposed that any change to the information submitted in a request for establishment of an FAA-recognized identification area be submitted to the FAA within 10 calendar days of the change, including changes to the point of contact or organizational affiliation of an FAA-recognized identification area. The geographic boundaries of the FAA-recognized identification area will not change unless they have been approved in accordance with § 89.215. The FAA would review and approve or deny any requested changes to the geographic boundaries using the same criteria used for a request for establishment of an FAA-recognized identification area. Any change submitted to the Administrator may result in the termination of the FAA-recognized identification area pursuant to proposed § 89.230 or modification of the FAA-recognized identification area if the FAA-recognized identification area no longer meets the criteria or eligibility requirements. After reviewing the public comments, the FAA adopts the time period to amend information as proposed. The FAA finds that 10 calendar days is a reasonable amount of time for the holder of the FAA-recognized identification area to submit administrative changes to the FAA, and that this process does not impact operations within the site.

2. Public Comments and FAA Response

Comments: Many members of AMA provided comments that stated the need to change geographic boundaries over time due to club movement, population encroachment, or lease expiration, among other reasons. They requested that FAA not only consider amendments to the

geographic boundaries of an FAA-recognized identification area, but also consider entire new geographic areas if the current flying site needs to move.

FAA Response: The FAA agrees with commenters and acknowledges that there may be situations that require an FAA-recognized identification area's boundaries to be altered or completely relocated. The FAA will allow for submission of revised geographic boundaries but will evaluate the revised location against the criteria in § 89.215. The FAA considers that changes to geographic location that would require entirely new geographic boundaries can also be submitted as a new application for an FAA-recognized identification area and would be subject to the same criteria. With the removal of the 12 calendar month limitation, the FAA finds that this requirement is not overly burdensome. One commenter suggested allowing applicants to transfer the affiliation of an approved FAA-recognized identification areas from one CBO to another, which may be necessitated by CBO reorganization. The FAA finds that such a change in affiliation may be acceptable but would require the new CBO to submit an application and indicate the change, and for the FAA to review and approve the application.

Comments: An individual commenter stated the allowance of only 10 days to submit amended information for an FAA-recognized identification area is too short for volunteer-based clubs that may only meet once every 30 days.

FAA Response: The FAA adopts the time period to amend information as proposed. The FAA finds that 10 calendar days is a reasonable amount of time for the holder of the FAA-recognized identification area to submit administrative changes to the FAA, and that this process does not impact operations within the site. The FAA envisions that CBOs that meet infrequently would likely make such administrative changes during these meetings or members could communicate with each other through other means and still provide the FAA notice within the required timeframe.

G. Duration of an FAA-Recognized Identification Area, Expiration, and Renewal

1. Discussion of the Final Rule

Under § 89.225, the FAA proposed a term of 48 calendar months after the date of approval for FAA-recognized identification areas. The FAA explained that a person wishing to renew the FAA-recognized identification area would have to submit a request for renewal no later than 120 days before the expiration date. In the proposal, if a request for renewal is submitted after that time but prior to the expiration date, the Administrator could choose not to consider the request. Requests for renewal submitted after the expiration date of the designation would not be considered by the Administrator. The FAA has determined that 48 calendar months is a reasonable term for a renewal interval. A 48 calendar month renewal period gives the FAA the opportunity to update its FAA-recognized identification area database to delete abandoned and non-operational sites, and therefore, the FAA is keeping the site duration term as proposed. The proposed rule included the restriction that once an FAA-recognized identification area had expired, it could not be re-established. This rule removes that restriction.

1. Public Comments and FAA Response

Comments: Commenters did not agree on whether FAA-recognized identification areas should ever expire. Some noted that many fixed flying sites are used (and reused) on a short-term basis for infrequent events such as competitions. Many commenters noted that current flying sites are leased from private property owners and are subject to renewal. Some commenters felt the 48 month renewal requirement is burdensome, while others disputed that sites should require any renewal to retain their approval status. One commenter argued that expiration should only occur if a characteristic used to approve the FAA-recognized identification area has changed. Several commenters asserted that the renewal period should be longer than 48 months. The Small UAV Coalition and an individual commenter recommended extending the renewal period to 60 months to align with the duration of AMA-affiliated fixed site land leases. The commenter

also recommended allowing FAA-recognized identification areas to continue to operate while the renewal is being considered, to include any period of time where the FAA's determination is under appeal. One individual commenter recommended a 60-month duration but with annual reviews for changes in site parameters. The Aircraft Owners and Pilots Association and two individual commenters recommended the FAA change the renewal period to 120 calendar months. They commented that 48 months is too burdensome for both community-based organizations and the FAA as well. Commenters generally objected to provisions such as expiration and the prohibition on re-applying for an FAA-recognized identification area in the location of an expired or terminated FAA-recognized identification area. Commenters asserted the FAA's assumption that non-equipped UAS would dwindle is faulty and demonstrates a flawed understanding of the modeling community.

Commenters stated that the requirement to request renewal of FAA-recognized identification areas no later than120 days before the expiration date was onerous or unnecessary. The Small UAV Coalition did not raise concerns with the renewal time period requirement.

FAA Response: The FAA has determined that 48 months is a reasonable term for a renewal interval. A 48-calendar month renewal period gives the FAA the opportunity to update its FAA-recognized identification area database to delete abandoned and non-operational sites. In addition, the 48-month renewal period gives the FAA the opportunity to validate that these sites are still necessary and continue to meet the applicable safety and security criteria. The FAA has determined that a 48-calendar month term balances the safety and security needs to periodically review FAA-recognized identification areas against the administrative overhead associated with conducting the review. The FAA finds that commenter suggestions for longer time periods (60 months or 120 calendar months) do not allow for sufficiently frequent review. For the reasons detailed above, the FAA has also determined the requirement to submit a renewal request for FAA-recognized identification areas is also reasonable. The FAA determines that the

requirement to request renewal no later than 120 days before the expiration period is necessary to provide the FAA time to process the renewal.

Comments: Commenters objected to the restriction on re-establishment of FAA-recognized identification areas that have expired. AiRXOS commented that the FAA provided no reasonable explanation for prohibiting applicants from applying to reestablish a previously approved FAA-recognized identification area that had expired, and noted that it does not appear to be a risk-based provision.

FAA Response: The FAA agrees with commenters that these areas will not phase out as initially conceived. In addition to removing the 12-calendar month limitation for application, the FAA will allow applicants to re-apply for an area that had expired. The FAA envisions that the process to re-apply be the same as the process for new applications, because the application would be evaluated against the same criteria.

H. Requests to Terminate an FAA-recognized Identification Area

1. Discussion of the Final Rule

As proposed in § 89.230(b)(1), if the holder of an FAA-recognized identification area seeks to terminate the site prior to the expiration date, the organization would do so by submitting a request for termination to the Administrator. In the proposed rule, that site would no longer be eligible to be an FAA-recognized identification area in the future. This rule removes this restriction and allows voluntarily terminated FAA-recognized identification areas to be submitted to be re-established.

2. Public Comments and FAA Response

Comments: Commenters objected to the proposed restriction against the re-establishment of an FAA-recognized identification area that was voluntarily terminated.

FAA Response: The FAA agrees. This rule allows applicants to re-apply for an area that has been terminated by the previous holder of the FAA-recognized remote identification area.

The FAA envisions that the process to re-apply be the same as the process for new applications, because the application would be evaluated against the same criteria and the 12-calendar month limitation on new applications is no longer applicable.

I. Termination by FAA and Petitions to Reconsider the FAA's Decision to Terminate an FAA-Recognized Identification Area

1. Discussion of the Final Rule

The FAA proposed in § 89.230(b)(2) that the FAA would be able to terminate an FAA-recognized identification area for cause or upon a finding, including but not limited to: (1) the FAA-recognized identification area may pose a risk to aviation safety, public safety, or national security; (2) a finding that the FAA-recognized identification area is no longer associated with a community-based organization recognized by the Administrator; or (3) a finding that the person who submitted a request for establishment of an FAA-recognized identification area provided false or misleading information during the submission, amendment, or renewal process.

The FAA proposed that a person whose FAA-recognized identification area has been terminated by the Agency would be able to petition for reconsideration by submitting a request for reconsideration within 30 calendar days of the date of issuance of the termination as required in proposed § 89.230.

This rule adopts this section with minor changes to clarify the rationale for terminating an FAA-recognized identification area and the criteria to petition to reconsider the FAA's decision to terminate an FAA-recognized identification area.

As proposed, once an FAA-recognized identification area is terminated by the FAA, a CBO would not be able to reapply to have the associated area reestablished as an FAA-recognized identification area. In this rule, the FAA clarifies that except as provided in petitions for reconsideration, if the FAA terminates an FAA-recognized identification area based upon a finding that the FAA-recognized identification area may pose a risk to aviation safety, public

safety, or national security, that flying site will no longer be eligible to be an FAA-recognized identification area for as long as those conditions remain in effect. The FAA is also adding "homeland security" to the list of considerations in § 89.230(b)(2) that may necessitate termination, for consistency with other changes made in § 89.215. The FAA agrees that if at some point there is reasonable expectation that the reason for terminating the FAA-recognized identification area is no longer relevant, then an FAA-recognized identification area application should be open to consideration.

2. Public Comments and FAA Response

Comments: Many commenters, including AOPA and the Utah Department of Transportation, did not agree with the termination and expiration of FAA-recognized identification areas generally and specifically were concerned with the inability to re-establish these sites. PRENAV and some individual commenters suggested CBOs should be allowed to reapply to have a flying site reestablished as an FAA-recognized identification area following a failed appeal. These commenters noted the conditions which led to the FAA's decision to terminate an FAA-recognized identification area may have changed at some point after the termination.

FAA Response: The FAA agrees that if the conditions that led to the termination are no longer in effect, a previously-established FAA-recognized identification area should be allowed to be re-established and has modified this final rule, accordingly. However, if those conditions that led to termination are still present, the FAA would not re-establish the site. The FAA is committed to not allowing FAA-recognized identification areas in locations that would pose a risk to aviation safety, public safety, or national security.

Comments: A number of commenters expressed concern with the termination and appeal process, in particular over whether due process was being sufficiently applied. AOPA suggested the FAA allow for a decision reconsideration process so that CBOs may address and resolve any relevant outstanding safety issues that lead to the FAA termination decision. AOPA further

proposed that impacted parties should be able to seek an administrative hearing concerning the FAA's decision to terminate an FAA-recognized identification area under part 13, expressing concern that without an administrative hearing there was no guarantee that all the relevant facts would be considered, nor that an impartial decision on the matter would be reached.

FAA Response: The absence of an FAA-recognized identification area does not prohibit UAS from operating in the area so long as those UAS are able to identify remotely. However, the FAA recognizes that the termination of an FAA-recognized identification area could affect persons flying unmanned aircraft without remote identification because, for example, the persons would have to fly their unmanned aircraft at another FAA-recognized identification area or would have to retrofit their unmanned aircraft with a remote identification broadcast module. As discussed in this rule, §89.230(b) establishes the grounds for termination of an FAA-recognized identification area. Because of the effect of the termination on persons operating unmanned aircraft, the FAA included a reconsideration process in § 89.230(c) to ensure due process by providing a reasonable time frame for eligible persons to submit a petition to the Administrator requesting reconsideration of the decision by stating the reasons justifying the request and including any supporting documentation. The FAA believes this process is reasonable and adequate because the termination of an FAA-recognized identification area does not ground unmanned aircraft that can remotely identify, persons can choose to retrofit their unmanned aircraft with remote identification broadcast modules if they want to continue flying in that airspace, and they can continue to fly their unmanned aircraft without remote identification at other FAA-recognized identification areas.

Comments: Some individual commenters were unsatisfied with the wording of this section. One individual commenter requested the FAA amend the wording to specify that a "FAA-recognized identification area representative or CBO representative" rather than a "person" can submit a petition. This commenter felt the current wording was not broad enough to encompass a CBO or property owner or lessee.

FAA Response: The FAA clarifies that the word "person" carries the meaning ascribed to it in 14 CFR 1.1, and includes corporate entities and other organizations as well as individuals. The FAA agrees that if at some point there is reasonable expectation that the reason for terminating the FAA-recognized identification area is no longer relevant, an FAA-recognized identification area application should be open to consideration. The advisory circular will contain further details regarding FAA-recognized identification areas, including the process for termination and appeal. The advisory circular on FAA-recognized identification areas will be published following this rulemaking.

XIII. Means of Compliance

A. Performance-Based Regulation

The FAA adopts the regulatory framework for remote identification with performance-based requirements rather than prescriptive text to provide a flexible regulation that allows a person to develop a means of compliance—which may include industry consensus standards—that adjusts to the fast pace of technological change, innovation, design, and development while still meeting the regulatory requirements. Performance-based requirements describe outcomes, goals, or results without establishing a specific means or process for regulated entities to follow.[23] The FAA recognizes that UAS technology is continually evolving, making it necessary to harmonize regulatory action with technological growth. Setting performance requirements is one way to promote that harmonization.

The FAA encourages consensus standards bodies to develop means of compliance and submit them to the FAA for acceptance. These bodies generally incorporate openness, balance, due process, appeals process, and peer review. The FAA has an extensive history of working with consensus standards bodies such as ASTM International (ASTM), Society of Automotive

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[23] *See* OMB Circular A-4.

Engineers (SAE), and Institute of Electrical and Electronics Engineers (IEEE). Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (NTAA)[24] directs Federal agencies to use consensus standards in lieu of government-unique standards except where inconsistent with law or otherwise impractical. The FAA intends to rely increasingly on consensus standards as FAA-accepted means of compliance for UAS performance-based regulations for remote identification, consistent with FAA precedent for general aviation aircraft and other initiatives taken with respect to UAS.

The approach aligns with DOT regulatory policy, which requires that DOT regulations be "be technologically neutral, and, to the extent feasible, they should specify performance objectives, rather than prescribing specific conduct that regulated entities must adopt."[25] This approach is also consistent with the direction of the Office of Management and Budget (OMB) Circular A-119, which favors the use of performance-based regulations and voluntary consensus standards. OMB Circular A-119 states that, for cases in which no suitable voluntary consensus standards exist, an agency may consider using other types of standards. In addition, an agency may develop its own standards or use other government-unique standards, solicit interest from qualified standards development organizations for development of a standard, or develop a standard using the process principles outlined in section 2e of the Circular.[26] OMB Circular A-119 cautions regulators to avoid standards with biases in favor of a few large manufacturers that create an unfair competitive advantage.

1. Discussion of the Final Rule

As promulgated in this rule, a person may use a means of compliance to meet the remote identification minimum performance requirements. The FAA has determined that the use of an

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[24] Pub. L. 104-113; 15 U.S.C. 3701 et seq.

[25] 49 CFR 5.5(e).

[26] OMB Circular A-119, Section 5d.

FAA-accepted consensus standard as a means of compliance provides stakeholders the flexibility to comply with the remote identification requirements. However, the FAA recognizes that consensus standards are one way, but not the sole means, to show compliance with the performance requirements of this rule. The FAA emphasizes that, though a means of compliance developed by a consensus standards body (e.g., ASTM, SAE, Consumer Technology Association (CTA), etc.) may be available, any individual or organization can submit its own means of compliance to the Administrator for consideration and potential acceptance under subpart E of this rule.

The FAA adopts subpart E essentially as proposed in the NPRM. However, the Agency is making certain modification to subpart E to reflect the revisions made to the remote identification framework in subpart B and subpart D. The FAA is eliminating all references to limited remote identification UAS in subpart E because of the decision not to move forward with that concept. The Agency is also incorporating the remote identification broadcast module solution into subpart E to enable the development of means of compliance used to produce the broadcast modules. For more information on these changes, see sections VII.A and VII.D of this preamble.

2. Public Comments and FAA Response

Comments: The Association for Unmanned Vehicle Systems International (AUVSI) and other commenters believed that the FAA's proposal is not performance-based; they mentioned that the rule is based on prescriptive technology mandates. AUVSI asked the FAA to adopt performance-based requirements that comply with international standards and avoid requiring specific technology mandates.

FAA Response: The FAA does not agree with this assertion because this rule mainly describes outcomes, goals, and results without establishing a specific way to achieve it. The FAA recognizes that UAS technology is continually evolving, making it necessary to harmonize regulatory action with technological growth. By establishing performance requirements in

part 89, the FAA is promoting harmonization and is providing a flexible regulation that allows a person to develop a means of compliance that adjusts to the fast pace of technological change, innovation, design, and development while still meeting the regulatory requirements.

B. Applicability and General Comments

In § 89.401, the FAA describes the applicability of subpart E. The FAA did not receive significant comments on this section and adopts the section mostly as proposed. The Agency is revising the regulatory text to delete references to the limited remote identification UAS, and incorporate the remote identification broadcast module concept.

C. Submission of a Means of Compliance

1. Discussion of the Final Rule

In accordance with § 89.405, any person may submit a means of compliance for acceptance by the FAA. Section 89.405 also establishes the information that has to be submitted to seek the FAA's acceptance of a means of compliance, and requires a means of compliance to include testing and validation procedures.

The FAA adopts this section mostly as proposed. The Agency is revising the regulatory text to delete references to limited remote identification UAS, and incorporate the remote identification broadcast module concept so that persons can file a means of compliance for the latter.

2. Public Comments and FAA Response

Comments: Some commenters questioned the value and use of the means of compliance process. Others believed that the proposed requirements for the submission of the means of compliance were vague. A number of commenters asked the FAA to clarify what information must be submitted for the FAA to accept a means of compliance under subpart E. Some asked the FAA to include standards or performance metrics for persons to follow when submitting a means of compliance for FAA-acceptance. Other commenters asked the FAA to consider "best

practices" when evaluating submissions. Commenters also asked the Agency to publish guidance material or examples of FAA-accepted means of compliance and related documents.

Multiple commenters asked the Agency to identify the standards and organizations it would work with to develop and accept the means of compliance under part 89.

FAA Response: The FAA does not agree with commenters who believe the means of compliance process is vague. Section 89.405 describes the information that must be submitted by any person seeking the FAA's acceptance of a means of compliance. The FAA has determined this information is necessary to assess whether a proposed means of compliance (e.g., a standard) meets all of the remote identification requirements of subpart D and subpart E of this rule and whether it can be used for the design and production of standard remote identification unmanned aircraft or remote identification broadcast modules.

The process is an essential component of the remote identification framework because an FAA-accepted means of compliance is used by designers and producers of standard remote identification unmanned aircraft or remote identification broadcast modules to ensure that the unmanned aircraft or broadcast modules meet the minimum performance requirements of this rule.

Consistent with its statements in the NPRM, the Agency is not planning on publicly disclosing the details or specification of any FAA-accepted means of compliance or related documents because they may contain proprietary data or commercially valuable information. The FAA is, however, publishing an advisory circular on the Means of Compliance Process for Remote Identification of Unmanned Aircraft Systems, that provides further guidance on the process. The advisory circular addresses the process and information that must be submitted under subpart E and is available in the public docket for this rulemaking.

Comments: Multiple commenters believed the requirements in subpart E will impose financial and administrative burdens, and will prevent or dissuade persons from submitting a means of compliance for FAA acceptance.

FAA Response: The FAA acknowledges that the rule imposes certain costs related to the development and submission of a means of compliance. These costs are justified by the benefits that will result from the rule, and both costs and benefits are evaluated and addressed in the regulatory evaluation available in section XXII.A of this preamble.

Comments: Many commenters, including some that identified as home-builders, expressed concerns about the submission requirements and mentioned that the process is geared towards large manufacturers. They mentioned that small manufacturers, non-commercial manufacturers, or home-builders could have difficulties in submitting means of compliance. Some commenters believed that only manufacturers can submit a means of compliance for FAA-acceptance.

FAA Response: As being promulgated, § 89.405(a) allows any person to submit a means of compliance. This includes, but is not limited to consensus standard bodies, designers and producers of unmanned aircraft, or other persons (e.g., universities or individuals.) The FAA noticed a common misunderstanding among commenters who believed that producers of standard remote identification unmanned aircraft or remote identification broadcast modules must develop and submit their own means of compliance for FAA acceptance. This is not the case. A producer must use an FAA-accepted means of compliance, but it can be any FAA-accepted means of compliance (e.g., one developed by a third party).

While this rule allows a home-builder to submit a means of compliance for FAA-acceptance, the Agency does not expect many home-builders to do so because home-built unmanned aircraft are explicitly excepted from the design and production requirements of subpart F. Even when a home-builder chooses to voluntarily opt into the design and production requirements of subpart F to produce a home-built standard remote identification unmanned aircraft, the FAA does not envision that many home-builders will file their own means of compliance. The FAA expects most will use an FAA-accepted means of compliance submitted by another person, such as a consensus standards body.

Comments: Wingcopter and other commenters mentioned that the testing and validation requirements in § 89.405(c) are complex and might make it difficult for persons to comply with the regulation. The commenters specifically questioned whether the means of compliance framework applies to UAS produced under part 21. The commenters said it was confusing because the certification specifications, special conditions, or Technical Standard Order requirements of part 21 cover testing and validation in addition to compliance demonstrations as part of the type certification process. Commenters specifically asked the FAA to clarify that the testing and validation requirements for certificated unmanned aircraft are addressed through the type certification process of part 21 instead of the requirements in part 89.

FAA Response: The FAA has determined that the testing and verification procedures are essential because an FAA-accepted means of compliance is used for the production of standard remote identification unmanned aircraft and remote identification broadcast modules. The requirement enables the person responsible for the production of the unmanned aircraft or remote identification broadcast module to demonstrate to the FAA through analysis, ground test, or flight test, as appropriate, how the unmanned aircraft or broadcast module performs its intended functions and meets the requirements in subpart D.

The FAA clarifies that the means of compliance framework applies to standard remote identification unmanned aircraft manufactured under parts 89 and 21. While unmanned aircraft that are certified under the airworthiness certification processes of part 21 may have other identification requirements in addition to those included in this rule, the requirements in subpart D of part 89 (which can be met through an FAA-accepted means of compliance issued under subpart E) will be applied during the type or supplemental type certification process for standard remote identification unmanned aircraft certificated and produced under part 21.

Comments: A multitude of commenters urged the FAA to revise the rule to allow for the submission of a means of compliance for remote identification retrofit equipment. Commenters support allowing manufacturers to produce these means of compliance to produce retrofit

equipment and argued it would help increase compliance with the remote identification operating requirements.

FAA Response: As discussed in sections VII.A and VII.D of this preamble, after reviewing public comments and giving further consideration, the FAA is incorporating the remote identification broadcast module concept into this rule. Accordingly, the Agency is revising this rule by incorporating minimum performance requirements for remote identification broadcast modules. With the changes effected in this rule, persons can now develop means of compliance for remote identification broadcast modules and submit them to the FAA for acceptance. The procedural requirement for submission and acceptance of means of compliance remains the same as with standard remote identification unmanned aircraft. Such FAA-accepted means of compliance can be used for the production of remote identification broadcast modules under subpart F. With these revisions, operators are now able to equip their existing unmanned aircraft with remote identification broadcast modules to comply with the operating requirements of subpart B.

Comments: The Motion Picture Association asked the FAA to develop an alternate means of compliance particularly for UAS operated indoors or those unable to utilize certain means to determine location reliably (e.g., GPS).

FAA Response: The FAA regulates the navigable airspace of the United States. Because this rule does not apply to indoor operations of unmanned aircraft, the FAA has determined that there is no need to incorporate the alternate means proposed by the Motion Picture Association. See section VI.B for more information on the applicability of operating requirements.

D. Acceptance of a Means of Compliance

1. Discussion of the Final Rule

Section 89.410 prescribes the requirements for accepting a means of compliance. This section requires that a person must demonstrate to the Administrator that the means of

compliance submitted for assessment and potential acceptance addresses all of the requirements of subpart D and E, and that any standard remote identification unmanned aircraft or remote identification broadcast module designed and produced in accordance with such means of compliance would meet the performance requirements of subpart D. Section 89.410 also clarifies that the Administrator will evaluate a means of compliance that is submitted to the FAA and may request additional information or documentation, as needed, to supplement the means of compliance. The Administrator will notify the person submitting the means of compliance whether the means of compliance has been accepted or not.

The FAA adopts this section mostly as proposed. The Agency is revising the regulatory text to delete references to limited remote identification UAS and incorporate the remote identification broadcast module concept.

2. Public Comments and FAA Response

Comments: The National Association of State Aviation Officials, Skydio Inc., the Consumer Technology Association (CTA), and others asked the FAA to commit to a deadline to review all submissions of means of compliance. Commenters indicated that without deadlines, the review process could be lengthy, impede the ability of designers and producers of UAS to bring products to market quickly, and inhibit innovation. Some commenters suggested specific deadlines. For example, Skydio Inc. asked the FAA to render a decision within 90 days of the submission unless there is a justified reason for the delay. Commenters also mentioned that the FAA should notify submitters, in writing, of the reason of any delay in reviewing the application.

FAA Response: A means of compliance must be accepted prior to being listed on a declaration of compliance for the design and production of a standard remote identification unmanned aircraft or remote identification broadcast module. The FAA acknowledges that the review process and response time will vary, and will be dependent on the complexity of the application and the technology employed. In certain circumstances the Administrator may need additional information or documentation to supplement the filing to be able to make a

determination. Therefore, the FAA cannot commit to a specific timeline for review because the process is dynamic, however the Agency is committed to working with stakeholders and allocating the necessary resources to review submissions of means of compliance in a timely manner.

Comments: Various commenters mentioned that the Agency should explain the grounds for rejecting a means of compliance, so submitters can understand the issues and correct defects.

FAA Response: The FAA will evaluate the means of compliance to ensure completeness and compliance with the requirements of subpart D or E. Consistent with § 89.410(c), if the Administrator determines the person has not provided sufficient evidence to demonstrate that the means of compliance meets the requirements of subpart D or E, the Agency will notify the person that the Administrator has not accepted the means of compliance and provide the reasons for the decision.

Comments: Streamline Designs LLC and others asked the FAA to file a notice of availability in the Federal Register whenever it accepts a means of compliance submitted by a standards body.

FAA Response: As discussed in the NPRM and as promulgated in this rule, the FAA will indicate acceptance of a means of compliance by notifying the submitter and publishing a notice in the *Federal Register* identifying that a means of compliance is accepted. All FAA-accepted means of compliance will be listed on https://www.faa.gov. The FAA will not disclose proprietary information in the document and will only provide general information stating that FAA has accepted the means of compliance. The FAA may disclose the non-proprietary broadcast specification and radio frequency spectrum so that sufficient information is available to develop receiving and processing equipment and software for the FAA, law enforcement, and the public.

Comments: The Air Line Pilots Association, Int'l and various commenters expressed concerns with the ability of the FAA to handle the workload created by this rule. Commenters

specifically mentioned issues regarding cost, timeliness, and availability of resources. For example, they argued that the FAA and other stakeholders would need to invest a significant amount of money and identify substantial resources.

FAA Response: As stated earlier, the FAA is committed to the implementation of remote identification and is developing internal procedures and allocating the appropriate resources to facilitate the review and acceptance processes under part 89. The FAA is committed to working with internal and external stakeholders to ensure that the process for submitting and obtaining FAA-acceptance of a means of compliance is conducted in an effective and timely manner.

Comments: Many commenters, including Amazon Prime Air, AUVSI, GSMA, ASTM International, Drone Delivery Systems, and others urged the FAA to accept the American Society for Testing and Materials (ASTM) international F3411-19 Standard Specification for Remote ID and Tracking as a means of compliance under this rule and requested the FAA work with ASTM to develop a rigorous standardized test plan. Drone Delivery Systems mentioned it supported the ASTM F3411-19 Standard Specification for Remote ID and Tracking for commercial UAS but that they did not expect it to become the requirement for every UAS.

FAA Response: The FAA recognizes that FAA-accepted consensus standards are one way, but not the sole means, to show compliance with the performance requirements of part 89. The FAA encourages ASTM and all other consensus standards bodies and interested parties to submit a means of compliance for FAA acceptance in accordance with the requirements of subpart E. The FAA emphasizes that, though a means of compliance developed by a consensus standards body may be available, any individual or organization is able to submit its own means of compliance to the Administrator for consideration and potential acceptance. Only FAA-accepted means of compliance can be used to produce standard remote identification unmanned aircraft and remote identification broadcast modules.

The FAA acknowledges those comments requesting the FAA adopt ASTM F3411-19 as a remote identification means of compliance as part of this final rule. The FAA recognizes the

significant work that ASTM and its members have put into the development of ASTM F3411-19. The FAA notes that some aspects of ASTM F3411-19 may need to be revised or updated as a result of the requirements of this final rule. Once that process has occurred, the FAA looks forward to evaluating ASTM F3411-19 as a potential means of compliance for remote identification of unmanned aircraft.

E. Rescission of FAA Acceptance of a Means of Compliance

1. Discussion of the Final Rule

According to § 89.415, the Administrator may rescind its acceptance of a means of compliance if that means of compliance no longer meets the requirements of subpart D or E. The FAA will publish a notice of rescission in the *Federal Register*.

The FAA adopts this section as proposed.

2. Public Comments and FAA Response

Comments: Some commenters expressed concerns that UAS might no longer comply with this rule if the means of compliance used by the manufacturer for the production of the standard remote identification UAS or the remote identification broadcast module is rescinded. Commenters believed the requirement could inhibit the production of UAS and broadcast equipment and stifle UAS research and development, especially if the means of compliance becomes obsolete a couple of years after it has been accepted.

FAA Response: An FAA-accepted means of compliance will remain in effect until the FAA rescinds its acceptance after the Administrator determines that the means of compliance does not meet the requirements in subpart D or E. This means that a standard remote identification unmanned aircraft or a remote identification broadcast module that is produced under a means of compliance that remains accepted by the FAA – however old it may be – complies with the requirements of this rule as long as it continues to meet all of the requirements of subparts D and E. The filing of new means of compliance for the manufacturing of new or

upgraded standard remote identification unmanned aircraft or remote identification broadcast modules that addresses technological advancements does not render the older versions obsolete.

In the event the means of compliance is rescinded, the FAA's acceptance of any declaration of compliance that relies on the no longer accepted means of compliance may be rescinded as well. The FAA may allow the submitter of the FAA-accepted declaration of compliance to amend the declaration of compliance to include another FAA-accepted means of compliance, as long as the standard remote identification unmanned aircraft or remote identification broadcast module produced and listed on the declaration of compliance complies with the newly-listed means of compliance. The FAA will not rescind its acceptance of a declaration of compliance that is promptly amended to list another FAA-accepted means of compliance. However, failure to amend the declaration of compliance may result in the rescission of the FAA's acceptance of the declaration of compliance in accordance with subpart F.

F. Record Retention Requirements

1. Discussion of the Final Rule

The FAA adopts § 89.420 as proposed. According to this section, a person who submits a means of compliance must retain all documentation and substantiating data submitted to the FAA for acceptance of the means of compliance; records of all test procedures, methodology, and other procedures, as applicable; and any other information necessary to justify and substantiate how the means of compliance enables compliance with the remote identification requirements. The person must retain these records for as long as the means of compliance is accepted, plus an additional 24 calendar months. The person is also required to make the records available for the Administrator's inspection.

The record retention requirement in § 89.420 applies to all persons holding FAA-accepted means of compliance. These could be, for example, consensus standards bodies;

designers and producers of remote identification unmanned aircraft of all sizes; or other persons (e.g., universities or individuals.)

2. Public Comments and FAA Response

Comments: Drone Delivery Systems and other commenters indicated that the record retention requirements in subpart E of this rule would increase unmanned aircraft costs. Some mentioned that the requirements would be overly burdensome for home-builders and small to medium size designers and producers of UAS.

FAA Response: The costs related to the record retention requirement in subpart E are justified by the benefits that will result from the rule, and both costs and benefits are evaluated and addressed in the Regulatory Evaluation section of this rule and in the Regulatory Impact Analysis available in the docket for this rulemaking.

The FAA clarifies that home-builders do not have to submit a means of compliance under subpart E. Home-builders are also not required to comply with the design and production requirements of subpart F unless they voluntarily opt into such requirements to build a home-built standard remote identification unmanned aircraft. If a home-builder opts into the design and production requirements, the home-builder can develop and use its own means of compliance or can use an FAA-accepted means of compliance held by another person (e.g., a consensus standard). The home-builder would not need to comply with the data retention requirements of subpart E unless it chooses to submit its own means of compliance under subpart E.

Comments: Streamline Designs LLC and others asked which data the holders of an FAA-accepted means of compliance have to retain.

FAA Response: Section 89.420 lists the data that the holders of FAA-accepted means of compliance have to retain. Further guidance is also provided in the advisory circular for means of compliance process for remote identification of unmanned aircraft systems, which is available in the public docket for this rulemaking.

XIV. Remote Identification Design and Production

The FAA adopts the design and production requirements for remote identification of unmanned aircraft in subpart F. The essence of subpart F remains as proposed but the Agency is revising the regulation to reflect the elimination of the limited remote identification UAS concept and the incorporation of the remote identification broadcast module concept. The FAA is also reorganizing various sections in subpart F to clarify the production requirements that apply to unmanned aircraft produced under a design and production approval issued under part 21; unmanned aircraft designed and produced under a declaration of compliance issued under part 89; and remote identification broadcast modules.

A. Applicability of Design and Production Requirements

1. Discussion of the Final Rule

According to § 89.501, subpart F prescribes the requirements for the design and production of unmanned aircraft with remote identification produced for operation in the airspace of the United States and remote identification broadcast modules. It also prescribes procedural requirements for the submission, acceptance, and rescission of declarations of compliance and certain rules governing persons submitting declarations of compliance for FAA acceptance.

2. Public Comments and FAA Response

Comments: Multiple commenters mentioned that the applicability of subpart F extends beyond the statutory authority of the FAA. They believed subpart F prohibits the manufacturing of UAS for indoor operations and in places other than the airspace of the United States and asked the Agency to except such UAS from the requirements of subpart F.

FAA Response: The FAA does not agree with commenters and the suggested production exception for unmanned aircraft operated indoors is unnecessary. The Agency regulates aircraft operated in the navigable airspace of the United States—not unmanned aircraft operations

conducted indoors. As indicated in § 89.501, the production requirements apply to unmanned aircraft with remote identification operated in the airspace of the United States.

Comments: Aerospace Industries Association and others asked the FAA to clarify who is a "manufacturer" under subpart F to help people identify whether they need to comply with the design and production requirements. Airlines for America, the Experimental Aircraft Association, and others questioned whether the FAA has statutory authority to regulate the foreign manufacturing of UAS as well as the importation and sale of UAS, particularly those without an airworthiness certification. A commenter asked the FAA to clarify how it would ensure foreign producers comply with the requirements of subpart F within the timeframes established in the rule, and without burdening operators.

FAA Response: The FAA clarifies that it does not regulate the sale or importation of unmanned aircraft. The requirements in subpart F apply to the production of remote identification broadcast modules and the production of unmanned aircraft with remote identification operated in the airspace of the United States. Any person, whether in the United States or a foreign country, producing such unmanned aircraft or broadcast modules must file a declaration of compliance, provide certain information, and agree to abide by the production requirements and certain terms and conditions (e.g., inspection, audit, product support and notification, instructions). If the person produces an unmanned aircraft or broadcast module that is not covered by an FAA-accepted declaration of compliance, the unmanned aircraft or broadcast module would not meet the remote identification requirements of part 89, and the operation would be restricted to an FAA-recognized identification area when conducted in the airspace of the United States. This regulatory framework is necessary to ensure that standard remote identification unmanned aircraft and remote identification broadcast modules used in the airspace of the United States can broadcast the remote identification message elements required by this rule, irrespective of where the unmanned aircraft or broadcast module is produced.

Persons producing unmanned aircraft identified in § 89.501(c), as discussed below, are not subject to the requirements of subpart F, and do not need to follow the production requirements or file a declaration of compliance.

Comments: The Small UAV Coalition, Wing Aviation, and other commenters mentioned that the manufacturing requirements should only apply to certain UAS, such as highly automated unmanned aircraft used for commercial purposes or sold to third parties. The Small UAV Coalition described "highly automated" as a UAS with a combination of "geo-awareness, self-flying, and self-navigation capabilities."

Some commenters asked the FAA to modify the applicability of subpart B based on a risk-based approach that maximizes opportunities for compliance and enhances the safety and security outcomes for airspace users. Wing Aviation indicated that risk factors associated with UAS operations are most closely correlated with careless, clueless, or higher-risk operations, and indicated that the design and production requirements would impose unnecessary restrictions on self-built UAS, which typically pose a lower risk. Multiple commenters also mentioned that the design and production requirements would preclude many hobbyists from designing, building, and flying their own UAS. The Experimental Aircraft Association (EAA) and many individuals indicated that the design and production requirements should not apply to traditional model aircraft given their low risk profile and lack of need for specialized equipment. Many recreational UAS owners expressed concerns that only FAA-approved ready-to-fly UAS would be allowed for sale and this would increase the financial burden to UAS operators.

Some commenters mentioned that the design and production requirements should apply to manufacturers of a certain size or to "mass manufacturers" of UAS. A significant number of commenters opposed requiring manufacturers of single units, UAS used in recreational operations, UAS used for experimental purposes, or similar UAS from having to comply with subpart F. Another commenter mentioned that the FAA should create an expedited process (e.g.,

with less documentation requirements) to allow persons manufacturing few UAS to have a simpler means to comply with the design and production requirements.

FAA Response: The FAA does not agree with comments that the design and production requirements should be based on the performance or capacity of the unmanned aircraft, the number of unmanned aircraft produced, the size or weight class, or the risk of the operation. The FAA also does not agree that the requirements should only apply to highly automated aircraft intended for sale to third parties or for commercial use.

The design and production requirements of this rule apply to most unmanned aircraft operating in the airspace of the United States. They are necessary to ensure that standard remote identification unmanned aircraft and remote identification broadcast modules used in the United States broadcast the remote identification message elements to enable compliance with the operating requirements of subpart B. The FAA has determined that it is in the interest of safety and security to require most unmanned aircraft to identify remotely when operating in the airspace of the United States. Accordingly, it has determined that the design and production requirements should be a rule of general applicability.

The FAA acknowledges that certain exceptions are warranted and adopts these exceptions in § 89.501(c), as further discussed below.

B. Exceptions to the Applicability of Design and Production Requirements

1. Exceptions: In General

i. Discussion of the Final Rule

The FAA has determined that– as a general rule– the design and production requirements should apply to unmanned aircraft operated in the airspace of the United States and should not be based on the intended use of the aircraft because the FAA's need to identify unmanned aircraft operating in the airspace of the United States is independent of the purpose of the operation or the perceived or actual risk associated with an unmanned aircraft operation.

As promulgated in this rule, § 89.501(c) establishes the exceptions to the applicability of subpart F. The design or production requirements do not apply to: home-built unmanned aircraft; unmanned aircraft of the United States Government; unmanned aircraft that weigh 0.55 pounds or less on takeoff, including everything that is on board or otherwise attached to the aircraft; and unmanned aircraft designed or produced exclusively for the purpose of aeronautical research or to show compliance with regulations.

The FAA is making conforming changes to § 89.501(c). Section 89.501(c)(1) was revised to replace the term "amateur-built unmanned aircraft system" with the term "home-built unmanned aircraft," which is consistent with the terminology change addressed in section V.D of this preamble. Furthermore, in § 89.501(c)(3), the FAA inadvertently included the wrong threshold by saying the exclusion would apply to unmanned aircraft that weigh less than 0.55 pounds. The FAA is correcting this error and clarifying that the exception applies to unmanned aircraft "that weigh 0.55 pounds or less on takeoff, including everything that is on board or otherwise attached to the aircraft."

ii. Public Comments and FAA Response

Comments: The FAA received many comments addressing exceptions to the design and production requirements. The Boeing Company asked the FAA to remove the proposed exceptions for home-built UAS, UAS of the United States Government, and UAS designed or produced for aeronautical research or to show compliance with regulations, unless the UAS are intended exclusively for operations at FAA-recognized identification areas. Boeing believed that, when operated in civil airspace, those excepted UAS should be subject to the same rules and requirements as other UAS to ensure safe operations for all.

Multiple commenters also mentioned that the design and production requirements should apply to all UAS. Some commenters indicated that the FAA could create tiers of design and production requirements so that the requirements that apply to certain UAS (e.g., home-built

UAS and UAS used in recreational operations) are less strict than those that apply to other UAS (e.g., UAS used in commercial operations).

FAA Response: The FAA considered extending the design and production requirements to all unmanned aircraft operating in the airspace of the United States. However, the Agency identified a need to except certain unmanned aircraft from the design and production requirements of this rule. As discussed above, home-built unmanned aircraft, unmanned aircraft of the United States Government, and unmanned aircraft designed or produced exclusively for the purpose of aeronautical research or to show compliance with regulations, are included in the exceptions to the design and production requirement the FAA is adopting in this rule. These exceptions, as well as the exception for unmanned aircraft that weigh 0.55 pounds or less on takeoff, including everything that is on board or otherwise attached to the aircraft, are discussed in detail in sections XIV.B.2 through XIV.B.5 of this preamble.

Comments: A number of commenters opposed requiring UAS used in recreational operations or traditional model aircraft to comply with the requirements of subpart F. The commenters argued that these aircraft are typically used in low risk profile operations.

FAA Response: The FAA does not agree with comments that the design and production requirements of subpart F should not apply to unmanned aircraft used in recreational operations or to traditional model aircraft given the low risk profile of the operations. The design and production requirements of subpart F are implemented to ensure unmanned aircraft have the remote identification capabilities necessary to enable operators to comply with the operational requirements in subpart B, which apply to most unmanned aircraft operating in the airspace of the United States.

2. Exceptions: Home-built Unmanned Aircraft

i. Discussion of the Final Rule

The FAA chose to exclude home-built unmanned aircraft from the design and production requirements because persons building these unmanned aircraft may not have the necessary technical knowledge, ability, or financial resources to design and produce an unmanned aircraft that meets the minimum performance requirements of this rule. The FAA believes requiring home-built unmanned aircraft to comply with the performance requirements for remote identification would place an undue burden on homebuilders. The Agency expects home-built unmanned aircraft will represent a very small portion of the total number of unmanned aircraft operating in the airspace of the United States. The FAA's position is that nothing in this rule prohibits a person from building a home-built standard remote identification unmanned aircraft for educational or recreational purposes. However, in that case, the person would be subject to all of the requirements of subpart F, even if the unmanned aircraft would otherwise be considered a home-built unmanned aircraft.

ii. Public Comments and FAA Response

Comments: The Utah Department of Transportation and many others supported the FAA's proposal to except home-built UAS from the design and production requirements of subpart F. However, numerous commenters believed the requirements in subpart F apply to home-built UAS and urged the FAA to revise the rule to except home-built UAS from having to meet the design and production requirements of subpart F. Many commenters mentioned that the requirement to show compliance with subpart F is too expensive and time-consuming for homebuilders, and persons building UAS for recreational purposes or science, technology, engineering and math education needs.

FAA Response: As the FAA explained in the NPRM, and as being promulgated in § 89.501(c)(1) of this rule, home-built unmanned aircraft are excepted from the design and

production requirements of subpart F, unless the homebuilder is specifically intending to produce a home-built standard remote identification unmanned aircraft.

The remote identification design and production requirements are different from the operating requirements. While some producers may be excepted from the design and production requirements under subpart F, operators would still have to comply with the remote identification operating requirement prescribed in subpart B of this rule. So, while home-built unmanned aircraft are not subject to the design and production requirements of subpart F, all operators of unmanned aircraft (including home-built unmanned aircraft) in the airspace of the United States must comply with the operating requirements of subpart B if the unmanned aircraft is registered or required to be registered under part 47 or 48. This means that the operator of a home-built unmanned aircraft that is not produced as a standard remote identification unmanned aircraft under subpart F must operate within FAA-recognized identification areas, must equip their unmanned aircraft with a remote identification broadcast module to operate outside of FAA-recognized identification areas, or must request authorization from the Administrator to deviate from the operating requirements of subpart B to operate without remote identification.

Comments: The FPVFC asserted that the requirements, as proposed, would make it unlawful for individuals to produce home-built UAS.

FAA Response: This is incorrect. As explained in the NPRM and as adopted in this rule, this rule establishes certain operational, design, and production requirements for unmanned aircraft. Nothing in the rule prohibits the production of home-built unmanned aircraft. Under § 89.501(c)(1), home-built unmanned aircraft are excepted from having to comply with the design and production requirements of subpart F. However, designers or producers of home-built unmanned aircraft can choose to comply with the design and production requirements by voluntarily opting into subpart F and building home-built standard remote identification unmanned aircraft.

Comments: Some commenters expressed concerns with the exception for home-built UAS. These commenters said that the exception could increase the demand for UAS kits and lead to an increase in UAS being built without remote identification. The Motion Picture Association (MPA) expressed concerns with excepting home-built UAS from the design and production requirements because they could have the ability to fly several miles from the control station using a remotely viewable camera, even though they are not equipped with remote identification capabilities. The MPA asked the FAA to add a technological requirement to the home-built UAS exception in § 89.501(c) to clarify that the exception would not apply to highly-capable aircraft.

FAA Response: The FAA determined that the exception for home-built unmanned aircraft is necessary because many homebuilders do not have the necessary technical knowledge, ability, or financial resources to design and produce unmanned aircraft that meet the minimum performance requirements of this rule. The FAA also determined that the risks of excepting home-built unmanned aircraft from the design and production requirements are mitigated by the fact that the operators of home-built unmanned aircraft must still comply with the operating rules of subpart B.

Comments: Several commenters asked the FAA for an alternate way for home-built UAS to comply, noting that hobbyists often build UAS from parts, including foam and balsa wood, rather than kits from recognized manufacturers. Other commenters mentioned that kit-built UAS are considered home-built and should be excepted from the design and production requirements, while other commenters mentioned that kit-built UAS should have some type of remote identification, particularly if they are operated outside an FAA-recognized identification area. For example, DJI Technology, Inc. asserted that excepting UAS from the remote identification requirements when a person fabricates and assembles more than 50 percent of the UAS makes no difference to safety and would not address approximately 80 percent or more of home-built aircraft as they are built today. DJI recommended a focus on the performance of the resulting

UAS, basing the need to comply with remote identification on the risk the UAS creates due to its performance.

The Academy of Model Aeronautics supported excepting persons assembling UAS from kits that contain 100 percent of the parts and instructions from having to comply with the design and production requirements. They recognized that many of these kit UAS would only be flown at FAA-recognized identification areas. Droneport Texas LLC stated that UAS kit designers or producers and suppliers should be able to provide 100 percent of the parts and instructions that are necessary for assembly of a fully functioning UAS without remote identification capabilities. The New Hampshire Department of Transportation suggested that the rule would motivate designers and producers of UAS to produce kits with less than 100 percent of the necessary parts to shift responsibility for subpart F compliance to homebuilders who would be reluctant or unable to comply.

FAA Response: As further discussed in section V.D of this preamble, the FAA originally proposed to use the term *amateur-built unmanned aircraft system* for the exception in § 89.501(c)(1) and defined it as "an unmanned aircraft system the major portion of which has been fabricated and assembled by a person who undertook the construction project solely for their own education or recreation." Under the proposal, the person building the amateur-built unmanned aircraft would have been required to fabricate and assemble at least 50 percent of the UAS. Following comments received, the FAA relabeled the exception as *home-built unmanned aircraft* and eliminated the fabrication and major portion requirements. This rule adopts the definition of home-built unmanned aircraft that an individual built solely for education or recreation.

