



**U.S. DEPARTMENT OF TRANSPORTATION**  
**FEDERAL AVIATION ADMINISTRATION**  
Aviation Rulemaking Committee Charter

Effective Date: 10/20/2015

**SUBJECT: UAS Registration Task Force Aviation Rulemaking Committee**

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- 1. PURPOSE.** This charter establishes the Unmanned Aircraft Systems (UAS) Registration Task Force (RTF) Aviation Rulemaking Committee (ARC), according to the Administrator's authority under Title 49 of the United States Code (49 U.S.C. § 106(p)(5)). The sponsor of the RTF ARC, subsequently referred to as the RTF, is the Director of the UAS Integration Office (AUS-1). This charter outlines the RTF's organization, responsibilities, and tasks.
- 2. BACKGROUND.** Federal law (49 U.S.C. § 44101(a)) requires that a person may only operate an aircraft when it is registered with the FAA. An "aircraft" is defined as "any contrivance invented, used, or designed to navigate, or fly in, the air" (49 U.S.C. § 40102(a)(6)). In 2012, Congress confirmed that UAS, including those used for recreation or hobby purposes, are aircraft consistent with the statutory definition set forth in 49 U.S.C. § 40102(a)(6). *See* Pub. L. 112-95, §§ 331(8), 336. The FAA currently requires civil UAS operators who have been granted operational authority by exemption to register their aircraft. The FAA would also require registration for civil UAS that would be operating under the proposed rule on Operation and Certification of small UAS. *See* 80 FR 9544 (Feb. 23, 2015). Although the FAA does not currently enforce the requirement for UAS used for hobby or recreational purposes to be registered, the rapid proliferation of these aircraft in the national airspace system (NAS), requires the FAA to reevaluate this policy in the interests of public safety and the safety of the NAS. The recommendations of the RTF are to be focused on registration requirements and process for small UAS, including those used for commercial purposes, and all model aircraft.
- 3. OBJECTIVES AND TASKS OF THE RTF.** The RTF will provide a forum to discuss and provide recommendations to the FAA and is tasked specifically to develop recommendations for the registration of small UAS. Specifically, the RTF will:
  - a. Develop and recommend minimum requirements for UAS that would need to be registered.
    - i. Factors to consider include, but are not limited to: technical capabilities and operational capabilities such as size, weight, speed, payload, equipage, and other factors such as the age of operator.
  - b. Develop and recommend registration processes.
    - i. Factors to consider include, but are not limited to: electronic means for registration, data retention and storage, fee collection, and information required to be submitted for registration.
  - c. Develop and recommend methods for proving registration and marking.
    - i. Factors to consider include, but are not limited to: how certificates will be issued and how a UAS will be able to be identified with the registered owner.

**Recommendation Report:**

The RTF will develop and submit to the FAA a recommendation report within 30 days of the charter being signed.

#### 4. RTF PROCEDURES.

- a. Act solely in an advisory capacity by advising and providing written recommendations to the Director of the UAS Integration Office
- b. May propose related follow-on tasks outside the stated scope of the RTF to the Director of the UAS Integration Office
- c. **Recommendation Report.** Submit a report detailing recommendations within four weeks of the effective date of the RTF.
  - i. The Industry Co-Chair sends the recommendation report to the Administrator through the Director of the UAS Integration Office, who will also distribute the recommendation report within the Agency
  - ii. The Director of the UAS Integration Office determines when the recommendation report and records pursuant to paragraph (8) will be made available for public release

#### 5. RTF ORGANIZATION, MEMBERSHIP, AND ADMINISTRATION. The FAA will establish a committee of members of the aviation community. The FAA will select members based on their familiarity with UAS, aircraft registration policies and procedures, retail inventory control and tracking, and electronic data capture. Membership will be balanced in viewpoints, interests, and knowledge of the committee's objectives and scope.

The provisions of the August 13, 2014 Office of Management and Budget guidance, "Revised Guidance on Appointment of Lobbyists to Federal Advisory Committees, Boards, and Commissions" (79 FR 47482), continues the ban on registered lobbyists participating on Agency Boards and Commissions if participating in their "individual capacity." The revised guidance allows registered lobbyists to participate on Agency Boards and Commissions in a "representative capacity" for the "express purpose of providing a committee with the views of a nongovernmental entity, a recognizable group of persons or nongovernmental entities (an industry, sector, labor unions, or environmental groups, etc.) or state or local government." For further information refer to the OMB guidance at 79 FR 47482.

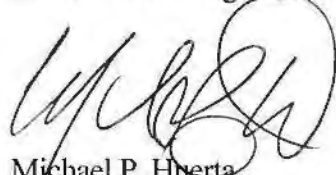
Membership is limited to promote discussion. Attendance, active participation, and commitment by members are essential for achieving the objectives and tasks.