The FAA recognizes that homebuilders may produce unmanned aircraft from scratch, may use partial kits in the building process, or may assemble unmanned aircraft from a complete kit produced by another person or entity. The exception for home-built unmanned aircraft in § 89.501(c)(1) of this rule applies to persons producing unmanned aircraft from scratch or using

partial kits to build unmanned aircraft without remote identification solely for education or recreation. These persons do not have to comply with the design and production requirements in subpart F.

As commenters noted, many unmanned aircraft, especially model aircraft, are produced with various levels of completion, such as ready-to-fly or almost ready-to-fly. Unmanned aircraft kits that are produced without key components of the unmanned aircraft, such as the engine or electric motor, flight control servos, or RF receiver, are not considered complete kits and the producers of these partial kits are not subject to the production requirements in subpart F.

However, the exception in § 89.501(c)(1) does not apply to the manufacturing of a complete unmanned aircraft kit because the complete kit is essentially a deconstructed unmanned aircraft. The FAA considers that any kit containing all the parts and instructions necessary to assemble an unmanned aircraft must have remote identification capabilities; therefore, a person or entity producing complete kits is subject to the production requirements of this rule. A different determination would grant a way to circumvent the intent of the design and production requirements of this rule. Accordingly, the person or entity producing the complete kit must comply with the design and production requirements of this rule, and must ensure that the complete kit contains all necessary parts and instructions for homebuilders to assemble a standard remote identification unmanned aircraft, even if the unmanned aircraft is considered home-built for other purposes. A homebuilder assembling an unmanned aircraft from a complete kit is not the designer or producer of the unmanned aircraft for purposes of subpart F of this rule. Therefore, the homebuilder does not need to comply with the design and production requirements in subpart F. Nevertheless, the operator of a home-built unmanned aircraft – whether produced from scratch or assembled from a partial kit or a complete kit – must comply with the operating requirements in subpart B of part 89.

3. Exceptions: Unmanned Aircraft of the United States Government

i. Discussion of the Final Rule

The FAA chose to exclude unmanned aircraft of the United States Government from the design and production requirements because of the need for the Federal Government of the United States to produce aircraft without remote identification to meet certain operational missions.

The production requirements and operational requirements are independent of each other. Even though subpart F establishes an exception for unmanned aircraft of the United States Government, an entity of the Federal Government of the United States operating an unmanned aircraft must assess whether it is subject to the operational requirements of part 89. The entity will have to comply with the remote identification operating requirements if it operates an unmanned aircraft that is registered, or required to be registered under part 47 or 48. Only the aircraft of the national defense forces of the United States are excepted from the aircraft registration requirements and are therefore not required to comply with the operating requirements of subpart B. This means that all other entities of the Federal Government of the United States, as well as all entities of the government of a State, the District of Columbia, or a territory or possession of the United States or a political subdivision of one of these governments or an Indian Tribal government, that wish to operate an unmanned aircraft without remote identification at a location other than an FAA-recognized identification area would be required to seek authorization from the Administrator to deviate from the operating provisions of subpart B of part 89.

ii. Public Comments and FAA Response

Comments: The Utah Department of Transportation requested that the FAA clarify which aircraft are covered by the exception in § 89.501(c)(2) by deleting the phrase "aircraft of the United States Government" and replacing it with "aircraft of the United States Military."

FAA Response: The FAA adopts the language as proposed because aircraft of the Federal Government of the United States are excepted from the design and production requirements of subpart F. This includes, but is not limited to, aircraft of the United States Military.

Comments: Multiple commenters expressed concerns with the proposed exception for UAS of the United States Government because they believe it could cause public distrust. The commenters mentioned that a better approach would be to create requirements (e.g., specific operational or pilot-related requirements) to enable sensitive operations to be conducted safety while still identifying in a general or broader manner.

FAA Response: The FAA has determined the exception is necessary so that the United States Government can produce unmanned aircraft without remote identification equipment, or can deviate from the design and production requirements of this rule. The exception is necessary to facilitate certain operational missions of the United States Government. The FAA believes that–unlike with the Federal Government–a State, the District of Columbia, territories, possessions, or Indian Tribal governments are unlikely to produce their own unmanned aircraft. However, the FAA acknowledges that these governments may have a need to deviate from the operating requirements of this rule when conducting sensitive operations. This is why this rule incorporates a deviation option. Through this deviation, governments can request authorization from the Administrator to deviate from the operating provisions of subpart B.

4. Exceptions: Unmanned Aircraft that Weigh 0.55 Pounds or Less on Takeoff, Including Everything That Is On Board or Otherwise Attached to the Aircraft

i. Discussion of the Final Rule

The FAA chose to exclude unmanned aircraft that weigh 0.55 pounds or less on takeoff, including everything that is on board or otherwise attached to the aircraft from the design and production requirements because, most of these unmanned aircraft may not be subject to the

registration or recognition of ownership requirements of part 48, and therefore would not need to comply with the operating requirements of subpart B of part 89.

As discussed in section XV of this preamble, if an unmanned aircraft weighing 0.55 pounds or less is operated under part 91, 107, or 135, an exemption issued under 49 U.S.C. 44807, or any other regulatory part requiring the aircraft to be registered, the design and production of such unmanned aircraft would have to comply with subpart F of part 89 and the operation of the unmanned aircraft would have to comply with subpart B.

ii. Public Comments and FAA Response

Comments: Several commenters suggested that the FAA should except small UAS from the remote identification requirements because many cannot carry additional equipment to comply with the rule. Commenters asked the FAA to expand this exception to cover UAS that end up exceeding the 0.55 pound threshold as a result of the installation of remote identification equipment. A commenter stated that UAS that weigh less than 0.55 pounds should be allowed up to an additional 0.1 pounds of add-ons to enable compliance with this rule.

Some commenters believed only large UAS would be capable of carrying remote identification equipment. Similarly, others believed that the Agency should only require large UAS to identify remotely. Therefore, many commenters suggested the FAA implement remote identification requirements based on the weight or size of the unmanned aircraft. For example, a commenter mentioned that a UAS weighing less than 20 pounds and with a wingspan of less than 80 inches should be excepted from the remote identification requirements of this rule.

FAA Response: The FAA does not agree with comments urging the Agency to expand the exception in § 89.501(c)(3) to unmanned aircraft that exceed the 0.55 pounds threshold as a consequence of installing remote identification equipment. The exception covers a subgroup of unmanned aircraft that is not subject to the registration requirements of part 48 because they weigh 0.55 pounds or less on takeoff, including everything that is on board or otherwise attached to the aircraft. Because aircraft that exceed the weight threshold have to register (or file a

confirmation of identification for foreign civil unmanned aircraft) and comply with the operating requirements of subpart B, the FAA determined these unmanned aircraft should also comply with the design and production requirements of this rule.

5. Exceptions: Unmanned Aircraft Designed or Produced Exclusively for the Purpose of Aeronautical Research or to Show Compliance with Regulations

i. Discussion of the Final Rule

The FAA chose to exclude unmanned aircraft designed or produced exclusively for the purpose of aeronautical research or to show compliance with regulations from the design and production requirements of this rule. This exclusion fosters innovation and encourages research, development, and testing activities related to the unmanned aircraft, the unmanned aircraft's control systems, equipment that is part of the unmanned aircraft (such as sensors), and the unmanned aircraft's flight profiles, as well as the development of specific functions and capabilities for the unmanned aircraft. The FAA determined that the exception is also necessary so that unmanned aircraft prototypes can show compliance with FAA regulations. This exception includes regulations related to FAA-accepted means of compliance or declarations of compliance for remote identification, and airworthiness regulations including but not limited to flights to show compliance for the issuance of type certificates and supplemental type certificates, flights to substantiate major design changes, and flights to show compliance with the function and reliability requirements of the regulations. The exception further supports research, development, and testing necessary for UAS infrastructure, systems, and technologies, including but not limited to future UTM and United States Government counter-UAS capabilities.

ii. Public Comments and FAA Response

Comments: A number of commenters asked the FAA to expand the scope of the exception in § 89.501(c)(4) so that UAS could be produced without remote identification for other purposes such as educational activities; science, technology, engineering, and math-related

activities; and recreational operations. Wing Aviation, LLC mentioned that the FAA should clarify whether this exception applies to UAS designed or produced for an operation approved by the Administrator under proposed § 89.120 (the operating requirements for operations at FAA-recognized identification areas and operations for aeronautical research).

FAA Response: The FAA does not agree with the request to expand the activities covered under the exception in § 89.501(c)(4). The term "educational activity" is broad and conceivably covers areas beyond the design and production of the unmanned aircraft and its component parts. Many educational activities are covered by the home-built exception in § 89.501(c)(1) of this rule. The aeronautical research exception is meant to allow the testing of prototype UAS, unmanned aircraft component parts, and related infrastructure, systems, and technologies without the requirement that the producer meet all of the design and production requirements of the rule. Persons operating UAS built without remote identification under this exception must comply with the operating requirements in subpart B of this rule.

C. Requirement to Issue Serial Numbers

1. Discussion of the Final Rule

As promulgated in § 89.505, no person may produce a standard remote identification unmanned aircraft under part 21 or 89, or a remote identification broadcast module, unless the unmanned aircraft or broadcast module is issued a serial number that complies with ANSI/CTA-2063-A. A producer of an unmanned aircraft with an integrated broadcast capability may update the serial number as part of the software upgrade to install the remote identification broadcast module. The ANSI/CTA-2063-A standard is incorporated by reference into this regulation, and is available for review and download, free of charge, at the time of publication of this rule.

The FAA adopts the use of the ANSI/CTA-2063-A standard because using a single accepted format for serial numbers helps ensure consistency in the broadcast of the message element. The FAA adopts this section essentially as proposed, but is making certain modification

to the regulation to eliminate the limited remote identification UAS concept and incorporate the remote identification broadcast module concept.

The NPRM sought comments regarding the adoption of ANSI/CTA-2063-A as the serial number standard for remote identification. The FAA specifically requested comments on whether ANSI/CTA-2063-A can be effectively used as a serial number standard for larger unmanned aircraft. The Agency particularly sought feedback from designers and producers of unmanned aircraft that assign serial numbers in accordance with ANSI/CTA-2063-A and inquired about the type and number of unmanned aircraft that the serial numbers are being assigned to.

2. Public Comments and FAA Response

i. General comments regarding the requirement to issue a serial number to unmanned aircraft with remote identification

Comments: Droneport Texas LLC, Wing Aviation, LLC, and others urged the FAA to modify the serial number requirement so that it only applies to UAS intended to be flown in the airspace of the United States, BVLOS, or for commercial use. Along these lines, a number of commenters opposed requiring producers of UAS used for limited recreational operations to comply with the serial number requirement in § 89.505. They mentioned that many of the unmanned aircraft will fly within FAA-recognized identification areas or VLOS, and therefore believed there is no need to require such aircraft to comply with the serial number requirement. The Drone U, Brands Hobby, University of Utah and many individuals also asked the FAA to eliminate the serial number requirement or to except UAS used for limited recreational operations from having to comply.

Many stated that this requirement would be impossible to comply with for those with amateur-built aircraft, as they do not come with serial numbers. Some of the commenters believed the requirement would potentially destroy the value of recreational UAS and threaten

recreational operations of UAS and supporting industries. The Executive Director of the Academy of Model Aeronautics stated that a serial number requirement would destroy the historical accuracy of scale replicas of manned aircraft. The DRONERESPONDERS Public Safety Alliance worried that many current models from popular manufacturers do not have serial numbers that comply with the proposal.

FAA Response: Aircraft registration and identification is consistent with preserving aviation safety. The FAA has determined that the serial number requirement must apply to all aircraft and broadcast modules subject to subpart F, and should not be based on the purpose or intent of the operation of the unmanned aircraft. The serial number requirement is necessary because it enables the unique identification of unmanned aircraft operating in the airspace of the United States. The requirement is particularly necessary to identify every unmanned aircraft that is registered under a single registration number issued under 14 CFR part 48 to the owner of multiple unmanned aircraft used exclusively for limited recreational operations in accordance with 49 U.S.C. 44809. This is particularly important when these unmanned aircraft are flown outside of FAA-recognized identification areas.

Home-built unmanned aircraft are excluded from the design and production requirements under subpart F. Producers of home-built unmanned aircraft do not have to comply with § 89.505, which requires producers of standard remote identification unmanned aircraft or remote identification broadcast modules to issue serial numbers that comply with ANSI/CTA-2063-A.

Comments: Some commenters asked the FAA to clarify which serial number enables compliance with § 89.505 because, in theory, every component of a UAS could have a serial number of its own. Commenters wanted the FAA to clarify which serial number would an owner retain, including for registration purposes, if the UAS parts were swapped in any way—whether due to an accident, suffering damages, or for general improvements. Watts Innovations LLC

mentioned that many UAS use common components such as flight controllers, radio, and motors, and that there should be one ANSI/CTA-2063-A serial number for each component of the UAS.

FAA Response: This rule does not require a producer to assign a serial number to individual components. Producers subject to the design and production requirements must comply with the requirements under subpart F of part 89. To comply with § 89.505, the producer must issue an ANSI/CTA-2063-A compliant serial number to the standard remote identification unmanned aircraft, as a whole, or the remote identification broadcast module. That serial number has to be listed in the FAA-accepted declaration of compliance corresponding to the standard remote identification unmanned aircraft or the remote identification broadcast module. That same serial number also has to be included in the unmanned aircraft's registration, and must be broadcast in accordance with the operating requirements of this rule.

Comments: The General Aviation Manufacturers Association suggested that a serial number not be required for those UAS already required to be equipped with ADS-B.

FAA Response: The FAA agrees that the requirement to issue a serial number should only apply to producers of standard remote identification unmanned aircraft and remote identification broadcast modules. Unmanned aircraft that are only equipped with ADS-B Out would not be required to have a serial number assigned by the producer under § 89.505.

Comments: A number of commenters urged the FAA to establish an alternative mechanism to enable UAS produced prior to the effective date of this rule or with a serial number that does not conform to the ANSI/CTA-2063-A standard to comply with § 89.505. Multiple commenters asked the FAA to allow the installation and use of remote identification add-on equipment on those UAS. Commenters mentioned that the serial number of the remote identification add-on equipment could be used to meet the serial number requirement in § 89.505.

Other commenters believed that the serial number requirement in § 89.505 would make the existing UAS fleet obsolete.

FAA Response: As explained earlier, the requirements for remote identification have been modified to allow persons to produce a retrofit solution, known as remote identification broadcast modules, to equip unmanned aircraft without remote identification to enable them to identify remotely. See section VII.D of this preamble for more information on the operating requirements for remote identification broadcast modules. Remote identification broadcast modules that comply with all requirements in part 89 can be produced after the effective date of this rule. The availability of remote identification broadcast modules helps facilitate the early adoption of remote identification by operators of unmanned aircraft.

In accordance with the serial number requirement in § 89.505, a producer would assign an ANSI/CTA-2063-A compliant serial number to each remote identification broadcast module. An unmanned aircraft produced without remote identification that is retrofitted with a remote identification broadcast module would broadcast the ANSI/CTA-2063-A compliant serial number and would be able to fly outside of FAA-recognized identification areas.

Even without the broadcast solution, an existing unmanned aircraft that is not retrofitted with a remote identification broadcast module is not obsolete or grounded. A person may continue to operate such existing unmanned aircraft at FAA-recognized identification areas. See section VII.F.2 of this preamble for more information on operating unmanned aircraft without remote identification. This rule does not require any person to assign an ANSI/CTA-2063-A compliant serial number to any existing unmanned aircraft produced prior to the compliance date of the design and production requirements.[27]

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[27] Producers may choose to assign an ANSI/CTA-2063-A compliant serial number to an unmanned aircraft produced prior to the compliance date of the design and production requirements of this rule (e.g., through a software upgrade). The assignment of the serial number – by itself – does not make the unmanned aircraft a standard remote identification unmanned aircraft or a compliant unmanned aircraft that is properly equipped with a remote identification broadcast module. Persons who wish to "upgrade" an unmanned aircraft produced prior to the compliance date of this rule to make it a standard remote identification unmanned aircraft or an unmanned aircraft equipped with a remote identification broadcast module may do so by meeting all design and production requirements in subpart F. Subpart F contains the design and production requirements for a standard remote identification unmanned aircraft and a remote identification broadcast module.

ii. Comments addressing ANSI/CTA-2063-A and other alternatives

Comments: The District of Columbia office of the Deputy Mayor for Public Safety and Justice, senseFly, Ax Enterprize, Wing Aviation, LLC, and many other commenters expressed support for the FAA's proposal to adopt ANSI/CTA-2063-A as the serial number standard for remote identification of UAS. In contrast, Watts Innovations LLC and some individuals indicated the requirement to issue a serial number that complies with ANSI/CTA-2063-A is unnecessary, especially for recreational UAS and home-built UAS.

Numerous AMA members said homebuilders should be allowed to select a personal serial number (e.g., a serial number that does not conform to the ANSI/CTA-2063-A standards) for their home-built UAS. Some commenters recommended the FAA not require an ANSI serial number standard or permit existing unmanned aircraft to be exempted from this requirement. A commenter added that current popular manufacturers do not follow the ANSI/CTA-2063-A serial number standard, so adopting that standard would place many manufacturers in noncompliance, unless granted exemptions. The commenter believed that this proposal could force operators to purchase new UAS before the expiration of their current fleet in the absence of a clear path to retrofit.

The Coconino County Sheriff's Office expressed concern about current serial numbers not complying with the ANSI/CTA-2063-A standard, but suggested that compliant serial numbers could perhaps be issued by the FAA at the time of registration or re-registration. One commenter stated the FAA should permit the use of user-generated serial numbers at least until industry makes available modular dongles that transmit serial numbers compliant with ANSI/CTA-2063-A. Another individual suggested the FAA provide a mechanism allowing for serial number equivalent assignment during registration of amateur-built UAS using an approved open source code.

Commenters questioned whether the requirement applied to the legacy UAS fleet. Other commenters mentioned that producers should be able to provide the serial number through a

software upgrade. Some of these commenters raised concerns with a software upgrade because UAS manufacturers might not have the ability to track whether the upgrade was successfully installed for the UAS to meet the serial number requirement.

FAA Response: The broadcast of a serial number is an essential component of remote identification. The FAA has decided to maintain its position to adopt the ANSI/CTA-2063-A standard, and require applicable producers to assign ANSI/CTA-2063-A compliant serial numbers to standard remote identification unmanned aircraft and remote identification broadcast modules. While ANSI/CTA-2063-A was specifically developed to provide a serial number format for small unmanned aircraft serial numbers, the FAA has determined that ANSI/CTA-2063-A is appropriate to issue serial numbers under this rule regardless of the size of the unmanned aircraft or broadcast module because it enables the issuance of unique serial numbers, and promotes worldwide standardization of unmanned aircraft remote identification requirements. The use of ANSI/CTA-2063-A would provide a single accepted format for serial numbers. It would also help ensure consistency and avoid duplication in the broadcast of this message element at any given moment. The ANSI/CTA-2063-A standard is available for viewing and download free of charge as of the publication of this final rule.

The FAA reaffirms that subpart F of this rule does not apply to the production of home-built unmanned aircraft. Accordingly, individuals constructing home-built unmanned aircraft are not required to obtain ANSI/CTA-2063-A serial numbers for their aircraft. As previously discussed, the serial number requirement in § 89.505 does not apply to existing unmanned aircraft. Unmanned aircraft without remote identification can continue to operate, as long as they comply with the operating requirements under subpart B of this rule.

The FAA is permitting the production and use of remote identification broadcast modules that may be retrofitted in unmanned aircraft without remote identification to meet the requirements of this rule. If operators of unmanned aircraft without remote identification, such as home-built unmanned aircraft or existing unmanned aircraft, want to operate outside of FAA-

recognized identification areas, they would need to equip their unmanned aircraft with remote identification broadcast modules to comply with the operational requirements of this rule.

In addition, the ANSI/CTA-2063-A standard has been available since before the publication of this rule, and nothing in this rule prohibits a producer from voluntarily assigning a compliant serial number to existing unmanned aircraft (e.g., through a software upgrade). A producer of unmanned aircraft with integrated broadcast capability may update the serial number as part of the software upgrade to install the remote identification broadcast module—this way existing unmanned aircraft may be issued an ANSI/CTA-2063-A compliant serial number and comply with the remote identification requirements.

Comments: Multiple commenters expressed concerns with their ability to access the ANSI/CTA-2063-A standard and the economic burdens of obtaining it.

FAA Response: As of the publication of this rule, the ANSI/CTA-2063-A standard is available for viewing and download free of charge, so the FAA does not believe its adoption will pose financial hardships.

Comments: Various individuals said the FAA should obtain a "manufacturer code" so they can issue ANSI/CTA-2063-A compliant serial numbers to the existing fleet of UAS. Other commenters indicated the FAA should provide a compliant serial number when the unmanned aircraft is registered or if the producer of the unmanned aircraft did not assign a serial number to the unmanned aircraft. Some commenters believe the FAA should create an automatic process to enable producers to obtain a manufacturer code to enable them to issue serial numbers via the FAA or ICAO website. Some commenters questioned whether they would have sufficient time to comply with the requirement.

FAA Response: The FAA has determined there is no need for the Agency to issue serial numbers to the existing unmanned aircraft fleet, at this time. As discussed in this rule, an existing unmanned aircraft that does not meet all requirements of subpart F can continue to fly at FAA-recognized identification areas. It can also be retrofitted with a remote identification broadcast

module to fly elsewhere. The remote identification broadcast module would need to have a serial number issued by the producer in accordance with § 89.505.

This rule does not establish a specific process to issue serial numbers. Producers may develop or follow any process that enables them to issue and assign ANSI/CTA-2063-A compliant serial numbers to the standard remote identification unmanned aircraft or remote identification broadcast modules.

Comments: Some commenters highlighted that ANSI/CTA-2063-A covers the issuance of serial numbers for small UAS. The National Agricultural Aviation Association and others asked the FAA to revise the rule so that the serial number requirement applies to UAS of a particular size or larger. The Small UAV Coalition and others asked the FAA to revise § 89.505 to require compliance with the ANSI serial number standard at the time of production of the UAS. Another commenter suggested the requirement be to use "an accepted industry standard on serial numbers." A commenter asked the FAA to use a standard that provides a scalable format for serial numbers and a scalable process for producers to request or assign serial numbers.

FAA Response: While ANSI/CTA-2063-A was specifically developed to provide a serial number format for small unmanned aircraft serial numbers, the FAA has determined that ANSI/CTA-2063-A is appropriate to issue serial numbers under this rule regardless of the size of the unmanned aircraft or broadcast module because it enables the issuance of unique serial numbers, and promotes worldwide standardization of unmanned aircraft remote identification requirements. The use of ANSI/CTA-2063-A provides a single accepted format for serial numbers, helping to ensure consistency in the broadcast of this message element. The FAA believes this standard provides for flexibility and scalability, noting that the "Manufacturer's Serial Number" field of the full serial number allows for over a quadrillion different number and letter combinations. The FAA notes that ANSI/CTA-2063-A is the current version of the standard as of the date of this rule and declines to include a policy for accepting new serial

number standards. Any future changes to the requirement to issue serial numbers that comply with ANSI/CTA-2063-A would require a new rulemaking activity.

The incorporation by reference approach requires pointing to a specific standard and the FAA must evaluate each standard to ensure it is consistent with the remote identification requirements and appropriately supports the transmission of the message elements. While this rule adopts ANSI/CTA-2063-A, the Agency may consider revisions to this standard – as well as other serial number standards – and may incorporate them into the regulation at a later time.

iii. Incorporation by Reference

As promulgated in § 89.505, the producer of a standard remote identification unmanned aircraft or remote identification broadcast module must issue a serial number to the unmanned aircraft or broadcast module that complies with ANSI/CTA-2063-A, *Small Unmanned Aerial Systems Serial Numbers* (September 2019). The Office of the Federal Register (OFR) has regulations concerning incorporation by reference. 1 CFR part 51. These regulations require that, for a final rule, agencies must discuss in the preamble to the rule the way in which the materials that the Agency incorporated by reference are reasonably available to interested persons, and how interested parties can obtain the materials. In addition, in accordance with 1 CFR 51.5(b), the Agency must summarize the material in the preamble of the final rule.

In accordance with the OFR's requirements, the FAA states that the ANSI/CTA-2063-A standard outlines the elements and characteristics of serial numbers used by small UAS. Each serial number is comprised of three basic components: the manufacturer code, the length code, and the manufacturer's serial number. Thus, each serial number is unique to a specific unmanned aircraft and can also be used to identify the manufacturer of the unmanned aircraft.

Interested persons can view and download ANSI/CTA-2063-A at: https://www.cta.tech by creating a free account and searching under "Research and Standards." The ANSI/CTA-2063-A standard is available for review and download, free of charge, at the time of publication of this rule.

D. Labeling Requirements

1. Discussion of the Final Rule

According to § 89.525, no person may produce a standard remote identification unmanned aircraft under the declaration of compliance process of part 89 or a stand-alone remote identification broadcast module unless the unmanned aircraft or the broadcast module displays a label indicating that it meets the requirements of part 89. The label must be in English and be legible, prominent, and permanently affixed to the unmanned aircraft or the broadcast module. For existing unmanned aircraft that are upgraded to have remote identification broadcast module capabilities integrated into the aircraft, the FAA envisions that the label would be affixed to the unmanned aircraft. In those instances, the producer may provide the label to the operator and instructions on how to affix them to the unmanned aircraft. Standard remote identification unmanned aircraft produced under a design or production approval issued under part 21 have to comply with the labeling requirements of part 21, as applicable.

The FAA is adopting the labeling requirement in § 89.525 essentially as proposed. The section was revised to eliminate the limited remote identification UAS concept and replace it with the remote identification broadcast module concept.

2. Public Comments and FAA Response

Comments: The FAA received many comments supporting the proposed labeling requirements. Commenters that agreed with this requirement included Edison Electric Institute, American Public Power Association, National Rural Electric Association, Alliance for Drone Innovation, the Northwest Electric Power Cooperative, Streamline Design, and many individual commenters. Some commenters asked the FAA to require producers to label their product compliance levels at the time of purchase.

The FAA also received numerous comments opposing the labeling requirement. DJI Technology, Inc. and other commenters indicated that the requirement was unnecessary and

would complicate compliance with the regulation. Commenters noted that some small UAS may not have room for multiple labels (e.g., a remote identification label in addition to the registration markings.) Others mentioned that the labeling requirement could potentially limit the physical space for collision-avoidance sensors and other features in small UAS because a significant portion of the unmanned aircraft could be covered with multiple labels.

Many commenters raised concerns regarding the impact of the labeling requirement on home-built unmanned aircraft or UAS used for recreational operations. Some commenters believed that the labeling requirement may reduce the performance and appearance of scale model aircraft. Many individual commenters expressed concerns that the labeling requirement would raise the costs of building, owning, or operating UAS for recreational purposes. Commenters requested the final rule be revised so that the labeling requirement only applies to UAS used for commercial operations.

FAA Response: The FAA is adopting the labeling requirement because there is a need for unmanned aircraft operators, FAA inspectors, investigators, and law enforcement to know the remote identification capabilities of a specific unmanned aircraft. The labeling requirement is necessary because it communicates information that would otherwise not be known by looking at the aircraft. A producer label enables the operator to determine what the operator can or cannot do with the unmanned aircraft. If the unmanned aircraft has no label, the presumption is that it has no remote identification capabilities, so the operator must either equip the unmanned aircraft with a remote identification broadcast module or operate the aircraft within an FAA-recognized identification area. The costs related to the labeling requirement are justified by the benefits that will result from the rule, and both costs and benefits are evaluated and addressed in the Regulatory Evaluation section of this rule and in the Regulatory Impact Analysis available in the docket for this rulemaking.

The FAA does not agree with commenters who believed the labeling requirement would impact performance and limit surface area availability for other sensors. This rule is

performance-based and there is no prescriptive requirement for how the labeling must be done. There is no requirement on font type, size, or location of the label. The label will adjust to the size of the unmanned aircraft. Also, a standards body or any person may create a labeling standard to meet all labeling requirements with a single label (e.g., remote identification, registration, operations over people, etc.).

Comments: Commenters including FPVFC and SenseFly asked the FAA to clarify how retrofitted UAS or UAS with remote identification add-on equipment would meet the labeling requirement. The Commercial Drone Alliance, FlyGuys, Inc., and ANRA Technologies suggested that if the rule allows for retrofit UAS or UAS with remote identification add-on equipment, then these aircraft would also have to meet all remote identification standards, including labeling.

FAA Response: As previously discussed, the FAA modified this rule to allow for the production and use of remote identification broadcast modules to identify remotely. Section 89.525(b) establishes the labeling requirements for remote identification broadcast modules. The requirements are similar to those that apply to standard remote identification unmanned aircraft.

Comments: Wingcopter mentioned that the labeling requirements should be moved to part 21 for UAS with a type certificate or production certificate issued under part 21.

FAA Response: The FAA revised subpart F to clarify which remote identification requirements apply to standard remote identification UAS produced under a design approval or production approval issued under part 21. While these aircraft are not subject to the labeling requirements in § 89.525, they must be labeled in accordance with the applicable requirements of part 21.

E. Production Requirements

This rule finalizes the design and production requirements in subpart F. These requirements apply to the production of new standard remote identification unmanned aircraft or remote identification broadcast modules. The FAA clarifies that a person must also follow these

requirements to upgrade an unmanned aircraft to meet the remote identification requirements for standard remote identification unmanned aircraft or for unmanned aircraft with remote identification broadcast modules.

The essence of subpart F remains the same but the Agency made a number of changes to eliminate the limited remote identification UAS concept and replace it with the remote identification broadcast module concept. The FAA also restructured the sections to clarify which production requirements apply to standard remote identification unmanned aircraft produced under part 21, and which requirements apply to standard remote identification unmanned aircraft and remote identification broadcast modules produced under an FAA-accepted declaration of compliance under subpart F.

1. Production Requirements: Standard Remote Identification Unmanned Aircraft Produced Under a Design or Production Approval Issued Under Part 21

i. Discussion of the Final Rule

The FAA added § 89.510 and made various changes to subpart F to clarify the production requirements that apply to standard remote identification unmanned aircraft produced under a design approval or production approval issued under part 21.

First, type certificated unmanned aircraft must meet the serial number requirement in § 89.505.

Second, type certificated unmanned aircraft must meet the production requirements in § 89.510. The unmanned aircraft must be designed and produced to meet the minimum performance requirements for standard remote identification unmanned aircraft systems established in § 89.310 in accordance with an FAA-accepted means of compliance; or be equipped with Automatic Dependent Surveillance-Broadcast (ADS-B) Out equipment that meets the requirements of § 91.225. Nothing in the rule precludes producers from producing unmanned

aircraft that have both the remote identification and ADS-B capabilities identified in the regulation.

Lastly, type certificated unmanned aircraft must meet all applicable requirements of part 21, including but not limited to, any applicable labeling or record retention requirements. The minimum performance requirements for remote identification in subpart D of part 89 will be addressed as part of the type certification process for unmanned aircraft.

ii. Public Comments and FAA Response

Comments: Many commenters conflated the declaration of compliance process under part 89 with the FAA airworthiness certification process under part 21. They referred to the "certification" process as a rather burdensome approach to determine whether a UAS complies with the remote identification requirements.

Some commenters asked the Agency to clarify whether the design and production requirements of subpart F apply to UAS certified under part 21. Some commenters believed the requirements do not apply but felt the regulatory text was not sufficiently clear. The commenters mentioned that subpart F of part 89 includes requirements already covered by the part 21 certification process and indicated that the lack of clarity could cause confusion, could lead to additional administrative burdens, and could delay the airworthiness certification of UAS under part 21.

UPS Flight Forward, United Parcel Service Co., and UPS Airlines indicated that the FAA should implement a technology-based solution that includes design requirements and a comprehensive system of oversight for the design and production of unmanned aircraft. UPSFF and UPS Airlines mentioned that the FAA should clarify how the requirements in the NPRM would affect or play into the approval of a type certificate for a UAS under part 21. UPSFF and UPS Airlines also requested clarification on whether all FAA-accepted means of compliance under subpart E were acceptable as part of the certification basis under 14 CFR 21.17.

FAA Response: UAS certificated under part 21 do not have to meet all of the design and production requirements in subpart F of part 89 because the requirements are redundant with some requirements that have to be met as part of the certification processes of part 21. Therefore, the FAA revised the subpart to clarify which requirements of subpart F apply to UAS certificated under part 21 and which apply to all other UAS produced under a declaration of compliance issued under part 89.

The FAA clarifies that the minimum performance requirements in subpart D of part 89 (which can be met through an FAA-accepted means of compliance issued under subpart E) will be applied during the type or supplemental type certification process for standard remote identification UAS under part 21.

The FAA also clarifies that the declaration of compliance process related to the production of all other UAS under subpart F is not a certification process. Therefore, an FAA-accepted declaration of compliance is not a type certificate or an airworthiness certificate.

2. Production Requirements: All Other Standard Remote Identification Unmanned Aircraft

i. Discussion of the Final Rule

The FAA adopts the production requirements in § 89.515 that apply to standard remote identification unmanned aircraft produced *without* a design approval or production approval issued under part 21. The essence of the requirements remains as proposed in the NPRM. The FAA made some changes for clarity and to remove the limited remote identification UAS concept from the regulation.

According to § 89.515, an unmanned aircraft produced under an FAA-accepted declaration of compliance under part 89 must be designed and produced to meet the minimum performance requirements for standard remote identification unmanned aircraft systems established in § 89.310 in accordance with an FAA-accepted means of compliance.

The producer of the unmanned aircraft must meet certain inspection requirements for production of the unmanned aircraft; audit requirements; and product support and notification requirements.

ii. Public Comments and FAA Response

Comments: Various commenters mentioned that the FAA should add detailed technical specifications (e.g., weight and the size of transmitters) to the design and production requirements.

FAA Response: The FAA does not agree with the commenters. This rule establishes minimum performance requirements for remote identification. It does not establish prescriptive production requirements on matters such as weight or size of the broadcast equipment, because the Agency wants producers to have the flexibility to adjust their designs based on the available technologies and market demand.

Comments: ALPA, National Agricultural Aviation Association (NAAA), CTIA – The Wireless Association, and other commenters expressed support for requiring remote identification UAS to meet the proposed minimum performance requirements. CTIA – The Wireless Association and NAAA, however, requested the FAA modify certain minimum performance requirements. NAAA asked the FAA to certify all UAS and UAS components. They believed that there should be prescriptive measures to determine whether a UAS is airworthy. For example, they mentioned that some of the requirements should include where to place the registration number and the need to equip the UAS with ADS-B In.

FAA Response: The FAA promulgates this rule as a performance-based rule to grant producers flexibility to demonstrate that a standard remote identification unmanned aircraft or remote identification broadcast module was designed and produced to meet the minimum performance requirements in subpart D to enable the unmanned aircraft or broadcast module to broadcast the required remote identification message elements.

At this time, the FAA does not agree with commenters asking the Agency to certify all standard remote identification unmanned aircraft and remote identification components. As discussed in section XIV.E.1 of this preamble, the declaration of compliance process under subpart F is not a certification or airworthiness process and an FAA-accepted declaration of compliance is not a type certificate or an airworthiness certificate. A different determination would be extremely burdensome (e.g., cost and time) for designers and producers. The FAA notes, however, that standard remote identification unmanned aircraft produced under a design approval or production approval issued under part 21 are subject to all applicable requirements and airworthiness determinations under part 21, as required in § 89.510. The FAA also notes that if a manufacturer has been issued a production certificate or other approval to produce an unmanned aircraft, part 89 precludes production of that unmanned aircraft unless the unmanned aircraft complies with the minimum performance requirements for remote identification contained in that part or is subject to an exception from the requirements in subpart F (e.g., the unmanned aircraft is equipped with ADS-B Out equipment.)

Comments: American Tower Corporation and others asked the FAA to permit UAS producers to set certain limits (AGL, Fly Zone, restriction areas) for the UAS they produce. The commenters believed this approach would grant flexibility to producers, would foster innovation, and would provide operators with greater options to meets their individual needs.

FAA Response: As previously discussed, this rule is performance-based and allows the production of unmanned aircraft that exceed the minimum performance requirements. While the operators must abide by the operating rules in subpart B, nothing in the rule precludes producers from implementing stricter standards or imposing additional equipment restrictions (e.g., geo-fencing technology).

Comments: Some individuals recommended the FAA eliminate subpart F and limit the rule to operational requirements. Others asked the FAA to remove requirements related to

producer certification and standards, and mentioned that the burden for complying with remote identification should rest on the operators of UAS instead of producers.

FAA Response: The success of the remote identification frameworks rests on having both operational and production requirements. Producers must follow requirements to ensure that standard remote identification unmanned aircraft and remote identification broadcast modules meet the minimum performance requirements and broadcast the message elements required by this rule. Operators must use such unmanned aircraft or broadcast modules to ensure they identify remotely when operating in the airspace of the United States.

Comments: Commenters recommended that the FAA align the production requirements and UAS designations with ICAO guidance, especially regarding the aircraft make, model, and serials taxonomy. Many commenters mentioned that the United States should strive for international harmonization of the remote identification requirements.

FAA Response: The FAA follows Order 8000.71 "Aircraft Make, Model, and Series Taxonomy" which establishes key definitions for the FAA's Make, Model, and Series (MMS) taxonomy and is based on the international standard taxonomy for MMS developed by the Commercial Aviation Safety Team/ICAO Common Taxonomy Team. The FAA recognizes that UAS technology is continually evolving, making it necessary to harmonize regulatory action with technological growth. The FAA regularly reaches out to its international partners on a bilateral and multilateral basis to harmonize regulations to the maximum extent possible. By establishing performance requirements, the FAA is promoting that harmonization and is providing a flexible regulation that allows persons to develop means of compliance that adjust to the fast pace of technological change, innovation, design, and development, and use them to design and produce unmanned aircraft that meet the remote identification requirements of this rule.

Comments: Many commenters expressed concerns with the cost of complying with the design and production requirements. Commenters requested the FAA revise the requirements of subpart F to reduce the impact and burden on producers and recreational flyers. Some commenters believed the requirements would substantially increase the cost of production of UAS, and could impact innovation and the United States UAS market as a whole.

FAA Response: Though the FAA does agree that the production requirements may impose additional burden on producers and increase production costs, the FAA is committed to the added safety and security benefits provided by remote identification and to the role it will play in the development of future UAS rules and concepts.

The FAA has revised the design and production requirements under subpart F to allow for a simpler compliance process by introducing the remote identification broadcast module. Comments specific on the design and production of the remote identification broadcast module are discussed in section XIV.E.3 of this preamble. Based on comments received and information from unmanned aircraft producers, part of the existing fleet of unmanned aircraft could be modified to enable compliance with remote identification requirements with relative simplicity and minimal cost (e.g., by securing a remote identification broadcast module or doing a software upgrade through the Internet).

The Agency clarifies that subpart F applies to producers and not operators (e.g., recreational flyers). A recreational flyer who is also a producer of unmanned aircraft would be excepted from the design and production requirement in accordance with § 89.501(c) if he or she is building a home-built unmanned aircraft. See section XIV.B.2 of this preamble for a discussion of the home-built exception.

Comments: Many commenters argued against involving original equipment manufacturers (OEM) in the rule requirements. First Person View Freedom Coalition believed OEM should not be involved with the NPRM on remote identification; another commenter stated the FAA should eliminate all OEM requirements. One individual commenter suggested the FAA

needs to create a system, create the standards, and allow producers of devices to choose to adopt and self-certify rather than requiring OEM to meet the production requirements. Kittyhawk.io, Inc. stated that OEM should not have that much responsibility for remote identification and control over its function, suggesting that the inclusion of OEM requirements and producers having a central role in access to the airspace presents not only complexity in execution, but also national security risks. WhiteFox Defense Technologies, Inc. added that the requirements should be revised to allow for UAS to be retrofitted with remote identification modules manufactured by third-parties other than the UAS OEM.

FAA Response: The FAA does not agree with the arguments not to involve OEM in the development of the remote identification of unmanned aircraft. Partnering with the manufacturers or OEM is important to the success of unmanned aircraft remote identification. This will support the primary intent of this rule: to provide a safe and secure airspace for manned and unmanned aircraft operations. OEMs are essential to the advancement and proliferation of the remote identification technology and incorporation into UAS products. Without the commitment and involvement of the UAS OEM, the safety and security benefits gained from remote identification will never fully develop or be implemented into the airspace of the United States. The FAA recognizes the need for the existing unmanned aircraft fleet to be able to comply with remote identification requirements and, to meet that need, this rule allows persons to retrofit unmanned aircraft with remote identification broadcast modules to allow them to identify remotely.

3. Production Requirements: Remote Identification Broadcast Modules

i. Discussion of the Final Rule

After considering public comments, the FAA decided to allow for the production and use of remote identification broadcast modules to enable unmanned aircraft without remote identification to comply with the remote identification requirements of part 89. Section 89.520

establishes the production requirements for remote identification broadcast modules. This section prescribes that no person is allowed to produce a remote identification broadcast module unless it is designed and produced to meet the minimum performance requirements for a remote identification broadcast module established in § 89.320 using an FAA-accepted means of compliance.

The producer of the remote identification broadcast modules must meet certain inspection requirements for production of the module; audit requirements; and product support and notification requirements. These requirements are aligned with similar requirements for standard remote identification unmanned aircraft. The FAA added an additional requirement for producers of remote identification broadcast modules in § 89.520(b)(4). Producers must provide instructions for installing and operating the remote identification broadcast module to any person operating an unmanned aircraft with the remote identification broadcast module. The producer must also explain how the person would obtain the ANSI/CTA-2063-A compliant serial number assigned to the broadcast module. The instructions could be made available on a website or through any other venue, as long as the person installing and operating the remote identification broadcast module has access to the instructions. The FAA expects these instructions would provide details about how to ensure the remote identification broadcast module is correctly installed, secured, or upgraded into the unmanned aircraft, and details to prevent the broadcast module from interfering with the aircraft flight characteristics or flight controls, as applicable. The instructions must describe any limitations associated with use of the broadcast module, such as certain features or characteristics of an unmanned aircraft that would prevent the broadcast module from meeting the required minimum performance requirements.

Persons producing remote identification broadcast modules must comply with the declaration of compliance process in subpart F. This is the same process that applies to the production of standard remote identification unmanned aircraft *without* a design approval or production approval issued under part 21.

The FAA envisions that some manufacturers would develop remote identification broadcast modules that can be installed on many different types of unmanned aircraft, whereas other manufacturers may produce broadcast modules that are compatible with only certain models of unmanned aircraft, either because of size, shape, power requirements, or other design features. The FAA does not require manufacturers to produce remote identification broadcast modules that work with all types of unmanned aircraft, but if the broadcast module is designed to meet the minimum performance requirements when installed on only certain models or types of unmanned aircraft, those limitations should be stated prominently in the installation instructions.

ii. Public Comments and FAA Response

Comments: A multitude of commenters indicated that the proposal precluded the production and use of add-on remote identification equipment and the retrofitting of older UAS with remote identification equipment. Some commenters believed the proposed requirements would make existing RC models, components, and electronics obsolete and un-flyable. AiRXOS indicated that the proposal did not address owner-initiated modifications, retrofits, compliance with maintenance schedules, and use of approved replacement parts.

A significant number of commenters asked the FAA to incorporate requirements for the production of an add-on remote identification device that can be used to retrofit a UAS manufactured without remote identification equipment (e.g., existing UAS). FPVFC and others recommended allowing UAS to fly using add-on components or add-on subassemblies manufactured to perform in a manner consistent with the requirements and capabilities of remote identification. They mentioned that a single module should be allowed to be plugged into all of the owner's UAS, and meet the safety requirements by associating individual serial numbers with operators.

Commenters provided a number of reasons in favor of the add-on equipment including, but not limited to, extending the life of the current UAS fleet, enhancing compliance with remote identification, and cost considerations. Some commenters mentioned that without the add-on

equipment, operators would likely have to buy new UAS and producers would spend additional resources developing and producing complete UAS rather than the add-on equipment and component pieces.

Various commenters mentioned that some UAS might not be able to be retrofitted with remote identification equipment. For example, certain small UAS might exceed the weight limitations after retrofitting while others might not have sufficient space to install the remote identification equipment. Commenters also mentioned that adding remote identification equipment to UAS, particularly certain small UAS, could impact the performance of the unmanned aircraft and reduce its flight capacity or capabilities (e.g., duration and distance).

One commenter expressed concerns that the design and production requirements would preclude owners from upgrading the remote identification electronics. This commenter, along with many others, mentioned that the requirements would preclude a party from installing remote identification electronics into a third-party airframe. This commenter stated that, as proposed, the rule does not support the development and growth of an FAA-certified avionics equipment industry.

Many commenters mentioned the lack of a retrofit option could price many hobbyists out of the hobby. Commenters said the rule would require almost every RC enthusiast to register as a manufacturer or to buy new UAS.

FAA Response: After reviewing public comments and giving further consideration, the FAA has decided to incorporate the remote identification broadcast module concept into this rule. See section VII.D of this preamble for a discussion on the operating requirements for unmanned aircraft equipped with remote identification broadcast modules. Accordingly, the FAA adopts the production requirements for broadcast modules in § 89.520. While these requirements are new, they are mostly identical to the production requirements for standard remote identification unmanned aircraft. The main differences are that the remote identification broadcast module must be designed and produced to meet the minimum performance

requirements established in § 89.320 and that the producer must provide instructions for the installation and operation of the broadcast modules. All requirements for remote identification broadcast modules, including but not limited to the instruction requirements, apply to both remote identification broadcast modules secured to the unmanned aircraft and remote identification broadcast modules implemented through a software upgrade using existing equipment on the unmanned aircraft. See section IX of this preamble for a discussion of the minimum performance requirements for remote identification modules.

Comments: The Consumer Technology Association and other commenters mentioned that the FAA should permit producers to continue selling non-compliant UAS if retrofit modules were available to bring the aircraft into compliance with the remote identification requirements.

FAA Response: As stated earlier, this rule only applies to the design and production of standard remote identification unmanned aircraft and remote identification broadcast modules. The FAA clarifies that the Agency does not regulate the importation or sale of unmanned aircraft.

Comments: Commenters, including senseFly, Recreational consumers, National Association of State Aviation Officials, National Alliance of Forest Owners, and many individuals indicated it would still be expensive to retrofit existing UAS with remote identification equipment. Theia stated the costs needed to obtain a declaration of compliance are unknown but could be substantial depending on final requirements; they urged the FAA to provide reduced cost declaration of compliance for entities that build, operate, and insure their own airframes.

FAA Response: The FAA acknowledges that this rule imposes certain costs on the designers and producers of standard remote identification unmanned aircraft and remote identification broadcast modules. These costs are justified by the benefits that will result from the rule, and both costs and benefits are evaluated and addressed in the Regulatory Evaluation

section of this rule and in the Regulatory Impact Analysis available in the docket for this rulemaking.

4. Product Support and Notification for Standard Remote Identification Unmanned Aircraft and Remote Identification Broadcast Modules

i. Discussion of the Final Rule

This rule finalizes the requirement that persons responsible for the production of standard remote identification unmanned aircraft or remote identification broadcast modules must maintain product support and notification procedures to notify the public and the FAA of any defect or condition that causes the unmanned aircraft or broadcast module to no longer meet the requirements of subpart F within 15 calendar days of becoming aware of the defect or condition, as stated in paragraph (b)(3) of § 89.515 and paragraph (b)(3) of § 89.520.

The FAA specifically sought comments on whether it should require producers to notify the public and the FAA of any defect or condition that causes the unmanned aircraft to no longer meet the requirements of subpart F within 15 calendar days of the date the person becomes aware of the defect or condition.

ii. Public Comments and FAA Response

Comments: The District of Columbia office of the Deputy Mayor for Public Safety and Justice expressed its support for a 15 calendar day notice period. AiRXOS recommended the requirement be "as soon as possible based on the assessment of the increased level of risk but no later than 15 days," and for the FAA to establish a formal notification process similar to Airworthiness Directives.

Airlines for America (A4A) recommended a shorter period of 3 calendar days to notify the FAA and the public if a defect or condition might create an immediate safety or security issue. In contrast, Droneport Texas LLC proposed a 60-calendar day notice period, and some individuals proposed a 90-calendar day term.

FAA Response: The FAA received a wide range of comments suggesting notification periods ranging from 3 to 90 days. Given the lack of agreement on a time frame, the FAA is adopting the notification period to be within 15 calendar days, as proposed. The FAA is requiring producers to notify the public and the FAA of any defect or condition that causes the unmanned aircraft to no longer meet the requirements of subpart F within 15 calendar days of the date the person becomes aware of the defect or condition. The FAA looked at overall impact to security, safety and cost and has determined that 15 calendar days provides a reasonable time for the producers to evaluate and confirm the presence of a defect that requires public notification.

F. Accountability

1. Discussion of the Final Rule

In addition to the audit requirements prescribed in § 89.515 for standard remote identification unmanned aircraft and § 89.520 for remote identification broadcast modules, the FAA requested comments regarding the appropriate time intervals for conducting independent audits, including any time intervals specified in industry standards related to independent audits of aviation systems as part of the design and production requirements.

The FAA is adopting the audit requirements because the Agency has determined it is necessary for producers to maintain product support and notification procedures to notify the public and the FAA of any defect or condition that causes the remote identification unmanned aircraft or broadcast module to no longer meet the requirements of subpart F.

2. Public Comments and FAA Response

Comments: Many commenters opposed including a requirement for audits or FAA facility inspections and argued they are unnecessary and burdensome for the industry. The Alliance for Drone Innovation, DJI Technology, Inc., and others recommended the FAA undertake random spot compliance checks by purchasing and testing products on the market to determine whether these products comply with the requirements rather than having to perform

the proposed compliance audits. Some commenters believe that competitors, product reviewers, and safety watchdogs would also check product compliance independently and report non-compliance or deviations to the FAA. Others mentioned that the requirements are unnecessary because the FAA, law enforcement, and the public can assess compliance by analyzing the broadcast and transmitted data because it would be accessible by the public. Other comments mentioned that the requirements would burden smaller producers and, in particular, individual UAS builders.

FAA Response: The FAA does not agree that there is no need for audits or inspections. The FAA also does not agree with the recommendation of using spot testing, product reviews, or public assessment for compliance in lieu of auditing requirement. Producer audits and inspections help ensure continued compliance with applicable requirements and are consistent with other types of producer inspections performed by the Agency and its authorized representatives. These inspections assist the FAA validation procedures, processes, and methods used to demonstrate that the designers and producers of unmanned aircraft and their produced remote identification unmanned aircraft and remote identification broadcast modules meet the requirements of subpart F.

Comments: AiRXOS and many individuals believed that the audit requirement is unnecessary and difficult to enforce, particularly with regards to the production of UAS used for research and development and home-built UAS. AiRXOS and others asked the FAA to impose the audit and inspection requirement only on commercial manufacturers. Some commenters asked the FAA to conduct independent audits of all original equipment manufacturers within the first 12 months of operation.

The FPVFC, multiple commercial UAS manufacturers, and a number of persons identifying as homebuilders opposed the requirement to allow the FAA to inspect facilities and witness any test necessary to determine compliance with subpart F of part 89. Many commenters mentioned that the FAA has no authority to enter facilities or individuals' homes and argued that

the requirement is unenforceable. FPVFC specifically challenged the FAA to articulate any other lawful recreational activity that would permit the government's inspection of a participating civilian's home or places, papers, etcetera, without a warrant, even if the activity were otherwise federally regulated. FPVFC believed the requirement is beyond the FAA's authority, that it raises 4th Amendment issues, and detracts from the FAA's goals of regulating the national airspace.

FAA Response: In accordance with § 89.501(c), the requirements of subpart F of this rule do not apply to home-built unmanned aircraft or unmanned aircraft designed or produced exclusively for the purpose of aeronautical research or to show compliance with regulations. This means that persons producing such unmanned aircraft are not subject to the requirements unless they voluntarily opt into subpart F.

The FAA considers the audit and inspection requirements to be essential elements of the declaration of compliance process. Standard remote identification unmanned aircraft produced in accordance with § 89.515 and remote identification broadcast modules produced in accordance with § 89.520 do not undergo part 21 certification. The requirements of the declaration of compliance process, including the audits, are meant to foster accountability and to ensure that the unmanned aircraft and broadcast modules meet the requirements of subpart F.

The audits are also necessary because this rule requires producers to maintain a product support and notification system and procedures to notify the public and the FAA of any defect or condition that may cause a standard remote identification unmanned aircraft or remote identification broadcast module to no longer comply with the requirements of this rule. To satisfy these obligations, persons responsible for the production of unmanned aircraft would have to monitor their manufacturing processes, unmanned aircraft operational usage (to the extent the producer has access to such information), and collection of accident and incident data.

As for inspections, the FAA has determined whenever the Agency identifies a safety issue that warrants review of a producer's data, records, or facilities, it is in the interest of safety

and security of the airspace of the United States for producers subject to subpart F to grant the FAA access to such data, records, or facilities and all data and reports from the audits and investigations.

Therefore, the FAA has determined the audit and inspection requirements are integral to ensuring compliance and conducting oversight of the production. Since most unmanned aircraft can be used for a number of purposes, the FAA has determined these requirements apply to all designers and producers of remote identification unmanned aircraft subject to subpart F.

Comments: Commenters expressed concerns that certain producers – particularly foreign – might not share certain information with the FAA or comply with certain requirements of the final rule.

FAA Response: No person may produce a standard remote identification unmanned aircraft or remote identification broadcast module unless the person complies with all of the design and production requirements of subpart F and obtains an FAA-accepted declaration of compliance authorizing the production of standard remote identification unmanned aircraft or remote identification broadcast modules for use in the airspace of the United States. Failure to comply with any of the requirements – including the audit or inspection requirements – constitutes grounds for the FAA to rescind its acceptance of a declaration of compliance. Any standard remote identification unmanned aircraft or a remote identification broadcast module listed under the rescinded declaration of compliance would not be able to operate outside of an FAA-recognized identification area.

Comments: Some commenters expressed concerns that the auditing requirement could place a burden on UAS producers, particularly small and new producers.

FAA Response: The FAA acknowledges that this rule imposes costs on the designers and producers of unmanned aircraft. These costs are justified by the benefits that will result from the rule, and both costs and benefits are evaluated and addressed in the Regulatory Evaluation

section of this rule and in the Regulatory Impact Analysis available in the docket for this rulemaking.

Comments: Wingcopter suggested that the FAA should exclude the manufacturers of UAS produced under a design approval or production approval issued under part 21 from having to comply with the audit requirements under part 89 because part 21 already includes requirements for audits and control of the quality system and production system.

FAA Response: The FAA agrees with Wingcopter; as previously discussed, the FAA has modified the rule to clarify which requirements of subpart F apply to unmanned aircraft produced under a design approval or production approval issued under part 21. The audit and inspection requirements in subpart F do not apply to aircraft certified under part 21 because they are subject to their own audits for quality system and production system controls under part 21.

Comments: Droneport Texas LLC, Watts Innovations LLC, and others believed the audits should be risk-based, and the frequency should be determined by each UAS manufacturer-based on the complexity of the UAS produced. A commenter mentioned that, unless an audit by the FAA is being conducted for cause and in agreement with the host nation (if required), a regular audit not being conducted at the request of manufacturers should be scheduled no sooner than 2 calendar years from the date of the previous audit. The first audit should require a minimum of 60 calendar days prior notice from the inspecting organization. The commenter mentioned that an audit for legal cause should be conducted using best practices from the United States Department of Justice and the justice agency of the host nation (if required).

FAA Response: The audit requirements in subpart F apply to designers and producers of remote identification unmanned aircraft. As previously stated, this includes any local or foreign producers or designers that intends to produce unmanned aircraft for use in the airspace of the United States. The FAA does not agree with the suggestion for setting audit frequency. The FAA did not impose a timeframe for the independent audits. It expects the person responsible for the production of the standard remote identification unmanned aircraft or remote identification

broadcast module to apply industry best practices to determine when and how often independent audits are needed. The FAA has determined the audits should occur on a regular basis and as many times as necessary. This grants flexibility to the producer to adjust the recurrence of the audits, based on the circumstances to ensure continuous compliance with the requirements of this rule.

G. Filing a Declaration of Compliance

1. Discussion of the Final Rule

As discussed in section V.E of this preamble, the FAA is adding a new definition in § 89.1 to ensure clarity regarding the meaning of a "declaration of compliance."

In addition, § 89.530 prescribes the requirements for submitting a declaration of compliance for FAA acceptance. Section 89.530 prescribes the eligibility requirements for submitting a declaration of compliance, and details the information required in that submission, whether for a standard remote identification unmanned aircraft or a remote identification broadcast module. The FAA has updated the information required in § 89.530 to include the FCC Identifier of the 47 CFR part 15-compliant radio frequency equipment used and integrated into the standard remote identification unmanned aircraft or the remote identification broadcast module.

In this rule, the FAA has revised the section to eliminate all references to limited remote identification UAS and incorporate the remote identification broadcast module concept. Section 89.530(c) prescribes the information that must be submitted in a declaration of compliance for remote identification broadcast modules.

2. Public Comments and FAA Response

i. Submission

Comments: Various commenters questioned the purpose and use of a declaration of compliance. Some believed that the declaration of compliance process is complex and that it

makes it difficult for persons to determine whether an unmanned aircraft complies with the remote identification requirements. Commenters mentioned that the requirements of subpart F should be simple and easy to follow, should not deter potential producers from venturing into the market, and should not stifle innovation.

FAA Response: The FAA believes a declaration of compliance is an essential part of the remote identification framework. An FAA-accepted declaration of compliance allows a person to produce standard remote identification unmanned aircraft or remote identification broadcast modules. It serves as an assurance that producers are using an FAA-accepted means of compliance for the production of the unmanned aircraft or broadcast module to meet the minimum performance requirements of this rule and are complying with all other design and production requirements of subpart F. Various commenters questioned the use of the audit requirement and mentioned that the FAA could have difficulties inspecting producers and ensuring the audits are performed.

The FAA has determined that the audit requirement is necessary, similar to the audit requirement under part 21, to ensure continued compliance with remote identification requirements. The FAA believes the audits would have to occur on a recurrent basis (as many times as necessary), and whenever the FAA provides notice of noncompliance or of potential noncompliance, to ensure and demonstrate the standard remote identification unmanned aircraft or the remote identification broadcast module meets the requirements of subpart F. A producer submitting a declaration of compliance for FAA acceptance must make certain assurances and meet certain requirements regarding inspections, audits, product support and notification, and instructions. Failure to comply with any of these requirements is grounds for rescission of the FAA's acceptance of the declaration of compliance, which directly impacts where the unmanned aircraft can be operated. An unmanned aircraft listed under a declaration of compliance that has been rescinded is only able to operate at an FAA-recognized identification area. Similarly, a

remote identification broadcast module listed under a declaration of compliance that has been rescinded cannot be used to meet the remote identification requirements.

Comments: Various commenters questioned the ability of the FAA to enforce the requirements of subpart F, especially when anyone can modify a UAS after it has been produced.

FAA Response: The production requirements of subpart F apply when a person produces a standard remote identification unmanned aircraft or remote identification broadcast modules. The production requirements do not apply to third parties who subsequently modify the standard remote identification unmanned aircraft or the remote identification broadcast module. However, these modifications could render the standard remote identification unmanned aircraft or remote identification broadcast module non-compliant for purposes of meeting the requirements of subpart B.

Comments: The NTSB expressed concerns with the declaration of compliance process and mentioned that it would be unlikely for producers under subpart F to conduct robust failure analysis equal to the level required for certified aircraft under part 21. The NTSB mentioned that an unforeseen combination of factors could affect an aircraft in flight and cause a fly-away or other hazardous events. The NTSB urged the FAA to consider potential unintended consequences of the proposed requirements.

FAA *Response*: As stated earlier, the FAA adopts the regulatory framework for remote identification with performance-based requirements rather than prescriptive ones to provide a flexible regulation The FAA appreciates the NTSB's concerns but believes they are addressed because the minimum performance requirements include a specific requirement that the remote identification equipment must not interfere with any other system or equipment installed on the unmanned aircraft, and must not interfere with the remote identification equipment. In addition, though the declaration of compliance process is simpler than the aircraft certification process of part 21, it provides the basic information necessary for the FAA to determine that a producer has complied with all applicable requirements and can produce standard remote identification

unmanned aircraft and remote identification broadcast modules that meet all of the minimum performance and production requirements for remote identification.

Comments: Multiple commenters asked the FAA to adopt a risk-based approach to certification where the type of certification required (e.g., self-certification, partial certification, full certification) is based on the risk of the operations conducted. The American Petroleum Institute and other commenters believed the declaration of compliance process amounts to self-certification and might not provide appropriate rigor and oversight.

FAA Response: The FAA does not agree with proposed risk-based approach for certification because the remote identification requirements are operational requirements and applicable to all unmanned aircraft irrespective of risk of the operation.

The FAA clarifies that the declaration of compliance process is not a self-certification process and does not confer airworthiness. An FAA-accepted declaration of compliance is not a type certificate or an airworthiness certificate. The process is simpler than the aircraft certification process of part 21 because it provides the basic information necessary for the FAA to determine that a producer has complied with all applicable requirements and can produce standard remote identification unmanned aircraft and remote identification broadcast modules that meet all of the minimum performance and production requirements for remote identification.

Comments: The NAAA and others indicated that all UAS with remote identification and component pieces should be subject to the airworthiness certification process. Wingcopter indicated that part 21 includes design and production requirements for certificated aircraft. They asked the FAA to clarify whether subpart F applies to all UAS or only those produced without design approval or production approval issued under part 21. The commenter also suggested that the FAA should revise part 21 to include remote identification requirements and mentioned that UAS certificated under part 21 should not be subject to the declaration of compliance process in subpart F.

FAA Response: The production of unmanned aircraft under the part 89 declaration of compliance process is not a type certification or airworthiness certification process. The FAA considered Wingcopter's request to add remote identification requirements to part 21 and to clarify that unmanned aircraft certificated under part 21 are not subject to the declaration of compliance process in subpart F of part 89. The FAA has determined that it does not need to add remote identification requirements to part 21. Remote identification requirements are included in part 89. As previously discussed, the Agency revised subpart F of part 89 of this rule to clarify which design and production requirements apply to unmanned aircraft under a design approval or production approval issued under part 21. The revisions also clarify that the requirements in §§ 89.525 through 89.545 for labeling and for the processes related to the submission, acceptance, rescission, reconsideration, and record retention of declarations of compliance only apply to unmanned aircraft produced without a design approval or production approval issued under part 21 and for remote identification broadcast modules. Unmanned aircraft undergoing certification under part 21 must meet the certification processes and requirements of part 21 and the requirements in § 89.510.

Comments: A number of comments asked the FAA to modify the production requirements to allow persons to file declarations of compliance for the production of remote identification add-on equipment that can be installed on UAS manufactured without remote identification capabilities. Commenters indicated that not doing so would place a significant burden on small and new producers.

FAA Response: The FAA agrees with commenters and has modified this rule by incorporating the remote identification broadcast module concept. The production requirements for remote identification broadcast modules are included in § 89.520 of this rule. Remote identification broadcast modules must also comply with the serial number, labeling, and record retention requirements in subpart F. The processes related to the submission, rescission, reconsideration, and record retention in subpart F also apply to the remote identification

broadcast module. The costs related to the incorporation of the remote identification broadcast module are justified by the benefits that will result from the rule, and both costs and benefits are discussed in the Regulatory Evaluation section of this rule and in the Regulatory Impact Analysis available in the docket for this rulemaking.

ii. Information Required for a Declaration of Compliance

Comments: Northeast UAS Airspace recommended that producers list the UAS model number in the declaration of compliance along with the compliant firmware or software version instead of the serial number.

FAA Response: The FAA does not agree with the recommendation to revise the requirements so that producers have to list the unmanned aircraft model number in the declaration of compliance along with the compliant firmware or software version instead of the serial number. Besides the make and model, a producer must list in the declaration of compliance all of the serial numbers that will be assigned to standard remote identification unmanned aircraft or remote identification broadcast modules under the declaration of compliance. Each standard remote identification unmanned aircraft or remote identification broadcast module produced under a declaration of compliance must be assigned a unique serial number to allow it to be distinguished from other standard remote identification unmanned aircraft or remote identification broadcast modules.

Comments: Streamline Designs LLC, senseFly, DJI Technology, Inc. and many individuals indicated that the requirement to list the serial number of every UAS produced under a declaration of compliance is overly restrictive. DJI Technology, Inc. believed the requirement for the producer to list the serial numbers of all UAS manufactured under a declaration of compliance is unnecessary because under the proposed revisions to the registration requirements, the owner of a UAS would have to include the serial number when registering the unmanned aircraft. Some commenters mentioned that for foreign manufactured UAS, the serial numbers

should be provided at the time the UAS are declared in a customs form by an import agent rather than at the time of production.

FAA Response: The FAA does not agree with the commenters. The Agency has determined the serial number is necessary to establish the unique identity of the unmanned aircraft. Because the declaration of compliance establishes that the standard remote identification unmanned aircraft or the remote identification broadcast module meets the minimum performance requirements, the consolidated list of all standard remote identification unmanned aircraft or remote identification broadcast modules produced under a declaration of compliance is necessary to facilitate recognition of unmanned aircraft and broadcast modules that meet the requirements. Lastly, the serial numbers must be listed because under the operating requirements in subpart B, an operator may only operate a standard remote identification unmanned aircraft or remote identification broadcast module outside an FAA-recognized identification area if its serial number is listed under an FAA-accepted declaration of compliance.

Comments: Unifly and other commenters believe a manufacturer should be able to update the list of serial numbers listed under an FAA-accepted declaration of compliance without it being considered a change to the declaration of compliance. Some commenters suggested that UAS serial numbers be "submitted to the FAA by the customs agent upon entry into the United States" and noted that listing all relevant serial numbers in the declaration of compliance will increase the cost of production management because the serial number is generated and introduced to the UAS flight controller during the factory production process, and therefore UAS meant to be sold in the United States would have to be identified and distinguished from UAS meant to be sold in other jurisdictions. Commenters suggested that an alternate method to address this issue would be to submit the declaration of compliance after production is complete and the UAS that are going to be sent to the United States for sale have been identified. Commenters mentioned that this alternative could create a delay in delivering UAS because the

UAS could not be sent to the United States until after the declaration of compliance has been accepted by the FAA.

FAA Response: The FAA does not agree with these comments. The producer is the party responsible for designing and producing standard remote identification unmanned aircraft and remote identification broadcast modules for operation in the United States and ensuring they meet the remote identification requirements of part 89. Therefore, the FAA has determined that the producer is responsible for all requirements under subpart F, including the filing and amendment of serial numbers.

The FAA does not agree with the request to allow designers and producers of remote identification unmanned aircraft to be able to update the list of serial numbers listed under an FAA-accepted declaration of compliance without following the amendment process for a declaration of compliance. An amendment is submitted to modify any aspect of an FAA-accepted declaration of compliance. Reasons for submitting an amendment include, but are not limited to: resolving a safety or non-compliance issue (e.g., replacing a means of compliance); updating or correcting information (e.g., the name of the responsible person or contact information); or including new serial numbers.

Comments: One commenter asked how the FAA intends to enforce the requirements, particularly with regards to international manufacturers of pre-fabricated racing UAS, which do not have GPS, barometers, or broadcast telemetry. Commenters mentioned the requirements would potentially impact the sport of UAS racing. Other commenters suggested people may resort to importing UAS from outside the UAS or overriding their UAS systems to circumvent these regulations.

FAA Response: No person may produce a standard remote identification unmanned aircraft or remote identification broadcast module unless the person complies with all of the design and production requirements of subpart F, and obtains an FAA-accepted declaration of compliance authorizing the production of standard remote identification unmanned aircraft or

remote identification broadcast modules for use in the airspace of the United States. Failure to comply with any of the requirements constitutes grounds for the FAA to rescind its acceptance of a declaration of compliance. Any standard remote identification unmanned aircraft or remote identification broadcast module listed under the rescinded declaration of compliance would not be able to operate outside of an FAA-recognized identification area.

This rule establishes production and operating requirements for remote identification. The rule does not preclude the sale of unmanned aircraft without remote identification nor does it prohibit someone from buying and importing foreign-made unmanned aircraft. However, the operating rules of part 89 continue to apply to all persons operating unmanned aircraft in the airspace of the United States, including persons operating foreign-made unmanned aircraft or unmanned aircraft without remote identification.

Comments: Many commenters asked the FAA to revise the regulation so that the producers of UAS do not have to file declarations of compliance.

FAA Response: As previously mentioned, the producer is the party responsible for designing and producing unmanned aircraft and broadcast modules for operation in the airspace of the United States and ensuring the unmanned aircraft and broadcast modules meet the remote identification requirements of subpart F. The FAA has determined the declaration of compliance must be submitted by the producers because it is a condition precedent to being able to produce unmanned aircraft and broadcast modules used in the airspace of the United States.

H. Acceptance of a Declaration of Compliance

1. Discussion of the Final Rule

Section 89.535 prescribes the requirements for the acceptance of declarations of compliance. The Administrator will evaluate a declaration of compliance that is submitted to the FAA and may request additional information or documentation, as needed, to supplement the declaration of compliance. If the Administrator determines that the submitter has demonstrated

compliance with the requirements of this subpart, the FAA will notify the submitter that the Administrator has accepted the declaration of compliance.

The FAA adopts the requirements for the acceptance of a declaration of compliance as proposed.

2. Public Comments and FAA Response

Comments: Streamline Designs LLC, AiRXOS, and numerous others asked the FAA to provide more information about the design and production requirements, and how the Agency would assess compliance to issue an acceptance of a declaration of compliance. For example, they asked the Agency to define routine maintenance and to list all requirements that must be met to obtain the FAA's approval of a declaration of compliance. They also asked if FAA will require validation for each producer. Various commenters asked the FAA to provide a list of all FAA-accepted declarations of compliance on the FAA website to notify the public of which declarations of compliance are valid.

FAA Response: The design and production requirements for remote identification of unmanned aircraft are covered in subpart F. Any person, whether in the United States or a foreign country, producing such unmanned aircraft or broadcast module must file a declaration of compliance, provide certain information, and agree to abide by the production requirements and certain terms and conditions (e.g., inspection, audit, product support and notification, instructions). The FAA will evaluate a declaration of compliance that is submitted to the FAA to determine that the submitter has demonstrated compliance with the requirements of this subpart, the FAA will notify the submitter that the Administrator has accepted the declaration of compliance. With the exception of including the FCC identifier of the 47 CFR part 15-compliant radio frequency equipment used and integrated into the standard remote identification unmanned aircraft or the remote identification broadcast module, the FAA adopts § 89.530, the required information for submitting a declaration of compliance for FAA acceptance, as proposed. The FAA will publish the list of FAA-accepted declarations of compliance at https://www.faa.gov.

The FAA is establishing an advisory circular on the declaration of compliance process for remote identification of unmanned aircraft. This advisory circular provides guidance on the declaration of compliance process described in part 89, and outlines the required information for submitting a declaration of compliance. This guidance material is also available in the docket for this rulemaking

Comments: Aerospace Industries Association (AIA) and many other commenters questioned whether the Agency had the necessary resources to process all declarations of compliance submitted for acceptance in a timely manner. The commenters also questioned whether the FAA had the proper oversight and enforcement mechanisms. This commenter added that as the UAS industry continues to grow, there will be an increase in declaration of compliance submissions, which would require a huge investment from the FAA, and other governmental stakeholders, to keep up with the demand. Various commenters asked the Agency to commit to a timeline for review of a declaration of compliance. For example, DJI proposed a 30-day review period; Skydio proposed a 90-day period to provide a decision to the producers.

FAA Response: The FAA is committed to the implementation of this rule and is developing internal processes and identifying and allocating the appropriate resources to facilitate all processes required under subpart F of part 89. The FAA is committed to working with internal and external stakeholders to ensure that the process of submitting and obtaining FAA-acceptance of a declaration of compliance is implemented in an effective and timely manner. That being said, the FAA cannot commit to a specific timeline to review and approve the declarations of compliance because the response time will vary based on the complexity of the application, the technology, and a wide variety of use cases. The Administrator might have a need to request additional information (e.g., test results, etc.) or documentation, as needed, to supplement the declaration of compliance and to ensure completeness and compliance with the requirements of § 89.530 of this rule.

Comments: Streamline Designs LLC, senseFly, DJI Technology, Inc., and many individuals believe that the process would increase the administrative and compliance burden for manufacturers, operators, and the FAA. They also said the process would delay the introduction of new UAS into the market because producers would have to wait for the FAA to accept their declarations of compliance. They believe the acceptance process will likely create a backlog.

FAA Response: The declaration of compliance process does not impose a burden on operators of unmanned aircraft because the requirements of subpart F only apply to producers of unmanned aircraft. As previously explained, the declaration of compliance process is an essential part of the remote identification framework and is a condition precedent for someone to be able to produce standard remote identification unmanned aircraft or remote identification broadcast modules. The FAA has determined the process is in the interest of safety and security of the airspace of the United States because it ensures that producers produce unmanned aircraft and broadcast modules that meet the minimum performance requirements for remote identification in the United States. The costs related to the process are justified by the benefits that will result from the rule, and both costs and benefits are discussed in the Regulatory Evaluation section of this rule and in the Regulatory Impact Analysis available in the docket for this rulemaking.

Comments: Theia and other commenters asked the FAA to provide a streamlined declaration of compliance process with lower costs and less stringent requirements for persons or entities that build, operate, and insure their own UAS. The Association for Unmanned Vehicle Systems International (AUVSI), Skydio, DJI Technology Inc., and other commenters asked the FAA to allow a producer to file a single declaration of compliance that covers multiple makes and models of UAS, rather than have to file an individual declaration of compliance for each make and model.

FAA Response: The FAA determined that the declaration of compliance process is simple, straightforward, and applies to all designers or producers of non-certificated unmanned aircraft. The FAA also determined that the declaration of compliance process provides the basic

information necessary to assess compliance with the remote identification requirements. The information and assessment is necessary for all aircraft, and the FAA has determined it should not vary based on the number of aircraft manufactured by a person or the fact that person manufactures the unmanned aircraft for his or her own use.

A declaration of compliance needs to contain a single producer, make, and model and serial number(s) to uniquely identify the standard remote identification unmanned aircraft or remote identification broadcast module.

I. Rescission of FAA Acceptance of a Declaration of Compliance

1. Discussion of the Final Rule

Section 89.540 establishes the grounds and procedures related to the rescission of the FAA's acceptance of a declaration of compliance and a petition for reconsideration of such decision. The Administrator may rescind an accepted declaration of compliance if a standard remote identification unmanned aircraft or remote identification broadcast module listed under the declaration of compliance does not meet the minimum performance requirements of the rule; if the declaration of compliance does not meet a requirement of subpart F; or if the FAA rescinds acceptance of the means of compliance listed in the declaration of compliance.

The Administrator may provide a reasonable period of time for the person who submitted the declaration of compliance to remediate the noncompliance.

Notice of a rescission will be published in the Federal Register.

2. Public Comments and FAA Response

i. Rescission of a Declaration of Compliance

Co*mments:* Commenters asked the FAA to publish a list of declarations of compliance that have been rescinded to notify the public of which declarations of compliance are no longer valid.

FAA Response: As explained in the NPRM and adopted in this rule, the FAA will notify the submitter of its rescission and will publish a list of declarations of compliance that are no longer accepted at https://www.faa.gov.

ii. Petition to Reconsider the Rescission of FAA acceptance of a Declaration of Compliance

Comments: PRENAV and multiple individuals asked the FAA to remove the 60-day limit to petition the Agency to reconsider its decision to rescind a previously accepted declaration of compliance because, they argued, issues typically take time to identify and resolve. Therefore, they believed there should be no time limit on a manufacturer's ability to petition for reconsideration of the rescission of the FAA's acceptance of a declaration of compliance.

FAA Response: If the FAA determines it is in the public interest, prior to rescission, it will provide a reasonable period of time for the person holding the declaration of compliance to remediate the issue of non-compliance. If the person does not take appropriate action to resolve the issue promptly, the Agency would proceed with the rescission. The FAA has determined the term is appropriate because it grants sufficient time after the rescission for the producer to request for reconsideration of the decision. Prior to the rescission, the FAA would grant producers reasonable time to take action to resolve the defects or conditions. The FAA would proceed with the rescission after it has determined that no action can be taken, that the producer did not act within a reasonable time, or that the producer is unwilling or unable to resolve the defect or condition.

J. Record Retention

1. Discussion of the Final Rule

The FAA adopts § 89.545 as proposed, except that it is deleting references to the limited remote identification UAS concept and replacing them with the remote identification broadcast module concept. According to the requirements, a person must retain the following information

for as long as the standard remote identification unmanned aircraft or remote identification broadcast module listed on that declaration of compliance is produced plus an additional 24 calendar months, and must make it available for inspection by the Administrator: (a) the means of compliance, all documentation, and substantiating data related to the means of compliance used; (b) records of all test results; and (c) any other information necessary to demonstrate compliance with the means of compliance so that the standard remote identification unmanned aircraft or remote identification broadcast module meets the remote identification requirements and the design and production requirements of part 89.

2. Public Comments and FAA Response

Comments: Some commenters mentioned that UAS manufacturers could have difficulties complying with the record retention requirements because certain components of the UAS (e.g., beacons or transmitters), could be procured from other persons (e.g., component manufacturers) and used in the UAS produced by the manufacturer.

FAA Response: The FAA does not agree with these commenters. The unmanned aircraft producer can obtain the data and documentation necessary for compliance as a part of its procurement process.

Comments: The Small UAV Coalition and others expressed concerns about the proposed requirement to retain "all test results" and requested clarification of what tests were covered by the requirement.

FAA Response: The record retention requirements in § 89.545 of this rule apply to the production of standard remote identification unmanned aircraft and remote identification broadcast modules. Designers and producers of remote identification unmanned aircraft must retain records of all test results showing that the standard remote identification unmanned aircraft or the remote identification broadcast module meet the minimum performance requirements in subpart D of part 89 and all production and design requirements in subpart F of part 89.

Comments: Multiple commenters expressed concerns that a person who does not comply with the requirements of subpart F could face legal liability.

FAA Response: No person may produce a standard remote identification unmanned aircraft or remote identification broadcast module unless the person complies with all design and production requirements in subpart F and obtains the FAA's acceptance of a declaration of compliance. Failure to comply with any of the requirements – including the record keeping requirements – constitutes a ground for the FAA to rescind its acceptance of a declaration of compliance. The rescission would mean that the person would not be authorized, under that declaration of compliance, to produce standard remote identification unmanned aircraft or remote identification broadcast modules for use in the airspace of the United States. Any standard remote identification unmanned aircraft or unmanned aircraft with a remote identification broadcast module listed in a rescinded declaration of compliance would be restricted to operating in an FAA-recognized identification area.

Comments: Various individuals expressed concerns that the record retention requirements could prove costly for manufacturers. Western Michigan University, Drone Delivery Systems, and others indicated that the administrative costs and record keeping requirements might prevent the home building of recreational UAS.

FAA Response: In accordance with § 89.501(c), the requirements of subpart F of this rule do not apply to home-built unmanned aircraft. This means that persons producing home-built unmanned aircraft are not subject to the record retention requirements unless they voluntarily opt into subpart F by producing home-built standard remote identification unmanned aircraft.

The FAA acknowledges that the record retention requirements in § 89.545 of this rule will impose certain costs to producers of standard remote identification unmanned aircraft and remote identification broadcast modules. The costs are justified by the benefits that will result from the rule, and both costs and benefits are discussed in the Regulatory Evaluation section of this rule and in the Regulatory Impact Analysis available in the docket for this rulemaking. The

Agency has determined that the requirement is necessary to verify demonstration of compliance with the minimum performance requirements in subpart D of part 89, and all production and design requirements in subpart F of part 89. In the event of an FAA investigation or analysis, the Administrator needs to obtain data necessary to reassess the acceptability of the declaration of compliance. The additional 24 calendar months would ensure that the data is still readily available while any FAA actions are being taken. If the FAA requests the data, and the submitter did not retain the data in accordance with this requirement, then the Administrator may choose to rescind acceptance of the declaration of compliance.

XV. Registration

The FAA proposed that persons operating unmanned aircraft registered or required to be registered under part 47 or 48 would have to comply with the remote identification requirements of proposed part 89. The FAA proposed to tie the remote identification requirements to the registration of unmanned aircraft because the FAA and law enforcement agencies need the ability to correlate remote identification information with registration data to obtain more complete information regarding the ownership of unmanned aircraft operating in the airspace of the United States.

Aircraft registration requirements serve the dual purposes of both identifying aircraft and promoting accountability and the safe and efficient use of the airspace of the United States by both manned and unmanned aircraft. With limited exceptions, most unmanned aircraft are required to be registered under part 47 or 48; therefore, nearly all unmanned aircraft operating in the airspace of the United States will have to comply with the remote identification requirements. Foreign civil unmanned aircraft operating in the airspace of the United States will also be required to comply with the remote identification requirements. This will enhance the overall safety and efficiency of the airspace of the United States.

Under the current registration requirements, no person may operate an unmanned aircraft in the airspace of the United States unless the unmanned aircraft has been registered by its owner under part 47 or 48, or unless the aircraft is excepted from registration. There are two exceptions to the registration requirements for unmanned aircraft: (1) unmanned aircraft of the Armed Forces of the United States; and (2) most unmanned aircraft weighing 0.55 pounds or less on takeoff, including everything that is on board or otherwise attached to the aircraft. Small unmanned aircraft operating under 14 CFR part 91, 107, or 135, or any other operating part are required to register under part 47 or 48 regardless of weight.[28]

U.S. owners of small unmanned aircraft used in civil operations (including commercial operations), limited recreational operations, or public aircraft operations, among others, are eligible to register the unmanned aircraft under part 48 in one of two ways: (1) under an individual registration number issued to each unmanned aircraft; or (2) under a single registration number issued to an owner of multiple unmanned aircraft used exclusively for limited recreational operations. The FAA's existing registration requirements were implemented through the *Registration and Marking Requirements for Small Unmanned Aircraft* interim final rule (Registration Rule), published on December 15, 2016.

In the NPRM, the FAA proposed changes to those registration requirements to meet the objectives and intent of remote identification of UAS. Specifically, the FAA proposed to require all unmanned aircraft, including those used for limited recreational operations, to obtain a unique registration number. The FAA also proposed requiring owners to submit the unmanned aircraft's serial number and other information as a part of the application process.

The FAA adopts the requirement tying remote identification requirements to registration requirements and the requirements to submit the unmanned aircraft's serial number and other information. After reviewing comments and further consideration, the FAA decided not to adopt

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[28] Foreign civil aircraft remain subject to the requirements of 14 CFR part 375 and, to the extent applicable, 14 CFR 48.125.

the requirement that all unmanned aircraft, including those used for limited recreational operations, obtain a unique registration number. Those changes are described in the sections that follow.

A. Aircraft Registration Requirements

1. Discussion of the Final Rule

The Registration Rule implemented separate registration requirements for "small unmanned aircraft used exclusively as model aircraft" and "small unmanned aircraft used as other than model aircraft." The Registration Rule required small unmanned aircraft used as other than model aircraft to be registered with a separate Certificate of Aircraft Registration issued for each individual aircraft. The Registration Rule required small unmanned aircraft used exclusively as model aircraft to be registered with a single Certificate of Aircraft Registration issued to the aircraft owner for all aircraft owned by that person.

In the Remote Identification of Unmanned Aircraft Systems NPRM, the FAA explained that the lack of aircraft-specific data for unmanned aircraft registered under part 48 could inhibit the FAA and law enforcement agencies from correlating the remote identification data with data stored in the Aircraft Registry. Thus, the FAA proposed to revise part 48 to require the individual registration of all small unmanned aircraft and the provision of additional aircraft-specific data. The FAA proposed that owners of small unmanned aircraft would have to complete the registration application by providing aircraft-specific information in addition to basic contact information.

After reviewing comments submitted in response to both the Registration Rule and the Remote Identification NPRM, and after further consideration, the FAA decided not to adopt this proposed change to part 48. The FAA will maintain the current registration options and will no longer revise part 48 to require the individual registration of all small unmanned aircraft. Owners

intending to operate all their small unmanned aircraft exclusively in compliance with 49 U.S.C. 44809 may register once for all unmanned aircraft meeting that description.[29]

The FAA proposed to revise the registration framework to require each unmanned aircraft to be registered under part 48. However, after considering comments and incorporating the remote identification broadcast module concept, the FAA determined that the current framework for small unmanned aircraft registration in part 48 is sufficient for remote identification and for statutory compliance with the FAA's authority for aircraft registration. By maintaining the current framework, the intent of the statutory requirement for aircraft registration is achieved without being overly burdensome, particularly considering the mitigation of cost for those individuals specifically flying multiple aircraft exclusively in compliance with section 44809. The FAA therefore will retain the current part 48 registration framework.

Corresponding updates are applied to part 48 to reflect the inclusion of the current statutory requirement for limited recreational operations and to incorporate information relevant to remote identification. Owners registering as exclusively compliant with section 44809 will be required to submit the aircraft manufacturer and model name of small unmanned aircraft associated with the registration number provided by the Registry. Owners of aircraft operated exclusively in compliance with section 44809 would be required to obtain unique certificates of aircraft registration for any aircraft that are ever operated outside of the statutory framework set forth in section 44809, such as under part 107.

The FAA is clarifying that owners registering as exclusively compliant with section 44809 may include more than one serial number – of either a standard remote identification unmanned aircraft or a remote identification broadcast module – on a single Certificate of Aircraft Registration. Serial numbers of both standard remote identification unmanned aircraft

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[29] The registration is based on the intended use of the unmanned aircraft. An operator would violate FAA regulations if he or she uses any of such aircraft for any purpose other than for limited recreational operations under 49 U.S.C. 44809.

and remote identification broadcast modules may be included on a single Certificate of Aircraft Registration for owners registering as exclusively compliant under section 44809.

The FAA reorders §§ 48.100 through 48.115 to maximize regulatory clarity and also revises §§ 48.100 through 48.110 to amend statutory references for 49 U.S.C. 44809 and to reflect the inclusion of remote identification broadcast module serial number information in the registration application.

2. Public Comments and FAA Response

Registration Rule Comments: The FAA received a comment from the University of Illinois at Urbana-Champaign, which urged the FAA to utilize the same system for recreational and commercial UAS, contending that there are no mechanical differences between the two groups and that having separate systems would likely lead to confusion. ALPA supported the efforts to minimize the burden of registering multiple small unmanned aircraft that are operated for hobby or recreational purposes. Some commenters supported registration of remote pilots instead of individual aircraft. Several commenters suggested that though the FAA has the authority to register aircraft, it does not have the authority to register pilots. A few individual commenters raised concerns about a single Certificate of Registration for multiple small unmanned aircraft owned by one operator.

Remote Identification NPRM Comments: A number of organizations supported the FAA's proposal that all aircraft, regardless of use, must be individually registered. The National Association of Tower Erectors stated its belief that public safety demands that recreational users be subject to the same remote identification requirements as commercial users. A number of commenters supported unique registration of each unmanned aircraft in the interest of safety and accountability and because it is more consistent with other aviation registration requirements. The American Association of Airport Executives (AAAE) supported the proposal to require unique registration for each unmanned aircraft because it would enable the FAA to trace each

unmanned aircraft back to its owner while also helping the FAA and industry to assess the total number of unmanned aircraft in the airspace of the United States.

In contrast, a significant number of organizations and numerous individual commenters noted that many owners of aircraft used for limited recreational operations have large numbers of fixed wing model aircraft. The Chairperson of the Academy of Model Aeronautics (AMA) Advanced Flight System Committee proposed instead that remote identification modules be movable from aircraft to aircraft and that the modules themselves be registered instead of the aircraft. Many commenters mentioned that requiring pilots to register may be a better option than requiring every aircraft to register, particularly with regard to the hobby class of UAS because students and young persons could freely fly various models. Other commenters stated the FAA presented no evidence that requiring registration of each unmanned aircraft would result in lower risk than applying one registration number to multiple aircraft. The New Hampshire Department of Transportation (NHDOT) suggested instead that UAS owners be allowed to submit to the FAA a list of the unmanned aircraft that they own. NHDOT added that the proposed changes to registration requirements do not address current non-compliance with registration requirements, and that the FAA should focus instead on increasing compliance. Numerous commenters stated they own dozens of aircraft and requiring them to register each one separately would be economically burdensome. Some of the commenters who own aircraft used for limited recreational operations noted they build the aircraft but rarely – if ever – fly them. Other commenters discussed that owners of these aircraft frequently disassemble these aircraft and switch out aircraft parts, creating several new combinations of aircraft, and asked which specific component of the aircraft needs to be registered. Another commenter expressed concern about the costs to FAA of keeping track of "hundreds of millions" of registrations and serial numbers.

Several commenters suggested that the requirement to register each unmanned aircraft is discriminatory against modelers because some manned aircraft such as ultralights are not required to be registered. Many commenters objected to the proposal on the grounds that it is

impracticable and costly for hobbyists, especially for handmade and kit-built aircraft, and that adopting the proposed rule will "destroy the RC aircraft hobby."

Other commenters believed that registering every unmanned aircraft is redundant and unnecessary, asserting that only one aircraft can be in the air at one time. Commenters also mentioned that if an unmanned aircraft is flown exclusively at an FAA-recognized identification area, the aircraft should not be required to be registered because information gathered from the registration process would serve no purpose for remote identification. Several commenters suggested the FAA should make a distinction between those operating commercially and those operating recreationally.

The AMA stated that registration is unnecessary for operators flying within visual line of sight because the operators are not far from the aircraft and can easily be located. The AMA objected to what they estimated would be a total collective burden of $8.1 million in registration costs borne by their members. The AMA added that its calculation of $8.1 million should be included in FAA's economic burden estimates and that the Regulatory Impact Assessment should be updated accordingly. Multiple individual commenters cited this same figure ($8.1 million), and asserted that it is excessively burdensome on AMA members and other hobbyists. The Aircraft Owners and Pilots Association (AOPA) echoed the AMA's $8.1 million estimate, and opposed the proposal to require registration of each small unmanned aircraft. In addition, AOPA expressed its opposition to registration requirements for aircraft that will operate exclusively in FAA-recognized identification areas.

One commenter asked whether the FAA was prepared to certify hundreds of thousands of UAS annually as may be required given the current market for home-built and out-of-the-box UAS. One commenter supported registering both commercial unmanned aircraft operating within the UTM and unmanned aircraft flown BVLOS with the serial number of each UAS, because the owner and UAS may be widely separated from one another at the time of an incident.

Many commenters believed that only certain types of aircraft should be required to be registered. Some of these commenters believed that only rotorcraft, including “quadcopters” and other “drones” should be required to register. Other commenters emphasized their use of sailplanes and stated their belief that those aircraft should not be required to register. Still other commenters believed that only those aircraft used for commercial purposes should be required to register.

The FAA received several comments regarding the weight requirement for small unmanned aircraft as it relates to registration. Commenters expressed support for removing a weight requirement entirely, rewriting the registration weight thresholds, and maintaining the current exclusion for aircraft weighing 0.55 pounds or less used for limited recreational operations under section 44809. The Small UAV Coalition supported exempting unmanned aircraft weighing 0.55 pounds or less from registration requirements, unless those UAS are used for commercial purposes or BVLOS.

Digital Aerolus, Inc. suggested that the FAA clarify that registration and identification requirements are not applicable below ground or indoors.

ALPA, along with numerous individuals, suggested that the FAA should require registration at the point-of-sale. In the case of home-made models, ALPA recommended that the FAA require that such aircraft be registered prior to its first use outdoors.

Numerous commenters suggested that the FAA facilitate the deregistration of UAS, in the case of destruction or theft, and clarify the registration requirements when a UAS is sold or transferred. The Utah Public Lands Policy Coordinating Office suggested that the FAA make the UAS aircraft registration database searchable, like the current aircraft registry. ALPA commented that the rule should clarify that registration information will be available only to law enforcement or the FAA.

FAA Response: For the reasons described above, the FAA agrees with the commenters who suggested that it was not necessary to register each individual unmanned aircraft operated for limited recreational purposes and does not adopt the proposed change in this rule.

In addition, as the FAA discussed in the Registration Rule, the FAA has consistently recognized that the term "small unmanned aircraft" includes both fixed wing and rotary aircraft, and has the same definition as the colloquial term "drone." The same is true for all unmanned aircraft. All unmanned aircraft that fall within the applicability of this regulation, not just those popularly referred to as "drones," are required to register.

With respect to comments regarding the minimum weight for small unmanned aircraft registration, this rulemaking clarifies the regulatory requirement with respect to operations under part 107. That threshold was not at issue in this rulemaking, and accordingly, comments requesting a change to the weight threshold are out of scope of this rule.

The FAA clarifies, as it did in the Registration Rule, that operations in the airspace of the United States only include operations out-of-doors and above the surface of the Earth. With respect to comments regarding point-of-sale registration, the FAA has statutory authority that is limited to requiring registration prior to operation. The FAA considered point-of-sale registration as an option, but it presented difficulties for the Agency to overcome, including that the individual purchasing the unmanned aircraft may not be the owner of the unmanned aircraft. At this time, the FAA has declined to make the part 48 registry publicly available, though it reserves the ability to do so in the System of Records Notice (SORN) 801 for this database. The Agency is balancing the sensitive nature of the personal information provided to the Agency by owners of small unmanned aircraft with the public availability of the information.

B. Registration Fees for the Registration of Individual Aircraft

1. Discussion of the Final Rule

Noting the FAA is required by statute to charge a fee for registration services, the Registration Rule imposed a $5 fee for registration and a $5 fee for registration renewal. The registration system permits the use of any credit, debit, gift, or prepaid card. If none of these methods of payment is available to the registrant, the Registration Rule noted that the registrant may register using the existing paper-based system under part 47, which allows payment by check or money order. The FAA also assesses a fee of $5 for a Certificate of Registration for each manned aircraft.[30]

To ease the financial burden on operators who previously registered multiple model aircraft under a single registration number, in the Remote Identification NPRM the FAA indicated it would explore ways to minimize the registration fee when multiple aircraft are registered at the same time and solicited comment.