The RTF will consist of members from the attached list of industry member organizations, manufacturers, and retailers who are involved in the promotion of UAS and/or UAS production, sale, or distribution. FAA and other agency subject matter experts may be requested to participate and provide technical support to RTF members.

- a. The Director of the UAS Integration Office will function as the FAA Co-Chair and will:
  - 1) Function as the Designated Federal Official
  - 2) Select and appoint industry members and the FAA participants
  - 3) Select an Industry Co-Chair from the membership of the RTF
  - 4) Provide the FAA participation and support from all affected lines-of-business
  - 5) Provide notification to the members of the time and place for each meeting
- b. Once appointed, the Industry Co-Chair will:

- 1) Coordinate required RTF meetings in order to meet the objectives and timelines
  - 2) Establish and distribute meeting agendas in a timely manner
  - 3) Determine the method of keeping meeting notes, if deemed necessary
  - 4) Perform other responsibilities, as required, to ensure the objectives are met
  - 5) Provide status reports, as requested, in writing to the Director of the UAS Integration Office
  - 6) Submit the recommendation report to the Director of the UAS Integration Office in accordance with 4(c)
6. **COST AND COMPENSATION.** The estimated cost to the Federal Government for the RTF is approximately \$2,500. All travel costs for government employees are the responsibility of the government employee's organization. Non-government representatives, including the Industry Co-Chair, serve without government compensation and bear all costs related to their participation on the RTF.
7. **PUBLIC PARTICIPATION.** Meetings are not open to the public. Persons or organizations outside the RTF who wish to attend a meeting must get approval in advance of the meeting from the Industry Co-Chair and the FAA Co-Chair.
8. **AVAILABILITY OF RECORDS.** Consistent with the Freedom of Information Act, Title 5, U.S.C., section 552, records, reports, agendas, working papers, and other documents that are made available to or prepared for or by the RTF will be available for public inspection and copying at the FAA UAS Integration Office, 490 L'Enfant Plaza, Suite 7225, Washington DC, 20024. Fees will be charged for information furnished to the public according to the fee schedule published in Title 49 of the Code of Federal Regulations, part 7.
- This charter may be found on the FAA Committee Database website at:  
[http://www.faa.gov/regulations\\_policies/rulemaking/committees/documents/](http://www.faa.gov/regulations_policies/rulemaking/committees/documents/).
9. **DISTRIBUTION.** This charter is distributed to the Director of the UAS Integration Office, the Office of the Associate Administrator for Aviation Safety, the Office of the Chief Counsel, the Office of Aviation Policy and Plans, and the Office of Rulemaking.
10. **EFFECTIVE DATE AND DURATION.** The RTF is effective upon issuance of this charter and will remain in existence for 30 days, unless the charter is sooner suspended, terminated, or extended by the Administrator.

Issued in Washington, D.C. on



Michael P. Huerta  
Administrator

**Unmanned Aircraft Systems (UAS)  
Registration Task Force (RTF)  
Aviation Rulemaking Committee  
(ARC)**

**Task Force Recommendations  
Final Report**

**November 21, 2015**

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## 1. BACKGROUND

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The Federal Aviation Administration (FAA) chartered the Unmanned Aircraft Systems (UAS) Registration Task Force (RTF) Aviation Rulemaking Committee (ARC) (Task Force) to provide recommendations to the FAA “on registration requirements and process for small UAS, including those used for commercial purposes, and all model aircraft.”

Federal law (49 U.S.C. § 44101(a)) requires that a person may only operate an aircraft when it is registered with the FAA. An “aircraft” is defined as “any contrivance invented, used, or designed to navigate, or fly in, the air” (49 U.S.C. § 40102(a) (6)). In 2012, Congress confirmed that UAS, including those used for recreation or hobby purposes, are aircraft consistent with the statutory definition set forth in 49 U.S.C. § 40102(a)(6). *See* Pub. L. 112-95, §§ 331(8), 336. The FAA currently requires civil UAS operators who have been granted operational authority by exemption to register their aircraft. The FAA would also require registration for civil UAS that would be operating under the proposed rule titled Operation and Certification of small UAS (sUAS). *See* 80 FR 9544 (Feb. 23, 2015).