After review of public comments and further consideration, the FAA retains the requirement for small unmanned aircraft owners to pay a $5 registration fee and a $5 renewal fee, though this rule differs from the proposal. As a result of the FAA's decision to maintain the current registration framework, owners of aircraft operated exclusively in compliance with 49 U.S.C. 44809 must only register once for all aircraft meeting that description. Therefore, those owners would pay the $5 fee one time every 3 years. As noted in the Registration Rule, though the Task Force and some commenters recommended no fee for small unmanned aircraft registration for varying reasons, the FAA is required by statute to charge a fee for registration services.[31] Accordingly, the revenue stream generated by the fees collected under this rule

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[30] 14 CFR 47.17(a).

[31] Section 45305 of title 49 U.S.C. directs the FAA to establish and collect fees for aircraft registration and airman certification activities to recover the cost of providing those services and to adjust these fees when the Administrator determines that the cost of the service has changed.

supports the development, maintenance, and operation of the Registry. The payment system used by the Registry complies with all Federal laws for online transactions, as discussed in the Registration Rule.

The applicability of the part 48 registration fee to public aircraft operations is consistent with the requirement set forth in part 47. Under 49 U.S.C. 44101, only certain foreign aircraft and aircraft of the national defense forces of the United States are eligible to operate unregistered aircraft in the United States. Small unmanned aircraft used in non-military public aircraft operations are subject to the registration requirements of 49 U.S.C. 44101 and, as such, must complete the registration process provided in part 47 or 48, which includes payment of the fee. The fee for small unmanned aircraft registration under part 48 must be submitted through the web-based registration application process.

2. Public Comments and FAA Response

Registration Rule Comments: The Small UAV Coalition and a number of individual commenters objected to the imposition of a registration fee. The Small UAV Coalition said the FAA should not impose a registration fee of any amount for small unmanned aircraft "to promote broad participation in the program." Some commenters referred to the $5 fee as a "tax."

A number of commenters objected to the requirement to pay the registration fee via the web-based system using credit or debit cards due to perceived privacy and security implications. Another questioned why the registration system requires a renewal fee every 3 years, when small manned-aircraft pilots are only charged a one-time fee.

Remote Identification NPRM Comments: A number of commenters objected to the size of the fee, as well as the requirement to pay to register each aircraft individually. DJI and many other commenters suggested that the $5 fee per aircraft is too high, and that the FAA should maintain the current $5-per-three-year fee per registrant, not per aircraft.

The District of Columbia office of the Deputy Mayor for Public Safety and Justice recommended imposing a discounted registration fee for those who comply prior to the proposed

regulatory deadline. Motorola Solutions, Inc., and one individual argued that public aircraft operations such as those involving law enforcement and search-and-rescue operations be exempt from the proposed registration fee.

One commenter noted that a registration fee could cause a lower level of overall compliance, added expense, and negative privacy implications, while adding that charging more than $5 per person contradicts the FAA's 2015 Registration Task Force recommendations.

FAA Response: As a result of the FAA's decision to maintain the current registration framework, owners of aircraft operated exclusively in compliance with 49 U.S.C. 44809 must only create one registration for all aircraft meeting that description. Comments received on the use of credit card payment are not within the scope of this rule. See the Regulatory Impact Analysis available in the docket for more information on the costs associated with the registration framework for this rule.

C. Information Included in the Application for Registration

1. Discussion of the Final Rule

In the Registration Rule, the FAA amended 14 CFR part 47 and created part 48 to require individuals intending to use a small unmanned aircraft exclusively as model aircraft to provide only basic contact information (name, address, and email address) for the small unmanned aircraft owner. For individuals intending to use a small unmanned aircraft as other than a model aircraft, in addition to the same basic contact information required for model aircraft, the Registration Rule also required the individual to provide aircraft-specific information (manufacturer and model name, and a serial number for each aircraft being registered).[32]

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[32] The FAA notes that, currently, serial numbers may be repeated because there is no mechanism in place for manufacturers to ensure that a given serial number is unique to a specific aircraft. However, the FAA supports any efforts by small UAS manufacturers collectively to standardize aircraft serial numbers, such that each small unmanned aircraft will receive a unique serial number in production.

The FAA adopts these requirements with one change. Applicants registering aircraft as limited recreational operations under 44809 must provide manufacturer and model information but not a unique serial number for each aircraft being registered.

In addition, the FAA proposed to update registration information requirements to require one or more telephone number(s) for the applicant. As the FAA explained in the NPRM, requiring owners of unmanned aircraft to provide their telephone number(s) as part of the registration process would assist FAA and law enforcement to disseminate safety and security-related information to the registrant in near real-time. This additional information will be retained by the FAA and only disclosed as needed to authorized law enforcement or Federal agencies. The FAA adopts this requirement as proposed.

2. Public Comments and FAA Response

Registration Rule Comments: The Small UAV Coalition recommended that the information the FAA requires of registrants "be no more than is necessary to provide the FAA and law enforcement and national security agencies with the ability to ensure proper and prompt accountability in the event of an accident or incident." The Small UAV Coalition also said that the regulatory responsibility to register an unmanned aircraft should rest with the owner of the aircraft, as it is with the current FAA Aircraft Registry, and as set forth in Chapter 441 of 49 U.S.C. and part 47 of 14 CFR. The Small UAV Coalition noted that in most instances the owner and operator will be the same person, but if the unmanned aircraft is leased to another person, then the owner-lessor should remain the registrant.

A few individual commenters said that for registration to be useful, the FAA should require additional information about the individual aircraft; specifically, to include the serial number of ready-to-fly aircraft and the serial number of electronic components used to construct home-built aircraft.

Remote Identification NPRM Comments: The Southern Company, along with Edison Electric Institute, the American Public Power Association, and the National Rural Electric

Cooperative Association, commenting jointly, supported the proposal to require telephone numbers to be included as part of the registration process. However, both commenters suggested that only a company telephone should be required for commercial operations, rather than individual telephone numbers for company operations. Both commenters sought clarification of this point in the final rule.

McInflight Aerospace, LLC, supported the proposed requirement, as it would permit an operator to be contacted immediately if an unmanned aircraft entered restricted airspace.

One commenter worried that registrants' phone numbers might be made available to bad actors if there is a failure in data security.

FAA Response: As discussed in the Registration Rule, the registration database complies with all Federal requirements for data security. The FAA does not specify what sort of telephone number must be included, beyond that it must be a way that the applicant can be reached. The FAA considered all comments received and believes the information required is the minimum information required to ensure accountability from the aircraft owner.

D. Proposed Changes to the Registration Requirements to Require a Serial Number as Part of the Registration Process

1. Discussion of the Final Rule

The FAA proposed to require a unique identifier as part of the message elements used to identify remotely UAS. The proposed revision of part 48 would require the provision of an unmanned aircraft's serial number at the time of registration.

As the FAA explained in the NPRM, the serial number requirement enables the FAA to correlate the data broadcast or transmitted by the UAS with the registration data in the Aircraft Registry to associate an unmanned aircraft with its registered owner. The requirement also allows the FAA to associate an aircraft with its owner while operating in the airspace of the United States and facilitates the identification of non-registered unmanned aircraft operating in

the airspace of the United States, which may warrant additional oversight or action by the FAA, national security agencies, or law enforcement agencies.

The FAA proposed to add a new § 47.14 to require the owners of standard remote identification unmanned aircraft and unmanned aircraft using a broadcast module registered under part 47 to list in the Certificate of Aircraft Registration the serial number issued by the manufacturer of the unmanned aircraft or the manufacturer of the broadcast module in accordance with the ANSI/CTA-2063-A serial number standard.

The FAA also proposed to revise § 48.100(a) to require a serial number for every small unmanned aircraft. Consistent with the proposed changes in part 47, § 48.100(a)(5) would have required the owner of any standard remote identification unmanned aircraft or limited remote identification unmanned aircraft to list in the Certificate of Aircraft Registration the serial number issued by the producer of the unmanned aircraft in accordance with the production requirements of part 89. Per the production requirements in proposed § 89.505, such serial number would have to comply with the ANSI/CTA-2063-A serial number standard.

In the NPRM, the FAA acknowledged that some unmanned aircraft may not have serial numbers that comply with the ANSI/CTA-2063-A serial number standard. Some examples include unmanned aircraft manufactured prior to the compliance date of a final rule (assuming the producer of the unmanned aircraft is unable to modify the aircraft or upgrade the software to assign an ANSI/CTA-2063-A compliant serial number), some amateur-built unmanned aircraft, and foreign-built unmanned aircraft with no serial numbers or with serial numbers that do not comply with ANSI/CTA-2063-A. Since these unmanned aircraft would not comply with the remote identification requirements for standard remote identification UAS or limited remote identification UAS, the FAA proposed to restrict their operation to FAA-recognized identification areas. Accordingly, the FAA did not impose a requirement for the owners of such unmanned aircraft to obtain an ANSI/CTA-2063-A compliant serial number and to list it in the application for a Certificate of Aircraft Registration or the notice of identification. The FAA

sought detailed comments on whether and why it should require the owners of UAS without remote identification to obtain an ANSI/CTA-2063-A compliant serial number and to list it in the application for a Certificate of Aircraft Registration or the notice of identification and whether there would be any costs associated with obtaining a compliant serial number. The FAA also sought comments on whether the Agency should issue ANSI/CTA-2063-A compliant serial numbers to such aircraft when registered or re-registered by their owners.

The FAA adopts the requirement that owners of standard remote identification unmanned aircraft and remote identification broadcast modules must provide an ANSI/CTA-2063A compliant serial number on their application for registration. After review of comments and further consideration, the FAA determined not to require owners of unmanned aircraft without remote identification to provide a serial number during registration.

For unmanned aircraft registered individually and operated under part 91, 107, or 135, or any other operating part, the FAA clarifies that the serial number used to register a standard remote identification unmanned aircraft or remote identification broadcast module may only be associated with one registration application. The FAA will not accept duplicate submissions of serial numbers under part 47 or 48. This means that a person may not move the remote identification broadcast module amongst aircraft required to be registered individually without removing the serial number from one Certificate of Aircraft Registration before adding it to another. Alternatively, the owner of such aircraft may obtain a unique remote identification broadcast module (with a unique serial number that complies with the ANSI/CTA-2063-A serial number standard) and include it with the registration of each unmanned aircraft registered individually and operated under part 91, 107, or 135, or any other operating part.

For owners operating exclusively in compliance with 49 U.S.C. 44809, the remote identification broadcast module may be used for all unmanned aircraft for which the owner is registered, but only one of those aircraft may be operated at a time. An owner may submit multiple remote identification broadcast module serial numbers for operation of multiple aircraft

simultaneously at a one-to-one aircraft-to-operator ratio, as long as those operations would be compliant with section 44809. If an owner includes a serial number associated with a standard remote identification unmanned aircraft in the registration application for operations exclusively in compliance with section 44809, he or she may also include a serial number for a remote identification broadcast module linked to other unmanned aircraft registered under his or her registration for operations exclusively in compliance with section 44809.

2. Public Comments and FAA Response

Comments: A number of commenters believed that requiring an individual to obtain and assign an ANSI/CTA-2063-A serial number imposed an unreasonable burden. Many stated that it would be impossible for those with amateur-built aircraft to comply with this requirement, as those aircraft do not come with serial numbers.

FAA Response: In response to comments regarding whether compliance with the serial number requirements is too burdensome for owners of model aircraft, the FAA notes that the revised requirements for remote identification offer increased flexibility for individuals who are equipping their unmanned aircraft with remote identification broadcast modules or operating exclusively in FAA-recognized identification areas.

The FAA determined that the serial number requirement is an important element of the remote identification framework. Serial numbers are used to provide a unique identity to unmanned aircraft operating in the airspace of the United States. The requirement is particularly necessary to identify unmanned aircraft operated for recreational purposes when multiple unmanned aircraft are registered under a single registration. The unique serial number of each standard remote identification unmanned aircraft or remote identification broadcast module allows the Agency and law enforcement to distinguish among unmanned aircraft with the same registration number that are flying outside of FAA-recognized identification areas.

Also, the FAA reaffirms that subpart F of this rule does not apply to the production of home-built unmanned aircraft. As explained in section XIV.A of this preamble, the FAA excepts

producers of home-built unmanned aircraft from the design and production requirements, therefore home-built unmanned aircraft need not comply with the serial number requirements as prescribed in § 89.505. If a person intends to produce a standard remote identification unmanned aircraft, or a remote identification broadcast module to equip their unmanned aircraft to comply with the remote identification requirements, then that person would have to comply with the design and production requirements under subpart F of part 89, which includes the requirement to issue a serial number that conforms to the ANSI/CTA-2063-A standard.

Comments: Several commenters stated this requirement would make it impossible to salvage parts from damaged aircraft for reuse, thus rendering every accident or crash a total loss. Others, in a similar vein, stated that this requirement would end the tradition of swapping or exchanging modular parts from model to model.

A commenter suggested that because model aircraft are often unique, the validity of their serial numbers would be unknowable to the FAA and a modeler could swap serial number plates undetected. Another commenter asked if the intent of the Agency is that the serial number is associated with the air frame alone, and that the electronics can be swapped between air frames. Another suggested that the FAA require reporting of each aircraft's radio control receiver, not the aircraft itself.

FAA Response: The FAA does not agree with commenters who believe that the requirement to obtain a serial number to then use for aircraft registration would render parts swapping obsolete. The FAA explains in section XVIII.A of this preamble that discarded unmanned aircraft can be disassembled into the following parts: carbon (frame, frame parts), plastic, metal parts (screws, standoffs), wire, electronics (flight controller, ESC, motors, camera, VTX, RX), and batteries. Those parts can be reused, especially if they remain in good condition. In addition, home-built unmanned aircraft are excepted from the production requirements of this rule including the requirement for a serial number.

Comments: The U.S. Chamber of Commerce Technology Engagement Center supported the proposed requirement, as it would lead to greater standardization. ALPA, in comments echoed by AAAE, supported the proposed requirement as "a fundamental necessity and fail-safe method of connecting each owner with the specific UAS being operated, thus allowing the fulfillment of the central purpose of [proposed 14 CFR part 89]."

One commenter suggested the serial-number requirement apply just to a remote identification module, rather than the entire aircraft. Another commenter predicted that "hobby companies" would be unable to afford to submit declarations of compliance that contain compliant serial numbers. A commenter suggested the FAA implement a waiver process for the operation of model aircraft outside of FAA-recognized identification areas.

The Edison Electric Institute, the American Public Power Association, and the National Rural Electric Cooperative Association, commenting jointly, supported the serial-number requirement, adding that aircraft registration requirements are the foundation for both identifying aircraft and promoting accountability. One commenter stated the serial number requirement, along with other changes proposed in the NPRM, is reasonable and would not pose an undue burden. Another agreed and added the inclusion of a serial number could aid first responders in the event of an accident. The District of Columbia office of the Deputy Mayor for Public Safety and Justice also supported the requirement, as it would aid in law enforcement and in determining whether or not a UAS is operating in restricted airspace. However, the District of Columbia office of the Deputy Mayor for Public Safety and Justice added that the serial number should be issued by the FAA, to reduce costs to users.

FAA Response: With respect to comments agreeing with the FAA's proposed approach, the FAA believes that the revised final rule requirement still provides sufficient information to ensure accountability of unmanned aircraft owners operating in the airspace of the United States. As of the publication of this rule, the ANSI/CTA-2063-A standard is available for viewing and download free of charge. While ANSI/CTA-2063-A was specifically developed to provide a

serial number format for small UAS serial numbers, the FAA has determined that ANSI/CTA-2063-A is appropriate to issue serial numbers under this rule regardless of the size of the unmanned aircraft or broadcast module because it enables the issuance of unique serial numbers, and promotes worldwide standardization of unmanned aircraft remote identification requirements. The use of ANSI/CTA-2063-A would provide a single accepted format for serial numbers, helping to ensure consistency in the transmission of this message element.

Subpart F of part 89 does not apply to unmanned aircraft without remote identification manufactured prior to the compliance date of the production requirement of this rule. The serial number requirement in § 89.505 applies to standard remote identification unmanned aircraft and remote identification broadcast modules produced after the effective date of this rule. This rule does not require producers to assign a serial number to any unmanned aircraft without remote identification produced prior to the compliance date of the design and production requirements.[33] The requirements also do not make the existing unmanned aircraft fleet obsolete because operators can continue to operate existing unmanned aircraft subject to the operating rules in subpart B of this rule. This means that operators may fly existing unmanned aircraft without remote identification equipment at FAA-recognized identification areas or may equip existing unmanned aircraft with remote identification broadcast modules to meet the operating requirements of this rule.

E. Serial Number Marking

1. Discussion of the Final Rule

Small unmanned aircraft registered under part 48 may not operate unless they display a unique identifier in a way that is readily accessible and visible upon inspection of the aircraft. The unique identifier must be either: (1) the registration number issued to an individual or the

[33] Producers may choose to assign an ANSI/CTA-2063-A compliant serial number to an unmanned aircraft produced prior to the compliance date of the design and production requirements of this rule.

registration number issued to the aircraft by the Registry upon completion of the registration process; or (2) the small unmanned aircraft serial number, if authorized by the Administrator and provided with the application for Certificate of Aircraft Registration.

In the NPRM, the FAA emphasized that small unmanned aircraft owners are not required to affix the serial number to the exterior of the aircraft, though nothing would preclude them from doing so. The FAA sought specific comments on whether UAS producers should be required to affix the serial number to the exterior of all standard remote identification unmanned aircraft and limited remote identification unmanned aircraft.

After review of comments and further consideration, the FAA decided not to impose such a requirement. The current registration marking requirements already require the registration number be marked on an external surface of the unmanned aircraft; this information allows the FAA to tie the aircraft to the FAA registration information including the serial number of the unmanned aircraft or broadcast module.

See section XIV.C of this preamble for a discussion of the serial number requirements of this rule.

2. Public Comments and FAA Response

Comments: Many commenters did not think it is necessary to display the serial number on the exterior of the unmanned aircraft, and many noted that the current requirement to display the registration number is sufficient. Some commenters, including Wingcopter, mentioned their support for external marking of unmanned aircraft with a serial number.

FAA Response: The FAA considered the above comments and is not prepared to permit serial number marking in lieu of registration identifier marking at this time. The NPRM proposal remains unchanged. The Administrator reserves the ability to permit serial number marking in the future. Comments regarding the external marking requirement are out of scope of this rulemaking.

F. Compliance Dates

As discussed in section XV.A of this preamble, the FAA proposed that all unmanned aircraft be required to register individually. In light of that change, the FAA proposed that § 48.5 be amended to establish new compliance dates for updating registrations to meet that requirement. Because this rule will not adopt those changes, there is no longer a need to establish new compliance dates.

This rule therefore removes and reserves § 48.5. Existing § 48.5 established the initial compliance time periods for registration which expired in 2016. Because this provision is no longer necessary and the existing § 48.5 includes terminology that is outdated following the 2018 FAA Reauthorization, the FAA is removing and reserving § 48.5 in this rule.

XVI. Foreign Registered Civil Unmanned Aircraft Operated in the United States

A. Discussion of the Final Rule

In the NPRM, the FAA explained the need to correlate the remote identification message elements transmitted or broadcast by foreign civil unmanned aircraft operated in the United States against information that helps FAA and law enforcement identify a person responsible for the operation of the foreign civil unmanned aircraft. Where unmanned aircraft are registered in a foreign jurisdiction, the FAA may not have access to information regarding the unmanned aircraft or its registered owner. The FAA proposed to allow a person to operate foreign-registered civil unmanned aircraft in the United States only if the person submits a notice of identification to the Administrator that includes certain information that allows the FAA to associate the foreign civil unmanned aircraft to a responsible person. The FAA explained that after a person submits a notice of identification, the Agency would issue a confirmation of identification. The Agency also clarified that the notice of identification and the confirmation of identification did not constitute, nor had the effect of, a United States aircraft registration.

After review of comments and further consideration, the FAA revised § 89.130(a) to clarify that the requirement to file a notice of identification applies to persons operating foreign-registered civil unmanned aircraft with remote identification in the airspace of the United States. These are persons operating foreign-registered unmanned aircraft that meet the remote identification requirements of part 89 (i.e., a foreign-registered standard remote identification unmanned aircraft or a foreign-registered unmanned aircraft with a remote identification broadcast module). Foreign-registered unmanned aircraft that do not meet the remote identification requirements of part 89 may only operate in the United States in an FAA-recognized identification area.[34]

In response to comments noting that some countries register operators instead of aircraft, the FAA is revising § 89.130(a)(8) by deleting the phrase "of the aircraft" so that the requirement for the filing of the notice of identification allows the operator to provide the registration number of the unmanned aircraft issued by the country of registry or the registration number issued to the operator of the unmanned aircraft by the country of registry, as applicable.

In light of the revisions addressed above, as of the effective date of this rule, no person will be permitted to operate a foreign registered civil unmanned aircraft with remote identification in the airspace of the United States unless, prior to the operation, the person submits a notice of identification that includes:

(1) The name of the person operating the foreign registered civil unmanned aircraft in the United States, and, if applicable, the person's authorized representative.

(2) The physical address of the person operating the foreign registered civil unmanned aircraft in the United States, and, if applicable, the physical address for the person's authorized

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[34] Foreign civil unmanned aircraft that are not registered in their home country are not eligible to file a notice of identification. Because such aircraft may not be able to register under part 47 or 48 and cannot file a notice of identification, they may be unable to meet the operating requirements of §§ 89.110 and 89.115(a). Therefore, unregistered foreign civil unmanned aircraft would be required to fly at an FAA-recognized identification area. These requirements are in addition to any other applicable requirements under 14 CFR part 375.

representative. If the operator or authorized representative does not receive mail at the physical address, a mailing address must also be provided.

(3) The telephone number(s) where the person operating the foreign registered civil unmanned aircraft in the United States, and, if applicable, the person's authorized representative can be reached while in the United States.

(4) The email address of the person operating the foreign registered civil unmanned aircraft in the United States, and, if applicable, the email address of the person's authorized representative.

(5) The unmanned aircraft manufacturer and model name.

(6) The serial number of the unmanned aircraft or remote identification broadcast module.

(7) The country of registration of the unmanned aircraft.

(8) The registration number.

Once the notice is submitted, the FAA will issue a confirmation of identification. In accordance with § 89.130(c), a person operating a foreign-registered unmanned aircraft in the airspace of the United States has to maintain the confirmation of identification at the unmanned aircraft control station, and has to produce it when requested by the FAA or a law enforcement officer. The holder of a confirmation of identification must ensure that the information provided remains accurate and must update the information prior to operating a foreign-registered civil unmanned aircraft in the airspace of the United States.

As specified in § 89.130(b)(2), the filing of the notice of identification and the issuance of a confirmation of identification under this rule do not have the effect of United States aircraft registration.

B. Public Comments and FAA Response

Comments: The Small UAV Coalition supported the proposed notice of identification and confirmation of identification requirement for foreign-registered civil UAS with remote identification operating in the airspace of the United States.

The European Union Aviation Safety Agency (EASA) noted that in the European Union, it is the operator who is required to be registered and not the unmanned aircraft (unless the unmanned aircraft is certified). EASA mentioned the requirement to include the registration number of the aircraft in the notice of identification would be burdensome because it would entail an obligation for operators registered in the European Union to register their unmanned aircraft in the United States as well.

FAA Response: The FAA acknowledges EASA's comments with respect to differences in the unmanned aircraft registration regimes. For example, some jurisdictions require the registration of all unmanned aircraft, some jurisdictions require the registration of certificated unmanned aircraft, some jurisdictions require the registration of the operator of uncertificated unmanned aircraft, and some jurisdictions have not implemented a registration system for unmanned aircraft. Section 89.130(a) is meant to assist the Administrator in obtaining certain information that allows the FAA to associate the foreign-registered civil unmanned aircraft to the operator, as the responsible person for the operation of the unmanned aircraft. Recognizing the differences in registration regimes, the FAA is revising § 89.130(a)(8) by deleting the phrase "of the aircraft" so that the requirement for the filing of the notice of identification allows the operator to provide the registration number of the unmanned aircraft issued by the country of registry or the registration number issued to the operator of the unmanned aircraft by the country of registry, as applicable.

Comments: Wing Aviation recommended removing the requirement to provide a physical address for the foreign operator in the United States as part of the process for the confirmation of identification and indicated that a physical address, a mailing address, and an authorized

representative should be sufficient to support oversight and enforcement action. The commenter suggested the rule should not assume operators will be, or need to be, collocated with the aircraft or flight area to ensure safe and compliant operations. According to Wing, this rule will set a global precedent for the implementation of remote identification and such a requirement, if followed by other jurisdictions, would significantly limit the ability of United States companies to scale competitively across international markets.

FAA Response: While operators have to submit their physical address under § 89.130(a)(2), such address is not necessarily required to be in the United States. The FAA and law enforcement have a need to locate the operator, as the responsible party, when physically located in the United States for oversight and enforcement purposes. The FAA also believes that providing the operator's physical address in the United States fosters accountability. Therefore, the FAA will finalize the requirement as proposed.

Comments: A few commenters expressed their concerns about this rule imposing operational limitations on persons operating foreign UAS in the airspace of the United States. Another commenter asked whether foreign-registered UAS had to re-register in the United States to be eligible to operate in the United States. The commenter asked whether the United States would recognize foreign certification and registration of UAS. Various commenters noted that foreign UAS may not have an ANSI/CTA-2063-A compliant serial number and might not comply with the remote identification requirements of this rule. The commenters sought clarification of whether such aircraft could operate in the United States and whether the FAA is prohibiting their sale in the United States.

FAA Response: While this rule does require all persons operating foreign unmanned aircraft in the airspace of the United States to comply with the remote identification operating requirements of part 89, it does not alter the operating rules for UAS operating in the airspace of the United States. This means that the operation of foreign unmanned aircraft in the airspace of the United States – just as with the operation of U.S.-registered unmanned aircraft – will

continue to be subject to the UAS operating rules in effect in the United States (e.g., part 91, part 107, 49 U.S.C. 44809, part 375). Foreign-registered unmanned aircraft do not have to re-register in the United States. However, the operators of foreign-registered UAS must ensure they comply with all applicable regulations and obtain the appropriate safety authority issued by the FAA and economic authority issued by the Department of Transportation, as applicable, prior to operating in the airspace of the United States.

FAA regulations do not prohibit the sale of unmanned aircraft without remote identification in the United States. The regulations do regulate the manufacturing of unmanned aircraft produced for operation in the airspace of the United States and the operation of all unmanned aircraft in the airspace of the United States, as further described in this rule.

XVII. ADS-B Out and Transponders for Remote Identification

A. Discussion of the Final Rule

The FAA proposed to prohibit the use of ADS-B Out equipment as a form of remote identification of UAS under part 89. The FAA also proposed changes to parts 91 and 107 to generally prohibit the use of ADS-B Out and transponders on UAS, unless otherwise authorized.

The FAA adopts § 89.125, ADS-B Out prohibition as proposed, with minor edits for clarity. This prohibits the use of ADS-B Out equipment as a form of remote identification under part 89.

The FAA adopts the proposed modifications to § 91.215, which state that ATC transponder and altitude-reporting equipment and use requirements do not apply to persons operating unmanned aircraft, unless the operation is conducted under a flight plan and the person operating the unmanned aircraft maintains two-way communication with ATC, or the use of a transponder is otherwise authorized by the Administrator. In addition, § 91.215(e)(2) prohibits the use of ATC transponders by persons operating unmanned aircraft unless the operation is conducted under a flight plan and the person operating the unmanned aircraft maintains two-way

communication with ATC, or the use of a transponder is otherwise authorized by the Administrator.

The FAA adopts the modifications to § 91.225(a)-(f) and (i) with some additional revisions for clarification. Per this section, no person may operate an unmanned aircraft under a flight plan and in two-way communication with ATC unless that aircraft has equipment installed that meets the performance requirements in TSO-C166b or TSO-C154c, and the equipment meets the requirements of § 91.227

In addition, § 91.225(i)(2) prohibits the use of ADS-B Out equipment by persons operating unmanned aircraft 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.

Lastly, the FAA adopts §§ 107.52 and 107.53 as proposed, which prohibit the use of ADS-B Out and ATC transponders on small UAS. Under § 107.52, no person may operate a small UAS under part 107 with a transponder on, unless otherwise authorized by the Administrator. Under § 107.53, no person may operate a small UAS under part 107 with ADS-B Out equipment in transmit mode unless otherwise authorized by the Administrator.

B. Public Comments and FAA Response

Comments: Many commenters supported prohibiting ADS-B Out on UAS to prevent high volumes of UAS traffic using ADS-B Out from interfering with ADS-B used by manned aircraft and Air Traffic Control (ATC). Multiple commenters wanted to ensure that the use of ADS-B Out on UAS must first be proven not to interfere with manned aircraft before being widely allowed. They asked the FAA to continue to monitor radio frequency spectrum concerns if some UAS are authorized to use ADS-B Out by exception. They also noted that ADS-B Out does not accommodate sharing all of the proposed message elements. Airlines for America recommended that the FAA clearly state that UAS remote identification is prohibited from interfering with existing electronic surveillance technologies used for manned aircraft, and that the FAA consider

permitting the use of ADS-B Out for more sophisticated UAS operations near commercial airports and manned aircraft.

FAA Response: The FAA agrees with commenters that supported prohibiting ADS-B Out on most UAS due to the likelihood that the high density of UAS operations compared to manned aircraft may generate signal saturation and create a safety hazard for manned aircraft. The FAA notes that unmanned aircraft remote identification equipment broadcasting in the frequency bands allowed under 47 CFR part 15 is prohibited by FCC regulations from interfering with existing, licensed frequencies used by existing surveillance technologies.

Comments: Many commenters also supported limited exceptions permitting ADS-B Out on larger UAS operating at higher altitudes and participating in ATC services. Some commenters challenged the FAA to justify remote identification requirements for unmanned aircraft that fly at higher altitudes. Boeing and other commenters recommended permitting ADS-B Out in lieu of remote identification for UAS operating primarily above 400 feet and not operating under 14 CFR part 107 (e.g., part 91, part 135). AERO Corporation recommended permitting the use of ADS-B Out on UAS operating above 400 feet under 14 CFR part 91, 107, or 135. The General Aviation Manufacturers Association recommended allowing ADS-B Out or transponder use for UAS of sufficient gross weight, based on the operations being performed.

The National Business Aviation Association agreed with prohibiting ADS-B Out and transponders on low altitude UAS such as those operating under 14 CFR part 107, but recommended clarifying the regulations to ensure UAS are not operating at higher altitudes typically used by manned aircraft while transmitting remote identification that is not directly available to manned aircraft. They recommended the FAA consider specifying UAS operations that are permitted or required to use ADS-B Out or a transponder instead of authorizing by exception, such as for UAS operating at higher altitudes, under a flight plan, or in communication with Air Traffic Control. Johns Hopkins University Applied Physics Lab asked the FAA to clarify that use of "ADS-B Out" in this proposal specifically refers to current use of

978 and 1090 MHz and does not preclude potential future systems on alternate frequencies that may meet remote identification requirements.

FAA Response: The FAA agrees with commenters that recommended permitting use of ADS-B Out instead of remote identification equipment by unmanned aircraft that are participating in ATC services and are likely to be integrated with manned aircraft, or by limited exception. For this reason, persons operating unmanned aircraft equipped with ADS-B Out, when operating under a flight plan and where the operator is in communication with ATC, do not have to meet the remote identification requirements in part 89. This is consistent with a recommendation by the UAS-ID ARC. Unmanned aircraft not operated in this specific manner must be equipped with remote identification unless authorized by the Administrator as permitted by § 89.105, which is being finalized to permit such exceptions on a case-by-case basis.

In response to the comment regarding future systems or alternate frequencies for ADS-B, the FAA notes that any changes to the current ADS-B Out equipment performance requirements, which include the 978 and 1090 MHz broadcast frequencies, would require a separate rulemaking activity and are outside the scope of this final rule.

Comments: Many commenters said that the rule does not clearly state that UAS authorized by the FAA to use ADS-B Out or transponders are excepted from meeting part 89 remote identification requirements. They suggested that remote identification would be unsuitable for use at traditional manned aircraft altitudes as well as unnecessary and redundant on UAS specifically approved to use ADS-B Out. Garmin similarly stated that requiring remote identification for UAS equipped with ADS-B would be unnecessarily duplicative.

FAA Response: The FAA agrees with commenters, and finalizes a change to § 89.101 which clarifies that the unmanned aircraft remote identification requirements do not apply to persons operating unmanned aircraft when the unmanned aircraft is equipped with ADS-B Out and operated in accordance with § 91.225.

However, as explained in section XIV.E.1 of this preamble, nothing in the rule precludes producers from producing unmanned aircraft that have both the remote identification and ADS-B capabilities identified in the regulation. Therefore, depending on the operation, with a few exceptions, unmanned aircraft must comply with remote identification requirements when the operation does not qualify for use of ADS-B Out under § 91.225. Operations that do qualify for use of ADS-B Out must comply with § 91.225.

Comments: Many commenters wanted the FAA to mandate the use of ADS-B Out on UAS instead of remote identification. Commenters objected to the FAA's rationale that ADS-B Out is not appropriate due to infrastructure issues (ground radars and ADS-B receivers) and noted that remote identification will also require substantial new infrastructure, such as Remote ID USS, UAS equipment, and potentially greater Internet coverage. Other commenters suggested that ADS-B Out should be a permitted option to meet the remote identification requirement.

FAA Response: In the NPRM, the FAA explained the range of considerations that influenced its decision not to propose ADS-B Out as a solution for unmanned aircraft remote identification, including coverage at low altitudes and the absence of any information about the control station location. The FAA declines to require the use of ADS-B Out as the means of providing unmanned aircraft remote identification. The FAA reiterates that the ADS-B system serves a unique purpose of enabling surveillance for air traffic control purposes while remote identification enables the FAA, law enforcement, and the public to identify unmanned aircraft and locate their operators. Due to the prospects of signal saturation and the differences in the types of information being shared, ADS-B Out is not a suitable alternative for remote identification equipment.

Comments suggesting that a greater number of receiver sites and software patches to limit ATC display clutter could address the issue with ADS-B Out were found to be impractical, in terms of both the time and the cost necessary to develop them. Further, they would not address the fundamental issues of signal saturation and insufficient message elements that made ADS-B

unsuitable for remote identification. In addition, the FAA notes that the remote identification requirements, as being finalized, no longer require the referenced USS network infrastructure for the time being.

Comments: Several commenters were concerned about punishing UAS operators who were early adopters of ADS-B Out, and suggested permitting ADS-B Out or similar broadcast remote identification devices that are interchangeable between multiple UAS. AT&T Services asked the FAA to permit ADS-B Out on UAS responding to emergencies, noting that their UAS providing emergency cellular service in disaster areas currently use ADS-B Out to share UAS location information with manned emergency aircraft. The Academy of Model Aeronautics proposed permitting a single ADS-B Out unit to identify an FAA-recognized identification area so manned aircraft and other UAS are aware of active model aircraft operations. They also proposed pairing this with ADS-B In and a warning system at some locations so members would be alerted when cooperative manned aircraft are in the area.

FAA Response: The FAA has determined that ADS-B Out as presently implemented for surveillance purposes is inadequate to meet unmanned aircraft remote identification requirements. This rule includes provisions in §§ 89.105 and 91.225 to permit use of ADS-B Out on unmanned aircraft on a case-by-case basis as authorized by the Administrator. The FAA declines to require the use of ADS-B Out to identify an FAA-recognized identification area because it was not intended to be used to identify physical locations where UAS may be operating without remote identification.

Comments: One commenter expressed concern about the volume of UAS users that will be transmitting on Wi-Fi frequencies as well as range and altitude coverage on these frequencies.

A commenter was concerned about future expansion of manned aircraft operations if ADS-B Out radio frequency spectrum could be saturated by UAS, and suggested the ADS-B Out system be upgraded to support UAS operations as well. Another commenter suggested requiring ADS-B Out in remote, uncontrolled airspace where is it unlikely to cause frequency saturation,

and requiring network remote identification in controlled and urban airspace where data and cellular coverage is readily available.

FAA Response: Regarding broadcast on Wi-Fi frequencies, the FAA notes that, by FCC rule, 47 CFR part 15 devices, including those used for the remote identification broadcast, may not cause harmful interference and must accept any interference received. In addition, remote identification equipment may not cause harmful interference to the unmanned aircraft command and control datalink or otherwise be in violation of FCC regulations. Unmanned aircraft remote identification equipment broadcasting in the 47 CFR part 15 radio frequency spectrum is also prohibited from interfering with existing, licensed frequencies used by existing surveillance technologies. With regard to the use of ADS-B Out in less dense environments where signal saturation would not be as likely a hazard, the FAA emphasizes that the ADS-B message set does not provide an indication of the control station location which is one of the reasons that ADS-B is not a suitable alternative.

Comments: Some commenters, including the Aviators Code Initiative, suggested that UAS operating under part 91 and future Urban Air Mobility (UAM) operations be required to use ADS-B Out unless future frequency saturation issues develop or remote identification is proven to be an adequate substitute for these operations.

FAA Response: The FAA partially agrees with comments that suggest ADS-B use is appropriate for unmanned aircraft operating under part 91 and UAM operations, and adopts the requirements necessary for unmanned aircraft to operate with ADS-B Out instead of remote identification. The FAA believes that the performance-based requirements in this rule provide multiple technical solutions for unmanned aircraft remote identification and support the evolution of remote identification solutions as UAS technology evolves.

Comments: A number of commenters challenged the FAA to justify its position that ADS-B functionality as a whole would be adversely impacted by a sharp increase in ADS-B users. uAvionix noted that radio frequency spectrum studies to date have focused on UAS

operating in high traffic density below 400 feet AGL, but there are no studies at higher altitudes. uAvionix and Sagetech Avionics stated the part 91 prohibition introduces the possibility of non-cooperative part 91 UAS unless otherwise required to equip with remote identification (or "otherwise authorized by the Administrator" to use ADS-B Out or transponders). uAvionix, McInflight Aerospace, Sagetech Avionics, and NBAA recommended considering alternatives such as ADS-B Out. They also noted these licensed frequencies would be more reliable than 47 CFR part 15, Remote Identification Frequencies.

FAA Response: In the NPRM, the FAA referenced a study titled "ADS-B Surveillance System Performance with Small UAS at Low Altitudes" as the basis for proposing that an ADS-B Out solution for unmanned aircraft remote identification would cause adverse impacts to the existing ADS-B surveillance system. The FAA agrees with the analysis and information contained in this study. Related comments suggesting that lower-power ADS-B Out transmitters could be developed to meet remote identification requirements, accompanied by additional receiver sites and software patches to limit ATC display clutter, were found to be impractical, both in terms of the time and the cost necessary to develop them. The FAA agrees with commenters concerned about the possibility of non-cooperative unmanned aircraft in areas where remote identification is required, and notes that in accordance with § 89.101, part 89 applies to all unmanned aircraft operations except for those unmanned aircraft operations under part 91 of this chapter that are transmitting ADS-B Out pursuant to § 91.225.

Comments: Many commenters noted that both UAS and manned aircraft would benefit from shared situational awareness if UAS were equipped with ADS-B Out, which would provide UAS position information to manned aircraft pilots (and vice versa) via ADS-B In. Another commenter recommended that all manned aircraft and commercial UAS be required to equip with ADS-B Out (and ADS-B In for UAS), while permitting recreational UAS without remote identification to operate in Class G airspace.

Several commenters suggested that UAS remote identification and location information should be available to operators via the ADS-B In system, similar to current traffic and weather information, and noted a potential risk of reduced collision prevention capability because remote identification and ADS-B systems do not share information. Several manned pilots objected to needing to purchase new equipment to gain access to UAS remote identification information after already being required to purchase ADS-B equipment.

A number of commenters discussed potential safety advantages associated with UAS equipping with ADS-B In as a means of remaining well clear of all ADS-B Out equipped aircraft. Several commenters suggested that ADS-B In should be required or optional for UAS, either in general or specifically for larger UAS or for UAS capable of BVLOS such as delivery operations, and the National Agricultural Aviation Association noted that ADS-B In for UAS remains essential.

FAA Response: As the FAA stated in the NPRM, the primary purpose of UAS remote identification is to identify UAS operating in the airspace and provide an indication of the location of the operator. The FAA discussed other potential uses of remote identification information, such as situational awareness or future aircraft separation applications.

The FAA recognizes the benefit of shared situational awareness and encourages unmanned aircraft operators to equip with ADS-B In for increased traffic awareness, if practicable. The FAA notes that ADS-B In is not required equipment for aircraft operations under part 91, and any changes to require ADS-B In for manned or unmanned aircraft are outside the scope of this rule.

XVIII. Environmental Analysis

A. Public Comments and FAA Response

Comments: The FAA received several comments addressing the potential environmental impacts associated with the proposed rule. Commenters expressed concerns with the potential

environmental impacts associated with the disposal for UAS that would potentially become obsolete under the rule requirements.

Some commenters suggested that additional analysis should be done under the National Environmental Policy Act, particularly in the areas of historic or socioeconomic impacts of the proposed rule. Other commenters indicated that the rule would increase the number of UAS operations with resulting impacts on noise and quality of life, wildlife, birds, light and visual impacts, and other similar environmental impacts.

FAA Response: The FAA believes the changes in this final rule compared to the NPRM provide the flexibility necessary for recreational unmanned aircraft designers, producers, and operators to continue to operate safely in the airspace of the United States. Specifically, this rule allows for the retrofit of existing unmanned aircraft and home-built unmanned aircraft and increases the availability of FAA-recognized identification areas where operations may occur without remote identification. For these reasons, FAA does not anticipate that this rule would result in an increase in unmanned aircraft disposal. The FAA notes that a discarded unmanned aircraft can be disassembled into the following parts: carbon (frame, frame parts), plastic, metal parts (screws, standoffs), wire, electronics (flight controller, ESC, motors, camera, VTX, RX), and batteries. Recycling centers and online vendors can assist with the proper management of used unmanned aircraft parts. In addition, parts in good working condition could potentially be reused.

The FAA considers that though this rulemaking action establishes requirements for the remote identification of unmanned aircraft, it does not, by itself, enable routine expanded operations, affect the frequency of UAS operations in the airspace of the United States, or authorize additional UAS operations. Nor does the rule open up new areas of airspace to UAS. With regard to the specific comments on impacts to birds, the FAA's experience has been that current levels of UAS operations do not produce negative impacts to Endangered Species Act-covered species or other migratory birds. The FAA also emphasizes that this rule does not relieve

operators from other legal obligations that may be applicable to them, such as ones imposed by the Endangered Species Act or the Migratory Bird Treaty Act. For these reasons, the FAA has determined that it is appropriate to apply a categorical exclusion to this rule and that it does not require preparation of an Environmental Assessment or an Environmental Impact Statement under the National Environmental Policy Act.

XIX. Effective and Compliance Dates

A. Effective Date of this Rule

1. Discussion of the Final Rule

As with most new regulations, the FAA recognized that some elements of the NPRM would take time to implement fully. The FAA also recognized it would need to implement requirements that address ongoing safety and security needs quickly. Therefore, the FAA proposed that the effective date of remote identification requirements would be the first day of the calendar month following 60 days from the date of publication of a final rule. The FAA also proposed the production compliance date would be 2 years after the proposed effective date, and the operational compliance date would be 3 years after the proposed effective date.

However, given the changes in policy concepts since the publication of the NPRM, the FAA has instead decided to change the effective date of this rule to 60 days from the date of publication—with the exception of subpart C concerning FAA-recognized identification areas, which becomes effective 18 months following the 60 day effective date. The FAA also adopts the production compliance date as 18 months after the rule's effective date, and the operational compliance date as 30 months after the rule's effective date.

The FAA decided not to adopt the proposed requirement for owners of small unmanned aircraft used exclusively for limited recreational operations to register each aircraft individually. The FAA decided to maintain the current registration options, and will no longer revise part 48

to require individual aircraft registration as proposed. Therefore, it is no longer necessary for the final rule to be effective on the first day of a calendar month following 60 days after the publication date.

2. Public Comments and FAA Response

Comments: Several commenters objected to mandating the use of technologies for remote identification of UAS and Remote ID USS, which do not exist and may not be developed by the proposed effective date, and noted that it is very difficult to estimate costs for operators accurately without existing technology. An individual commenter found it hard to envision third party companies completing implementation of an airspace-wide UAS equivalent to the current ATC system by the proposed effective date. Another commenter who also had issues with the proposed date recommended phasing in requirements initially in small geographic areas with limited technical requirements and then gradually expand to national use, adding additional technical requirements upon successful completion of each phase.

FAA Response: The FAA notes that technologies for unmanned aircraft remote identification are not required to be developed or available on the rule effective date, but rather this date establishes a starting point for the 18-month production compliance date. Producers will have to comply with the rule's requirements by the production compliance date, which is 18 months after the effective date. Operators will have to comply with the rule's requirements by the operational compliance date, which is 30 months after the effective date.

Comments expressing concern about the readiness of Remote ID USS and the USS network by the rule effective date are no longer applicable because the FAA is no longer adopting those proposed requirements.

The FAA received many comments regarding the proposed timeline for accepting FAA-recognized identification areas applications, and how that policy would impact the rule. Those public comments and FAA responses are discussed in section XII of this preamble. Section

XII.C of this preamble also discusses the FAA rationale for eliminating the 12-month deadline, and the impact of that elimination on the effectivity of subpart C of part 89.

B. Production Requirements Compliance Date

1. Discussion of the Final Rule

The FAA proposed a 24-month compliance date for the production of remote identification unmanned aircraft. The FAA discussed how persons responsible for the production of unmanned aircraft would not be able to submit declarations of compliance until the FAA accepts at least one means of compliance. Once a means of compliance is accepted by the FAA, persons responsible for the production of unmanned aircraft would need time to design, develop, and test unmanned aircraft using that means of compliance. For that reason, the FAA proposed a 24-month period before compliance with the production requirements would be required. As proposed, the 24-month period would have provided time for the development and deployment of Remote ID USS to support the requirements of the proposed rule. Prior to the 24-month compliance date, the FAA proposed that the rule would allow for the production and operation of both unmanned aircraft with and without remote identification.

As being finalized, this rule requires persons producing standard remote identification unmanned aircraft for operation in the airspace of the United States to comply with the requirements of subpart F by September 16, 2022. The compliance date has been reduced by 6 months and now begins 18 months after the effective date of this rule. The change from the proposed 24-month production compliance date for standard remote identification unmanned aircraft is supported by the removal of the requirement for the unmanned aircraft to connect to the Internet and transmit information to a Remote ID USS. The change is also supported by the elimination of any schedule or technical risks associated with the development and deployment of a Remote ID USS network. The FAA also considered the maturity of existing standards for unmanned aircraft remote identification, such as ASTM F3411-19, and notes that the UAS-ID

ARC suggested that industry consensus standards could be updated in as little as 6 months. For these reasons, this rule establishes an 18-month compliance date for the production of standard remote identification unmanned aircraft.

As promulgated, this rule also requires persons producing remote identification broadcast modules to comply with the requirements of subpart F by [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]. This requirement is because of the introduction of the remote identification broadcast module concept that replaces the proposed limited remote identification UAS concept, as further discussed throughout this rule. The requirement will support early adoption of remote identification.

2. Public Comments and FAA Response

Comments: A few commenters supported the 24-month production compliance date, as proposed, including Zipline International and Airlines for America. An individual commenter supported the 2-year production timeline if the remote identification requirements were changed to "broadcast or network" but not both. This commenter believed this change would simplify the complexity of UAS and support faster development. Another individual stated that while the 2-year production compliance date is appropriate for "mass produced commercial UAS," it should not apply to any recreational UAS. Similarly, another individual commenter noted it will be hard to incorporate remote identification on fixed wing model aircraft and suggested that additional time should be allowed for model aircraft.

Many commenters stated the 24-month compliance date for production of UAS with remote identification is not long enough for the introduction of a new technology like UAS remote identification. Some of these commenters provided specific recommendations for a different compliance date, while others stated their disagreement without providing a recommendation. An individual commenter suggested that because remote identification is a new technology, introduction should happen slowly, and UAS with remote identification should be available before the rule is adopted. Another commenter noted that ADS-B technology was being

developed and tested before the ADS-B rule was adopted, and that 10 years was provided for manned aircraft to equip with ADS-B technology. This commenter raised the concern that UAS remote identification technology has not been developed and tested, yet the FAA still intends to finalize the rule. Some commenters wanted the FAA to provide further guidance to allow adequate time for UAS service operators to replace, update, or upgrade hardware to meet any new requirement.

Droneport Texas LLC recommended a 3-year production compliance date because "the time required for rule assessment, engineering, testing, manufacturing and marketing to provide remote ID unit consumption at levels that allow for economies of scale to become practical is estimated to begin at a minimum of 36 months." A separate individual commenter recommended a production compliance period of 48 months because the commenter believed it is unlikely that the infrastructure necessary to enable remote identification will be ready in 2 years.

In contrast to commenters who recommended a longer production compliance period, commenters that supported a production period shorter than the 2 years proposed include the Small UAV Coalition, American Association of Airport Executives, and Verizon/Skyward. The Small UAV Coalition stated the production compliance date should be shortened by 1 year on the basis that the ASTM F38 UAS Remote Identification standard has been published and the 1-year allocated to development and acceptance of a means of compliance can be eliminated. The American Association of Airport Executives also supported a 1-year production compliance period, stating that "this is a more reasonable balance between the needs of airports and many other stakeholders, and the time needed to implement the proposed framework." Verizon and Skyward noted that "USS Remote ID compliance is technically feasible today for a very high percentage of existing UAS through software upgrades and for manufacturers with minimal changes" and suggested a production compliance date of 10 months after the rule's effective date.

An individual commenter suggested that the FAA should allow for a 1-year vendor proposal period where UAS producers would compete to manufacture a system that meets FAA requirements, at which point the FAA should approve the qualified bidder with the lowest cost. The Consumer Technology Association and other commenters said that the FAA should permit producers to continue selling non-compliant UAS if retrofit modules were available to bring the aircraft into compliance with the remote identification requirements.

FAA Response: As stated above, the FAA is no longer requiring standard remote identification unmanned aircraft to connect to the Internet and transmit information to a Remote ID USS. As a result, any schedule or technical risks associated with the development and deployment of a Remote ID USS network are no longer applicable. Since FAA is adopting a broadcast-only remote identification requirement, the decision to eliminate the network requirement for remote identification at this time supports a reduction of the production compliance date from 24 months to 18 months.

The FAA acknowledges that though persons responsible for the production of unmanned aircraft will not be able to submit declarations of compliance until the FAA accepts at least one means of compliance, the FAA anticipates an expedited revision to the ASTM F3411-19 Standard Specification for Remote ID and Tracking to occur after publication of this final rule. Once the standard is revised to meet the minimum performance requirements, it could be submitted for consideration as an FAA-accepted means of compliance. The FAA also notes that any person, including unmanned aircraft manufacturers, may submit a means of compliance for consideration by the FAA. This provides additional opportunities for the UAS industry to develop means of compliance, potentially on an accelerated schedule. Finally, the FAA believes the 18-month production compliance date provides sufficient time for unmanned aircraft manufacturers to design, develop, and test standard remote identification unmanned aircraft using an FAA-accepted means of compliance.

C. Operational Requirements Compliance Date

1. Discussion of the Final Rule

The FAA proposed that the requirements for the operation of unmanned aircraft with remote identification would begin 36 months after the effective date of a final rule. This 36-month period would run concurrently with the proposed 24-month period provided for the development of means of compliance, and for the design and production of unmanned aircraft with remote identification. The FAA explained in the NPRM that once unmanned aircraft with remote identification become widely available, this rule would allow an additional 1-year time period for unmanned aircraft owners and operators to purchase and transition to operations of unmanned aircraft with remote identification.

As promulgated, this rule requires persons operating unmanned aircraft in the airspace of the United States to comply with the operational rules in subpart B by September 16, 2023. The compliance date has been reduced by 6 months and now begins 30 months after the effective date of this rule as compared to the proposed 36-month compliance date in the NPRM. The FAA notes that the 30-month operational compliance date is still 1 year later than the 18-month production compliance date, so the difference between the two dates has been maintained in this final rule compared to the NPRM. The FAA believes that an operational compliance date that is 1 year after the production compliance date provides adequate time for unmanned aircraft operators to acquire standard remote identification unmanned aircraft.

In addition, because there is no production compliance date for remote identification broadcast modules, the FAA anticipates that a means of compliance may be developed and submitted to the FAA for consideration soon after the rule is effective, potentially resulting in broadcast modules being available well in advance of the 30-month operational compliance date. The FAA believes that a 30-month operational compliance date is appropriate for operators of standard remote identification unmanned aircraft, as well as unmanned aircraft equipped with remote identification broadcast modules.

2. Public Comments and FAA Response

Comments: The FAA received some comments that supported the operational compliance date as proposed, including comments from the Golden Gate Bridge, Highway and Transportation District, and various individuals that noted a 3-year phase-in period is reasonable for developing initial solutions. However, many commenters did not agree with the FAA's proposed 3-year operational compliance date, of which some suggested alternative time periods that are longer or shorter than the proposed operational compliance date.

Many commenters raised the concern that there is only 1 year between the production and operational compliance dates, resulting in some UAS being ineligible to operate after only 1 year of ownership. Instead, an individual commenter suggested that a 3-year operational compliance date, after the manufacturing compliance date, would be preferable and would preclude having to throw away or discontinue using UAS purchased only a year prior to the operational compliance date. Many individual commenters, however, stated the FAA's belief that a typical UAS would reach the end of its useful life in 3 years is incorrect, and therefore opposed the proposed operational compliance date of 3 years after the effective date of the rule. An individual stated that while a "commercial quadcopter (drone)" may have a lifespan of 3 years, certain R/C model aircraft can have a lifespan of 30-40 years or more. Another commenter stated that with proper care and maintenance, the lifespan of a UAS can be extended past 3 years. An individual suggested the government pay for the loss of use of UAS equipment that lasts for greater than 3 years. Another individual recommended that additional time be provided to allow the price of UAS with remote identification to come down. This commenter also noted that its existing fleet of UAS without remote identification will have no resale value

In contrast to the commenters that requested additional time to comply with the operational compliance period, others suggested an operational compliance date shorter than the proposed 3 years. Organizations including: Amazon, AUVSI, the National Sheriff's Association, Zipline International, sports organizations (NFL, MLB, NASCAR, and NCAA), U.S. Rail

Operating Subsidiaries of the Canadian National Railway Company, FlyGuys, Inc., Tampa International Airport/Hillsborough County Aviation Authority, and UPS, all supported the expeditious implementation of the rule. These commenters generally opposed an operational compliance date longer than 3 years. Verizon and Skyward stated the operational compliance date could be as soon as 12 months after the rule's effective date. The U.S. Chamber of Commerce supported 18 months for the operational compliance date, and suggested that the FAA follow the recommendations of the Drone Advisory Committee (DAC) related to early compliance with remote identification requirements. The Small UAV Coalition supported an operational compliance period of 18 to 24 months.

DRONERESPONDERS Public Safety Alliance, Airlines for America, International Association of Fire Fighters, Medina County EMA, American Association of Airport Executives, and Motorola Solutions, Inc. supported a 2-year operational compliance date while generally agreeing that shortening the operational compliance date serves to expedite the safety and security benefits of the rule. An individual believed that UAS manufacturers would have sufficient time to incorporate remote identification into their UAS, and that the operational compliance date should be reduced to a time period of 1 year to 18 months. Another individual commenter recommended shortening the operational compliance date because of existing UAS operations that are in violation of the regulations.

Kittyhawk stated the 3-year compliance date is too long because the FAA has made it clear that "routine (i.e. waiverless) advanced operations like those beyond visual line of sight, operations over people, or operations at night, require Remote ID." Kittyhawk supports a tiered approach for establishing compliance dates, which would allow some operations to be conducted with remote identification immediately upon the rule effective date. The National Association of Tower Erectors (NATE) suggested reducing the 3-year operational compliance period both to enhance safety and enable earlier expanded operations such as BVLOS. The National Agricultural Aviation Association stated they do not believe it should take 3 years to implement

the rule, but did not provide a specific alternative timeline. AirMap, Aerospace Industries Association, and the Commercial Drone Alliance supported an immediate implementation of the rule compared to the proposed 3-year compliance date. WhiteFox Defense Technologies supported a shorter operational compliance period if the rule was modified to allow retrofit modules for existing UAS.

Several individual commenters recommended a 5-year timeline for the operational compliance date because they believed it would better align with the typical lifespan of UAS, and allow time for the technology to be widely available. The Academy of Model Aeronautics supported a "more reasonable timeline," including incentives similar to those that were provided for the general aviation community to equip with ADS-B. Several individual commenters referenced the 10-year operational compliance period in the ADS-B rule as justification for extending the proposed 3-year operational compliance date; most of these commenters suggested an operational compliance date between 5 and 10 years from the rule's publication date. Other commenters recommended additional time, ranging from 10-15 years, for the operational compliance date because remote identification technology does not exist. Several individual commenters recommended a 5-7 year operational compliance date, and for the FAA to not rush the implementation of remote identification.

To simplify compliance, multiple individuals supported the idea of an FAA "grandfathering" provision that would not require existing UAS to comply with the rules for remote identification for 10 years. A commenter suggested grandfathering all existing recreational UAS, with remote identification required for recreational UAS only if they are new. This commenter recommended a 5-year operational compliance date for part 107 operators. Another commenter noted that many recreational UAS operators are still not registered, and asked why the FAA thinks these unregistered operators will comply with a 3-year operational compliance period. San Diego County Water requested that additional 3-year waivers be

available for operators that are not able to comply with the 3-year remote identification operational compliance date.

Rather than requiring a fixed time period, an individual suggested that the operational compliance date be based on the availability of remote identification technology. Another individual suggested a phased approach for operational compliance dates, with UAS conducting higher risk operations having an earlier date than those conducing low risk operations. Utah Public Lands policy recommended that "the FAA should initiate a pilot program, working with UAS developers, USS suppliers, and UAS operators, to better understand how these various components can be successfully brought together and proven and, only then, determine an implementation or compliance period accompanied with known costs and technology solutions." Another individual asked how the 3-year operational compliance date would apply to existing UAS.

FAA Response: The FAA does not agree with grandfathering or broadly excepting existing unmanned aircraft from meeting remote identification requirements. However, after considering the comments received, the FAA has updated this rule to permit less complex, cost-effective solutions to prevent obsolescence of existing unmanned aircraft, and support continued unmanned aircraft operations in compliance with remote identification requirements. Removing the requirements to transmit remote identification information to a Remote ID USS will make it more straightforward for manufacturers to upgrade or retrofit existing unmanned aircraft to meet the broadcast remote identification requirements, or to upgrade unmanned aircraft which are produced before the production compliance date. Most unmanned aircraft produced without remote identification will be able to equip with a remote identification broadcast module, or will be able to operate in an FAA-recognized identification area. The FAA anticipates this rule, which permits additional organizations to apply for an FAA-recognized identification area, with no deadline for submitting an application, will result in an increased number of FAA-recognized identification areas for operators without remote identification.

Though the finalized remote identification requirements support reducing the production compliance date by 6 months, the FAA does not agree with commenters that suggested further shortening the operational compliance date. A 1-year time period, as originally proposed in the NPRM, is necessary for unmanned aircraft owners and operators to purchase new unmanned aircraft, upgrade or retrofit existing unmanned aircraft, and transition to operations of those unmanned aircraft which meet remote identification requirements. Therefore, the FAA is adopting a 30-month operational compliance period which runs concurrently with the amended 18-month production compliance date. Requirements that prohibit operation of UAS without remote identification would begin 30 months after the effective date of the rule. This 30-month period provides sufficient time for the development of means of compliance for the design and production of unmanned aircraft with remote identification, and time for operators to procure standard remote identification unmanned aircraft or remote identification broadcast modules to comply with the operating requirements of this rule.

Comments: Commenters, including Unifly and the District of Columbia government, believed that UAS operating under a waiver should still be required to have remote identification. These operations include nighttime operations, operations over people, or BVLOS operations. In contrast, an individual member of the FPVFC suggested that if the UAS has remote identification, operations over people and at night should be allowed without a waiver. This individual added that if the UAS has LAANC authorization, then no remote identification equipment should be required for operating over people or at night. Other commenters also referenced similar recommendations made by the DAC, and stated that UAS that meet the remote identification requirements should not be required to seek a waiver for small UAS operations at night or over people.

FAA Response: The unmanned aircraft remote identification requirements in this rule are separate from, and in addition to, the UAS operating rules as well as any waivers or exemptions issued from those operating rules. The FAA agrees that all UAS operations, including those

subject to waiver or exemption, must meet the unmanned aircraft remote identification requirements in part 89. The FAA does not agree with commenters who suggest equipping an unmanned aircraft with remote identification is a basis for operating without a waiver when a waiver would otherwise be required. Having remote identification equipment does not address the operational safety issues associated with operating an unmanned aircraft at night or over people, and does not support relief from any existing operating requirements, including requirements for airspace authorizations.

D. Incentives for Early Compliance

1. Discussion of the Final Rule

The FAA explained that early compliance may benefit both industry and UAS operators, and encourages regulated parties to implement remote identification of unmanned aircraft sooner than the established compliance dates. The FAA requested comments on the NPRM providing specific proposals and ideas on how to build an early compliance framework into the regulation. The Agency stated it is interested in comments related to how an early compliance framework would work and how it would fit into the overarching remote identification framework proposed by the FAA.

The FAA received many comments addressing incentives for early compliance. The FAA has reviewed the comments supporting an incentive for early compliance with remote identification, and views these incentives as part of the implementation methodology and not part of this rule.

2. Public Comments and FAA Response

Comments: A commenter suggested allowing operations in certain restricted airspace as an incentive for early compliance with the remote identification requirements. AUVSI, Small UAV Coalition, Consumer Technology Association, Aerospace Industries Association, and WhiteFox Defense Technologies expressed their support for incentivizing early compliance,

including support of the DAC recommendations. AUVSI identified many possible incentives for early compliance with the remote identification requirements, such as permitting expanded operations through waivers and exemptions for operators who equip early, providing "preferential treatment" for UAS equipped with remote identification, increased access to airspace such as temporary flight restrictions, restricted areas, and controlled airspace, and various financial incentives. AiRXOS stated that "early compliance with remote identification should be incentivized through applied use in advanced operational approvals." Fortem Technologies supported expedited waiver approvals for operators that use UAS equipped with remote identification.

FAA Response: The FAA commits to conducting an analysis of any waivers or exemptions that use remote identification industry consensus standards and communicating any additional information needed for the FAA to give credit for, as appropriate, using remote identification as part of a waiver application. This is how operators may take advantage of the availability of industry consensus standards prior to a final rule concerning remote identification. While voluntary adoption of remote identification will not equate to automatic waiver approval, the FAA's evaluation of part 107 waiver applications may consider early adoption of remote identification prior to any required compliance date set forth by this rule.

To be considered as a benefit for a particular operation, applicants will need to demonstrate in their waiver application that the unmanned aircraft are equipped with remote identification capability and will remain compliant with this rule during operations. The FAA will evaluate applicants' ability to demonstrate early compliance with remote identification in their DroneZone applications. The FAA anticipates such updates will result in handling applications for waiver in an efficient manner.

The FAA supports the proposition that remote identification will provide security benefits, which underlies the DAC's recommendations regarding increasing access by unmanned

aircraft with remote identification to airspace restricted for security reasons. The Agency is committed to working with interagency security partners to realize those benefits where appropriate, including using remote identification equipage as a positive consideration in authorizing access to airspace to which security instructions have been applied. Remote identification equipage will be, however, only one of many complex factors driving decisions made by the FAA to enable access by UAS to this sort of secured airspace. The FAA will continue to coordinate with security agencies, as well as industry, to determine how to best leverage the security benefits offered by remote identification. The FAA commits to considering the added safety and security benefits provided by remote identification equipage in development of future rules related to UAS and airspace access.

Comments: Many commenters provided input and ideas that would allow for an early compliance framework into the regulation. Both AUVSI and SenseFly suggested the FAA follow the recommendations provided by the DAC[35] as an early compliance framework for UAS remote identification requirements, while Wing Aviation LLC suggested the FAA accepts the ASTM F3411-19 Standard Specification for Remote ID and Tracking as an idea for early compliance. An individual member of the FPVFC suggested that the FAA should adopt the incentives proposed in the DAC's October 2019 submission to the FAA. Verizon and Skyward and also expressed support for incentivizing early compliance.

Unifly recommended allowing operators to use an add-on retrofit for remote identification as a solution for achieving early compliance. An individual commenter stated the FAA should utilize open source technology to build an early compliance framework, and provided web-links to those sources. This commenter stated that working with these resources may require new partnerships or contracts, but they can be tremendously beneficial to the FAA.

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[35] October 17, 2019 Drone Advisory Committee (DAC) Meeting Materials *https://www.faa.gov/uas/programs_partnerships/drone_advisory_committee/media/eBook_10172019_DAC_Meeting.pdf*

Another individual commenter suggested the FAA provide monetary subsidies for operators to adopt remote identification technology similar to the rebates that were offered for ADS-B. The Albuquerque Radio Control Club recommended subsidizing purchases of equipment over $50 to help ensure widespread compliance, and the Aviators Code Initiative suggested offering subsidies for installation of remote identification equipment on UAS manufactured without broadcast capability. Some commenters suggested the government subsidize UAS operators to speed the replacement of current UAS with remote identification UAS, similar to the incentives for manned aircraft to equip with ADS-B Out.

Droneport Texas LLC raised the concern that "since a regulation cannot be followed until it is implemented, attempts at creating an early compliance framework will only confuse those attempting to enforce the law and create an easily-challenged situation for those required to adjudicate on this slippery slope."

FAA Response: The Agency will review all comments and incentive methods for potential inclusion in implementation after this rule is published.

Incentives for government procurement and contracting would require compliance with certain specific regulations and standards. To be fair and equitable, the FAA's procurement processes do not enable preferential treatment for voluntary early adoption of equipment or compliance to regulations.

Regarding early equipage, as stated in the FAA's remote identification NPRM, the FAA will maintain an online database of designers and producers of remote identification unmanned aircraft that have declared compliance with an industry consensus standard recognized by the FAA as a means of compliance with the remote identification rule. The FAA will begin this database with the first declaration of compliance. This online list will be linked to all applicable FAA apps, including B4UFLY, and on all relevant webpages. The FAA will endeavor to ensure information is disseminated as far as possible.

As stated in the FAA's remote identification NPRM, the FAA is willing to consider methods to offset the registration costs associated with final remote identification rule compliance. 84 FR 72438, 72463 (Dec. 31, 2019) at Sec. IX.C. The FAA will consider opportunities for cost reduction and off-setting, while remaining mindful of statutory requirements that apply to the collection of registration fees.

Finally, the FAA strongly encourages the industry to continue collaborating in the area of early adoption incentives. It is important to recognize that the broad safety and security benefits of remote identification equipage for UAS are realized only with widespread compliance with the rule and equipage standards. The result is a cooperative user community that becomes its own mitigation against risk presented by other unmanned air traffic, especially in circumstances with the unmanned aircraft flying beyond visual line-of-sight. The FAA recognizes that while this may not be a direct incentive for individual operators and recreational flyers, it should broadly incentivize the unmanned aircraft producer or designer community to produce aircraft in compliance with published industry consensus standards (e.g., the serial number standard) as early and quickly as possible.

XX. Comments on the Regulatory Impact Analysis—Benefits and Costs

A. General Comments about Cost Impacts of the Rule

Comments: Many commenters stated the remote identification requirements as proposed would be too costly for many recreational operators and businesses, many of which are small, to comply. Commenters suggested that retail hobby businesses already operate on low margins. Any impact on these businesses would also have negative downstream effects on the community. The affected groups include retail hobby shops, designers and producers of UAS and suppliers of model aircraft, parts and equipment, and aerial photographers. The commenters suggested that many recreational operators and owners, especially those involved in flying and building remote controlled aircraft, would cease pursuing the hobby or business, because of the cost to either

upgrade or replace existing aircraft to meet the proposed standard and the cost to subscribe to Internet service. Many commenters expressed concern for the potential impact of the rule on businesses and consumers who cannot afford to retrofit or replace UAS at a low cost. Commenters suggested that there does not exist an off-the-shelf solution, such as software upgrades, to retrofit most recreational aircraft. One commenter provided an estimate of $12 billion in sales for the model aircraft industry for 2021. Another commenter reported $1 billion to $20 billion per year based on IBIS World's 2020 Hobby and Toy Store industry. Commenters state that by requiring standard remote identification UAS to both broadcast and provide information over the Internet, the FAA is violating the requirement of EO 13563 to maximize net benefits and design regulations to impose the least burden. Allowing the option of remote broadcast alone would allow UAS owners to save the Remote ID USS subscription fee. The broadcast-only option would also not reduce demand from operators who do not want to send flight data to a Remote ID USS. Removal of the requirement for both kinds of transmission would also eliminate the need for "Limited" remote identification UAS and streamline the regulation. DJI Technology estimated a one-time cost of $2 or less per unit for a large quantity when manufacturing new UAS or a cost for existing UAS of $15 or less per unit for a large quantity without requiring screens, sim cards, Internet connections, data plans, or centralized data aggregation like a network solution would require. A commenter states that the FAA neglects the increased cost of customer support because UASs will not be able to fly unless Remote ID USS is functional. The reason a UAS is not working will not always be clear, and designers and producers of remote identification UAS or sellers may need to provide support to determine the reason the UAS is not functioning. Using data on customer complaint rates for the telecommunications sector tracked by the Australian Communications and Media Authority (ACMA) on complaint rates and an estimate of the cost of a customer service call by the Harvard Business Review of $10 per call, the commenter estimates a 10-year cost of $80 million.

FAA Response: The FAA acknowledges that recreational and business operators of unmanned aircraft will incur out-of-pocket costs as a result of this rule. However, the FAA has attempted to alleviate complexity and costs of compliance for all operators of unmanned aircraft by removing the network requirement from this rule and allowing remote identification using a stand-alone broadcast module for the time being. The concept allows unmanned aircraft built without remote identification (e.g., existing unmanned aircraft fleet, home-built unmanned aircraft) to be operated outside of FAA-recognized identification areas because the broadcast modules enable the unmanned aircraft to broadcast the remote identification message elements required by this rule.

The FAA decided to incorporate this concept into this rule after reviewing public comments and considering the significant concerns raised with respect to the remote identification UAS framework. The FAA determined a remote identification broadcast module facilitates compliance with this rule and meets the safety and security needs of the FAA, national security agencies, and law enforcement. The concept is broadcast-based and does not require a person to connect to the Internet to identify remotely, as the limited remote identification UAS proposal did. This shift allows unmanned aircraft with remote identification broadcast modules to operate in areas where the Internet is unavailable. In addition, by making this a broadcast solution, the FAA has determined that the 400-foot range limitation included in the proposed requirements for limited remote identification UAS is no longer warranted and has removed the design constraint.

Comments: Multiple commenters expressed concern with displacing hobbyists, recreational operators and amateur builders in favor of creating opportunities for new commercial operations. In particular, one commenter believed that the FAA's proposed approach highly favors current monolithic vendors and delivery fleet operators of UAS (DJI, Amazon, Google, UPS, etc.), and would harm or eliminate small UAS integrator-owners by forcing UAS

owners to purchase them only from a limited number of commercial corporations. Thus, the rule would severely limit or eliminate independent UAS electronic vendors.

FAA Response: The FAA recognizes that this rule places a burden on all operators of unmanned aircraft, and has eliminated the Internet connectivity requirement to reduce the negative impact to independent UAS electronic vendors and the hobby industry. The FAA does not agree that it favors creating opportunities for new commercial operations at the expense of hobbyists, recreational operators and home-builders. While recreational users of unmanned aircraft have been operating in the airspace of the United States for decades, commercial operations of unmanned aircraft are in their infancy. Commercial operations of unmanned aircraft are creating economic opportunities and facilitating safer operating environments by substituting unmanned aircraft for manned operations. The evolution of this nascent industry has spawned educational programs from elementary school through college, which in turn could produce a new generation of model aircraft enthusiasts and recreational operators.

Comments: Many commenters suggested that designers and producers of remote identification UAS are likely to pass on the costs of additional parts, equipment, and software necessary to meet the proposed standard to consumers in the form of higher prices for aircraft. One commenter stated the cost of implementing the proposed nationwide infrastructure, broadcasting and monitoring system of UAS will be paid by consumers including UAS manufacturers' new costs that would be passed on to UAS buyers. Commenters suggested that the additional cost of UAS production and operation would also result in fewer designers and producers of remote identification UAS and near elimination of the hobby market. One commenter expressed concern that the remote identification requirements would limit competition and innovation in UAS technologies leading to adverse impacts on employment and the United States economy.

FAA Response: The FAA agrees that designers and producers of remote identification unmanned aircraft will likely pass the costs of producing standard remote identification

unmanned aircraft to consumers, though the elimination of the network requirement at this time should reduce consumer costs. As well, the infrastructure required to receive broadcast messages would be borne by the entity requiring access to the information, and not the consumer. In addition, in its preliminary regulatory impact analysis, FAA acknowledged uncertainties regarding direct or indirect effects of the rule on the small toy unmanned aircraft market. Producers of toy unmanned aircraft where the unmanned aircraft currently weigh more than 0.55 pounds would need to make a business decision weighing the costs and practicality of producing small toy unmanned aircraft with remote identification using an FAA-accepted means of compliance. As a result, the market for small toy unmanned aircraft where the unmanned aircraft weighs more than 0.55 pounds may be negatively affected by the rule, while the market for unmanned aircraft weighing 0.55 pounds or less may be positively affected. Nonetheless, the UAS industry is evolving rapidly as demonstrated by the success of beyond visual line of sight operations and small-cargo delivery operations occurring on a limited basis in the airspace of the United States, and therefore, the FAA does not believe this rule would limit innovation in the technologies supporting integration of UAS into the airspace of the United States.

Comments: Many commenters expressed concern with the option of flying within designated fields (FAA-recognized identification areas) because of their inconvenient locations, scarcity, and the membership costs required for usage. Commenters indicated the impracticality of using designated flying fields compared with using one's own residential property. Other comments stated that limiting first-person-view (FPV) UAS to a few FAA-recognized identification areas will harm the FPV UAS market because hobbyists will not have access to a wide variety of interesting places. Similarly, amateur photographers with substantial investments in equipment (e.g. $5,000) will only be able to fly at an FAA-recognized identification area near home. Commenters expressed concern that the rule will devalue current equipment and end the recreational UAS photography hobby.

FAA Response: The FAA concedes that the proposed rule imposed opportunity costs and out-of-pocket costs for individuals that would only be able to comply with the proposed rule by travelling to an FAA-recognized identification area. This rule allows operators to equip their unmanned aircraft with remote identification broadcast modules, which would enable affected individuals to operate at locations other than FAA-recognized identification areas so long as a remote identification broadcast module is securely installed into their aircraft. The FAA acknowledges that these individuals will incur a cost for purchase of the broadcast module, and anticipates that owners of UAS without remote identification would prefer to incur this cost in exchange for the freedom to fly at locations other than FAA-recognized identification areas.

Comments: Commenters stated the FAA underestimated the time and resource cost burden for the CBOs to complete FAA-recognized identification area requests. A commenter asserted that the burden threatens the viability of CBOs.

FAA Response: The FAA agrees that it could have underestimated the time and resource cost burden for CBOs to complete FAA-recognized identification area requests. However, to revise the estimates, the FAA requires a cost for the time and resource burden, with documentation supporting the estimate. The FAA expects that submitting an FAA-recognized identification area requests could become automated at some point, alleviating some of the burden on CBOs to complete the FAA-recognized identification area request.

Comments: Commenters suggested that the proposed rule would implicitly force operators to purchase additional equipment, such as transmitters or transponders, which could cost about $100 to $500.

FAA Response: The FAA agrees that operators with a desire to operate beyond the boundaries of an FAA-recognized identification area will be required to purchase broadcast equipment of some kind (i.e. standard remote identification unmanned aircraft or a remote identification broadcast module). The FAA expects that the incremental cost to a consumer will range between $20 and $50 per unit. The FAA determined remote identification facilitates

compliance with this rule and meets the safety and security needs of the FAA, national security agencies, and law enforcement.

Commenters: Multiple commenters suggested that many recreational operators may ultimately decide not to comply with the rule because of the perception that the cost of compliance is overly burdensome. Commenters suggested that a high level of non-compliance would have an overall negative effect on safety.

FAA Response: The FAA has greatly reduced the burden for recreational operators to comply with this rule. The two most impactful changes for recreational operators are: 1) the network connectivity requirement has been removed at this time, and 2) the proposed requirement to register each aircraft individually is not adopted. The FAA does not agree that there will be a high-level of non-compliance by recreational operators. The FAA is continually engaging the recreational community regarding safely operating in the airspace of the United States, and asserts that this community is, by and large, aware that FAA regulations lead to a safer, more secure operating environment for all (users and non-users alike).[36]

Comments: Many commenters expressed concern with the potential obsolescence of existing aircraft equipment and their financial impact. DJI noted that no manufacturer would be willing to certify that retrofits comply with remote identification requirements because previously sold models are no longer in their control. The manufacturer certification requirement therefore reduces the retrofit rate to zero. Commenters provided examples of equipment that may become obsolete, including UAS camera platforms with retail value of $3,000 and UASs with values of $10,000 or more. Another commenter noted that many hobbyists own dozens of UAS, some of which are nearly 50 years old, some of which are unique and difficult or impossible to replace, and some of which cost over $15,000. Commenters asserted a wide variation in retail values of existing UAS and accessories, including transmitters and ground control stations.

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[36] https://www.faa.gov/uas/resources/community_engagement/

Investments in equipment and licenses range from hundreds to hundreds of thousands or even millions of dollars. One commenter provided an estimate of $880 as the average UAS priced based on a survey of members of the First Person View Freedom Coalition. In addition to obsolescence of equipment, another commenter stated there would be obsolescence in terms of training based on existing equipment for some UAS operators.

FAA Response: First, the FAA appreciates the estimate of $880 as the average UAS price based on a survey of First Person View Freedom Coalition members. Second, this rule will allow pilots to attach a remote identification broadcast module to unmanned aircraft that will make the aircraft remote identification compliant. The FAA acknowledges that the relief provided in this rule will still be considered a burden by some operators. Nonetheless, the rule will create a safe and secure airspace and is a stepping stone toward integration of increasingly complex UAS operations.

Comments: Commenters expressed concerns with the costs associated with a Remote ID USS, suggesting that the FAA underestimated subscription costs in the regulatory evaluation. The commenters also suggest that businesses would not be able to incur the cost of a data plan, which would adversely affect their ability to continue operations. Some estimates ranged from $25 to $100 per month for subscription fees. Multiple commenters expressed concern with the purchase of cellular service or a data plan for the purposes of transmitting remote identification information from their UAS. Commenters were also concerned about the cost to switch to data plans with better coverage for those with cellular service plans.

FAA Response: The FAA acknowledges the complexity of creating Remote ID USS and requiring network connectivity by operators to a Remote ID USS. The requirement that the remote identification UAS connect to the Internet and transmit remote identification message elements through the Internet to a Remote ID USS is not adopted at this time.

Comments: A commenter stated the FAA incorrectly assumes that there may be no price charged for USS subscriptions and therefore no societal cost. The commenter stated that no

matter what pricing strategy a USS provider selects, it must recover the real resource cost of designing, building and maintaining the system.

FAA Response: The FAA recognizes that if Remote ID USS were to exist, they would do so with intent to recover the cost of designing, building, and maintaining the system. However, the FAA acknowledges the complexity of designing a Remote ID USS and did not adopt the proposed network connectivity requirement at this time.

Comments: Many commenters stated the costs of the proposed rule include additional unmanned aircraft registration fees as well as subscription fees for remote identification service providers. These fees would increase barriers to entry and reduce the accessibility of UAS to lower income individuals while shifting the market to larger corporations that can sell the remote identification hardware and software. Droneport Texas noted that the costs of Remote ID USS subscriptions were not included in the FAA-recognized identification area analysis but is required for remote identification UAS operating in an FAA-recognized identification area as proposed. The International Association of Fire Fighters and the Coconino County Sheriff's Office noted the increased cost for emergency response organizations to comply with the proposed rule. One commenter suggested Remote ID USS subscriptions should be provided free if it is required for emergency service operators

FAA Response: The FAA agrees that registration and subscription fees could reduce the accessibility of unmanned aircraft to lower income individuals and notes that the proposed requirement that recreational operators register each aircraft individually is not adopted. In addition, the proposed network connectivity requirement is not adopted at this time, and thus subscription fees are eliminated. Instead, this rule requires that small unmanned aircraft operating beyond the boundaries of an FAA-recognized identification area do so with either standard remote identification or with a remote identification broadcast module.

Comments: One commenter stated the FAA should not have included the cost of obsolescence for UAS purchased in the first year of the rule implementation. The commenter

also asserted that the FAA incorrectly applied an 80 percent retrofit rate in the calculation of obsolescence cost, inconsistent with the stated assumption of a 20 percent retrofit rate.

FAA Response: The FAA appreciates the commenter's observations regarding the cost of obsolescence. FAA has carefully reviewed the obsolescence section of the regulatory impact analysis and provides clarity to the commenter. On page 75 of the analysis, it is stated that 20 percent of the recreational fleet purchased during year 1 could be retrofit. Based on the assumption that 20 percent of the recreational fleet purchased during year 1 could be retrofit, the FAA determined that the remaining 80 percent of the fleet could become obsolete prior to the end of its lifespan.

To estimate the size of the fleet that would become obsolete, the FAA spread the estimated sales of recreational aircraft that could not be retrofit equally over a 12-month period during year 1. Based on the assumption that a small unmanned aircraft has a 3-year lifespan (36 months), those unmanned aircraft purchased during the earlier part of year 1 would have less loss of use compared to those aircraft purchased near the end of year 1. For calculating obsolescence, sales of unmanned aircraft were presumed to occur on the first day of the month. Therefore, units sold in January of year 1 of the analysis period are fully depreciated by December of year 3, and thus there is no loss of useful life; units sold in February of year 1 lose one month of useful life (which is January of year 4); units sold in March of year 1 lose two months of useful life (which are January-February of year 4); units sold in April of year 1 lose three months of useful life (which are January-March of year 4); etc. This calculation is shown on Appendix G of the regulatory impact analysis.

Comments: Commenters stated that many areas in which UAS operations take place, such as for aerial photography, inspections, or survey mapping, tend to be rural locations or coastlines where Internet connection and cellular service does not exist. The requirement to transmit via Internet would therefore create geographic limitations for many businesses. It would prevent operators from providing services in those areas without cellular service.

FAA Response: The FAA recognizes the complexities and nuances of a remote identification rule that requires network connectivity, including the geographic limitations it creates for many businesses. The proposed requirement to transmit via Internet is not part of this rule at this time. Instead, this rule requires that small unmanned aircraft operating beyond the boundaries of an FAA-recognized identification area do so with either standard remote identification or with a remote identification broadcast module.

Comments: Commenters provided alternative estimates of the number of Academy of Model Aeronautics members ranging from 180,000 to 195,000 with 9 to 10 as the average number of aircraft owned by AMA members. Based on these estimates of membership and aircraft ownership, commenters develop an estimated cost of $8.1 million to $9.75 million associated with registration. Multiple commenters expressed concern with the burden associated with the registration process and fee for each owned aircraft. Many commenters opposed having to register each aircraft.

FAA Response: The FAA appreciates information provided by AMA regarding the number of its members and the average number of aircraft owned by each member. The proposal to require recreational operators register each aircraft individually is not adopted. By maintaining the current framework, the intent of the statutory requirement for aircraft registration is achieved without being overly burdensome, particularly considering the mitigation of cost for those individuals specifically flying multiple aircraft exclusively in compliance with section 44809. The FAA therefore will retain the current part 48 registration framework. Corresponding updates are applied to part 48 to reflect the inclusion of the current statutory requirement for limited recreational operations and to incorporate information relevant to remote identification. Owners registering as exclusively compliant with section 44809 will be required to submit the aircraft manufacturer and model name.

Comments: A commenter stated requiring one control station for each aircraft would increase costs substantially. Another commenter stated the cost of replacing a commercial fleet due to the lack of serial numbers would be cost-prohibitive for many small businesses.

FAA Response: The FAA notes that the serial number requirement in § 89.505 applies to standard remote identification unmanned aircraft and remote identification broadcast modules produced after the effective date of this rule. This rule does not require designers and producers of remote identification unmanned aircraft to assign a serial number to any unmanned aircraft produced prior to the compliance date of the design and production requirements. The requirements also do not make the existing unmanned aircraft fleet obsolete because operators can continue to operate existing unmanned aircraft subject to the operating rules in subpart B of this rule.[37] This rule does not require any person to assign an ANSI/CTA-2063-A compliant serial number to any existing unmanned aircraft produced prior to the compliance date of the design and production requirements. In addition, the rule neither requires serial numbers to be assigned to control stations nor prevents operators from swapping out control stations. The serial number requirements are specific to the unmanned aircraft, not to the entire UAS.

Comments: Many commenters suggested that UAS on the market last more than the three years that FAA assumed in its regulatory impact analysis. Some commenters estimated the lifespan to be 10 years with an average cost per UAS for recreational operators to be $600-$700.

FAA Response: The FAA appreciates commenters' estimates for the average lifespan of an unmanned aircraft and the average cost for unmanned aircraft used for recreational operators. At this time, the FAA continues to assume an average lifespan of unmanned aircraft to be three

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[37] Producers may choose to assign an ANSI/CTA-2063-A compliant serial number to an unmanned aircraft produced prior to the compliance date of the design and production requirements of this rule (e.g., through a software upgrade). The assignment of the serial number – by itself – does not make the unmanned aircraft a standard remote identification unmanned aircraft or a compliant unmanned aircraft that is properly equipped with a remote identification broadcast module. Persons who wish to "upgrade" an unmanned aircraft produced prior to the compliance date of this rule to make it a standard remote identification unmanned aircraft or an unmanned aircraft equipped with a remote identification broadcast module may do so by meeting all design and production requirements in subpart F. Subpart F contains the design and production requirements for a standard remote identification unmanned aircraft and a remote identification broadcast module.

years, which is the assumption used by the FAA in its published 2020 UAS fleet forecasts.[38] The FAA welcomes estimates of UAS lifespan and UAS costs when informed by supporting documentation, and would consider use of such estimates in its regulatory impact analyses.

Comments: One commenter questioned whether the proposed rule would meet the threshold under the Unfunded Mandates Reform Act.

FAA Response: The FAA recognizes that the Unfunded Mandates Reform Act (UMRA) was enacted to avoid imposing unfunded Federal mandates on State, local, and tribal governments (SLTG), or the private sector. Most of UMRAs provisions apply to proposed and final rules for which a general notice of proposed rulemaking was published and that include a Federal mandate that may result in the expenditure of funds by SLTG, in the aggregate, or by the private sector of $100 million or more in any year. The FAA notes that the threshold of $100 million (in 1995 dollars) or more in any 1 year was not exceeded in either the proposed rule or the final rule.

Comments: A commenter stated the proposed rule did not address the costs of equipping 18,000 police departments with technology required to access remote identification data and the required training of 750,000 officers to use the technology. The commenter asserted that these costs should be included in the cost analysis for the final rule and suggested that the FAA should conduct a survey of law enforcement departments to determine if they are equipped with remote identification technology, and what the cost and funding needs would be if they need to obtain the technology. Further, the commenter suggested that the FAA delay the implementation of the final rule until funding and implementation plans for law enforcement groups are available.

FAA Response: The FAA recognizes that equipping 18,000 police departments with technology to access remote identification data, and then training 750,000 officers to use the technology has costs. The regulatory impact analysis for this rule identifies the qualitative safety

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[38] *https://www.faa.gov/data_research/aviation/aerospace_forecasts/media/FY2020-40_FAA_Aerospace_Forecast.pdf.* Pages 41-63.

and security benefits of remote identification information used to distinguish compliant operations from non-compliant operations. The FAA does not place any requirements on local law enforcement; to the contrary, the purpose is to make a resource available so that they can use it in the discharge of their responsibilities. The FAA assumes that security and law enforcement entities would incur costs relative to the scope of their needs (e.g., scaled to national, regional and locality needs, based on the level of UAS operations).

Comments: Some commenters expressed concerns that the rule would adversely impact UAS manufactured in the United States, causing manufacturing to move offshore as the Western products and products in the United States become less competitive. One commenter gave examples of certain companies that supply radio systems that have abandoned their markets and cut back on their research and development because foreign companies have copied their technologies and undercut their manufacturing costs.

FAA Response: The FAA acknowledges that at the time of this rulemaking, foreign companies produce a majority of the unmanned aircraft already being operated in the United States. Accordingly, the FAA does not expect this rule to negatively impact United States designers and producers of remote identification unmanned aircraft at a greater rate than their foreign counterparts.

Comments: A commenter asserted the FAA incorrectly neglects the value of lost UAS sales due to the cost of the rule. The commenter stated the FAA implicitly and incorrectly assumes that the UAS elasticity of demand is zero and that designers and producers of remote identification UAS will pass all costs to consumers, but that the quantity demanded will be unaffected. The commenter argued that the other possible assumption is that the manufacturer will absorb all costs, but the market is competitive so this will not happen. The commenter provided an estimate based on a survey that the demand for new UAS would decline by 10.6 percent due to the increase in cost. The commenter further asserted that demand may decrease

because of the loss of privacy from the requirement to disclose location and flight data to the government and the public.

FAA Response: The FAA appreciates these comments, and recognizes that the final rule could change consumer behavior and result in reduced demand for unmanned aircraft. However, for purposes of the regulatory impact analysis, three scenarios were considered – a base scenario (which is the preliminary estimate), a low case scenario, and a high case scenario. The low case scenario is reflective of a reduced demand for unmanned aircraft.

B. Comments on Benefits and Cost Savings

Comments: Commenters did not agree that the cost of conducting investigations would decrease under the remote identification requirement. Some commenters suggested remote identification will increase the total cost of investigating UAS incidents. Commenters argued that by increasing the amount of available data from remote identification, there would be an increase in the number of incidents requiring investigations. Commenters also argued that there would be an increase in the cost of investigations due to potential non-compliance among amateur flyers or hobbyists.

FAA Response: The FAA recognizes the commenters concerns and notes that since Fiscal Year 2017, the number of UAS investigations conducted by the FAA has declined.[39] The FAA continually conducts community outreach with the recreational and part 107 communities regarding safe operation of UAS in the airspace of the United States. Similarly, part 107 remote pilots must pass recurrent knowledge testing every 24 calendar months on topics related to

[39] The FAA recorded 2,141 investigations in FY 2017; 2,002 investigations in FY 2018, 1,955 investigations in FY 2019; and it is estimated that there will be approximately 1,460 investigations in FY 2020.

operating safely and complying with regulations.[40] The FAA believes that a vast majority of pilots in each of the communities are compliant with regulations and operate safely.

For purposes of the regulatory impact analysis the FAA presents a range for estimating the FAA costs of UAS investigations using three scenarios based on UAS fleet size. The regulatory impact analysis also acknowledges security partners and law enforcement communities incur costs investigating UAS incidents, and discusses them qualitatively in the regulatory impact analysis for the final rule.

Comments: Commenters asserted that because of the safety record of limited recreational aircraft and first-person view quadcopter operators, there are no incremental safety or security benefits from applying the remote identification requirements to recreational flyers. The rule would not necessarily prevent malicious actors from building their own unmanned aircraft without complying.

FAA Response: FAA agrees with commenters that the final rule for the remote identification of unmanned aircraft would not prevent malicious actors from building their own unmanned aircraft that do not comply with the requirements of this rule. However, as discussed earlier in this preamble, an unmanned aircraft flying in violation of this rule would be a data point that law enforcement could use in deciding what action to take in response to that aircraft. In addition, broadcast remote identification does not rely on Internet availability, and is a secure method which is less susceptible to widespread failure caused by malicious actors or systems outages. The FAA has determined that a requirement for unmanned aircraft to broadcast remote identification information will provide the FAA, law enforcement, the general public, and other parts of the aviation community with real-time information about unmanned aircraft operations in any area in which broadcast signals can be received. The broadcast will permit detection of

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[40] The FAA notes the requirements for recurrent knowledge testing were proposed to be removed and replaced with recurrent knowledge training in the Operations of Small Unmanned Aircraft Systems over People notice of proposed rulemaking. 84 FR 3856, February 13, 2019.

unmanned aircraft and will permit law enforcement and the general public who receive those broadcasted message elements to have information about the aircraft location as well as information about the control station or takeoff location.

Comments: Commenters asserted that the FAA should make the data on UAS incidents available to the public to assess the level of safety benefits.

FAA Response: The FAA values the commenters concern. At this time, the FAA does not report on UAS investigations. The FAA does publish a quarterly UAS sightings report, however the FAA acknowledges that reported UAS sightings do not necessarily involve the violation of regulations or unsafe conditions.[41]

Comments: A commenter stated the FAA incorrectly includes benefits of extended operations though the proposed rule does not enable flight at night, operations over people, or flights beyond visual line of sight. The commenter asserted that it is incorrect to include the benefits from future rules in the analysis. In addition, there is no evidence that remote identification is necessary to expand UAS operations.

FAA Response: The FAA acknowledges that the reader of the regulatory impact analysis may have the impression that the benefits of extended operations were included in its estimates of the proposed rule, however, they were not and it was not the FAA's intent to mislead the reader. The FAA provided estimated cost savings due to a reduction in waiver processing for operations over people and night operations in Appendix C of its preliminary regulatory impact analysis (page 162), however these cost savings were not used for the proposed rule's estimated net costs.

C. Comments on Data and Assumptions

Comments: Many commenters argued the FAA substantially underestimated the current UAS fleet size and UAS sales. Commenters did not agree with the assumptions regarding the

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[41] *https://www.faa.gov/uas/resources/public_records/uas_sightings_report/*

average number of aircraft owned, suggesting that the FAA underestimated the number of affected aircraft. The AMA stated their members own on average of at least nine model aircraft and many AMA members own 100 to 200 aircraft. Recreational flyers of model aircraft frequently buy, sell, and trade aircraft. The requirement to register an aircraft every time ownership changes is impractical and costly. Some recreational flyers replace aircraft more frequently than the three-year lifespan assumed by the FAA. Some hobbyists frequently exchange and recombine aircraft components making it difficult to identify distinct aircraft. One commenter provided an average estimate of 15 UAS owned, based on a survey of members from the First-Person View Freedom Coalition. One commenter suggested it will take 15 minutes to complete an aircraft registration because of the additional complexity of the proposed requirement.