Although the FAA does not currently enforce the requirement for sUAS used for hobby or recreational purposes to be registered, the rapid proliferation of these aircraft in the national airspace has caused the FAA to reevaluate this policy in the interests of public safety and the safety of the National Airspace System (NAS). On October 22, 2015, the Department of Transportation (DOT) and the FAA published the Clarification of the Applicability of Aircraft Registration Requirements for Unmanned Aircraft Systems (UAS) and Request for Information Regarding Electronic Registration for UAS (Clarification and RFI). *See* 80 FR 63912. The Clarification and RFI did three main things: (1) clarified that the statutory requirements regarding aircraft registration of UAS apply to aircraft used for recreational or hobby purposes; (2) announced the formation of this Task Force; and (3) facilitated the Task Force’s work, requesting information and data from the public in 10 specific areas.

The stated objective of the Task Force was to develop recommendations for the creation of a registration process, which ultimately would contribute to an enforceable rule imposed by the FAA. The FAA stated that the intent of establishing this registration framework was to promote a culture of accountability while achieving a maximum level of compliance.

The FAA scoped the Task Force’s objectives at inception, and advised them that deliberations and recommendations were not dependent on the issuance or enactment of new regulation(s) or legislation, thus bound by existing statutes and rules. Additionally, the FAA advised the Task Force that recommendations should only consider sUAS operations covered under existing laws or statutes for which the FAA has direct oversight or responsibility (e.g., indoor sUAS operations were outside of the scope of discussion).

Recommendations from the Task Force are within the bounds of its charter, and may be used at the FAA’s discretion. The FAA may incorporate all, some, or none of the recommendations provided in any rulemaking activity, as well as take any future steps deemed necessary by the Agency to ensure compliance with the registration requirement. The work of the Task Force is an important step toward promoting a safety culture, but it is by no means the only action that can be taken. Any

implemented registration system must align with the Agency's priorities of safety, education, and accountability.

## **2. OBJECTIVES AND SUMMARY OF ACTIVITIES OF THE TASK FORCE**

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The Task Force was comprised of individuals from a diverse group of aviation and non-aviation perspectives. The Task Force members were:

- 3D Robotics (3DR)
- Academy of Model Aeronautics (AMA)
- Aerospace Industries Association (AIA)
- Air Line Pilots Association (ALPA)
- Aircraft Owners and Pilots Association (AOPA)
- Amazon Prime Air
- Amazon Retail
- American Association of Airport Executives (AAAE)
- Association for Unmanned Vehicle Systems International (AUVSI)
- Best Buy
- Consumer Technology Association (CTA)
- DJI
- General Aviation Manufacturers Association (GAMA)
- GoogleX
- GoPro
- Helicopter Association International (HAI)
- International Association of Chiefs of Police (IACP)
- Management Association for Private Photogrammetric Surveyors (MAPPS)
- Measure
- National Association of State Aviation Officials (NASAO)
- National Business Aviation Association (NBAA)
- Parrot
- Precision Hawk
- Small UAV Coalition
- Walmart

The FAA charged the Task Force with the following three objectives:

1. Develop and recommend minimum requirements for UAS that would need to be registered.
  - Factors to consider include, but are not limited to: technical capabilities and operational capabilities such as size, weight, speed, payload, equipage, and other factors such as age of operator.
2. Develop and recommend registration processes.
  - Factors to consider include, but are not limited to: electronic means for registration, data retention and storage, fee collection, and information required to be submitted for registration.

3. Develop and recommend methods for proving registration and marking.
  - Factors to consider include, but are not limited to: how certificates will be issued and how a UAS will be able to be identified with the registered owner.

To support the FAA in establishing a unique small UAS (sUAS) registration process, the Task Force members participated in preliminary interviews with the FAA between October 22, 2015 and October 30, 2015. To facilitate initial discussions, the Task Force was asked to consider the following questions:

1. What methods are available for identifying individual products? Does every UAS sold have an individual serial number? Is there another method for identifying individual products sold without serial numbers or those built from kits?
2. At what point should registration occur (e.g., point-of-sale (POS) or prior to operation)? How should transfers of ownership be addressed in registration?
3. If registration occurs at POS, who should be responsible for submission of the data? What burdens would be placed on vendor of UAS if DOT required registration to occur at POS? What are the advantages of a point-of-sale approach relative to a prior-to-operation approach?
4. Consistent with past practice of discretion, should certain UAS be excluded from registration based on performance capabilities or other characteristics that could be associated with safety risk, such as weight, speed, altitude operating limitations, duration of flight?
5. How should a registration process be designed to minimize burdens and best protect innovation and encourage growth in the UAS industry?
6. Should the registration be electronic or web-based? Are there existing tools that could support an electronic registration process?
7. What type of information should be collected during the registration process to positively identify the aircraft owner and aircraft?
8. How should the registration data be stored? Who should have access to the registration data? How should the data be used?
9. Will the data be used primarily to hold registrants accountable for accidents or intentional misuse? If so, how will this affect registration by consumers? How will registration be enforced?
10. To encourage awareness, should the registration process include an acknowledgment of UAS safe operating rules?
11. Should a registration fee be collected and if so, how will the registration fee be collected if registration occurs POS? Are there payment services that can be leveraged to assist (e.g., PayPal)?
12. How will a registration program affect sales of drones, future innovation, and the positive economic impacts of the use of drones?
13. The effort to register all aircraft will have costs to government, consumers, industry, and registrants. What are these costs, and are these costs clearly outweighed by the benefits to aviation safety?
14. Are there additional means to encourage accountability and safe responsible use of UAS?

The Task Force met to discuss the three main objectives over a three-day period between November 3, 2015 and November 5, 2015. Administrator Huerta opened the meeting by asking the Task Force to keep in mind the need to ensure a strong culture of safety and responsibility in the National Airspace System (NAS). The Administrator also highlighted the desire to make registration

as easy as possible for sUAS owners and operators, and to relieve them of burdens associated with registration of larger manned aircraft. The FAA briefed participants on the current statutory requirements and international obligations for aircraft registration before the group began initial discussions on a streamlined registration process and minimum requirements for sUAS that need to be registered. The Task Force was also notified that there is an existing FAA contract in place that could be leveraged to build a baseline registration system and that their input would help frame the parameters for the new system and determine how information could be fed into the system and accessed. The Task Force was then presented with a summary of the most current public comments submitted in response to the Clarification and RFI.

Following the introductory briefing, the industry chair led an open discussion for the group to raise questions and share thoughts regarding the three main objectives of the Task Force. This discussion focused on the goals of the registration process: to educate users on the safe operating rules for sUAS and the need to link the aircraft to the owner or operator in the event of an incident or accident. The Task Force recognized a need to connect responsibility for the aircraft to the owner of the aircraft. The Task Force also agreed that any recommendations need to be rooted in concerns for safety and applicable safety data, where available. The afternoon session of the first day focused on the first objective of the task force: whether certain sUAS should be excluded from registration. The Task Force acknowledged that this should be a risk-based decision. There was much discussion about the low level of risk that we accept today for manned aircraft operations and what is the appropriate level of risk to accept for unmanned aircraft operations, based on the data that is available, and based on distinctions made in other jurisdictions that have identified a lowest-weight cutoff for sUAS regulation.

On day two of the meeting, the co-chairs led with a brief recap of the Day 1 discussion regarding which sUAS should be required to be registered and outlined the goals for the Day 2 discussion, which focused on developing and recommending a registration process and means for proving registration methods and marking sUAS. For this session, the Task Force created breakout groups to help facilitate discussion amongst the members. The third day of the meeting began with a review of the previous days' work, followed by a facilitated discussion to develop consensus recommendations on the three objectives.

From these discussions, the Task Force developed high-level recommendations for sUAS registration requirements and processes that address the questions posed by FAA. The recommendations in this report reflect the final statements of the Task Force.

### **3. EXECUTIVE SUMMARY**

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The Task Force agreed that it was outside the scope of the Task Force's objectives to debate or discuss the DOT Secretary's decision to require registration of sUAS or the legal authority for the implementation of such a mandate. Once that understanding was reached, the Task Force undertook the task to develop and recommend a registration process that ensures accountability for users of the NAS and encourages a maximum level of compliance with the registration requirement, while not unduly burdening the nascent UAS industry and its enthusiastic owners and users of all ages. The Task Force also sought to define a category of sUAS that should be excluded from the registration requirement because they do not present a significant level of risk to the non-flying public and to users of the NAS.

The Task Force recommendations for the registration process are summarized as follows:

- 1) Fill out an electronic registration form through the web or through an application (app).
- 2) Immediately receive an electronic certificate of registration and a personal universal registration number for use on all sUAS owned by that person.
- 3) Mark the registration number (or registered serial number) on all applicable sUAS prior to their operation in the NAS.

While the brief summary above leaves out some details, like the option of serial number registration, it demonstrates the simplicity of the solution recommended by the Task Force members. This simplicity is what allowed for a consensus recommendation to develop. Any registration steps more burdensome than these three simple steps may jeopardize the likelihood of widespread adoption and would undermine the overall registration philosophy that enabled the Task Force to come to consensus.

Although there were often very divergent views, and some decisions were not unanimous, the Task Force reached general agreement on their recommendations to the FAA with the frequent use of votes. Additionally, the general consensus view of the Task Force is that the recommendations on the three objectives are to be presented together as a unified recommendation, with each of the individual recommendations dependent upon elements in the others. Compromises in positions were made whenever possible to obtain a general consensus, and changes to any of the components could further dilute support among the Task Force members and their constituencies for the final recommendations. It should be noted that the Task Force acknowledged that the timeframe provided for deliberations did not allow for in-depth analysis of all the factors involved in instituting a federal requirement for registering sUAS, nor did it allow for an assessment of the impact of such a mandate on the recreational/hobby community.