FAA Response: The FAA values the response on the average number of aircraft owned by recreational flyers. The FAA recognizes its fleet forecast for recreational unmanned aircraft is most likely underestimated, and is pursuing resources to assist with developing a forecast that accurately reflects the number of aircraft in the fleet. In the NPRM, the FAA explained that the lack of aircraft-specific data for unmanned aircraft registered under part 48 could inhibit the FAA and law enforcement agencies from correlating the remote identification data with data stored in the FAA's Aircraft Registry. Thus, the Agency proposed to revise part 48 to require the individual registration of all small unmanned aircraft and the provision of additional aircraft-specific data. The FAA proposed that owners of small unmanned aircraft would have to complete the registration application by providing aircraft specific information in addition to basic contact information. After evaluating the comments and incorporating the new remote identification broadcast module option for part 89 compliance, the FAA determined it will maintain the current registration framework and will no longer revise part 48 to require the individual registration of all small unmanned aircraft. Owners intending to operate all their small

unmanned aircraft exclusively in compliance with 49 U.S.C. 44809 may maintain one registration for all unmanned aircraft meeting that description.[42]

Comments: A commenter suggested the regulatory impact analysis should include the cost of cell phones and data plans because not all recreational flyers own cell phones. Commenters also expressed concern that some flyers may incur costs of switching to data plans with better coverage. A commenter stated the FAA overestimated the percentage of UAS that are already connected to the Internet, but did not provide an alternative estimate. Many commenters did not agree with the FAA assumption that most unmanned aircraft would only need a software upgrade to comply. Compliance would require the addition of hardware that would add weight and cost. In some cases, retrofitting aircraft to connect to the Internet is not technically feasible, especially for small aircraft. The weight of additional equipment would adversely impact the performance of UAS, especially in speed, safety, endurance and races. A commenter stated that the regulatory evaluation omitted or underestimated the cost of service to retrofit the aircraft for connection to the Internet. Commenters stated that the FAA's assumption of monthly Remote ID USS subscription fee per aircraft based on LAANC fees underestimates the actual cost. The commenter suggested that the median monthly fee would be approximately $10 per month based on Internet pet and car location and tracking services. A commenter did not agree with the FAA's assumption that all LAANC providers will become Remote ID USS and stated the FAA did not provide data to support its estimate of the number of USS providers. Another commenter asserted that the FAA does not have sufficient resources to monitor the USS network and enforce the proposed requirements.

FAA Response: The FAA appreciates that comments received on the regulatory impact analysis for the rule. The NPRM proposed requiring both standard remote identification and

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[42] The registration is based on the intended use of the unmanned aircraft. An operator would violate FAA regulations if he or she uses any of such aircraft for any purpose other than for limited recreational operations under 49 U.S.C. 44809.

limited remote identification UAS to transmit the remote identification message elements through an Internet connection to a Remote ID USS. After careful consideration of public comments on the implementation challenges associated with this requirement, the FAA decided to eliminate this requirement. Without the requirement to transmit remote identification through the Internet, limited remote identification UAS is no longer a viable concept. In its place, the FAA incorporates a modified regulatory framework under which persons can retrofit an unmanned aircraft with a remote identification broadcast module to satisfy the remote identification requirements of this rule. While the FAA recognizes that there are potential benefits associated with establishing a network of Remote ID USS, the FAA believes that, for the time being and given the types of unmanned aircraft operations that are currently allowed, the broadcast remote identification solution fulfills agency and law enforcement needs to maintain the safety and security of the airspace of the United States.

In addition, FAA acknowledges that the weight of additional equipment to an unmanned aircraft adversely impacts its performance and discusses this cost of the rule qualitatively in the regulatory impact analysis for the final rule.

Comments: Some recreational flyers did not agree with the assumption that all modelers belong to the AMA. Commenters also stated the FAA incorrectly assumed that most AMA members operate exclusively at flight sites and that only 10 percent of members will be displaced due to denials of FAA-recognized identification area requests.

FAA Response: The FAA appreciates the comments on the composition of the recreational flyer population. The FAA is aware that not all recreational flyers belong to the AMA, and provides clarity on this point in the regulatory impact analysis of the final rule. The regulatory impact analysis for the final rule acknowledges that AMA members do not operate exclusively at flight sights. The regulatory impact analysis will reflect that all recreational flyers belonging to a community-based organization will choose to purchase a remote identification broadcast module to equip their unmanned aircraft to be in compliance with the final rule when

operating outside of the boundaries of an FAA-recognized identification area. Lastly, the FAA acknowledges comments which state that over 10 percent of AMA members would be displaced from flight sites due to denials of FAA-recognized identification area requests. The FAA acknowledges that the public may have access to information or data that would enable the FAA to estimate costs with greater accuracy, and encourages the public to provide such information with supporting documentation.

Comments: Commenters stated that the FAA underestimated the average lifespan of UAS, asserting that some aircraft have decades of useful life rather than an average of three years. Commenters requested that the data used to estimate the lifespan of UAS be available to the public for review. A commenter provided an estimated average lifespan of 6 years based on a survey of members in the First Person View Freedom Coalition. Other commenters contended that the average lifespan of recreational UAS is much lower than 3 years due to accidents.

FAA Response: The FAA values the information provided by commenters touching on the lifespan assumption used for the regulatory impact analysis. The 3-year lifespan is not an assumption created specifically to analyze the costs and benefits of the remote identification rulemaking. Rather, the lifespan is one element used to forecast the unmanned aircraft fleet, which is available to the public in a document titled *FAA Aerospace Forecast 2020-2040*.[43] The FAA continues to seek resources and information that inform unmanned aircraft lifespan assumptions.

D. Comments on Regulatory Alternatives

Comments: Multiple commenters suggested alternatives to reduce the burden on operators. One alternative would be to grandfather older UAS or to allow for a grace period for compliance. Over time as the existing unmanned aircraft fleet becomes obsolete, fewer

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[43] . *https://www.faa.gov/data_research/aviation/aerospace_forecasts/media/FY2020-40_FAA_Aerospace_Forecast.pdf*. Pages 41-63.

unmanned aircraft not equipped with remote identification capabilities would make up the market. Some commenters also proposed additional time to come into compliance. Others suggested a notification system that would allow pilots to call-in to identify themselves before flying their unmanned aircraft. Some commenters suggested requiring Internet transmission of remote identification for BVLOS operations only. Several commenters supported the concept of remote identification, but suggested establishing simpler alternatives to the rule, such as a simple remote beacon that would have less performance impact on smaller aircraft. Others preferred to use a simple application on the phone or an FAA-approved application to register pre-flight model and location to "check-out" airspace. Some commenters proposed a government buy-back program to compensate for the loss of use for aircraft that cannot comply through software upgrades or government subsidization. Many commenters suggested the FAA should compensate or reimburse UAS owners for aircraft rendered obsolete by the rule. One commenter suggested the use of network publishing utilizing a network connection to transmit remote identification as an alternative to broadcasting which would require equipment upgrades. The commenter noted that the proposed solution was recommended by the UAS Identification and Tracking Aviation Rulemaking Committee in its final report. Commenters express concern that the compliance deadline of 1 year is too soon. The proposed compliance period would benefit designers and producers of remote identification UAS by increasing sales at the expense of UAS owners who have to purchase new equipment to comply.

FAA Response: The FAA values the abundance of commenter suggestions for reducing the burden of the rulemaking on operators of unmanned aircraft, and will not adopt the network requirement as proposed for the time being. Instead, operators of unmanned aircraft can comply with the final rule in one of three ways, which include: 1) operating standard remote identification unmanned aircraft, or 2) attaching a remote identification broadcast module to an unmanned aircraft that is not able to otherwise broadcast, or 3) operating unmanned aircraft within the boundaries of an FAA-recognized identification area.

The FAA decided to incorporate this concept after reviewing public comments and considering the significant concerns raised with respect to the remote identification UAS framework. The FAA determined a remote identification broadcast module facilitates compliance with this rule and meets the safety and security needs of the FAA, national security agencies, and law enforcement. The concept is broadcast based and does not require a person to connect to the Internet to identify remotely, as the limited remote identification UAS proposal did. This shift allows unmanned aircraft with remote identification broadcast modules to operate in areas where the Internet is unavailable. In addition, by making this a broadcast solution, the FAA has determined that the 400-foot range limitation included in the proposed requirements for limited remote identification UAS is no longer warranted and has removed the design constraint.

E. Miscellaneous Comments

Comments: Some commenters expressed concern that the existing 4G and LTE cellular networks will be adversely affected by the potential increase in usage due to UAS surveillance and monitoring.

FAA Response: The FAA acknowledges the concern that existing 4G and LTE cellular networks would be adversely affected by the potential increase in usage due to UAS surveillance and monitoring, and did not adopt the proposed requirement for network connectivity at this time.

Comments: The Fourth Branch Project of the Mercatus Center at George Mason University suggested that the FAA had not established how much risk a UAS without remote identification poses to manned aircraft when operating in Class G airspace and away from airports and heliports, and noted that increased costs of network remote identification as well as dependence on Remote ID USS and Internet connectivity is likely excessive considering that risk is likely very low. Many other comments also noted that given the safety record of UAS operators, the safety benefits would be minimal. Some also noted that the FAA did not produce

data to support the claim of safety benefits. DJI also noted that some of the improvements in safety may have occurred even without the remote identification rule.

FAA Response: The FAA acknowledges the comments related to risk, and notes that this rule will play a critical role in threat discrimination by law enforcement and national security entities, similar to radar data for manned aircraft and license plates on road vehicles. Law enforcement officials have made clear that it can be very difficult to make a decision about the risk posed by a person manipulating the flight controls of the UAS with the limited information available from visually observing an unmanned aircraft. Remote identification information will enable better threat discrimination, an immediate and appropriate law enforcement response, and an effective follow-on investigation. This is because remote identification information can be correlated with unmanned aircraft registry information to inform law enforcement officers about the registered owner. This information, along with the real-time location of the UAS operator, provide critical input to a law enforcement officer's decision on whether intervention is appropriate. In addition, a careless or clueless operator may be introducing unnecessary risk into the airspace of the United States without realizing it. Remote identification allows appropriate authorities to identify the operator for follow up or education on how to operate safely and in compliance with the FAA's rules.

XXI. Guidance Documents

The FAA is promulgating several guidance documents to supplement the requirements in this rule. Copies of the guidance documents are available in the docket for this rulemaking.

The FAA is establishing an advisory circular on the means of compliance process for remote identification of unmanned aircraft systems. This advisory circular provides guidance on the means of compliance process described in part 89. This AC outlines the required information for submitting a means of compliance.

The FAA is establishing an advisory circular on the declaration of compliance process for remote identification of unmanned aircraft systems. This advisory circular provides guidance on the declaration of compliance process described in part 89. This AC outlines the required information for submitting a declaration of compliance.

The FAA is revising AC 107-2, Small Unmanned Aircraft Systems, to describe the requirements of remote identification. The advisory circular also describes where the various small UAS are permitted to operate.

The FAA is establishing a new advisory circular for FAA-recognized identification areas. This advisory circular provides guidance to persons requesting the establishment of an FAA-recognized identification area under § 89.210. This AC also provides guidance for persons responsible for FAA-recognized identification areas, as well as persons operating UAS at FAA-recognized identification areas under § 89.115(b).

XXII. Regulatory Notices and Analyses

Changes to Federal regulations must undergo several economic analyses. First, Executive Order 12866 and Executive Order 13563 direct that each Federal agency shall propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs. In addition, DOT rulemaking procedures in subpart B of 49 CFR part 5 instruct DOT agencies that if the regulatory action is expected to impose costs, then the rulemaking shall include either a reasoned determination that the benefits outweigh the costs or, if the particular rulemaking is mandated by statute or compelling safety need notwithstanding a negative cost-benefit assessment, a detailed discussion of the rationale supporting the specific regulatory action proposed, and an explanation of why a less costly alternative is not an option. Second, the Regulatory Flexibility Act of 1980 (Pub. L. 96-354) requires agencies to analyze the economic impact of regulatory changes on small entities. Third, the Trade Agreements Act of 1979 (Pub. L. 96-39) prohibits agencies from setting standards that create unnecessary obstacles to the

foreign commerce of the United States. In developing United States standards, this Trade Act requires agencies to consider international standards and, where appropriate, that they be the basis of United States standards. Fourth, the Unfunded Mandates Reform Act of 1995 (Pub. L. 104-4) requires agencies to prepare a written assessment of the costs, benefits, and other effects of proposed or final rules that include a Federal mandate likely to result in the expenditure by State, local, or tribal governments, in the aggregate, or by the private sector, of $100 million or more annually (adjusted for inflation with base year of 1995). The FAA has provided a detailed Regulatory Impact Analysis in the docket of this rulemaking. This portion of the preamble summarizes the FAA's analysis of the economic impacts of this rule.

In conducting these analyses, the FAA has determined that this rule: (1) has benefits that justify its costs; (2) is a "significant regulatory action" as defined in section 3(f) of Executive Order 12866; (3) is "significant" as defined in DOT's general rulemaking procedures at 49 CFR 5.13(a)(1); (4) will have a significant economic impact on a substantial number of small entities; (4) will not create unnecessary obstacles to the foreign commerce of the United States; and (5) will not impose an unfunded mandate on State, local, or tribal governments, or on the private sector by exceeding the threshold identified above.

A. Regulatory Evaluation

1. Key Assumptions and Data Sources

The analysis of the rule is based on findings from the Unmanned Aircraft Systems Identification and Tracking Aviation Rulemaking Committee (UAS-ID ARC), as well as data and information from the FAA and industry stakeholders. The analysis for the regulatory evaluation is based on the following assumptions and data sources.

- The analysis uses 2020 constant dollars. Year 1 of the period of analysis, which would correlate with the effective date of the final rule, is used as the base year.

- The FAA uses a 10-year time period of analysis to capture the effects of the compliance period and recurring effects of the rule.[44]
- The analysis includes the 18-month phase-in period from the effective date of the rule for compliance by persons responsible for the production of unmanned aircraft. At the end of 30 months from the effective date, operators must fly either a standard remote identification unmanned aircraft or an unmanned aircraft equipped with a remote identification broadcast module, or operate within the boundaries of an FAA-recognized identification area.
- The FAA uses a three percent and seven percent discount rate to quantify present value costs and cost savings as prescribed by OMB in Circular A-4.[45]
- The analysis of costs and cost savings of this rule are based on the fleet forecast for small unmanned aircraft as published in the FAA Aerospace Forecast 2020-2040.[46] The forecast includes base, low, and high scenarios. The analysis provides a range of net impacts from low to high based on these forecast scenarios. The FAA considers the primary estimate of net impacts of the rule to be the base scenario.
- Based on the FAA part 48 unmanned aircraft registry, the FAA estimates that 87.6 percent of small unmanned aircraft sold in the United States are produced by foreign entities.

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[44] The FAA typically uses a 5-year time period for Regulatory Impact Analysis of UAS rulemakings to align with historical and current FAA UAS Forecasts (see *https://www.faa.gov/data_research/aviation/aerospace_forecasts/media/Unmanned_Aircraft_Systems.pdf*). In addition, the FAA acknowledges uncertainty in estimating incremental impacts of this proposed rule beyond 5 years due to rapid changes in UAS technology and innovation.

[45] OMB Circular A-4, *Regulatory Analysis* (2003), *https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/circulars/A4/a-4.pdf*.

[46] FAA Aerospace Forecast Fiscal Years 2020-2040 at 41-63, *available at http://www.faa.gov/data_research/aviation/aerospace_forecasts/media/FY2020-40_FAA_Aerospace_Forecast.pdf*

- Each unmanned aircraft producer will incur an estimated one-time cost of $85 for the purchase of a remote identification standard from a consensus standards body.[47] The serial number standard is available at no cost.
- The FAA estimates that potentially as many as 191 United States and 351 foreign producers would submit a declaration of compliance for 391 United States and 891 foreign models of unmanned aircraft for FAA during year 2 of the analysis period.[48] During each of the remaining years of the analysis period, the FAA assumes an additional nine new producers would submit a declaration of compliance annually for one model of unmanned aircraft each, and nine new models will be produced by preexisting producers, for a total of eighteen new models of unmanned aircraft annually.[49]
- The FAA assumes that five percent of the declarations of compliance submitted by persons responsible for the production of standard remote identification unmanned aircraft and remote identification broadcast modules to the FAA would not be accepted. The declaration of compliance would then be rewritten and resubmitted to the FAA for acceptance, and the FAA would accept the resubmission.
- Producers will maintain product support and notification procedures to notify the public and the FAA of any defect or condition that causes the unmanned aircraft or broadcast module to not to meet the requirements of proposed part 89.

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[47] *https://www.astm.org/Standards/F3411.htm*. Accessed August 4, 2020. The price for the Standard Specification for Remote ID and Tracking is listed as $85.

[48] Based on analysis of the Association for Unmanned Vehicle Systems International (AUVSI) Unmanned Systems & Robotics Database.

[49] Based on analysis of the Association for Unmanned Vehicle Systems International (AUVSI) Unmanned Systems & Robotics Database.

- The FAA assigns the United States Department of Transportation guidance on the hourly value of travel time savings for personal purposes (for limited recreational flyers only). This value is equal to $14.37 per hour and is applicable for the 10-year analysis period.[50]
- The FAA assumes that all Academy of Model Aeronautics (AMA) flying sites, about 2,200 as of this writing,[51] will submit requests to establish FAA-recognized identification areas, and that 90 percent of the requests will be approved. The remaining 10 percent are assumed to be in sensitive areas and therefore will not be approved to become an FAA-recognized identification area. The FAA also assumes that 1,700 United States Army Junior ROTC clubs and 66 institutions identified as awarding undergraduate degrees in aerospace engineering will submit requests to establish FAA-recognized identification areas, and that 90 percent of the requests will be approved as well.[52]
- The FAA estimates it will conduct approximately 1,500 to 1,600 investigations of UAS incidents annually for each year of the analysis period and that each investigation will range between 0 and 40 hours.[53] This is used to estimate cost savings from reduced hours for FAA UAS investigations.
- The FAA determines the cost of a broadcast module to be $50.[54]

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[50] Time savings is estimated to be median hourly wage plus benefits as described in the U.S. Department of Transportation Revised Departmental Guidance on Valuation of Travel Time in Economic Analysis (Sept. 27, 2016).

[51] https://www.modelaircraft.org/club-finder. Accessed August 26, 2020. The FAA notes that a subset of AMA clubs has flying sites.

[52]http://www.usarmyjrotc.com/general/program_overview.php. Accessed August 26, 2020. https://ira.asee.org/wp-content/uploads/2019/07/2018-Engineering-by-Numbers-Engineering-Statistics-UPDATED-15-July-2019.pdf. P. 18. Accessed August 26, 2020.

[53] The FAA conducted 2,002 investigations in FY 2018; 1,995 investigations in FY 2019; and as of May 18, 2020, the FAA has conducted 920 investigations.

[54] The FAA received company proprietary information from potential U.S. manufacturers of a broadcast module that may meet remote identification requirements. One U.S. manufacturer estimated a cost of $50 for a self-contained module with its own power and GPS, with a decrease in cost as production volume increases. Another U.S. manufacturer stated an estimate would not be available until the rule's final requirements were published. Commercially available modules that comply with French remote identification laws range from 40 euros (equivalent to $47.48 US dollars on 9/14/2020), and up.

- The FAA notes the analysis of this rule reflects industry conditions that predate the public health emergency concerning the coronavirus disease 2019 (COVID-19). While there is currently a lack of data to forecast the timing of recovery from COVID-19 impacts relative to implementation of the rule, the analysis provides information on the types of impacts that may be experienced in the future as the economy returns to baseline levels.

2. Benefits Summary

The FAA expects this rule will result in several important benefits and enhancements to support safety and security in the airspace of the United States. Remote identification provides information that helps address existing challenges of the FAA, law enforcement entities, and national security agencies responsible for the safety and security of the airspace of the United States. As UAS operations increase, so does the risk of unmanned aircraft being operated in close proximity to manned aircraft or in airspace that is not open to the operations. Remote identification provides a means to identify these aircraft and locate the person that controls them (e.g., operators, pilots in command). It allows law enforcement and national security agencies to distinguish compliant airspace users from those potentially posing a safety or security risk. It permits the FAA and law enforcement to conduct oversight of persons operating UAS and to determine whether compliance actions, enforcement, educational, training, or other types of actions are needed to mitigate safety or security risks and foster increased compliance with regulations. Remote identification data also informs users of the airspace of the United States of the operations that are being conducted at any given moment in a particular airspace.

The FAA expects this rule will result in important benefits and enhancements to support the safe integration of expanded UAS operations in the United States airspace. Remote identification provides greater situational awareness of UAS operations to airport operators and other aircraft in the vicinity of those operations. Manned aircraft, especially those operating at low altitudes where UAS operations are anticipated to be the most prevalent (such as helicopters and agricultural aircraft), could carry the necessary equipment to display the location of UAS

operating nearby. In addition, towered airports could use remote identification information for situational awareness, especially for landing and takeoff operations.

3. Cost and Savings Summary

The costs of this rule include UAS owners including additional information when completing the unmanned aircraft certificate of registration; UAS operators flying compliant remote identification unmanned aircraft or travelling to FAA-recognized identification areas to operate without remote identification; the producers of standard remote identification unmanned aircraft and the producers of broadcast modules submitting a declaration of compliance to the FAA for acceptance; entities submitting means of compliance to the FAA for acceptance; entities submitting requests to establish FAA-recognized identification areas; FAA approving means of compliance, declarations of compliance, and requests for designated flying fields, and developing information technology in support of the rule. The cost savings of this rule include relief provided to the FAA from avoided aviation safety inspector costs resulting from a reduction in hours expended on UAS investigations.

The FAA bases the analysis of this rule on a fleet forecast for small unmanned aircraft that includes base, low, and high scenarios. Accordingly, this analysis provides a range of net impacts from low to high based on these forecast scenarios. The FAA considers the base scenario as the primary estimate of net impacts of this rule. For the primary estimate, over a 10 year period of analysis this rule will result in present value net costs of $227.1 million at a three percent discount rate, with annualized net costs of $26.6 million. At a seven percent discount rate, this rule will result in present value net costs of $186.5 million, with annualized net costs of $26.6 million. The following table summarizes the quantified costs and cost savings of this rule for the three forecast scenarios.

Table 2: Net Costs of Final Rule ($Millions)*
Base Scenario – Primary Estimate

Affected Entity/Category	10 Year Present Value (at 3%)	Annualized (at 3%)	10 Year Present Value (at 7%)	Annualized (at 7%)
UAS Owners/Operators	181.3	21.2	144.9	20.6
UAS Producers (US and Foreign)	33.8	4.0	30.9	4.4
Developers of Remote Identification Means of Compliance	2.9	0.3	2.4	0.3
FAA-Recognized Identification Area Requests	0.6	0.1	0.6	0.1
FAA Costs	12.1	1.4	10.6	1.5
Total Costs	230.7	27.0	189.4	27.0
Cost Savings	(3.6)	(0.4)	(2.9)	(0.4)
Net Costs	227.1	26.6	186.5	26.6

*Table notes: (i) Column totals may not sum due to rounding and parenthesis, "( )", around numbers to indicate savings. (ii) The low and high forecast scenarios are not symmetric around the base—please see the forecast report for more information. The FAA Aerospace Forecast Fiscal Years 2020-2040, available at https://www.faa.gov/data_research/aviation/aerospace_forecasts/media/FY2020-40_FAA_Aerospace_Forecast.pdf. The forecast provides a base with high and low scenarios.

Table 3: Net Costs of Final Rule ($Millions)*
Low Scenario

Affected Entity/Category	10 Year Present Value (at 3%)	Annualized (at 3%)	10 Year Present Value (at 7%)	Annualized (at 7%)
UAS Owners/Operators	167.7	19.7	134.1	19.1
UAS Producers (US and Foreign)	33.8	4.0	30.9	4.4
Developers of Remote Identification Means of Compliance	2.9	0.3	2.4	0.3
FAA-Recognized Identification Area Requests	0.6	0.1	0.6	0.1
FAA Costs	12.1	1.4	10.6	1.5
Total Costs	217.1	25.4	178.6	25.4
Cost Savings	(3.5)	(0.4)	(2.8)	(0.4)
Net Costs	213.6	25.0	175.8	25.0

Table notes: Column totals may not sum due to rounding and parenthesis, "( )", around numbers to indicate savings.

Table 4: Net Costs of Final Rule ($Millions)*
High Scenario

Affected Entity/Category	10 Year Present Value (at 3%)	Annualized (at 3%)	10 Year Present Value (at 7%)	Annualized (at 7%)
UAS Owners/Operators	200.8	23.5	160.4	22.8
UAS Producers (US and Foreign)	33.8	4.0	30.9	4.4
Developers of Remote Identification Means of Compliance	2.9	0.3	2.4	0.3
FAA-Recognized Identification Area Requests	0.6	0.1	0.6	0.1
FAA Costs	12.1	1.4	10.6	1.5
Total Costs	250.2	29.3	204.9	29.2
Cost Savings	(3.7)	(0.4)	(3.0)	(0.4)
Net Costs	246.4	28.9	201.9	28.7

*Table notes: Column totals may not sum due to rounding and parenthesis, "( )", around numbers indicate savings.

The following table presents an itemized list of the base scenario or primary estimate of costs and cost savings from this rule.

Table 5: Remote Identification Costs and Cost Savings ($Millions)
Base Scenario—Primary Estimate

Affected Entity	10 Year Present Value (at 3%)	10 Year Present Value (at 7%)
UAS Owners/Operators		
Recreational		
Registration Updates	0.82	0.67
Travel Expense (Travel to FAA-recognized Identification Areas)	85.18	66.17
Broadcast Module	27.15	23.57
Standard Unmanned Aircraft	51.17	40.68
Part 107		
Registration	2.35	1.92
Broadcast Module	3.62	3.23
Standard Unmanned Aircraft	10.97	8.65
FAA-recognized Identification Area Requests		
Letters of Agreement Submission	0.64	0.56
UAS Manufacturers		
Declaration of Compliance	31.53	28.83
Industry Consensus Standard - Remote Identification	0.05	0.05
Industry Consensus Standard - Serial Number*	0.00	0.00
Labeling Requirement	2.22	2.03
Developers of Remote Identification Means of Compliance		
Industry Consensus Standard	1.25	1.10
Developers of Means of Compliance (Others)	1.65	1.30
FAA Costs		
Accept/Not Accept Means of Compliance	0.15	0.12
Accept/Not Accept Mfr Declaration of Compliance **	0.00	0.00
Web Portal Update - Registration/Notification	0.73	0.70
Approve/Disapprove Designated FAA-recognized Identification Areas	6.46	5.65
Website for Receiving Declarations of Compliance	4.72	4.14
Total Costs	230.69	189.38
Cost Savings: Reduced Hours for FAA UAS Investigations	(3.58)	(2.85)
Net Costs	227.11	186.53
Annualized Net Costs	26.62	26.56

*Serial number standard is available at zero cost to manufacturers.
**Automated approval through FAA DroneZone portal at no additional costs.
Note: Column totals may not sum due to rounding.

The key cost drivers of the rule are the total costs for remote identification equipage followed by travel expenses for a select group of recreational flyers. Total costs for remote identification equipage are about $93 million at a three percent discount rate and about $76 million at a seven percent discount rate. The annualized equipage cost is about $11 million at both a three percent discount rate and a seven percent discount rate. This impact represents 40.3

percent of the rule's total costs. The cost for a select group of operators to travel to an FAA-recognized identification area is 36.9 percent of the rule's total costs.

The FAA expects this rule will also provide important unquantified savings and efficiencies from reduced operational costs. The ability to identify and locate UAS provides additional situational awareness to manned and unmanned aircraft and critical information to law enforcement and other government officials. This will become increasingly important as the number of UAS operations in all classes of airspace grow. The following table summarizes unquantified savings from the final rule.

Table 6: Unquantified Savings

Savings	**Summary**
Reduced obsolescence of unmanned aircraft	Operators will be able to attach a remote identification broadcast module to their unmanned aircraft that enables them to identify remotely. Without this option, operators would be allowed to only operate within the boundaries of an FAA-recognized identification area.
Refined threat assessment	Remote identification provides near real-time information to security agencies and law enforcement organizations that will enhance threat assessments.
Promotes safety	Availability of near real-time information facilitated by remote identification discourages unsafe flying by operators of unmanned aircraft, thereby promoting safety for other users of the airspace of the United States and for those on the ground.
Supports industry innovation	Supports future industry and technology innovation by providing a performance-based framework for the development of current and future industry standards and means of compliance.

4. Alternatives Considered

The FAA considered both higher and lower cost alternatives for the final rule. The alternatives and the FAA's reasons for rejecting those alternatives are discussed below.

i. Alternative Compliance Periods - Producers

The chosen compliance period to estimate producer costs is 18 months beyond the effective date of the final rule. The FAA proposed a 2-year compliance date in the NPRM, and

considered it for the final rule as well. The reduction in the producer compliance period by 6 months reflects that the final rule removes the network requirement which alleviates technical complexities for producers of unmanned aircraft. Though no FAA-accepted means of compliance is currently available for producers to build to, there is an ASTM Standard Specification for Remote ID and Tracking available. Accordingly, the FAA believes it is practical for this industry consensus standard to be modified and submitted for acceptance as a means of compliance 6 months after the effective date of the final rule, allowing an additional year for producers to design, build, and test unmanned aircraft that meet the standard.

The final rule does not preclude earlier producer compliance, and there potentially could be economic incentive to comply earlier.

ii. Alternative Operational Compliance Period

The FAA considered allowing 3 years beyond the effective date of the final rule for owners and operators to comply with the remote identification requirements of this rule. However, the FAA determined that period of time was less preferable because it prolonged safety and security risks to air traffic and airports by delaying the ability of law enforcement personnel to identify unauthorized UAS operations. To reduce the delay in implementing remote identification, the owner/operator compliance period was reduced from 3 years after the effective date of the final rule to 30 months after the effective date of the final rule. For UAS purchased prior to the final rule or after the final rule is published, a broadcast module could be purchased to continue operating the unmanned aircraft for the entirety of its lifespan. In addition, the adopted alternative is more likely to reduce uncertainty of adverse impacts to producers with inventories of UAS produced before the compliance date that would likely not meet the remote identification provisions of the proposal.

iii. Requiring ADS-B Out

The FAA could have required transponders or ADS-B Out for unmanned aircraft as a means to identify those aircraft remotely. The FAA is prohibiting the use of transponders or ADS-B Out for remote identification of unmanned aircraft operations, with limited exceptions, for two primary reasons. First, the FAA expects that, due to the volume of unmanned aircraft operations projected, the additional radio frequency signals would saturate the available spectrum and degrade the overall cooperative surveillance system. Second, transponders and ADS-B Out do not provide any information about the location of control stations or takeoff locations, as these systems were designed for manned aircraft. For these reasons, the FAA has determined that existing cooperative surveillance systems are incapable of supporting unmanned aircraft remote identification. In addition, there would be a higher cost to equip under this alternative compared to the rule. The cost to equip unmanned aircraft with transponders and ADS-B Out would be $3,999 per aircraft.

iv. UAS Service Suppliers

The final rule considered a network solution that would require Remote ID USS to come forward to offer remote identification services to individuals operating UAS in the airspace of the United States. Throughout its integration of UAS into the airspace of the United States, the FAA has taken a phased, incremental approach that fosters industry innovation while meeting the safety and security concerns presented by the operations. The FAA believes this should be the case with remote identification of unmanned aircraft as well and has carefully considered the intent of the remote identification of unmanned aircraft.

Though the FAA continues to work toward full integration of UAS into the airspace of the United States, the FAA believes that the most appropriate step, at this time, is to establish a broadcast based remote identification system that provides for immediate awareness of unmanned aircraft in the widest variety of settings. The FAA is not adopting the requirement to transmit message elements through the Internet to a Remote ID USS in this rule. The FAA

believes broadcast alone is sufficient for the time being, given the types of unmanned aircraft operations that are currently allowed, to maintain the safety and security of the airspace of the United States.

v. Require Network Connectivity and Broadcast Capability

The FAA considered requiring network connectivity through a USS and a broadcast requirement for the final rule, but as adopted the rule contains only a broadcast requirement at this time. The FAA recognized concerns about an Internet connectivity requirement including Internet availability or connectivity issues, and increased costs for UAS upgrades, Internet data plans, and Remote ID USS subscriptions. The FAA acknowledges that the ability to connect to the Internet is dependent on a variety of factors including geographic coverage of cellular Internet networks, wide-scale network disruptions, or natural disasters.

The FAA notes that many current UAS are capable of broadcast but may have difficulty with the potential complexity and cost of integrating network capabilities to meet the standard remote identification requirements proposed in the NPRM. By shifting to the broadcast-only requirement, the dependency on an Internet connection as the sole means of providing remote identification information is removed and allows the unmanned aircraft to operate in areas where the Internet is unavailable. In addition, by incorporating a broadcast requirement, the FAA has determined that the 400-foot range limitation is no longer warranted and has removed this design constraint.

vi. Requiring Separate Certificate of Aircraft Registration for each Section 44809 Unmanned Aircraft

This rule retains the requirement for small unmanned aircraft owners to pay a $5 registration fee and a $5 renewal fee, but this final rule differs from the proposal which required a separate registration for each individual aircraft. As a result of the FAA's decision to maintain the current registration framework, owners of aircraft operated exclusively in compliance with

49 U.S.C. 44809 must only register once every 3 years for all aircraft meeting that description. Therefore, those owners would pay the $5 fee one time every 3 years, and not a $5 fee for each aircraft registered.

vii. Open FAA-Recognized Identification Areas to Entities Other than CBOs

The FAA considered allowing educational institutions and State and local governments to request FAA-recognized identification areas. The intent for allowing FAA-recognized identification areas is to minimize the regulatory burden for operators of existing unmanned aircraft used exclusively for educational purposes or by State and local government that do not have remote identification equipment, while still meeting the intent of the rule.

By identifying a defined location where operations of unmanned aircraft without remote identification would be occurring, the FAA-recognized identification area itself becomes the form of identification. Though the FAA considers that FAA-recognized identification areas may not be necessary for the majority of unmanned aircraft operators under this rule with the addition of the remote identification broadcast module option, the FAA recognizes an ongoing need for some operators such as educational science, technology, engineering, and math programs to have an option for flying their unmanned aircraft without remote identification. To support science, technology, engineering, and math programs and encourage participation in aviation for educational purposes, this rule will expand eligibility to educational institutions including institutions of primary and secondary education, trade schools, colleges, and universities. As adopted, community-based organizations will continue to be eligible to apply.

The FAA is including educational institutions at all levels in recognition of the critical role they play in providing pathways to aviation careers, whether through science, technology, engineering, and math curricula; the building and flight of unmanned aircraft; or other educational activities. The FAA determines it is appropriate to allow these educational institutions to request the establishment of FAA-recognized identification areas for their educational purposes. The FAA believes that extending the ability to request establishment of

FAA-recognized identification areas to educational institutions will provide a greater number of convenient locations for those operations and reduce costs associated with travel time to FAA-recognized identification areas.

The FAA also considered expanding eligibility for FAA-recognized identification areas to State and local governments. The FAA considers that expanding eligibility to CBOs and educational institutions at all levels is sufficient, and declines to expand eligibility to State and local governments. With the addition of the remote identification broadcast module option, the FAA considers there is now an available option for unmanned aircraft operators to retrofit their unmanned aircraft produced prior to the production compliance date. Expanding eligibility to State and local governments could expand the scope of FAA-recognized identification areas to an extent that would undermine the effectiveness of remote identification.

B. Regulatory Flexibility Act

The Regulatory Flexibility Act of 1980 (Pub. L. 96-354) (RFA) establishes "as a principle of regulatory issuance that agencies shall endeavor, consistent with the objectives of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of the businesses, organizations, and governmental jurisdictions subject to regulation. To achieve this principle, agencies are required to solicit and consider flexible regulatory proposals and to explain the rationale for their actions to assure that such proposals are given serious consideration." The RFA covers a wide range of small entities, including small businesses, not-for-profit organizations, and small governmental jurisdictions.

Agencies must perform a review to determine whether a rule will have a significant economic impact on a substantial number of small entities. If the Agency determines that it will, section 604 of the Act requires agencies to prepare a Final Regulatory Flexibility Analysis describing the impact of final rules on small entities.

The FAA has determined this rule will have a significant economic impact on a substantial number of small entities. Therefore, under the requirements in section 604 of the RFA, the Final Regulatory Flexibility Analysis must address:

- A statement of the need for, and objectives of, the rule;
- A statement of the significant issues raised by the public comments in response to the initial regulatory flexibility analysis, a statement of the assessment of the Agency of such issues, and a statement of any changes made in the proposed rule as a result of such comments;
- The response of the Agency to any comments filed by the Chief Counsel for Advocacy of the Small Business Administration in response to the proposed rule, and a detailed statement of any change made to the proposed rule in the final rule as a result of the comments;
- A description of and an estimate of the number of small entities to which the rule will apply or an explanation of why no such estimate is available;
- A description of the projected reporting, recordkeeping, and other compliance requirements of the rule, including an estimate of the classes of small entities that will be subject to the requirement and the type of professional skills necessary for preparation of the report or record; and
- A description of the steps the Agency has taken to minimize the significant economic impact on small entities consistent with the stated objectives of applicable statutes, including a statement of the factual, policy, and legal reasons for selecting the alternative adopted in the final rule and why each one of the other significant alternatives to the rule considered by the Agency which affect the impact on small entities was rejected.

1. A Statement of the Need for, and Objectives of, the Rule

The remote identification of unmanned aircraft is necessary to ensure public safety and the safety and efficiency of the airspace of the United States. The remote identification framework provides unmanned aircraft-specific data, which could be used in tandem with new

technologies and infrastructure to facilitate advanced operational capabilities (such as detect-and-avoid and aircraft-to-aircraft communications that support beyond visual line of sight operations). Remote identification of unmanned aircraft will allow the FAA, national security agencies, and law enforcement entities, to discern compliant airspace users from those potentially posing a safety or security risk.

Current rules for registration and marking of unmanned aircraft facilitate the identification of the owners of unmanned aircraft, but normally only upon physical examination of the aircraft. Existing electronic surveillance technologies, like transponders and ADS-B, were considered as potential solutions for the remote identification of unmanned aircraft but were determined to be unsuitable due to the lack of infrastructure for these technologies at lower altitudes and potential saturation of available radio frequency spectrum. Currently, the lack of real-time data regarding unmanned aircraft operations affects the ability of the FAA to oversee the safety and security of the airspace of the United States, creates challenges for national security agencies and law enforcement entities in identifying threats, and impedes the further integration of UAS into the airspace of the United States. The FAA addresses the identification issues associated with UAS by requiring the use of systems and technology to enable the remote identification of unmanned aircraft.

The final rule is consistent with the FAA's missions of promoting safe flight of civil aircraft through regulations necessary for safety in air commerce and national security and promoting the safe and efficient use of the navigable airspace. The rule also strengthens the FAA's oversight of UAS operations and supports efforts of law enforcement to address and mitigate disruptive behavior and hazards, which may threaten the safety and security of the airspace of the United States, other UAS, manned aviation, and persons and property on the ground. The near real-time access to remote identification information will also assist Federal security partners in threat discrimination—allowing them to identify an operator and make an informed decision regarding the need to take actions to mitigate a perceived security or safety

risk. The final rule enhances the FAA's ability to monitor compliance with applicable regulations; contributes to the FAA's ability to undertake compliance, enforcement, and educational actions required to mitigate safety risks; and incrementally advances the safe and secure integration of UAS into the airspace of the United States.

Statement of the legal basis. The FAA promulgates this rulemaking pursuant to various authorities. First, under 49 U.S.C. 40103(b)(1) and (2), the FAA is directed to issue regulations: (1) to ensure the safety of aircraft and the efficient use of airspace; and (2) to govern the flight of aircraft for purposes of navigating, protecting and identifying aircraft, and protecting individuals and property on the ground.

Second, under 49 U.S.C. 44701(a)(5), the FAA must promote safe flight of civil aircraft by prescribing regulations the FAA finds necessary for safety in air commerce and national security.

Third, under section 2202 of Pub. L. 114-190, the Administrator must convene industry stakeholders to facilitate the development of consensus standards for remotely identifying operators and owners of UAS and associated unmanned aircraft and to issue regulations or guidance based on any standards developed.

Fourth, under 49 U.S.C. 44805, the Administrator must establish a process for, among other things, accepting risk-based consensus safety standards related to the design and production of small UAS.

Fifth, under 49 U.S.C. 44805(b)(7), the Administrator must take into account any consensus identification standard regarding remote identification of unmanned aircraft developed pursuant to section 2202 of Pub. L. 114-190.

Sixth, under 49 U.S.C. 44809(f), the Administrator is not prohibited from promulgating rules generally applicable to unmanned aircraft, including those unmanned aircraft eligible for the exception for limited recreational operations of UAS. Among other things, this authority

extends to rules relating to the registration and marking of unmanned aircraft and the standards for remotely identifying owners and operators of UAS and associated unmanned aircraft.

Seventh, the FAA has authority to regulate registration of aircraft under 49 U.S.C. 44101–44106 and 44110–44113, which require aircraft to be registered as a condition of operation and establish registration requirements and registration processes.

Lastly, this rulemaking is promulgated under the authority described in 49 U.S.C. 106(f), which establishes the authority of the Administrator to promulgate regulations and rules, and 49 U.S.C. 40101(d), which authorizes the FAA to consider in the public interest, among other things, the enhancement of safety and security as the highest priorities in air commerce, the regulation of civil and military operations in the interest of safety and efficiency, and assistance to law enforcement agencies in the enforcement of laws related to regulation of controlled substances, to the extent consistent with aviation safety.

Objectives for the final rule. The FAA is integrating UAS operations into the airspace of the United States through a phased, incremental, and risk-based approach.[55] On June 28, 2016, the FAA achieved a major step towards UAS integration when it issued the final rule for Operation and Certification of Small Unmanned Aircraft Systems.[56] This was one of multiple UAS-related regulatory actions taken by the FAA to enable the safe integration of UAS into the airspace of the United States. As technology progresses and the utility of UAS increases, the FAA anticipates a need for further rulemaking to continue to foster the safe, secure, and efficient use of the airspace of the United States. The FAA believes that the next step in the regulatory process involves the enactment of regulatory requirements to enable the remote identification of UAS operating in the airspace of the United States.

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[55] Consult http://www.faa.gov/uas for additional information regarding UAS operations.

[56] 81 FR 42064.

This action would implement requirements for the remote identification of UAS. The remote identification of UAS in the airspace of the United States would address safety, security, and law enforcement concerns regarding the further integration of these aircraft into the airspace.

2. A Statement of the Significant Issues Raised by the Public Comments in Response to the Initial Regulatory Flexibility Analysis, a Statement of the Assessment of the Agency of Such Issues, and a Statement of Any Changes Made in the Proposed Rule as a Result of Such Comments

FAA is not aware of any comments specific to the regulatory flexibility analysis; however, many commenters stated that small businesses would be adversely affected. Commenters that stated that compliance with the remote identification requirements as proposed would be too costly for many recreational operators and businesses, many of which are small. The commenters suggested that many recreational operators and owners, especially those involved in flying and building remote controlled aircraft, would cease pursuing the hobby or business, because of the cost to either upgrade or replace existing aircraft to meet the proposed standard and the cost to subscribe to Internet service. Commenters suggested that there does not exist an off-the-shelf solution, such as software upgrades, to retrofit most recreational aircraft.

The FAA has attempted to alleviate complexity and costs of compliance for all operators of unmanned aircraft by removing the network requirement from the final rule and allowing remote identification using a stand-alone broadcast module at this time. The concept allows unmanned aircraft built without remote identification (e.g., existing unmanned aircraft fleet, home-built unmanned aircraft) to be operated outside of FAA-recognized identification areas because the broadcast modules enable the unmanned aircraft to broadcast the remote identification message elements required by this rule.

The FAA decided to incorporate this new concept into this rule after reviewing public comments and considering the significant concerns raised with respect to the remote identification UAS framework. The FAA determined a remote identification broadcast module

facilitates compliance with this rule and meets the safety and security needs under this rule of the FAA, national security agencies, and law enforcement. The concept is broadcast-based and does not require a person to connect to the Internet to identify remotely, as the limited remote identification UAS proposal did. This shift allows unmanned aircraft equipped with remote identification broadcast modules to operate in areas where the Internet is unavailable. In addition, by making this a broadcast solution, the FAA has determined that the 400-foot range limitation included in the proposed requirements for limited remote identification UAS is no longer warranted and has removed the design constraint.

3. The Response of the Agency to Any Comments Filed by the Chief Counsel for Advocacy of the Small Business Administration in Response to the Proposed Rule, and a Detailed Statement of Any Change Made to the Proposed Rule in the Final Rule as a Result of the Comments.

The Chief Counsel for Advocacy of the Small Business did not submit comments to the proposed rule.

4. A Description of and an Estimate of the Number of Small Entities to Which the Rule Will Apply or an Explanation of Why No Such Estimate is Available

The rule could apply to three communities of small entities: producers of unmanned aircraft, entities that either own or operate UAS, and community-based organizations.

For purposes of this rulemaking, the FAA estimates that there are approximately 188 United States entities that produce small unmanned aircraft.[57] Out of these 188 United States entities, data on entity size, as defined by number of employees, was available for 157 of the entities. Out of these 157, 132 are categorized as small, 11 are categorized as medium, and 12 are

[57] AUVSI Air Platform Database. Accessed July 2020.

categorized as large.[58] Data for the remaining entities was not available and thus the categorization by entity size could not be determined, however a majority of these entities are believed to be small. NAICS code 336411 is titled "Miscellaneous Aircraft Manufacturing," and includes the manufacture of unmanned and robotic aircraft. The SBA defines industries within this code to be small if they employ 1,500 employees or less.

The next group of entities affected by the final rule are owners and operators of UAS that conduct operations for purposes other than recreational. While the FAA does not collect entity size information when owners register unmanned aircraft, the Association for Unmanned Vehicle Systems International (AUVSI) has performed an analysis of part 107 waivers issued and determined that 92 percent of the waivers were issued to entities with fewer than 100 employees.[59] Based on the AUVSI analysis, the FAA determines that a majority of entities operating unmanned aircraft for other than recreational purposes are small.

Model aircraft clubs[60] currently operating flying sites are affected by this rulemaking. To have an established flying site approved as an FAA-recognized identification area, these organizations would be required to submit a request to the FAA. Based on an AMA (Academy of Model Aeronautics) membership of 180,000,[61] it is estimated that each flying club has, on average, 82 members.[62] For NAICS code 713990 "All Other Amusement and Recreation Activities" the SBA standard for small entity size is less than $7.5 million in annual receipts. Financial records for these individual community-based organizations are not public information,

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[58] This is based on AUVSI criteria for number of employees. The AUVSI criteria for a manufacturer of unmanned aircraft to be identified as a small entity is 49 employees or fewer. The criteria to be identified as a medium entity is 50-499 employees. Large entities are determined to have 500 or more employees.