Based primarily upon an assessment of available safety studies and risk probability calculations, and notwithstanding determinations in other countries with differing weight thresholds, the Task Force recommended an exclusion from the registration requirement for any small unmanned aircraft weighing a total of 250 grams (g) or less. The 250 grams or less exclusion was based on a maximum weight that was defined as the maximum weight possible including the aircraft, payload, and any other associated weight. In manned aircraft terms, it is the “maximum takeoff weight.”

The Task Force also recommends a free, owner-based registration system with a single registration number for each registrant. (They also suggested that if the FAA is required by statute to charge, that the fee should be \$0.001). sUAS owners would be required to register with the FAA, prior to operation in the NAS, by entering their name and street address into a web-based or app based registration system. The system would be powered by an Application Program Interface (API) that would allow multiple app clients to feed registration information into the database, ensuring widespread compliance. Provision of email address, telephone number, and serial number of the aircraft into the system would be optional. Information on U.S. citizenship or residence status would not be required, but there would be a minimum age requirement of 13 years to register. At the time of registration, each registrant would receive a certificate of registration that contains a unique universal registration number (and the aircraft serial number if provided) that can be used on all sUAS owned by the individual. This registration number would be required to be directly marked on or affixed to each sUAS the registrant owns, prior to outdoor operation. This marking would

need to be maintained in a readable and legible condition, and be readily accessible upon visual inspection. If a registrant chose to provide the FAA with the aircraft's serial number, the registrant would not be required to further mark the sUAS with the FAA-issued registration number, as long as the serial number meets the requirement of being readable, legible, and readily accessible (without the use of tools) upon visual inspection. The Task Force also recommends that the registration process contain some sort of education component which could be similar to the existing content in the *Know Before You Fly* campaign.

## **4. TASK FORCE RECOMMENDATIONS**

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### **4.1 Minimum Requirements for UAS that Would Need to be Registered (i.e., exclusion from the registration requirement)**

The Task Force accepted as a baseline that the registration requirement will only apply to sUAS (i.e., aircraft weighing less than 55 pounds) that are operated outdoors in the NAS. Beyond that baseline, however, the FAA asked the Task Force to recommend additional minimum requirements for sUAS that would need to be registered. In particular, the agency asked the Task Force to consider factors including, but not limited to, technical capabilities and operational capabilities such as size, weight, speed, payload, equipage, and other factors such as the age of the operator.

The safety of the non-flying public and of other users of the NAS was central to the Task Force's determination of what category of sUAS to recommend for exemption from the registration requirement. With considerations of safety in mind, the Task Force addressed the possibility of recommending an exclusion based on various factors, including: weight (alone and in combination with altitude or kinetic energy), mass, speed, kinetic energy, payload, equipage (e.g., camera, GPS), and operational capabilities, such as the ability to navigate the airspace, the ability to operate above a certain altitude above ground level (AGL), the ability to operate beyond visual line of sight (BVLOS) of the operator, the ability to operate autonomously, and flight duration.

The Task Force ultimately agreed to use a mass-based approach to determine an appropriate category of sUAS to recommend for exclusion from the registration requirement. This was based upon the probability of a catastrophic event occurring (i.e., death or serious injury) due to a collision between an sUAS and a person on the ground. Because of the lack of data on UAS-aircraft collisions, engine ingestion, propeller, and rotor impacts by UAS, the probability of a catastrophic event occurring due to those events was not part of the consideration. This approach best satisfied the Task Force's concerns about safety and provided a minimum weight threshold for registration that is easy to understand and apply and would therefore encourage compliance. The formula considered was identified to the group as a standard aviation risk assessment formula used in consideration of manned aircraft safety.

The free fall ground level velocity (V) of an object from 500 feet (ft.) (~152 meters (m)) above ground in a vacuum is determined by contemplating potential and kinetic energy exchange, thus:

$$V = \sqrt{2 * g * h} = (2gh)^{\frac{1}{2}} = \left(2 * 9.81 \frac{m}{s^2} * 152m\right)^{\frac{1}{2}}$$

$$V = 54.6 \frac{m}{s} (\sim 122 \frac{mi}{hr})$$

The terminal velocity, however, of such an aircraft in free fall through air will be lower than this value and will vary, dependent on effective projected area and drag. For ease of administration and sUAS owner understanding, the task force strongly advised a mass-based approach for determining the generally safe threshold below which an sUAS would not need to be registered. In order to define such a mass threshold, several assumptions need to be made, thus:

$$\text{Drag coefficient: } C_d = 0.3$$

$$\text{Projected area: } S = 0.1m * 0.2m = 0.02m^2$$

$$\text{Air Density at Sea Level: } \rho = 1.225 \frac{kg}{m^3}$$

The terminal velocity in free vertical fall through air at sea level is then the steady state condition where:

$$\text{Drag Force (m * g)} \quad F_D = \frac{1}{2} \rho S C_d V^2$$

$$\text{Drag Force } \left(m * 9.81 \frac{m}{s^2}\right) = F_D = \frac{1}{2} * \left(1.225 \frac{kg}{m^3}\right) * (0.02m^2) * (0.3) * V^2$$

The kinetic energy (KE) expressed in Joules of an object of mass (M), moving at velocity (V) is determined by the following formula:

$$KE = \frac{1}{2} m v^2$$

Referencing information from a 2012 MITRE report (which further references a United Kingdom Ministry of Defense 2010 study), an object with a kinetic energy level of 80 Joules (or approximately 59 foot-pounds) has a 30% probability of being lethal when striking a person in the head.<sup>1</sup>

Solving for mass and velocity, this equates to an object weighing 250 grams traveling at a terminal velocity of 25 meters/second or approximately 57 miles per hour.

Using these results, it is reasonable to estimate the probability of such a lethal event occurring per sUAS flight hour, by the following approach:

$$P_{event} = MTBF^{-1} * \left( \frac{S_{UAS}}{S_h} \right) * (n * \frac{S_h}{S_s}) * EF * P_l$$

$S_{UAS}$  = Area of UAS,

$S_h$  = Area of human,

$S_s$  = Area of surface,

$n$  = Number of humans

$$P_{event} = \frac{S_{UAS} * \left( \frac{n}{S_s} \right) * EF * P_l}{MTBF}$$

Where:

$$Population\ Density = \frac{n}{S_s}$$

(For these purposes, we have used population density numbers reflecting a relatively densely packed urban environment. We have done so despite the fact that sUAS operations are prohibited over unprotected persons not connected to the operation).

MTBF = mean time between failures (of the sUAS in hours).

Exposed fraction (EF) = fraction of people outdoors and directly exposed to the falling object at any one time.

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<sup>1</sup> “A New Paradigm for Small UAS,” Andrew Lacher and David Maroney, *available at* [https://www.mitre.org/sites/default/files/pdf/12\\_2840.pdf](https://www.mitre.org/sites/default/files/pdf/12_2840.pdf); “Lethality Criteria for Debris Generated From Accidental Explosions,” Jon Henderson, *available at* <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA532158>.

If we assume the following values:

$$\text{MTBF} = 100 \text{ hours}$$

$$\textbf{Population Density} = 10,000 \frac{n}{mi^2} \sim 0.0039 \frac{n}{m^2}$$

$$\textbf{S}_{UAS} = 0.1 * 0.2 = 0.02 \text{ m}^2 \textbf{ Note: as above}$$

$$\textbf{EF} = \textbf{Exposed Fraction} = 0.2$$

$$\textbf{P}_l = \textbf{Probability of Lethality} = 0.3$$

Then, the likelihood (or probability, P) of a catastrophic event can be estimated as:

$$\textbf{P}_{event} = \frac{0.02 * 0.0039 * 0.2 * 0.3}{100}$$

$$\textbf{P}_{event} = 4.7 \times 10^{-8}, \text{ or less than 1 ground fatality for every 20,000,000 flight hours of an sUAS}$$

Considering that the acceptable risk levels for commercial air transport are on the order of  $1 \times 10^{-9}$ , and general aviation actual risk levels are on the order of  $5 \times 10^{-5}$ , this level of risk at  $4.7 \times 10^{-8}$  seems to present a reasonably acceptable risk level to the Task Force for sUAS that meet the aforementioned assumptions. Some members of the task force questioned why sUAS risk level would ever be required to exceed the current general aviation risk level of  $5 \times 10^{-5}$ .

Based on that calculation, the Task Force recommends that the FAA exempt from the registration requirement any unmanned aircraft weighing 250 grams or less. The 250 grams or less exclusion was based on a maximum weight that was defined as the maximum weight possible including the aircraft, payload, and any other associated weight. In manned aircraft terms, it is the “maximum takeoff weight.”

It is important to note, however, that this recommendation is interdependent on the Task Force’s other recommendations on the registration process. The Task Force spent considerable time discussing and deliberating about what the appropriate weight threshold should be. While general agreement was ultimately reached on the 250 gram weight, there were Task Force members who believed it was too conservative, as the weight could negatively impact the credibility of the sUAS registration program and thus lessen compliance levels because it would require registration of some sUAS generally considered to be in the “toy” category. Others took the opposite view that there should be no registration exemption for UAS of any size. There was also concern that other countries are considering or have already established regulatory cutoffs at much higher weights of 1 kilogram or 2 kilograms. Some also felt there was insufficient time afforded to fully evaluate the calculations and assumptions made that resulted in the 250 gram cutoff weight, particularly because the typical approved operation of small UAS, unlike the typical operation of manned aircraft, does not involve flight over unprotected people.

Certain members of the Task Force asked that it be noted that this is a nascent industry with very little experiential data to inform the assumptions and that periodic review of the data may be warranted. Certain task force members noted that the FAA's 25 years of bird strike data show that fatal aircraft accidents caused by small and medium birds (weighing four pounds on average) are extremely rare despite the presence of billions of birds within the low altitudes where small UAS typically fly, and urged the FAA to select a weight that posed a similar safety risk. Task force members representing manned aircraft organizations expressed specific concerns that data on UAS-aircraft collisions, engine ingestion, propeller, and rotor impacts by UAS was not available when determining the weight threshold. All members urged the FAA to expedite its work currently underway in this area.

Consensus was reached for a registration system that provides registrants with a single registration number to be used on every aircraft they own and, where applicable, permits registrants to use the manufacturer's permanently affixed serial number to satisfy the marking requirement. *See* discussions below in sections 4.2 and 4.3.2, respectively. It should also be noted that the 250 gram weight threshold was agreed to for registration purposes only and was not a validation of the underlying assumptions for any purpose other than the registration requirement. It was agreed by all members that this threshold, arrived at under the circumstances described, should not be used by the FAA to establish operational restrictions or categories in any future rulemaking unless safety concerns require the FAA to take appropriate action.

## **4.2 The Registration Process**

The Task Force approached its discussions of the registration process with two goals in mind – to ensure accountability by creating a traceable link between aircraft and owner, and to encourage the maximum levels of regulatory compliance by making the registration process as simple as possible. To achieve the twin goals of accountability and compliance, the Task Force recommends the FAA institute a simple, owner-based registration system in which the FAA issues a single registration number to each registrant which covers all sUAS owned by that registrant. The Task Force also adopted recommendations related to: (1) the information to be collected during the registration process; (2) the point at which registration should occur; (3) whether the registration process should be electronic or web-based; (4) whether a registration fee should be imposed; and (5) whether there should be a minimum age limit for registration. Because the Task Force is recommending an owner-based registration system, questions concerning how to deal with transfers of ownership are easily addressed by the registrants' marking methods.

### 4.2.1 What information should be collected?

#### *Registrant Contact Information*

To ensure accountability, the Task Force recommends the FAA require all registrants to provide their name and street address, with the option to provide an email address or telephone number. While the Task Force recognizes that a registrant's email address and telephone number may be useful for the FAA to disseminate safety-related information to sUAS owners, the Task Force nevertheless believes disclosure of such information should be optional. With the exception of information released to authorized law enforcement agencies and state transportation and aviation offices, the Task Force urges the FAA to prevent the release of any personal information that the

agency is not specifically required by law to disclose. Because this new requirement will impact unmanned aircraft owners who do not have the means to protect their identities and addresses behind corporate structures (as some manned aircraft owners currently do), it is important for the FAA to take all possible steps to shield the information of privately owned aircraft from unauthorized disclosure, including issuing an advance statement that the information collected will be considered to be exempt from disclosure under FOIA.

### *Aircraft Information*

Because the Task Force is recommending the FAA institute an owner-based registration system, it believes registrants should not be required to provide any aircraft information, such as serial number or make and model of the sUAS, during the registration process. Registrants should, however, have the option to provide the aircraft's manufacturer serial number, so that the serial number can then be used to satisfy the marking requirement (as discussed below, in section 4.3.2). Additionally, to ensure the broadest possible participation, this registration system should make no distinction for, or impose additional requirements upon, sUAS manufactured or purchased outside the United States.

### *Citizenship Status*

With the goals of encouraging the growth of the sUAS industry and compliance with the registration requirement in mind, the Task Force recommends there be no U.S. citizenship or residency requirement for registration eligibility. This requirement, which makes sense with respect to the owners of passenger aircraft, does not match the way this technology is used by foreign visitors, students and others who are in the United States temporarily. If, however, the FAA does include a U.S. citizenship or residency requirement, the Task Force recommends that the Agency use its discretion to permit owners not eligible to register to operate in the U.S. by applying for an expedited waiver from the registration requirement for a specified, limited period of time (consistent with §41703(a)(4)). Eliminating the citizenship requirement would help achieve the goal that sUAS owners are known to the FAA for safety purposes.