[59] (AUVSI) Association of Unmanned Vehicle Systems International. As of April 2020, 4,144 waivers had been issued. For those waivers that could be identified by entity size, 85.5 percent were granted to entities with less than 10 employees), and 6.7 percent were granted to entities with 10 to 100 employees.

[60] Academy of Model Aeronautics (AMA), *http://www.modelaircraft.org/aboutama/whatisama.aspx*; more than 2,500 AMA clubs.

[61] http://amablog.modelaircraft.org/amagov/files/2020/02/AMA-Letter-to-Sec-Chao-on-Remote-ID-Hobbyist-Impact-2-12-20-.pdf

[62] Ibid. Based on 2020 AMA membership of 180,000 and approximately 2,200 AMA fields, the average membership per field is estimated to be 82 individuals.

but it is believed that none have receipts totaling $7.5 million, and thus each is considered a small entity.

The FAA determines that a majority of entities impacted by this proposed rule are small. Therefore, the FAA determines this proposed rule would have a significant economic impact on a substantial number of small entities.

5. A Description of the Projected Reporting, Recordkeeping and Other Compliance Requirements of the Rule, Including an Estimate of the Classes of Small Entities That Will be Subject to the Requirement and the Type of Professional Skills Necessary for Preparation of the Report or Record.

This rule imposes recordkeeping requirements. The FAA proposed changes to the registration requirements for all unmanned aircraft, including small unmanned aircraft, in the NPRM. While the FAA is not finalizing all of the registration changes proposed, this final rule finalizes certain requirements for all persons registering unmanned aircraft. As of the effective date of this final rule, an applicant requesting registration of an unmanned aircraft is required to submit the following information: the applicant's name, physical address, email address, and telephone number(s); the aircraft manufacturer and model name; the serial number of the standard remote identification unmanned aircraft or the serial number of the remote identification broadcast module; and other information as required by the Administrator.

Next, the FAA requires persons who develop standards that the FAA may accept as a means of compliance to submit those standards for review and acceptance by the FAA. A person who submits a means of compliance is required to retain the data for as long as the means of compliance is accepted, plus an additional 24 calendar months.

The FAA is requiring persons who produce unmanned aircraft with remote identification to meet the minimum performance requirements of the rule using an FAA-accepted means of compliance. To demonstrate the unmanned aircraft has been produced to meet the minimum performance requirements using an FAA-accepted means of compliance, persons responsible for

the production of unmanned aircraft would be required to submit to the FAA a declaration of compliance. A person who submits a declaration of compliance is required to retain the data submitted for 24 calendar months after the cessation of production of the unmanned aircraft with remote identification.

The rule requires a producer to label the unmanned aircraft to show that it was produced with remote identification technology capable of meeting the rule. The labeling requirement would inform the operator that the unmanned aircraft is eligible to conduct operations within the airspace of the United States.

Standard remote identification unmanned aircraft and unmanned aircraft equipped with a remote identification broadcast module must be designed and produced to broadcast certain message elements using unlicensed radio frequency spectrum. The disclosure of this information in the form of message elements is necessary to comply with the statutory requirement to develop standards for remotely identifying operators and owners of UAS and associated unmanned aircraft. Remote identification of unmanned aircraft would provide airspace awareness to the FAA, national security agencies, law enforcement entities, and other government officials which could be used to distinguish compliant airspace users from those potentially posing a safety or security risk.

Authorized representatives of CBOs and educational institutions may request the establishment of an FAA-recognized identification area by submitting an application in a form and manner acceptable to the Administrator. The application will collect certain information regarding the location and requirements of the flying site, and require the CBO representative to confirm certain information regarding the site.

6. A Description of the Steps the Agency Has Taken to Minimize the Significant Economic Impact on Small Entities Consistent With the Stated Objectives of Applicable Statutes, Including a Statement of the Factual, Policy, and Legal Reasons for Selecting the Alternative Adopted in the Final Rule and Why Each One of the Other Significant Alternatives to the Rule Considered by the Agency Which Affect the Impact on Small Entities Was Rejected.

The FAA considered both higher and lower cost alternatives as part of the proposed rule because the RFA requires the Agency to consider significant regulatory alternatives that meet the Agency's statutory objectives and minimize the costs to small entities. The FAA rejected the costlier alternatives due to policy considerations and the undue burden imposed on small unmanned aircraft operators. The less costly alternatives and the FAA's reasons for either rejecting those alternatives, or adopting them for the final rule, are discussed below.

i. Alternative Compliance Periods - Producers

The chosen compliance period to estimate producer costs is 18 months beyond the effective date of the final rule. The FAA proposed a 2-year compliance date in the NPRM, and considered it for the final rule as well. The reduction in the producer compliance period by 6 months reflects that the final rule removes the network requirement for the time being, which alleviates technical complexities for producers of unmanned aircraft. Though no FAA-accepted means of compliance is currently available for producers to build to, there is an ASTM Standard Specification for remote identification and tracking available. Accordingly, the FAA believes it is practical for this industry consensus standard to be modified and submitted for acceptance as a means of compliance 6 months after the effective date of the final rule, allowing an additional year for producers to design, build, and test unmanned aircraft that meet the standard.

The FAA has not identified or analyzed an alternative based on the final rule's requirements. The rule does not preclude earlier producer compliance, and there potentially could be economic incentive to comply earlier.

ii. Alternative Operational Compliance Periods

The FAA considered allowing 3 years beyond the effective date of the final rule for owners and operators to comply with the remote identification requirements of this rule. However, the FAA determined that period of time was less preferable because it prolonged safety and security risks to air traffic and airports by delaying the ability of law enforcement personnel to identify unauthorized UAS operations. To reduce the delay in implementing remote identification, the owner/operator compliance period was reduced from 3 years after the effective date of the final rule to 30 months after the effective date of the final rule. For UAS purchased prior to the final rule or after the final rule is published, a stand-alone broadcast module could be purchased to continue operating the unmanned aircraft for its natural lifespan. Permitting stand-alone broadcast modules is a simple and minimally burdensome solution that lowers the cost for existing manufactured and amateur-built unmanned aircraft to meet the remote identification requirements via broadcast. In addition, this alternative is likely to reduce uncertainty of adverse impacts to producers with inventories of unmanned aircraft produced before the compliance date that would likely not meet the remote identification provisions of the proposal.

iii. Require Network Connectivity and Broadcast Capability

The FAA considered requiring network connectivity through a USS in addition to the broadcast requirement that the final rule adopts. However, the FAA recognized concerns about an Internet connectivity requirement including Internet availability or connectivity issues; increased costs for unmanned aircraft upgrades, Internet data plans, and Remote ID USS subscriptions; and reduced air and ground risk when operating in remote areas with less air traffic and lower population density. The FAA acknowledges that the ability to connect to the Internet is dependent on a variety of factors including geographic coverage of cellular Internet networks, wide-scale network disruptions, or natural disasters.

There are some remote areas where an operator cannot connect to the Internet, such as locations where cellular or other Internet signals are not available or sufficient to establish and

maintain a connection to a Remote ID USS. While loss of the broadcast capability is an indication of a remote identification equipment failure, loss of connectivity to the Internet or a Remote ID USS could be attributed to a lack of Internet availability that is outside the control of the UAS operator. A functioning broadcast capability is necessary for remote identification information to be available in areas that do not have Internet availability. Therefore, the proposed regulations have been updated to reflect that the required remote identification message elements must be broadcast from the unmanned aircraft, with no Internet connectivity or Remote ID USS transmission requirements.

The FAA notes that many current unmanned aircraft are capable of broadcasting information but may have difficulty with the potential complexity and cost of integrating network capabilities to meet proposed standard remote identification requirements. By incorporating the broadcast-only requirement, the dependency on an Internet connection as the sole means of providing remote identification information is removed, and allows the unmanned aircraft to operate in areas where the Internet is unavailable. In addition, by incorporating a broadcast requirement, the FAA has determined that the 400-foot range limitation is no longer warranted and has removed this design constraint. The previously proposed limited remote identification UAS concept is being replaced with the remote identification broadcast module to provide a simpler, cost-effective method for existing and amateur-built unmanned aircraft to meet the remote identification requirements.

iv. Requiring Separate Certificate of Aircraft Registration for each Section 44809 Unmanned Aircraft

This rule retains the requirement for small unmanned aircraft owners to pay a $5 registration fee and a $5 renewal fee, though this rule differs from the proposal in the NPRM to require a separate registration for each individual aircraft. As a result of the FAA's decision to maintain the current registration framework, owners of aircraft operated exclusively in compliance with 49 U.S.C. 44809 must only register once for all aircraft meeting that

description. Therefore, those owners would pay the $5 fee one time every 3 years, and not a $5 fee for each aircraft registered.

v. Open FAA-Recognized Identification Areas to Entities Other than CBOs

The FAA considered allowing educational institutions and State and local governments to request FAA-recognized identification areas if it would reduce regulatory burden while meeting the intent of the rule.

By identifying a defined location where operations of UAS without remote identification would be occurring, the FAA-recognized identification area itself becomes the form of identification. Though the FAA considers that FAA-recognized identification areas may not be necessary for the majority of unmanned aircraft operators under this rule with the addition of the remote identification broadcast module option, the FAA recognizes an ongoing need for some operators such as educational science, technology, engineering, and math programs to have an option for operating without remote identification. To support science, technology, engineering, and math programs and encourage participation in aviation for educational purposes, this rule will expand eligibility to educational institutions including institutions of primary and secondary education, trade schools, colleges, and universities. As adopted, community-based organizations will continue to be eligible to apply.

The FAA is including educational institutions at all levels in recognition of the critical role they play in providing pathways to aviation careers, whether through science, technology, engineering, and math curricula; the building and flight of unmanned aircraft; or other educational activities. The FAA determines it is appropriate to allow these educational institutions to request the establishment of FAA-recognized identification areas. The FAA believes that extending the ability to request establishment of FAA-recognized identification areas to educational institutions will provide more convenient locations for those operations and reduce costs associated with travel time to FAA-recognized identification areas.

The FAA also considered expanding eligibility for FAA-recognized identification areas to State and local governments. The FAA considers that expanding eligibility to CBOs and educational institutions at all levels is sufficient, and declines to expand eligibility to State and local governments. With the addition of the remote identification broadcast module option, the FAA considers there is now an available option for operators to retrofit their unmanned aircraft produced prior to the production compliance date. Expanding eligibility to State and local governments could expand the scope of FAA-recognized identification areas to an extent that would undermine the effectiveness of remote identification.

C. International Trade Impact Assessment

The Trade Agreements Act of 1979 (Pub. L. 96-39), as amended by the Uruguay Round Agreements Act (Pub. L. 103-465), prohibits Federal agencies from establishing standards or engaging in related activities that create unnecessary obstacles to the foreign commerce of the United States. Pursuant to these Acts, the establishment of standards is not considered an unnecessary obstacle to the foreign commerce of the United States, so long as the standard has a legitimate domestic objective, such as the protection of safety, and does not operate in a manner that excludes imports that meet this objective. The statute also requires consideration of international standards and, where appropriate, that they be the basis for United States standards.

The FAA has assessed the potential effect of this rule and determined that it ensures the safety of the American public and does not exclude imports that meet this objective. As a result, the FAA does not consider this final rule as creating an unnecessary obstacle to foreign commerce.

D. Unfunded Mandates Assessment

Title II of the Unfunded Mandates Reform Act of 1995 (Pub. L. 104-4) requires each Federal agency to prepare a written statement assessing the effects of any Federal mandate in a proposed or final agency rule that may result in an expenditure of $100 million or more (in 1995

dollars) in any 1 year by State, local, and tribal governments, in the aggregate, or by the private sector; such a mandate is deemed to be a "significant regulatory action." The FAA currently uses an inflation-adjusted value of about $155 million in lieu of $100 million. This final rule does not contain such a mandate; therefore, the requirements of Title II of the Act do not apply.

E. Paperwork Reduction Act

The Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)) requires that the FAA consider the impact of paperwork and other information collection burdens imposed on the public. The FAA sought public comments on all of the information collections being established or revised in this rule. The FAA did not receive any comments specific to the information collection-related aspects of the proposed rule. The FAA is implementing these collections based on the requirements of this rule as published in the NPRM.

Five new information collections are established as part of this rule.

1. New Information Collection: 2120-0785: Additional Elements for Small Unmanned Aircraft Registration System

This rule finalizes several changes to the registration requirements for small unmanned aircraft registering under part 48. Specifically, the FAA is establishing a new information collection to add the following information to the list of information collected upon registration or registration renewal of small unmanned aircraft under information collection 2120-0765, Small Unmanned Aircraft Registration System:

(1) Applicant's telephone number(s) and, for an applicant other than an individual, the telephone number(s) of the authorized representative.

(2) For any standard remote identification unmanned aircraft, the serial number issued by the manufacturer of the unmanned aircraft in accordance with the design and production requirements of part 89. The serial number provided in this application must not be listed on more than one Certificate of Aircraft Registration at the same time.

(3) For any unmanned aircraft equipped with a remote identification broadcast module, the serial number issued by the manufacturer of the remote identification broadcast module in accordance with the design and production requirements of part 89. An applicant may submit the serial number of more than one remote identification broadcast module as part of the application for aircraft registration under § 48.105. The serial number of a remote identification broadcast module provided in this application must not be listed on more than one Certificate of Aircraft Registration at the same time.

The FAA recognizes that persons who currently register their small unmanned aircraft other than exclusively for limited recreational operations are already required to provide the manufacturer, model, and serial number, if available. Therefore, these persons will only need to update their registration with one or more telephone numbers.

Persons who have registered their unmanned aircraft exclusively for limited recreational operations will need to provide one or more telephone numbers, and will need to list one or more unmanned aircraft serial numbers or remote identification broadcast module serial numbers if they wish to operate their unmanned aircraft outside FAA-recognized identification areas.

Use: The FAA would use the telephone number, manufacturer, model, and serial number of the unmanned aircraft or remote identification broadcast module to assist with the remote identification of unmanned aircraft systems. The serial number, which may be broadcast as the unique identifier of an unmanned aircraft, would help to identify the aircraft and associate the aircraft with its owner. The FAA would use the telephone number of the owner to disseminate safety and security-related information to the registrant as well as issues related to compliance.

Table 7: Small Unmanned Aircraft Registration – Incremental Hourly Burden and Cost ($Mil.)

Year	Registrations	Hourly Burden	Total Cost ($Mil.)
1	552,046	9,201	$0.29
2	819,428	13,657	$0.37
3	748,983	12,483	$0.36

Year	Registrations	Hourly Burden	Total Cost ($Mil.)
Total	2,120,457	35,341	$1.02

Row and column totals may not sum due to rounding.

2. New Information Collection: 2120-0782, Identification of Foreign-Registered Civil Unmanned Aircraft Operating in the Airspace of the United States

The FAA is extending the operational requirements of part 89 to persons operating foreign civil unmanned aircraft in the United States. These persons must comply with the remote identification requirements, which means that these persons are required to operate foreign civil unmanned aircraft that qualify as standard remote identification unmanned aircraft, unmanned aircraft equipped with a remote identification broadcast module, or that have no remote identification equipment, but are operated within an FAA-recognized identification area.

The FAA will allow a person to operate foreign-registered civil unmanned aircraft in the United States only if the person submits a notice of identification to the Administrator. The notice is required to have the following information to allow FAA to associate an unmanned aircraft to a responsible person:

(1) The name of the person operating the foreign registered civil unmanned aircraft in the United States, and, if applicable, the person's authorized representative.

(2) The physical address of the person operating the foreign registered civil unmanned aircraft in the United States, and, if applicable, the physical address for the person's authorized representative. If the operator or authorized representative does not receive mail at the physical address, a mailing address must also be provided.

(3) The telephone number(s) where the person operating the foreign registered civil unmanned aircraft in the United States, and, if applicable, the person's authorized representative can be reached while in the United States.

(4) The email address of the person operating the foreign registered civil unmanned aircraft in the United States, and, if applicable, the email address of the person's authorized representative.

(5) The unmanned aircraft manufacturer and model name.

(6) The serial number of the unmanned aircraft or remote identification broadcast module.

(7) The country of registration of the unmanned aircraft.

(8) The registration number.

Once a person submits a notice of identification, the FAA will issue a confirmation of identification. A person operating a foreign-registered civil unmanned aircraft in the United States will have to maintain the confirmation of identification at the unmanned aircraft' control station, and will have to produce it when requested by the FAA or a law enforcement officer. The holder of a confirmation of identification will have to ensure that the information provided remains accurate and is current prior to operating a foreign-registered civil unmanned aircraft in the United States.

Use: The FAA uses information provided by operators of foreign-registered civil unmanned aircraft operating in the airspace of the United States to identify those aircraft.

Table 8: Notice of Identification (Unit Cost)

Year	Minutes to Establish Account[63]	Additional Minutes Per Aircraft	Total Minutes	Part 107 Opportunity Cost of Time ($0.794/Minute)[64]	Recreational Flyer Opportunity Cost of Time ($0.242/Minute)[65]

[63] *https://www.faa.gov/news/updates/media/2015-12-13_2120-AK82_RIA.pdf*. See Page 13 of the Regulatory Impact Analysis of the Interim Final Rule Regulatory Evaluation for the Registration and Marking Requirements for Small Unmanned Aircraft. RIN 2120-AK82.

[64] The hourly wage earned by part 107 operators is estimated to be $33.33 per hour. The fully-burdened hourly wage (compensation + benefits) uses a load factor 1.43 for a total of $47.66 per hour. ($0.794 per minute).

[65] Department of Transportation Departmental Guidance on Valuation of Travel Time in Economic Analysis, September 27, 2016. Table 4 Recommended Hourly Values of Travel Time Savings, Page 17. In constant dollars, the hourly value of time for personal travel is $14.52 per hour ($.242 per minute). This value is used as a proxy for the value of time of someone operating UAS for recreational operations.

Year	Minutes to Establish Account[63]	Additional Minutes Per Aircraft	Total Minutes	Part 107 Opportunity Cost of Time ($0.794/Minute)[64]	Recreational Flyer Opportunity Cost of Time ($0.242/Minute)[65]
1	5	1	6	$4.76/notification	$1.45/notification
2	5	1	6	$4.76/notification	$1.45/notification
3	5	1	6	$4.76/notification	$1.45/notification

3. New Information Collection: 2120-0781, Remote Identification Means of Compliance, Declaration of Compliance, and Labeling Requirements

i. Means of Compliance

The FAA is requiring persons who develop standards that the FAA may accept as means of compliance for the production of standard remote identification unmanned aircraft and remote identification broadcast modules to submit those standards for review and acceptance by the FAA. The means of compliance will include requirements for producer demonstration of how the standard remote identification unmanned aircraft or remote identification broadcast module performs its intended functions and meets the performance requirements by analysis, ground test, or flight test, as appropriate. A person who submits a means of compliance that is accepted by the FAA is required to retain the following data for as long as the means of compliance is accepted and an additional 24 calendar months: all documentation and substantiating data submitted for the acceptance of the means of compliance; records of all test procedures, methodology, and other procedures, if applicable; and any other information necessary to justify and substantiate how the means of compliance enables compliance with the remote identification requirements of part 89.

Use: The FAA uses the means of compliance as a way for persons responsible for the production of standard remote identification unmanned aircraft or remote identification broadcast

modules to demonstrate compliance with the requirements for remote identification of unmanned aircraft.

Table 9: Means of Compliance

Hourly Burden and Cost

Year	Means Of Compliance Submitted	Total Pages	Hrs Per Page	Total Hrs	Cost Per Hour	Total Cost
1	1	12	1	12	$94.52	$1,134.24
2	1	12	1	12	$94.52	$1,134.24
3	1	12	1	12	$94.52	$1,134.24
Total	3	36	3	36		$3,402.72

Row and column totals may not sum due to rounding.

ii. Declaration of Compliance

The FAA is requiring persons responsible for the production of standard remote identification unmanned aircraft and remote identification broadcast modules to produce those unmanned aircraft and broadcast modules to meet the minimum performance requirements of the rule using an FAA-accepted means of compliance.

To demonstrate that a standard remote identification unmanned aircraft has been produced using an FAA-accepted means of compliance, producers are required to submit to the FAA a declaration of compliance containing:

- The name, physical address, telephone number, and email address of the person responsible for production of the standard remote identification unmanned aircraft.
- The unmanned aircraft make and model.
- The unmanned aircraft's serial number, or the range of serial numbers for which the person responsible for production is declaring compliance.
- The FCC Identifier of the 47 CFR part 15-compliant radio frequency equipment used and integrated into the unmanned aircraft.
- The means of compliance used in the design and production of the unmanned aircraft.

- Whether the declaration of compliance is an initial declaration or an amended declaration, and if the declaration of compliance is an amended declaration, the reason for the amendment.
- A declaration that the person responsible for the production of the unmanned aircraft:
    - Can demonstrate that the unmanned aircraft was designed and produced to meet the minimum performance requirements of standard remote identification unmanned aircraft by using an FAA-accepted means of compliance.
    - Will, upon request, allow the Administrator to inspect its facilities, technical data, and any unmanned aircraft produced with remote identification, and to witness any tests necessary to determine compliance with part 89, subpart D.
    - Will perform independent audits on a recurring basis, and whenever the FAA provides notice of noncompliance or of potential noncompliance, to demonstrate compliance with the requirements of subpart F of part 89, and will provide the results of those audits to the FAA upon request.
    - Will maintain product support and notification procedures to notify the public and the FAA of any defect or condition that causes the unmanned aircraft to no longer meet the requirements of subpart F of part 89, within 15 calendar days of the date the person becomes aware of the defect or condition.
- A statement that 47 CFR part 15-compliant radio frequency equipment is used and is integrated into the unmanned aircraft without modification to its authorized radio frequency parameters.[66]

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[66] As part of the acceptance process, the FAA will rely on an applicant's statement that the equipment complies with FCC regulations. The FAA's acceptance of a declaration of compliance is not a determination that the equipment is in compliance with FCC regulations. The FAA notes that an applicant who falsely asserts that the equipment is in compliance with FCC regulations may be subject to civil and criminal penalties, as well as administrative action pursuant to 18 U.S.C. 1001 and 14 CFR 89.5.

To demonstrate that a remote identification broadcast module has been produced using an FAA-accepted means of compliance, producers are required to submit to the FAA a declaration of compliance containing:

- The name, physical address, telephone number, and email address of the person responsible for production of the remote identification broadcast module.
- The remote identification broadcast module make and model.
- The remote identification broadcast module serial number, or the range of serial numbers for which the person responsible for production is declaring compliance.
- The FCC Identifier of the 47 CFR part 15-compliant radio frequency equipment used and integrated into the remote identification broadcast module.
- The means of compliance used in the design and production of the remote identification broadcast module.
- Whether the declaration of compliance is an initial declaration or an amended declaration, and if the declaration of compliance is an amended declaration, the reason for the amendment.
- A declaration that the person responsible for the production of the remote identification broadcast module:
    - Can demonstrate that the broadcast module was designed and produced to meet the minimum performance requirements of remote identification broadcast modules by using an FAA-accepted means of compliance.
    - Will, upon request, allow the Administrator to inspect its facilities, technical data, and any remote identification broadcast modules produced, and to witness any tests necessary to determine compliance with part 89, subpart D.
    - Will perform independent audits on a recurring basis, and whenever the FAA provides notice of noncompliance or of potential noncompliance, to demonstrate

compliance with the requirements of subpart F of part 89, and will provide the results of those audits to the FAA upon request.

  - Will maintain product support and notification procedures to notify the public and the FAA of any defect or condition that causes the remote identification broadcast module to no longer meet the requirements of subpart F of part 89, within 15 calendar days of the date the person becomes aware of the defect or condition.
  - Will make available instructions for installing and operating the remote identification broadcast module to any person operating an unmanned aircraft with the remote identification broadcast module.

- A statement that 47 CFR part 15-compliant radio frequency equipment is used and is integrated into the remote identification broadcast module without modification to its authorized radio frequency parameters, and a statement that instructions have been provided for installation of 47 CFR part 15-compliant remote identification broadcast module without modification to the broadcast module's authorized radio frequency parameters.

A person who submits a declaration of compliance that is accepted by the FAA is required to retain the following data for 24 calendar months after the cessation of production of the standard remote identification unmanned aircraft or remote identification broadcast module: the means of compliance, all documentation, and substantiating data related to the means of compliance used; records of all test results; and any other information necessary to demonstrate compliance with the means of compliance so that the unmanned aircraft or broadcast module meets the remote identification requirements of part 89.

Use: The FAA uses the declaration of compliance to determine that the person responsible for the production of standard remote identification unmanned aircraft or remote identification broadcast modules has demonstrated compliance with the requirements for remote identification of unmanned aircraft.

Table 10: Declaration of Compliance
Hourly Burden and Cost ($Mil)

Year	Declaration of Compliance Submitted	Pages Per Declaration of Compliance	Hours Per Page	Hourly Burden	Cost Per Hour	Total Cost
1						
2	1,346.1	50	1 hour	67,305	$83.79	$5.64
3	18.9	50	1 hour	945	$83.79	$0.08
Total	1,365			68,250	$83.79	$5.72

Row and column totals may not sum due to rounding.

iii. Labeling

For standard remote identification unmanned aircraft and remote identification broadcast modules, the rule requires the person responsible for production of the unmanned aircraft or broadcast module to label the unmanned aircraft or broadcast module to show that it was produced with remote identification technology that meets the requirements of the rule. The label would be in English and be legible, prominent, and permanently affixed to the unmanned aircraft or broadcast module. The proposed labeling requirement assists the operator to know that his or her unmanned aircraft or broadcast module is eligible to conduct operations within the airspace of the United States.

Use: The labeling requirement assists the FAA and owners and operators of unmanned aircraft and broadcast modules to determine if the unmanned aircraft or broadcast module meets the remote identification requirements of the rule.

Table 11: Labeling Requirement
Hourly Burden and Cost ($Mil.)

Year	Number of Platforms	Hours Per Design	Hourly Burden	Cost Per Hour	Total Cost
1					
2	1,282	2	2,564	$83.79	$0.215
3	18	2	36	$83.79	$0.003
Total	1,300		2,600	$83.79	$0.218

Row and column totals may not sum due to rounding.

4. New Information Collection: 2120-0783, Remote Identification Message Elements

Standard remote identification unmanned aircraft and unmanned aircraft equipped with a remote identification broadcast module must be designed and produced to broadcast certain message elements using unlicensed radio frequency spectrum. The remote identification requirements to broadcast the message elements are consistent with the statutory authority allowing FAA to promulgate rules generally applicable to unmanned aircraft relating to the standards for remotely identifying owners and operators of UAS and associated unmanned aircraft.[67]

Remote identification of unmanned aircraft would provide airspace awareness to the FAA, national security agencies, law enforcement entities, and other government officials. The information can be used to distinguish compliant airspace users from those potentially posing a safety or security risk.

No person would be able to operate an unmanned aircraft required to have remote identification within the airspace of the United States unless the unmanned aircraft is capable of broadcasting certain message elements. Persons operating unmanned aircraft would comply with remote identification in one of three ways. First, standard remote identification unmanned aircraft would broadcast those message elements directly from the unmanned aircraft. These message elements would include the unique identifier (either the unmanned aircraft's serial number or session ID), latitude, longitude, and geometric altitude of both the control station and the unmanned aircraft, the velocity of the unmanned aircraft, a time mark, and an emergency status code that would be broadcast-only when applicable. A standard remote identification unmanned aircraft that could no longer broadcast the message elements would have to land as soon as practicable.

Second, unmanned aircraft without remote identification could equip with a remote identification broadcast module by either a software upgrade or by securing the module to the

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[67] See 49 U.S.C. 44809.

unmanned aircraft prior to takeoff. The broadcast module would broadcast the message elements directly from the unmanned aircraft. These message elements would include the unique identifier (the unmanned aircraft's serial number); latitude, longitude, and geometric altitude of both the takeoff location and the unmanned aircraft; the velocity of the unmanned aircraft; and a time mark. Unmanned aircraft with remote identification broadcast modules would have to be operated such that the person manipulating the flight controls of the UAS is able to see the unmanned aircraft at all times throughout the operation.

The third way to comply with the unmanned aircraft remote identification requirements would be to operate an unmanned aircraft without remote identification at an FAA-recognized identification area. Because these types of operations do not involve the broadcast of message elements, they were not considered as part of this information collection.

Use: The remote identification message elements are broadcast from the standard remote identification unmanned aircraft or remote identification broadcast module using unlicensed radio frequency spectrum.

The following table shows the number of estimated respondents that would broadcast messages.

Table 12: Broadcast Message Elements

Year	Remote ID Respondents
1	
2	269,600
3	1,160,669
Total	1,430,269

5. New Information Collection: 2120-0784, Application for FAA-Recognized Identification Areas

The FAA will allow CBO representatives and representatives of educational institutions to submit applications for flying sites to become FAA-recognized identification areas in a form and manner acceptable to the FAA. The application collects certain information regarding the

location of the flying site, and requires the representative to confirm certain information regarding the site.

An applicant for an FAA-recognized identification area would be required to submit: (1) the name of the eligible person under § 89.205; (2) the name of the individual making the request on behalf of the eligible person; (3) a declaration that the individual making the request has the authority to act on behalf of the entity; (4) the name and contact information, including telephone number, of the primary point of contact for communications with the FAA; (5) the physical address of the proposed FAA-recognized identification area; (6) the location of the proposed FAA-recognized identification area; (7) if applicable, a copy of any existing letter of agreement regarding the flying site; (8) a description of the intended purpose of the FAA-recognized identification area and why the proposed FAA-recognized identification area is necessary for that purpose, and (9) any other information required by the Administrator.

Use: Applications permit community-based organizations and educational institutions to apply for FAA-recognized identification areas.

Table 13: Request for FAA-Recognized Identification Area Hourly Burden and Cost ($Mil)

Year	Requests Submitted	Pages Per Request	Total Pages	Hrs Per Page	Total Hours	Hourly Burden	Total Cost
2	3,966	4	15,864	0.5	7,932	$58.47	$0.46
3	50	4	200	0.5	100	$58.47	$0.01
Total	4,016		16,064		8,032		$0.47

Row and column totals may not sum due to rounding.

F. International Compatibility and Cooperation

In keeping with United States obligations under the Convention on International Civil Aviation, it is FAA policy to conform to International Civil Aviation Organization Standards and Recommended Practices to the maximum extent practicable. The FAA has reviewed the existing ICAO Standards and Recommended Practices and has determined that no Standards and Recommended Practices correspond to these regulations. The FAA regularly reaches out to its

international partners on a bilateral and multilateral basis to harmonize regulations to the maximum extent possible. The FAA's international outreach efforts include the following:

- Discussions with the Switzerland Federal Office of Civil Aviation (FOCA) regarding plans for use of remote identification to facilitate U-Space operations and plans to allow multiple UAS Service Suppliers to provide a range of services, similar in concept to current and future FAA USS plans.
- Collaboration with the European Union Aviation Safety Agency (EASA) on the EASA U-Space Regulatory Framework.
- Cooperation in the Joint Authorities for Rulemaking on Unmanned Systems (JARUS) on UTM/U-Space and other regulatory recommendations under development.
- Collaboration with the Transport Canada Civil Aviation (TCCA) Remotely Piloted Aircraft Systems (RPAS) Task Force on policy, rulemaking, regulatory, and research and development topics related to UAS and beyond visual line of sight operations.
- The FAA hosted a workshop on Sharing Best Practices for Managing UAS with the Association of Southeast Asian Nations (ASEAN) Member States in Singapore.
- Meetings with the Australia Civil Aviation Safety Authority (CASA) to share best practices and lessons learned on UAS integration.
- Shared the remote identification NPRM announcement with FAA international Regional Directors, and also shared the NPRM directly with 35 civil aviation authorities, air navigation service providers, trade associations and embassies.
- The FAA met with Transport Canada Civil Aviation (TCCA), briefed them on the remote identification NPRM, and learned of TCCA plans to issue proposed BVLOS rulemaking with potential remote identification content by the end of 2020.
- The FAA Associate Administrator for Aviation Safety gave a speech on the remote identification NPRM at the Singapore Airshow.

- The FAA met with United Kingdom National Air Traffic Services organization to discuss UTM, including the status of the remote identification rulemaking and comments received to date.
- The FAA Administrator met with the French Minister of Transportation in discussions that included the remote identification NPRM.
- The FAA met with EASA to discuss comments received and the status of the respective U-Space rulemaking by EASA and remote identification rulemaking of the FAA, and learned that EASA had received approximately 2600 comments on their U-Space Opinion compared to the 53,000 comments received on the remote identification NPRM.
- The FAA held webinars with 52 countries, and representatives from the International Civil Aviation Organization (ICAO) and the Latin American Civil Aviation Commission (LACAC), ICAO Regional Offices, and the Africa Civil Aviation Commission (AFCAC) to discuss the FAA UTM Concept of Operations, including its relationship to remote identification transmissions, answering questions on the status of remote identification rulemaking.

In addition, the FAA has assessed the European Commission regulations for UAS remote identification and compared them to the requirements in this final rule. Similar to the proposed European Commission regulations, the FAA adopts a broadcast-only requirement for remote identification information. Other similarities include that the European regulation and the FAA's rule both include the position of the unmanned aircraft and the control station as remote identification message elements. One difference is the proposed European regulation requires the broadcast of both the unmanned aircraft registration number and the serial number, whereas the FAA's rule uses the unmanned aircraft or remote identification broadcast module serial number or a session ID as the unique identifier in the remote identification message set. Other differences include that the European regulation requires message elements for the route course and speed of

the unmanned aircraft, while the FAA's rule only includes velocity of the unmanned aircraft, and the FAA rule includes remote identification message elements for emergency status and a time mark, but the European regulation does not.

G. Environmental Analysis

FAA Order 1050.1F identifies FAA actions that are categorically excluded from preparation of an environmental assessment or environmental impact statement under the National Environmental Policy Act (NEPA) in the absence of extraordinary circumstances. The FAA determined that the categorical exclusion in FAA Order 1050.1F, paragraph 5-6.6.f. applies to this action. The FAA has determined that none of the extraordinary circumstances in FAA Order 1050.1F, paragraph 5-2 exist.

This rulemaking action provides a framework and establishes requirements for the remote identification of all UAS operating in the airspace of the United States. It will not alone enable routine expanded operations, affect the frequency of UAS operations in the airspace of the United States, or authorize additional UAS operations. Nor does the rule by itself open up new areas of airspace to UAS.

Subpart C provides the requirements for an applicant to request the establishment of an FAA-recognized identification area. At the time that FAA establishes any such area, the FAA will conduct any necessary environmental reviews.

For these reasons, the FAA has reviewed the implementation of the rulemaking action and determined it is categorically excluded from further environmental review. Possible extraordinary circumstances that would preclude the use of a categorical exclusion have been examined and the FAA has determined that no such circumstances exist. After careful and thorough consideration of the rulemaking action, the FAA finds that it does not require preparation of an Environmental Assessment or an Environmental Impact Statement in accordance with the requirements of NEPA, Council on Environmental Quality regulations, and FAA Order 1050.1F.

XXIII. Executive Order Determinations

A. Executive Order 13132, Federalism

The FAA has analyzed this rule under the principles and criteria of Executive Order 13132, Federalism. The Agency has determined that this action would not have a substantial direct effect on the States, or the relationship between the Federal Government and the States, or on the distribution of power and responsibilities among the various levels of government, and, therefore, would not have federalism implications.

B. Executive Order 13175, Consultation and Coordination with Indian Tribal Governments

Consistent with Executive Order 13175, Consultation and Coordination with Indian Tribal Governments,[68] and FAA Order 1210.20, American Indian and Alaska Native Tribal Consultation Policy and Procedures,[69] the FAA ensures that Federally Recognized Tribes (Tribes) are given the opportunity to provide meaningful and timely input regarding proposed Federal actions that have the potential to have substantial direct effects on one or more Indian tribes, on the relationship between the Federal Government and Indian tribes, or on the distribution of power and responsibilities between the Federal Government and Indian tribes; or to affect uniquely or significantly their respective Tribes.

One tribe, the Choctaw Nation, provided comments on the proposed rule. See Comment ID FAA-2019-1100-34477. In these comments, the Choctaw Nation expressed that remote identification would help expand unmanned aircraft operations and build confidence in local communities. It also requested that FAA be mindful of issues facing rural communities in development of the final rule, including the potential for unique broadband and communication issues.

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[68] 65 FR 67249 (Nov. 6, 2000).

[69] FAA Order No. 1210.20 (Jan. 28, 2004), available at *http://www.faa.gov/documentLibrary/media/1210.pdf.*

At this point, the FAA has not identified any substantial direct effects or any unique or significant effects on tribes resulting from this rule.

The FAA continues to develop its involvement with tribes within the broader UAS integration effort.[70] In particular, the FAA has partnered with the Choctaw Nation in a pilot program under which State, local, and tribal governments test and evaluate the integration of civil and public UAS operations into the low-altitude airspace of the United States to promote the safe operation of UAS and enable the development of UAS technologies and their use in agriculture, commerce, emergency management, human transportation, and other sectors.[71]

The FAA has also conducted outreach to tribes to ensure they are familiar with UAS-related rules and that they are aware of FAA's plans for additional rulemakings to integrate UAS into the airspace of the United States. As part of that recent outreach, the FAA has:

- Presented information on UAS for public safety at the Osage Nation 2019 Public Safety Drone Conference (Tulsa, Oklahoma, November 5, 2019); and
- Provided information to the National Congress of American Indians on the proposed rule for remote identification of UAS. (February 6, 2020).

The FAA will continue to respond to tribes that express interest in or concerns about UAS operations, and will engage in government-to-government consultation with tribes as appropriate, in accordance with Executive Orders and FAA guidance.

C. Executive Order 13211, Regulations that Significantly Affect Energy Supply, Distribution, or Use

The FAA analyzed this rule under Executive Order 13211, Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use (May 18, 2001). The

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[70] 81 FR 42064, 42189.

[71] Federal Aviation Administration, UAS Integration Pilot Program (May 7, 2018), available at https://www.faa.gov/uas/programs_partnerships/uas_integration_pilot_program/.

Agency has determined that it would not be a "significant energy action" under the executive order and would not be likely to have a significant adverse effect on the supply, distribution, or use of energy.

D. Executive Order 13609, Promoting International Regulatory Cooperation

Executive Order 13609, Promoting International Regulatory Cooperation, (77 FR 26413, May 4, 2012) promotes international regulatory cooperation to meet shared challenges involving health, safety, labor, security, environmental, and other issues and to reduce, eliminate, or prevent unnecessary differences in regulatory requirements.

For significant regulations that the Agency identifies as having significant international impacts, the FAA has to consider, to the extent feasible, appropriate, and consistent with law, any regulatory approaches by a foreign government that the United States has agreed to consider under a regulatory cooperation council work plan. A significant regulatory action under Executive Order 13609 has the same meaning as in section 3(f) of Executive Order 12866. An international impact, as defined in Executive Order 13609, means "a direct effect that a proposed or final regulation is expected to have on international trade and investment, or that otherwise may be of significant interest to the trading partners of the United States."

As discussed in the International Compatibility and Cooperation section of this rule, in keeping with United States obligations under the Convention on International Civil Aviation, the FAA seeks to conform to International Civil Aviation Organization Standards and Recommended Practices to the maximum extent practicable. The FAA has reviewed the corresponding ICAO Standards and Recommended Practices and has identified no differences with these regulations. In addition, the FAA regularly reaches out to its international partners on a bi-lateral and multi-lateral basis to harmonize regulations to the maximum extent possible. Thus, the FAA believes that the rule should have no effect on international regulatory cooperation.

The FAA identified a direct effect that may be of significant interest to the trading partners of the United States. Even though a majority of the costs and the benefits of the rule are accrued by United States entities and United States commerce,[72] the rule is estimated to cost foreign producers approximately $121.8 million at 3 percent present value and $86 million at 7 percent present value. These costs exceed those borne by United States producers because presently a vast majority of UAS operated in the United States are manufactured overseas (> 80 percent). On a per unit basis, the costs to foreign and United States producers of UAS are expected to be the same.

E. Executive Order 13771, Reducing Regulation and Controlling Regulatory Costs

This final rule is an Executive Order 13771 regulatory action. Details on the estimated impacts of this final rule are in the rule's economic analysis.

XXIV. Additional Information

A. Availability of Rulemaking Documents

An electronic copy of rulemaking documents may be obtained from the Internet by:

- Searching the Federal eRulemaking Portal (https://www.regulations.gov);
- Visiting the FAA's Regulations and Policies at https://www.faa.gov/regulations_policies; or
- Accessing the Government Publishing Office at https://www.govinfo.gov.

Copies may also be obtained by sending a request to the Federal Aviation Administration, Office of Rulemaking, ARM-1, 800 Independence Avenue S.W., Washington, D.C. 20591, or by calling (202) 267-9677. Commenters must identify the docket or notice number of this rulemaking.

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[72] Thus, the FAA estimates that the primary impact of the rule will be on U.S. entities.

All documents the FAA considered in developing this proposed rule, including economic analyses and technical reports, may be accessed from the Internet through the Federal eRulemaking Portal referenced above.

B. Small Business Regulatory Enforcement Fairness Act

The Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA) requires the FAA to comply with small entity requests for information or advice about compliance with statutes and regulations within its jurisdiction. A small entity with questions regarding this document may contact its local FAA official, or the person listed under the FOR FURTHER INFORMATION CONTACT heading at the beginning of the preamble. To find out more about SBREFA on the Internet, visit https://www.faa.gov/regulations_policies/rulemaking/sbre_act/.

List of Subjects

14 CFR Part 1

Air transportation.

14 CFR Part 11

Administrative practice and procedure, Reporting and recordkeeping requirements.

14 CFR Part 47

Aircraft, Reporting and recordkeeping requirements.

14 CFR Part 48

Aircraft, Reporting and recordkeeping requirements.

14 CFR Part 89

Aircraft, Airmen, Air traffic control, Aviation safety, Incorporation by reference, Reporting and recordkeeping requirements, Security measures.

14 CFR Part 91

Air traffic control, Aircraft, Airmen, Aviation safety, Reporting and recordkeeping requirements, Security measures.

14 CFR Part 107

Aircraft, Airmen, Aviation safety, Security measures.

The Amendment

In consideration of the foregoing, the Federal Aviation Administration amends chapter I of title 14, Code of Federal Regulations as follows:

PART 1—DEFINITIONS AND ABBREVIATIONS

1. The authority citation for part 1 continues to read as follows:

Authority: 49 U.S.C. 106(f), 106(g), 40113, 44701.

2. In § 1.1, add the definition for "Unmanned aircraft system" in alphabetical order to read as follows:

§ 1.1 General definitions.

* * * * *

Unmanned aircraft system means an unmanned aircraft and its associated elements (including communication links and the components that control the unmanned aircraft) that are required for the safe and efficient operation of the unmanned aircraft in the airspace of the United States.

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PART 11—GENERAL RULEMAKING PROCEDURES

3. The authority citation for part 11 continues to read as follows:

Authority: 49 U.S.C. 106(f), 106(g), 40101, 40103, 40105, 40109, 40113, 44110, 44502, 44701-44702, 44711, 46102, and 51 U.S.C. 50901-50923.

4. Amend § 11.201(b) by adding the entry "Part 89" in numerical order to read as follows:

§ 11.201 Office of Management and Budget (OMB) control numbers assigned under the Paperwork Reduction Act.

* * * * *

(b) * * *

14 CFR part or section identified and described	Current OMB control number
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Part 89	2120-0781, 2120-0782, 2120-0783, 2120-0785
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PART 47—AIRCRAFT REGISTRATION

5. The authority citation for part 47 is revised to read as follows:

Authority: 4 U.S.T. 1830; Pub. L. 108-297, 118 Stat. 1095 (49 U.S.C. 40101 note, 49 U.S.C. 44101 note); 49 U.S.C. 106(f), 106(g), 40113-40114, 44101-44108, 44110-44113, 44703-44704, 44713, 44809(f), 45302, 45305, 46104, 46301.

6. Add § 47.14 to read as follows:

§ 47.14 Serial numbers for unmanned aircraft.

(a) The unmanned aircraft serial number provided as part of any application for aircraft registration of any standard remote identification unmanned aircraft must be the serial number issued by the manufacturer of the unmanned aircraft in accordance with the design and production requirements of part 89 of this chapter. The serial number provided in this application must not be listed on more than one Certificate of Aircraft Registration at the same time.

(b) The unmanned aircraft serial number provided as part of any application for registration of any unmanned aircraft with a remote identification broadcast module must be the serial number issued by the manufacturer of the remote identification broadcast module in accordance with the design and production requirements of part 89 of this chapter. The serial number provided in this application must not be listed on more than one Certificate of Aircraft Registration at the same time.

PART 48—REGISTRATION AND MARKING REQUIREMENTS FOR SMALL UNMANNED AIRCRAFT

7. The authority citation for part 48 is revised to read as follows:

Authority: 49 U.S.C. 106(f), 106(g), 40101, 40103, 40113-40114, 41703, 44101-44103, 44105-44106, 44110-44113, 44809(f), 45302, 45305, 46104, 46301, 46306.

§ 48.5 [Removed and Reserved]

8. Remove and reserve § 48.5.

9. Amend § 48.15 by revising paragraph (b) to read as follows:

§ 48.15 Requirement to register.

* * * * *

(b) The aircraft is operated exclusively in compliance with 49 U.S.C. 44809 and weighs 0.55 pounds or less on takeoff, including everything that is on board or otherwise attached to the aircraft; or

* * * * *

10. Amend § 48.25 by revising paragraph (a) to read as follows:

§ 48.25 Applicants.

(a) To register a small unmanned aircraft in the United States under this part, a person must provide the information required by § 48.110 to the Registry in a form and manner prescribed by the Administrator. Upon submission of this information, the FAA issues a Certificate of Aircraft Registration to that person.

* * * * *

11. Amend § 48.30 by revising paragraphs (a) and (b) to read as follows:

§ 48.30 Fees.

(a) The fee for issuing or renewing a Certificate of Aircraft Registration as described in § 48.100 is $5.00 per aircraft.

(b) The fee for issuing or renewing a Certificate of Aircraft Registration as described in § 48.105 is $5.00 per certificate.

* * * * *

§§ 48.100, 48.105, 48.110, and 48.115 [Redesignated as §§ 48.110, 48.115, 48.100, and 48.105]

12. Redesignate §§ 48.100 through 48.115 as follows:

Old section	New section
48.100	48.110
48.105	48.115
48.110	48.100
48.115	48.105

13. Amend newly redesignated § 48.100 by revising the section heading and paragraphs (a) and (c)(1) to read as follows:

§ 48.100 Registration: Small unmanned aircraft operated for any purpose other than exclusively limited recreational operations.

(a) *Certificate of Aircraft Registration.* A Certificate of Aircraft Registration issued in accordance with § 48.110 to a small unmanned aircraft used for any purpose other than operating exclusively in compliance with 49 U.S.C. 44809 constitutes registration for the small unmanned aircraft identified on the application.

* * * * *

(c) * * *

(1) The holder of a Certificate of Aircraft Registration must renew the Certificate by verifying, in a form and manner prescribed by the Administrator, that the information provided in accordance with § 48.110 is accurate and if it is not, provide updated information. The verification may take place at any time within the six months preceding the month in which the Certificate of Aircraft registration expires.

* * * * *

14. Amend newly redesignated § 48.105 by revising the section heading and paragraphs (a) and (c)(1) to read as follows:

§ 48.105 Registration: Small unmanned aircraft intended exclusively for limited recreational operations.

(a) *Certificate of Aircraft Registration.* A Certificate of Aircraft Registration issued in accordance with § 48.110 for small unmanned aircraft to be operated exclusively in compliance with 49 U.S.C. 44809 constitutes registration for all the small unmanned aircraft used exclusively for operations in compliance with 49 U.S.C. 44809 owned by the individual identified on the application.

* * * * *

(c) * * *

(1) The holder of a Certificate of Aircraft Registration must renew the Certificate by verifying, in a form and manner prescribed by the Administrator, that the information provided in accordance with § 48.110 is accurate and if it is not, provide updated information. The verification may take place at any time within the six months preceding the month in which the Certificate of Aircraft registration expires.

* * * * *

15. Revise newly redesignated § 48.110 to read as follows:

§ 48.110 Application.

(a) *Required information.* Each applicant for a Certificate of Aircraft Registration issued under this part must submit all of the following information to the Registry:

(1) Applicant's name and, for an applicant other than an individual, the name of the authorized representative applying for a Certificate of Aircraft Registration.

(2) Applicant's physical address and, for an applicant other than an individual, the physical address of the authorized representative. If the applicant or authorized representative cannot receive mail at a physical address, then provide a mailing address.

(3) Applicant's email address or, for applicants other than individuals, the email address of the authorized representative.

(4) Applicant's telephone number(s) and, for an applicant other than an individual, the telephone number(s) of the authorized representative.

(5) The aircraft manufacturer and model name.

(6) For any standard remote identification unmanned aircraft, the serial number issued by the manufacturer of the unmanned aircraft in accordance with the design and production requirements of part 89 of this chapter. The serial number provided in this application must not be listed on more than one Certificate of Aircraft Registration at the same time.

(7) For any unmanned aircraft equipped with a remote identification broadcast module, the serial number issued by the manufacturer of the remote identification broadcast module in accordance with the design and production requirements of part 89 of this chapter. An applicant may submit the serial number of more than one remote identification broadcast module as part of the application for aircraft registration under § 48.105. The serial number of a remote identification broadcast module provided in this application must not be listed on more than one Certificate of Aircraft Registration at the same time.

(8) Other information as required by the Administrator.

(b) *Provision of information.* The information identified in paragraph (a) of this section must be submitted to the Registry through the web-based small unmanned aircraft registration system in a form and manner prescribed by the Administrator.

(c) *Issuance of Certificate of Aircraft Registration.* The FAA will issue a Certificate of Aircraft Registration upon completion of the application requirements provided in paragraph (a) of this section.

16. Amend newly redesignated § 48.115 by revising paragraphs (a) and (b)(1) to read as follows:

§ 48.115 Requirement to maintain current information.

(a) The holder of a Certificate of Aircraft Registration must ensure that the information provided under § 48.110 remains accurate.

(b) * * *

(1) A change in the information provided under § 48.110.

* * * * *

17. Amend § 48.200 by revising paragraph (b)(2) to read as follows:

§ 48.200 General.

* * * * *

(b) * * *

(2) If authorized by the Administrator, the small unmanned aircraft serial number provided with the application for Certificate of Aircraft Registration under § 48.110(a).

18. Add part 89 to subchapter F to read as follows:

PART 89—REMOTE IDENTIFICATION OF UNMANNED AIRCRAFT

Sec.

Subpart A—General

89.1 Definitions.
89.5 Falsification, reproduction, alteration, or omission.

Subpart B—Operating Requirements

89.101 Applicability.
89.105 Remote identification requirement.
89.110 Operation of standard remote identification unmanned aircraft.
89.115 Alternative remote identification.
89.120 Operations for aeronautical research or to show compliance with regulations.
89.125 Automatic Dependent Surveillance-Broadcast (ADS-B) Out prohibition.
89.130 Confirmation of identification.

Subpart C—[Reserved]

Subpart D—Requirements for Standard Remote Identification Unmanned Aircraft and Remote Identification Broadcast Modules

89.301 Applicability.
89.305 Minimum message elements broadcast by standard remote identification unmanned aircraft.
89.310 Minimum performance requirements for standard remote identification unmanned aircraft.

89.315 Minimum message elements broadcast by remote identification broadcast modules.
89.320 Minimum performance requirements for remote identification broadcast modules.

Subpart E—Means of Compliance

89.401 Applicability.
89.405 Submission of a means of compliance for FAA acceptance.
89.410 Acceptance of a means of compliance.
89.415 Rescission.
89.420 Record retention.

Subpart F— Remote Identification Design and Production

89.501 Applicability.
89.505 Serial numbers.
89.510 Production requirements for unmanned aircraft produced under a design approval or production approval issued under part 21 of this chapter.
89.515 Production requirements for unmanned aircraft without design approval or production approval issued under part 21 of this chapter.
89.520 Production requirements for remote identification broadcast modules.
89.525 Labeling.
89.530 Submission of a declaration of compliance for FAA acceptance.
89.535 Acceptance of a declaration of compliance.
89.540 Rescission and reconsideration.
89.545 Record retention.

Authority: 49 U.S.C. 106(f), 106(g), 40101(d), 40103(b), 44701, 44805, 44809(f); Section 2202 of Pub. L. 114-190, 130 Stat. 629.

Subpart A—General

§ 89.1 Definitions.

The following definitions apply to this part.

Declaration of compliance means a record submitted to the FAA by the producer of a standard remote identification unmanned aircraft or remote identification broadcast module to attest that all the requirements of subpart F of this part have been met.

Home-built unmanned aircraft means an unmanned aircraft that an individual built solely for education or recreation.

§ 89.5 Falsification, reproduction, alteration, or omission.

(a) No person may make or cause to be made any of the following:

(1) Any fraudulent or intentionally false statement in any document related to any acceptance, application, approval, authorization, certificate, declaration, designation, qualification, record, report, request for reconsideration, or similar, submitted under this part.

(2) Any fraudulent or intentionally false statement in any document required to be developed, provided, kept, or used to show compliance with any requirement under this part.

(3) Any reproduction or alteration, for fraudulent purpose, of any document related to any acceptance, application, approval, authorization, certificate, declaration, designation, qualification, record, report, request for reconsideration, or similar, submitted or granted under this part.

(b) No person may, by omission, knowingly conceal or cause to be concealed, a material fact in–

(1) Any document related to any acceptance, application, approval, authorization, certificate, declaration, designation, qualification, record, report, request for reconsideration, or similar, submitted under this part; or

(2) Any document required to be developed, provided, kept, or used to show compliance with any requirement under this part.

(c) The commission by any person of an act prohibited under paragraph (a) or (b) of this section is a basis for –

(1) Denial, suspension, rescission, or revocation of any acceptance, application, approval, authorization, certificate, declaration, declaration of compliance, designation, document, filing, qualification, means of compliance, record, report, request for reconsideration, or similar instrument issued or granted by the Administrator and held by that person; or

(2) A civil penalty.

Subpart B—Operating Requirements

§ 89.101 Applicability.

(a) Except as provided in paragraph (b) of this section, this subpart applies to the following:

(1) Persons operating unmanned aircraft registered or required to be registered under part 47 or 48 of this chapter.

(2) Persons operating foreign civil unmanned aircraft in the United States.

(b) This subpart does not apply to unmanned aircraft operations under part 91 of this chapter that are transmitting ADS-B Out pursuant to § 91.225.

§ 89.105 Remote identification requirement.

Except as otherwise authorized by the Administrator or as provided in § 89.120, after September 16, 2023, no person may operate an unmanned aircraft within the airspace of the United States unless the operation meets the requirements of § 89.110 or § 89.115.

§ 89.110 Operation of standard remote identification unmanned aircraft.

Unless otherwise authorized by the Administrator, a person may comply with the remote identification requirement of § 89.105 by operating a standard remote identification unmanned aircraft under the following conditions:

(a) *Operational requirements.* A person may operate a standard remote identification unmanned aircraft only if the person operating the standard remote identification unmanned aircraft ensures that all of the following conditions are met:

(1) From takeoff to shutdown, the standard remote identification unmanned aircraft must broadcast the message elements of § 89.305.

(2) The person manipulating the flight controls of the unmanned aircraft system must land the unmanned aircraft as soon as practicable if the standard remote identification unmanned aircraft is no longer broadcasting the message elements of § 89.305.

(b) *Standard remote identification unmanned aircraft requirements.* A person may operate a standard remote identification unmanned aircraft only if the unmanned aircraft meets all of the following requirements:

(1) Its serial number is listed on an FAA-accepted declaration of compliance, or the standard remote identification unmanned aircraft is covered by a design approval or production approval issued under part 21 of this chapter and meets the requirements of subpart F of this part.

(2) Its remote identification equipment is functional and complies with the requirements of this part from takeoff to shutdown.

(3) Its remote identification equipment and functionality have not been disabled.

(4) The Certificate of Aircraft Registration of the unmanned aircraft used in the operation must include the serial number of the unmanned aircraft, as per applicable requirements of parts 47 and 48 of this chapter, or the serial number of the unmanned aircraft must be provided to the FAA in a notice of identification pursuant to § 89.130 prior to the operation.

§ 89.115 Alternative remote identification.

A person operating an unmanned aircraft that is not a standard remote identification unmanned aircraft may comply with the remote identification requirement of § 89.105 by meeting all of the requirements of either paragraph (a) or (b) of this section.

(a) *Remote identification broadcast modules*. Unless otherwise authorized by the Administrator, a person may operate an unmanned aircraft that is not a standard remote identification unmanned aircraft if all of the following conditions are met:

(1) *Equipage*. (i) The unmanned aircraft used in the operation must be equipped with a remote identification broadcast module that meets the requirements of § 89.320 and the serial number of the remote identification broadcast module must be listed on an FAA-accepted declaration of compliance.

(ii) The Certificate of Aircraft Registration of the unmanned aircraft used in the operation must include the serial number of the remote identification broadcast module, as per applicable requirements of parts 47 and 48 of this chapter, or the serial number of the unmanned aircraft must be provided to the FAA in a notice of identification pursuant to § 89.130 prior to the operation.

(2) *Remote identification operating requirements.* Unless otherwise authorized by the Administrator, a person may operate an unmanned aircraft under this paragraph (a) only if all of the following conditions are met:

(i) From takeoff to shutdown, the person operating the unmanned aircraft must ensure that the remote identification broadcast module broadcasts the remote identification message elements of § 89.315 directly from the unmanned aircraft.

(ii) The person manipulating the flight controls of the unmanned aircraft system must be able to see the unmanned aircraft at all times throughout the operation.

(3) *Pre-flight requirement*. Prior to takeoff, the person manipulating the flight controls of the unmanned aircraft system must ensure the remote identification broadcast module is functioning in accordance with this subpart.

(4) *In-flight loss of remote identification broadcast.* The person manipulating the flight controls of the unmanned aircraft system must land the unmanned aircraft as soon as practicable if the unmanned aircraft is no longer broadcasting the message elements of § 89.315.

(b) *Operations at FAA-recognized identification areas.* Unless otherwise authorized by the Administrator, a person may operate an unmanned aircraft without remote identification equipment only if all of the following conditions are met:

(1) The unmanned aircraft and the person manipulating the flight controls of the unmanned aircraft system remain within the boundaries of an FAA-recognized identification area throughout the operation; and

(2) The person manipulating the flight controls of the unmanned aircraft system must be able to see the unmanned aircraft at all times throughout the operation.

§ 89.120 Operations for aeronautical research or to show compliance with regulations.

The Administrator may authorize operations without remote identification where the operation is solely for the purpose of aeronautical research or to show compliance with regulations.

§ 89.125 Automatic Dependent Surveillance-Broadcast (ADS-B) Out prohibition.

Automatic Dependent Surveillance-Broadcast (ADS-B) Out equipment cannot be used to comply with the remote identification requirements of this part.

§ 89.130 Confirmation of identification.

(a) *Notification requirement*. No person may operate a foreign registered civil unmanned aircraft with remote identification in the airspace of the United States unless, prior to the operation, the person submits a notice of identification in a form and manner acceptable to the Administrator. The notice of identification must include all of the following:

(1) The name of the person operating the foreign registered civil unmanned aircraft in the United States, and, if applicable, the person's authorized representative.

(2) The physical address of the person operating the foreign registered civil unmanned aircraft in the United States, and, if applicable, the physical address for the person's authorized representative. If the operator or authorized representative does not receive mail at the physical address, a mailing address must also be provided.

(3) The telephone number(s) where the person operating the foreign registered civil unmanned aircraft in the United States, and, if applicable, the person's authorized representative can be reached while in the United States.

(4) The email address of the person operating the foreign registered civil unmanned aircraft in the United States, and, if applicable, the email address of the person's authorized representative.

(5) The unmanned aircraft manufacturer and model name.

(6) The serial number of the unmanned aircraft or remote identification broadcast module.

(7) The country of registration of the unmanned aircraft.

(8) The registration number.

(b) *Issuance of a Confirmation of Identification*. (1) The FAA will issue a Confirmation of Identification upon completion of the notification requirements provided in paragraph (a) of this section.

(2) The filing of a notification under paragraph (a) of this section and the Confirmation of Identification issued under paragraph (b)(1) of this section do not have the effect of United States aircraft registration.

(c) *Proof of notification*. No person may operate a foreign registered civil unmanned aircraft with remote identification in the United States unless the person obtains a Confirmation of Identification under paragraph (b)(1) of this section, maintains such Confirmation of Identification at the unmanned aircraft's control station, and produces the Confirmation of Identification when requested by the FAA or a law enforcement officer.

(d) *Requirement to maintain current information*. The holder of a Confirmation of Identification must ensure that the information provided under paragraph (a) of this section remains accurate and must update the information prior to operating a foreign registered civil unmanned aircraft in the United States.

Subpart C [Reserved]

Subpart D—Requirements for Standard Remote Identification Unmanned Aircraft and Remote Identification Broadcast Modules

§ 89.301 Applicability.

This subpart prescribes the minimum message element set and minimum performance requirements for standard remote identification unmanned aircraft and remote identification broadcast modules.

§ 89.305 Minimum message elements broadcast by standard remote identification unmanned aircraft.

A standard remote identification unmanned aircraft must be capable of broadcasting the following remote identification message elements:

(a) The identity of the unmanned aircraft, consisting of:

(1) A serial number assigned to the unmanned aircraft by the person responsible for the production of the standard remote identification unmanned aircraft; or

(2) A session ID.

(b) An indication of the latitude and longitude of the control station.

(c) An indication of the geometric altitude of the control station.

(d) An indication of the latitude and longitude of the unmanned aircraft.

(e) An indication of the geometric altitude of the unmanned aircraft.

(f) An indication of the velocity of the unmanned aircraft.

(g) A time mark identifying the Coordinated Universal Time (UTC) time of applicability of a position source output.

(h) An indication of the emergency status of the unmanned aircraft.

§ 89.310 Minimum performance requirements for standard remote identification unmanned aircraft.

A standard remote identification unmanned aircraft must meet the following minimum performance requirements:

(a) *Control station location.* The location of the control station of the unmanned aircraft must be generated and encoded into the message elements and must correspond to the location of the person manipulating the flight controls of the unmanned aircraft system.

(b) *Time mark.* The time mark message element must be synchronized with all other remote identification message elements.

(c) *Self-testing and monitoring.* (1) Prior to takeoff, the unmanned aircraft must automatically test the remote identification functionality and notify the person manipulating the flight controls of the unmanned aircraft system of the result of the test.

(2) The unmanned aircraft must not be able to take off if the remote identification equipment is not functional.

(3) The unmanned aircraft must continuously monitor the remote identification functionality from takeoff to shutdown and must provide notification of malfunction or failure to the person manipulating the flight controls of the unmanned aircraft system.

(d) *Tamper resistance.* The unmanned aircraft must be designed and produced in a way that reduces the ability of a person to tamper with the remote identification functionality.

(e) *Error correction.* The remote identification equipment must incorporate error correction in the broadcast of the message elements in § 89.305.

(f) *Interference considerations.* The remote identification equipment must not interfere with other systems or equipment installed on the unmanned aircraft, and other systems or equipment installed on the unmanned aircraft must not interfere with the remote identification equipment.

(g) *Message broadcast.* (1) The unmanned aircraft must be capable of broadcasting the message elements in § 89.305 using a non-proprietary broadcast specification and using radio frequency spectrum compatible with personal wireless devices in accordance with 47 CFR part 15, where operations may occur without an FCC individual license.

(2) Any broadcasting device used to meet the requirements of this section must be integrated into the unmanned aircraft without modification to its authorized radio frequency parameters and designed to maximize the range at which the broadcast can be received, while complying with 47 CFR part 15 and any other applicable laws in effect as of the date the declaration of compliance is submitted to the FAA for acceptance.

(h) *Message elements performance requirements.* (1) The reported geometric position of the unmanned aircraft and the control station must be accurate to within 100 feet of the true position, with 95 percent probability.

(2) The reported geometric altitude of the control station must be accurate to within 15 feet of the true geometric altitude, with 95 percent probability.

(3) The reported geometric altitude of the unmanned aircraft must be accurate to within 150 feet of the true geometric altitude, with 95 percent probability.

(4) The unmanned aircraft must broadcast the latitude, longitude, and geometric altitude of the unmanned aircraft and its control station no later than 1.0 seconds from the time of measurement to the time of broadcast.

(5) The unmanned aircraft must broadcast the message elements at a rate of at least 1 message per second.

(i) *Take-off limitation.* The unmanned aircraft must not be able to take off unless it is broadcasting the message elements in § 89.305.

§ 89.315 Minimum message elements broadcast by remote identification broadcast modules.

Remote identification broadcast modules must be capable of broadcasting the following remote identification message elements:

(a) The identity of the unmanned aircraft, consisting of the serial number assigned to the remote identification broadcast module by the person responsible for the production of the remote identification broadcast module.

(b) An indication of the latitude and longitude of the unmanned aircraft.

(c) An indication of the geometric altitude of the unmanned aircraft.

(d) An indication of the velocity of the unmanned aircraft.

(e) An indication of the latitude and longitude of the take-off location of the unmanned aircraft.

(f) An indication of the geometric altitude of the take-off location of the unmanned aircraft.

(g) A time mark identifying the Coordinated Universal Time (UTC) time of applicability of a position source output.

§ 89.320 Minimum performance requirements for remote identification broadcast modules.

Remote identification broadcast modules must meet the following minimum performance requirements:

(a) *Take-off location.* The remote identification broadcast module must be capable of determining the take-off location of the unmanned aircraft.

(b) *Time mark.* The time mark message element must be synchronized with all other remote identification message elements.

(c) *Self-testing and monitoring.* (1) Prior to take-off, the remote identification broadcast module must automatically test the remote identification functionality and notify the person manipulating the flight controls of the unmanned aircraft system of the result of the test.

(2) The remote identification broadcast module must continuously monitor the remote identification functionality from takeoff to shutdown and must provide notification of malfunction or failure to the person manipulating the flight controls of the unmanned aircraft system.

(d) *Tamper resistance.* The remote identification broadcast module must be designed and produced in a way that reduces the ability of a person to tamper with the remote identification functionality.

(e) *Error correction.* The remote identification broadcast module must incorporate error correction in the broadcast of the message elements in § 89.315.

(f) *Interference considerations.* The remote identification broadcast module must not interfere with other systems or equipment installed on compatible unmanned aircraft, and other systems or equipment installed on compatible unmanned aircraft must not interfere with the remote identification equipment.

(g) *Message broadcast.* (1) The remote identification broadcast module must be capable of broadcasting the message elements in § 89.315 using a non-proprietary broadcast specification

and using radio frequency spectrum compatible with personal wireless devices in accordance with 47 CFR part 15, where operations may occur without an FCC individual license.

(2) The remote identification broadcast module must be designed to maximize the range at which the broadcast can be received, while complying with 47 CFR part 15 and any other applicable laws in effect as of the date the declaration of compliance is submitted to the FAA for acceptance.

(h) *Message elements performance requirements.* (1) The reported geometric position of the unmanned aircraft must be accurate to within 100 feet of the true position, with 95 percent probability.

(2) The reported geometric altitude of the unmanned aircraft must be accurate to within 150 feet of the true geometric altitude, with 95 percent probability.

(3) The reported geometric position of the take-off location must be accurate to within 100 feet of the true geometric position, with 95 percent probability.

(4) The reported geometric altitude of the take-off location must be accurate to within 150 feet of the true geometric altitude, with 95 percent probability.

(5) The remote identification broadcast module must broadcast the latitude, longitude, and geometric altitude of the unmanned aircraft no later than 1.0 seconds from the time of measurement to the time of broadcast.

(6) The remote identification broadcast module must broadcast the message elements at a rate of at least 1 message per second.

Subpart E—Means of Compliance

§ 89.401 Applicability.

This subpart prescribes —

(a) Requirements for means of compliance with subpart D of this part.

(b) Procedural requirements for the submission and acceptance of means of compliance used in the design and production of standard remote identification unmanned aircraft or remote

identification broadcast modules to ensure they meet the minimum performance requirements of this part.

(c) Rules governing persons submitting means of compliance for FAA acceptance.

§ 89.405 Submission of a means of compliance for FAA acceptance.

(a) *Eligibility*. Any person may submit a means of compliance for acceptance by the FAA.

(b) *Required information.* A person requesting acceptance of a means of compliance must submit the following information to the FAA in a form and manner acceptable to the Administrator:

(1) The name of the person or entity submitting the means of compliance, the name of the main point of contact for communications with the FAA, the physical address, email address, and other contact information.

(2) A detailed description of the means of compliance.

(3) An explanation of how the means of compliance addresses all of the minimum performance requirements established in subpart D of this part so that any standard remote identification unmanned aircraft or remote identification broadcast module designed and produced in accordance with such means of compliance meets the remote identification requirements of this part.

(4) Any substantiating material the person wishes the FAA to consider as part of the request.

(c) *Testing and validation.* A means of compliance submitted for acceptance by the FAA must include testing and validation procedures for persons responsible for the production of standard remote identification unmanned aircraft or remote identification broadcast modules to demonstrate through analysis, ground test, or flight test, as appropriate, how the standard remote identification unmanned aircraft or the remote identification broadcast module performs its

intended functions and meets the requirements in subpart D of this part, including any applicable FAA performance requirements for radio station operation.

§ 89.410 Acceptance of a means of compliance.

(a) A person requesting acceptance of a means of compliance must demonstrate to the Administrator that the means of compliance addresses all of the requirements of subparts D and E of this part, and that any standard remote identification unmanned aircraft or remote identification broadcast module designed and produced in accordance with such means of compliance would meet the performance requirements of subpart D of this part.

(b) The Administrator will evaluate a means of compliance that is submitted to the FAA and may request additional information or documentation, as needed, to supplement the submission.

(c) If the Administrator determines the person has demonstrated that the means of compliance meets the requirements of subparts D and E of this part, the FAA will notify the person that the Administrator has accepted the means of compliance.

§ 89.415 Rescission.

(a) *Rescission of an FAA-accepted means of compliance.* (1) A means of compliance is subject to ongoing review by the Administrator. The Administrator may rescind acceptance of a means of compliance if the Administrator determines that a means of compliance does not meet any or all of the requirements of subpart D or E of this part.

(2) The Administrator will publish a notice of rescission in the *Federal Register*.

(b) *Inapplicability of part 13, subpart D, of this chapter*. Part 13, subpart D, of this chapter does not apply to the procedures of paragraph (a) of this section.

§ 89.420 Record retention.

A person who submits a means of compliance that is accepted by the Administrator under this subpart must retain the following information for as long as the means of compliance is

accepted plus an additional 24 calendar months, and must make available for inspection by the Administrator the following:

(a) All documentation and substantiating data submitted to the FAA for acceptance of the means of compliance.

(b) Records of all test procedures, methodology, and other procedures, as applicable.

(c) Any other information necessary to justify and substantiate how the means of compliance enables compliance with the remote identification requirements of this part.

Subpart F— Remote Identification Design and Production

§ 89.501 Applicability.

(a) This subpart prescribes —

(1) Requirements for the design and production of unmanned aircraft with remote identification produced for operation in the airspace of the United States.

(2) Requirements for the design and production of remote identification broadcast modules.

(3) Procedural requirements for the submission, acceptance, and rescission of declarations of compliance.

(4) Rules governing persons submitting declarations of compliance for FAA acceptance under this part.

(b) Except as provided in paragraph (c) of this section, this subpart applies to the design and production of all unmanned aircraft operated in the airspace of the United States.

(c) Except for unmanned aircraft designed and produced to be standard remote identification unmanned aircraft, this subpart does not apply to the design or production of:

(1) Home-built unmanned aircraft.

(2) Unmanned aircraft of the United States Government.

(3) Unmanned aircraft that weigh 0.55 pounds or less on takeoff, including everything that is on board or otherwise attached to the aircraft.

(4) Unmanned aircraft designed or produced exclusively for the purpose of aeronautical research or to show compliance with regulations.

§ 89.505 Serial numbers.

No person may produce a standard remote identification unmanned aircraft under § 89.510 or § 89.515 or a remote identification broadcast module under § 89.520, unless the producer assigns to the unmanned aircraft or remote identification broadcast module a serial number that complies with ANSI/CTA-2063-A. ANSI/CTA-2063-A, *Small Unmanned Aerial Systems Serial Numbers* (September 2019) is incorporated by reference into this section with the approval of the Director of the Office of the Federal Register under 5 U.S.C. 552(a) and 1 CFR part 51. All approved material is available for inspection at the FAA's Office of Rulemaking (ARM-1), 800 Independence Avenue, SW, Washington, DC 20590 (telephone 202-267-9677) and is available from Consumer Technology Association (CTA), 1919 South Eads Street, Arlington, VA 22202, CTA@CTA.tech, 703-907-7600 or at https://www.cta.tech. It is also available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, email fedreg.legal@nara.gov, or go to *www.archives.gov/federal-register/cfr/ibr-locations.html.*

§ 89.510 Production requirements for unmanned aircraft produced under a design approval or production approval issued under part 21 of this chapter.

After September 16, 2022, no person may produce an unmanned aircraft for operation in the airspace of the United States under a design approval or production approval issued under part 21 of this chapter unless:

(a) All applicable requirements of part 21 of this chapter are met; and

(b) The unmanned aircraft is—

(1) Designed and produced to meet the minimum performance requirements for standard remote identification unmanned aircraft established in § 89.310 in accordance with an FAA-accepted means of compliance; or

(2) Equipped with Automatic Dependent Surveillance-Broadcast (ADS-B) Out equipment that meets the requirements of § 91.225 of this chapter.

§ 89.515 Production requirements for unmanned aircraft without design approval or production approval issued under part 21 of this chapter.

Except as provided in § 89.510, after September 16, 2022, no person may produce an unmanned aircraft for operation in the airspace of the United States unless—

(a) The unmanned aircraft is designed and produced to meet the minimum performance requirements for standard remote identification unmanned aircraft established in § 89.310 in accordance with an FAA-accepted means of compliance; and

(b) All of the following conditions are met:

(1) *Inspection requirements for production of standard unmanned aircraft.* A person responsible for the production of standard remote identification unmanned aircraft must, upon request, allow the Administrator to inspect the person's facilities, technical data, and any standard remote identification unmanned aircraft the person produces, and to witness any tests necessary to determine compliance with this subpart.

(2) *Audit requirements.* A person responsible for the production of standard remote identification unmanned aircraft must cause independent audits to be performed on a recurring basis, and additionally whenever the FAA provides notice of noncompliance or potential noncompliance, to demonstrate the unmanned aircraft listed under a declaration of compliance meet the requirements of this subpart. The person responsible for the production of standard remote identification unmanned aircraft must provide the results of all such audits to the FAA upon request.

(3) *Product support and notification.* A person responsible for the production of standard remote identification unmanned aircraft must maintain product support and notification procedures to notify the public and the FAA of any defect or condition that causes an unmanned

aircraft to no longer meet the requirements of this subpart, within 15 calendar days of the date the person becomes aware of the defect or condition.

§ 89.520 Production requirements for remote identification broadcast modules.

After [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER], no person may produce remote identification broadcast modules unless:

(a) The remote identification broadcast module is designed and produced to meet the minimum performance requirements for remote identification broadcast modules established in § 89.320 in accordance with an FAA-accepted means of compliance; and

(b) All of the following conditions are met:

(1) *Inspection requirements for production of remote identification broadcast modules.* A person responsible for the production of remote identification broadcast modules must, upon request, allow the Administrator to inspect the person's facilities, technical data, and any remote identification broadcast modules the person produces, and to witness any tests necessary to determine compliance with this subpart.

(2) *Audit requirements*. A person responsible for the production of remote identification broadcast modules must cause independent audits to be performed on a recurring basis, and additionally whenever the FAA provides notice of noncompliance or potential noncompliance, to demonstrate the remote identification broadcast modules listed under a declaration of compliance meet the requirements of this subpart. The person responsible for the production of remote identification broadcast modules must provide the results of all such audits to the FAA upon request.

(3) *Product support and notification.* A person responsible for the production of remote identification broadcast modules must maintain product support and notification procedures to notify the public and the FAA of any defect or condition that causes the remote identification

broadcast module to no longer meet the requirements of this subpart, within 15 calendar days of the date the person becomes aware of the defect or condition.

(4) *Instructions.* A person responsible for the production of a remote identification broadcast module must make available instructions for installing and operating the remote identification broadcast module to any person operating an unmanned aircraft with the remote identification broadcast module.

§ 89.525 Labeling.

(a) No person may produce a standard remote identification unmanned aircraft under § 89.515 unless it displays a label indicating that the unmanned aircraft meets the requirements of this part. The label must be in English and be legible, prominent, and permanently affixed to the unmanned aircraft.

(b) No person may produce a remote identification broadcast module under § 89.520 unless it displays a label indicating that the equipment meets the requirements of this part. The label must be in English and be legible, prominent, and permanently affixed to the broadcast module.

§ 89.530 Submission of a declaration of compliance for FAA acceptance.

(a) *Eligibility.* A person responsible for the production of a standard remote identification unmanned aircraft under § 89.515 or a remote identification broadcast module under § 89.520 must submit a declaration of compliance for acceptance by the FAA.

(b) *Required information for standard remote identification unmanned aircraft.* The person responsible for the production of a standard remote identification unmanned aircraft requesting acceptance of a declaration of compliance must declare that the unmanned aircraft complies with the requirements of this subpart by submitting a declaration of compliance to the FAA in a form and manner acceptable to the Administrator. The declaration must include at a minimum the following information:

(1) The name, physical address, telephone number, and email address of the person responsible for production of the unmanned aircraft.

(2) The unmanned aircraft's make and model.

(3) The unmanned aircraft's serial number, or the range of serial numbers for which the person responsible for production is declaring compliance.

(4) The FCC Identifier of the 47 CFR part 15-compliant radio frequency equipment used and integrated into the unmanned aircraft.

(5) The means of compliance used in the design and production of the unmanned aircraft.

(6) Whether the declaration of compliance is an initial declaration or an amended declaration, and if the declaration of compliance is an amended declaration, the reason for the amendment.

(7) A declaration that the person responsible for the production of the unmanned aircraft:

(i) Can demonstrate that the unmanned aircraft was designed and produced to meet the minimum performance requirements of § 89.310 by using an FAA-accepted means of compliance.

(ii) Complies with the requirements of § 89.515(b).

(8) A statement that 47 CFR part 15-compliant radio frequency equipment is used and is integrated into the unmanned aircraft without modification to its authorized radio frequency parameters.

(c) *Required information for remote identification broadcast modules.* The person responsible for the production of a remote identification broadcast module under § 89.520 that is requesting acceptance of a declaration of compliance must declare that the remote identification broadcast module complies with the requirements of this subpart by submitting a declaration of compliance to the FAA in a form and manner acceptable to the Administrator. The declaration must include at a minimum the following information:

(1) The name, physical address, telephone number, and email address of the person responsible for production of the remote identification broadcast module.

(2) The remote identification broadcast module's make and model.

(3) The remote identification broadcast module's serial number, or the range of serial numbers for which the person responsible for production is declaring compliance.

(4) The FCC Identifier of the 47 CFR part 15-compliant radio frequency equipment used and integrated into the remote identification broadcast module.

(5) The means of compliance used in the design and production of the remote identification broadcast module.

(6) Whether the declaration of compliance is an initial declaration or an amended declaration, and if the declaration of compliance is an amended declaration, the reason for the amendment.

(7) A declaration that the person responsible for the production of the remote identification broadcast module:

(i) Can demonstrate that the remote identification broadcast module was designed and produced to meet the minimum performance requirements of § 89.320 by using an FAA-accepted means of compliance.

(ii) Complies with the requirements of § 89.520(b).

(8) A statement that 47 CFR part 15-compliant radio frequency equipment is used and is integrated into the remote identification broadcast module without modification to its authorized radio frequency parameters, and a statement that instructions have been provided for installation of 47 CFR part 15-compliant remote identification broadcast module without modification to the broadcast module's authorized radio frequency parameters.

§ 89.535 Acceptance of a declaration of compliance.

(a) The Administrator will evaluate a declaration of compliance that is submitted to the FAA and may request additional information or documentation, as needed, to supplement the declaration of compliance.

(b) If the Administrator determines that the submitter has demonstrated compliance with the requirements of this subpart, the FAA will notify the submitter that the Administrator has accepted the declaration of compliance.

§ 89.540 Rescission and reconsideration.

(a) *Rescission of the FAA's acceptance of a declaration of compliance.* (1) A declaration of compliance is subject to ongoing review by the Administrator. The Administrator may rescind acceptance of a declaration of compliance under circumstances including but not limited to the following:

(i) A standard remote identification unmanned aircraft or remote identification broadcast module listed under an accepted declaration of compliance does not meet the minimum performance requirements of § 89.310 or § 89.320.

(ii) A previously FAA-accepted declaration of compliance does not meet a requirement of this subpart; or

(iii) The FAA rescinds acceptance of the means of compliance listed in an FAA-accepted declaration of compliance.

(2) The Administrator will notify the person who submitted the FAA-accepted declaration of compliance of any issue of noncompliance.

(3) If the Administrator determines that it is in the public interest, prior to rescinding acceptance of a declaration of compliance, the Administrator may provide a reasonable period of time for the person who submitted the declaration of compliance to remediate the noncompliance. A failure to remediate the noncompliance constitutes cause for rescission of the FAA's acceptance of the declaration of compliance.

(4) The Administrator will notify the person who submitted the declaration of compliance of the decision to rescind acceptance of the declaration of compliance by publishing a notice of rescission in the *Federal Register*.

(b) *Petition to reconsider the FAA's decision to rescind acceptance of a declaration of compliance.* (1) The person who submitted the FAA-accepted declaration of compliance or any person adversely affected by the rescission of the Administrator's acceptance of a declaration of compliance may petition for a reconsideration of the decision by submitting a request to the FAA in a form and manner acceptable to the Administrator within 60 calendar days of the date of publication in the *Federal Register* of notification of rescission.

(2) A petition to reconsider the rescission of the Administrator's acceptance of a declaration of compliance must show that the petitioner is an interested party and has been adversely affected by the decision of the FAA. The petition must also demonstrate at least one of the following:

(i) The petitioner adduces a significant additional fact not previously presented to the FAA.

(ii) The Administrator made a material error of fact in the decision to rescind acceptance of the declaration of compliance.

(iii) The Administrator did not correctly interpret a law, regulation, or precedent.

(3) Upon consideration of the information submitted by the petitioner, the Administrator will notify the petitioner and the person who submitted the declaration of compliance (if different) of the decision on whether to reinstate the Administrator's acceptance of the declaration of compliance.

(c) *Inapplicability of part 13, subpart D, of this chapter.* Part 13, subpart D, of this chapter does not apply to the procedures of paragraphs (a) and (b) of this section.

§ 89.545 Record retention.

A person who submits a declaration of compliance under this subpart that is accepted by the Administrator must retain the following information for as long as the standard remote identification unmanned aircraft or remote identification broadcast module listed on that declaration of compliance is produced plus an additional 24 calendar months, and must make available for inspection by the Administrator the following:

(a) The means of compliance, all documentation, and substantiating data related to the means of compliance used.

(b) Records of all test results.

(c) Any other information necessary to demonstrate compliance with the means of compliance so that the standard remote identification unmanned aircraft or remote identification broadcast module meets the remote identification requirements and the design and production requirements of this part.

19. Effective September 16, 2022, add subpart C to part 89 to read as follows:

Subpart C—FAA-Recognized Identification Areas

89.201 Applicability.
89.205 Eligibility.
89.210 Requests for establishment of an FAA-recognized identification area.
89.215 Approval of FAA-recognized identification areas.
89.220 Amendment.
89.225 Duration of an FAA-recognized identification area.
89.230 Expiration and termination.

Subpart C—FAA-Recognized Identification Areas

§ 89.201 Applicability.

This subpart prescribes procedural requirements to establish an FAA-recognized identification area.

§ 89.205 Eligibility.

Only the following persons are eligible to apply for the establishment of an FAA-recognized identification area under this subpart:

(a) A community-based organization recognized by the Administrator.

(b) An educational institution, including primary and secondary educational institutions, trade schools, colleges, and universities.

§ 89.210 Requests for establishment of an FAA-recognized identification area.

(a) *Application.* An eligible person requesting the establishment of an FAA-recognized identification area under this subpart may submit an application in a form and manner acceptable to the Administrator.

(b) *Required documentation.* A request under this subpart must contain all of the following information:

(1) The name of the eligible person under § 89.205.

(2) The name of the individual making the request on behalf of the eligible person.

(3) A declaration that the individual making the request has the authority to act on behalf of the community-based organization or educational institution.

(4) The name and contact information of the primary point of contact for communications with the FAA.

(5) The physical address of the proposed FAA-recognized identification area.

(6) The location of the proposed FAA-recognized identification area in a form and manner prescribed by the Administrator.

(7) If applicable, a copy of any existing letter of agreement regarding the flying site.

(8) Description of the intended purpose of the FAA-recognized identification area and why the proposed FAA-recognized identification area is necessary for that purpose.

(9) Any other information required by the Administrator.

§ 89.215 Approval of FAA-recognized identification areas.

The Administrator will assess applications for FAA-recognized identification areas and may require additional information or documentation, as needed, to supplement an application. The Administrator will approve or deny an application, and may take into consideration matters such as, but not limited to:

(a) The existence of any FAA established flight or airspace restriction limiting the operation of unmanned aircraft systems, such as special use airspace designations under part 73 of this chapter, temporary flight restrictions issued under part 91 of this chapter, or any other special flight rule, restriction or regulation in this chapter limiting the operation of unmanned aircraft systems in the interest of safety, efficiency, national security and/or homeland security, which overlaps with the proposed FAA-recognized identification area.

(b) The safe and efficient use of airspace by other aircraft.

(c) The safety and security of persons or property on the ground.

(d) The need for an FAA-recognized identification area in the proposed location and proximity of other FAA-recognized identification areas.

§ 89.220 Amendment.

(a) From the time of application until expiration or termination of an FAA-recognized identification area, any change to the information submitted in the application including but not limited to a change to the point of contact for the FAA-recognized identification area or a change to the FAA-recognized identification area's organizational affiliation must be submitted to the FAA within 10 calendar days of the change.

(b) If the person who has been granted an FAA-recognized identification area wishes to change the geographic boundaries of the FAA-recognized identification area, the person must submit a request describing the change to the FAA for review. The geographic boundaries of the FAA-recognized identification area will not change unless the requested change is approved in accordance with § 89.215.

(c) The establishment of an FAA-recognized identification area is subject to ongoing review in accordance with § 89.215 by the Administrator that may result in the termination of the FAA-recognized identification area pursuant to § 89.230 or modification of the FAA-recognized identification area.

§ 89.225 Duration of an FAA-recognized identification area.

(a) *Duration.* Except as otherwise provided in this subpart, an FAA-recognized identification area will be in effect for 48 calendar months after the date the FAA approves the request for establishment of an FAA-recognized identification area.

(b) *Renewal.* A person wishing to renew an FAA-recognized identification area must submit a request for renewal no later than 120 days prior to the expiration of the FAA-recognized identification area in a form and manner acceptable to the Administrator. The Administrator may deny requests submitted after that deadline or requests submitted after the expiration.

§ 89.230 Expiration and termination.

(a) *Expiration.* Unless renewed, an FAA-recognized identification area issued under this subpart will expire automatically and will have no further force or effect as of the day that immediately follows the date of expiration.

(b) *Termination prior to expiration*—(1) *Termination by request.* An individual identified as the point of contact for an approved FAA-recognized identification area may submit a request to the Administrator to terminate that FAA-recognized identification area.

(2) *Termination by FAA.* (i) The FAA may terminate an FAA-recognized identification area upon a finding that—

(A) The FAA-recognized identification area may pose a risk to aviation safety, public safety, homeland security, or national security;

(B) The FAA-recognized identification area is no longer associated with a person eligible for an FAA-recognized identification area; or

(C) The person who submitted a request for establishment of an FAA-recognized identification area provided false or misleading information during the submission, amendment, or renewal process.

(ii) The Administrator will notify the primary point of contact of the decision to terminate the FAA-recognized identification area and the reasons for the termination. Except as provided in paragraph (c) of this section, if the FAA terminates an FAA-recognized identification area

based upon a finding that the FAA-recognized identification area may pose a risk to aviation safety, public safety, homeland security, or national security, that area will no longer be eligible to be an FAA-recognized identification area for as long as those conditions remain in effect.

(c) *Petition to reconsider the FAA's decision to terminate an FAA-recognized identification area*. No later than 30 calendar days after the termination of an FAA-recognized identification area, a person may petition the Administrator for reconsideration of the decision. The petition must state the reasons justifying the request for reconsideration and include any supporting documentation. Upon consideration of the information submitted by the petitioner, the Administrator will notify the petitioner of the decision on the request for reconsideration.

(d) *Inapplicability of part 13, subpart D, of this chapter*. Part 13, subpart D, of this chapter does not apply to the procedures of paragraphs (b) and (c) of this section.

PART 91—GENERAL OPERATING AND FLIGHT RULES

20. The authority citation for part 91 continues to read as follows:

Authority: 49 U.S.C. 106(f), 106(g), 40101, 40103, 40105, 40113, 40120, 44101, 44111, 44701, 44704, 44709, 44711, 44712, 44715, 44716, 44717, 44722, 46306, 46315, 46316, 46504, 46506-46507, 47122, 47508, 47528-47531, 47534, Pub. L. 114-190, 130 Stat. 615 (49 U.S.C. 44703 note); articles 12 and 29 of the Convention on International Civil Aviation (61 Stat. 1180), (126 Stat. 11).

21. Amend § 91.215 by revising paragraphs (b) introductory text and (c) and adding paragraph (e) to read as follows:

§ 91.215 ATC transponder and altitude reporting equipment and use.

* * * * *

(b) *All airspace.* Unless otherwise authorized or directed by ATC, and except as provided in paragraph (e)(1) of this section, no person may operate an aircraft in the airspace described in paragraphs (b)(1) through (5) of this section, unless that aircraft is equipped with an operable coded radar beacon transponder having either Mode 3/A 4096 code capability, replying to Mode 3/A interrogations with the code specified by ATC, or a Mode S capability, replying to Mode

3/A interrogations with the code specified by ATC and intermode and Mode S interrogations in accordance with the applicable provisions specified in TSO C-112, and that aircraft is equipped with automatic pressure altitude reporting equipment having a Mode C capability that automatically replies to Mode C interrogations by transmitting pressure altitude information in 100-foot increments. The requirements of this paragraph (b) apply to—

* * * * *

(c) *Transponder-on operation.* Except as provided in paragraph (e)(2) of this section, while in the airspace as specified in paragraph (b) of this section or in all controlled airspace, each person operating an aircraft equipped with an operable ATC transponder maintained in accordance with § 91.413 shall operate the transponder, including Mode C equipment if installed, and shall reply on the appropriate code or as assigned by ATC, unless otherwise directed by ATC when transmitting would jeopardize the safe execution of air traffic control functions.

* * * * *

(e) *Unmanned aircraft.* (1) The requirements of paragraph (b) of this section do not apply to a person operating an unmanned aircraft under this part unless the operation is conducted under a flight plan and the person operating the unmanned aircraft maintains two-way communication with ATC.

(2) No person may operate an unmanned aircraft under this part with a transponder on unless:

(i) The operation is conducted under a flight plan and the person operating the unmanned aircraft maintains two-way communication with ATC; or

(ii) The use of a transponder is otherwise authorized by the Administrator.

* * * * *

22. Amend § 91.225 by revising paragraphs (a) introductory text, (b) introductory text, (d) introductory text, and (f) introductory text and adding paragraph (i) to read as follows:

§ 91.225 Automatic Dependent Surveillance-Broadcast (ADS-B) Out equipment and use.

(a) After January 1, 2020, unless otherwise authorized by ATC, no person may operate an aircraft in Class A airspace unless the aircraft has equipment installed that—

* * * * *

(b) After January 1, 2020, except as prohibited in paragraph (i)(2) of this section or unless otherwise authorized by ATC, no person may operate an aircraft below 18,000 feet MSL and in airspace described in paragraph (d) of this section unless the aircraft has equipment installed that—

* * * * *

(d) After January 1, 2020, except as prohibited in paragraph (i)(2) of this section or unless otherwise authorized by ATC, no person may operate an aircraft in the following airspace unless the aircraft has equipment installed that meets the requirements in paragraph (b) of this section:

* * * * *

(f) Except as prohibited in paragraph (i)(2) of this section, each person operating an aircraft equipped with ADS-B Out must operate this equipment in the transmit mode at all times unless—

* * * * *

(i) For unmanned aircraft:

(1) No person may operate an unmanned aircraft under a flight plan and in two way communication with ATC unless:

(i) That aircraft has equipment installed that meets the performance requirements in TSO-C166b or TSO-C154c; and

(ii) The equipment meets the requirements of § 91.227.

(2) No person may operate an unmanned aircraft under this part with Automatic Dependent Surveillance-Broadcast Out equipment in transmit mode unless:

(i) The operation is conducted under a flight plan and the person operating that unmanned aircraft maintains two-way communication with ATC; or

(ii) The use of ADS-B Out is otherwise authorized by the Administrator.

PART 107—SMALL UNMANNED AIRCRAFT SYSTEMS

23. The authority citation for part 107 continues to read as follows:

Authority: 49 U.S.C. 106(f), 40101 note, 40103(b), 44701(a)(5), 44807.

§ 107.53 [Redesignated as § 107.56]

24. Redesignate § 107.53 as § 107.56.

25. Add § 107.52 and new § 107.53 to read as follows:

§ 107.52 ATC transponder equipment prohibition.

Unless otherwise authorized by the Administrator, no person may operate a small unmanned aircraft system under this part with a transponder on.

§ 107.53 Automatic Dependent Surveillance-Broadcast (ADS-B) Out prohibition.

Unless otherwise authorized by the Administrator, no person may operate a small unmanned aircraft system under this part with ADS-B Out equipment in transmit mode.

Issued in Washington, DC, under the authority of 49 U.S.C. 106(f), 40101, 40103, 44701(a)(5), 44805, 44809, and section 2202 of Pub. L. 114-190.

Steve Dickson,

Administrator.

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