#### 4.2.2 At what point should registration occur? Should the system be electronic or web-based?

As noted above, 49 U.S.C. § 44101(a) stipulates that a person may only *operate* an aircraft when it is registered with the FAA. As such, the majority of the Task Force believes the FAA cannot require registration of sUAS at the point-of-sale. Some members of the Task Force expressed the opinion that maximum compliance can best be achieved with point-of-sale registration and those members therefore encourage the FAA to include it as one of several options for registration. Several other members of the Task Force pointed out that, because the FAA's authority extends only to *operation* of aircraft, point-of-sale registration cannot be mandated.

An important registration attribute that the Task Force members could broadly agree on was that in order to promote greater acceptance of the registration requirement, the registration process should be as quick and easy as possible. The Task Force encourages the FAA to consider implementing additional methods and strategies to maximize compliance with the registration requirement but without adding cumbersome steps into the process.

The Task Force believes the registration process should be web-based, and that the FAA should create an online registration system that allows for multiple entry points through an Application Program Interface (API). This would allow, for example, an sUAS manufacturer or trade organization to develop an app that communicates through an API by which it can register its customers or members by submitting registration information directly to the FAA database on their behalf. Examples of multiple entry points are web apps, web portals, web browsers, cell phone apps, plug-ins, etc.

The registration information required and the certificate of registration received would be the same regardless of what point of entry is used into the registration system. The online registration system should provide an option for owners to edit and delete their registration information, as well as to view and print physical copies of their registration certificates through access to a password-protected web-based portal.

#### 4.2.2.1 Training and education in conjunction with operator registration

Recognizing how important it is that all users of the NAS receive information on safety in the NAS, the Task Force recommends the registration process contain some sort of education component and acknowledgment, with controls in place such that the registration process would be incomplete until the registrant has acknowledged receipt of this information. The information provided could be similar to the existing content in the *Know Before You Fly* program.

#### 4.2.3 Should a registration fee be imposed?

To encourage a high level of compliance with the registration requirement, the Task Force believes the FAA should not impose a registration fee. In the event that the FAA must charge a fee for legal reasons, the Task Force suggested a *de minimis* fee of 1/10<sup>th</sup> of one cent (\$0.001).

#### 4.2.4 Should there be an age limit for registration?

All sUAS flown outdoors and exceeding 250g maximum flight weight must be registered. However, consistent with the Children's Online Privacy Protection Act, 15 U.S.C. §§ 6501-6505, the Task Force recommends a requirement that individuals be 13 years or older to register an sUAS. Although acknowledging that some sUAS may be operated by persons younger than 13, the Task Force would thus recommend that registered sUAS owners be 13 years of age or older, and that children under that age operate sUAS under a parent or guardian's registration.

### **4.3 Methods for Proving Registration and Marking**

The FAA charged the Task Force with developing and recommending methods for proving registration and marking. Factors to consider included, but were not limited to, how registration certificates will be issued and how an sUAS will be able to be identified with the registered owner (i.e., a marking requirement).

#### 4.3.1 Certificate of Registration

The Task Force recommends that the FAA issue a certificate of registration to each registrant at the time of registration. The certificate should be issued electronically (perhaps in PDF format), unless the registrant specifically requests a paper copy. The Task Force recommends that a web or app based system provide registered users with the ability to view and print physical copies of their registration certificates through access to a password-protected portal. Should the FAA provide for generation and mailing of physical certificates, where requested, the Task Force did not object to a reasonable cost-based fee being charged by the FAA for such a service. The certificate should contain the registrant's name, the registrant's FAA-issued registration number, and the address of the FAA registration website that is accessible by law enforcement or other authorities for the purposes of confirming registration status. For registrants who elect to provide the serial number(s) of their aircraft, the certificate should also contain those serial number(s). The Task Force encourages the FAA to include safety and regulatory information with the certificate of registration. Any time a registered sUAS is in operation, the operator of that sUAS should be prepared to produce a legible copy of the certificate of registration for inspection, in either electronic or printed form.

#### 4.3.2 Marking Requirement

Because the main goal of registration is to create a connection between the aircraft and its owner, the Task Force recognizes that it is necessary to mark each registered sUAS with a unique identifier that is readily traceable back to its owner. The Task Force recommends two options for complying with this marking requirement. Specifically, registrants can either affix their FAA-issued registration number to the aircraft or they can rely on a manufacturer's serial number that is already permanently affixed to the aircraft. An sUAS owner may only rely on the manufacturer's serial number, however, if the owner provided that serial number to the FAA during registration and if it appears on the owner's certificate of registration.

The Task Force further recommends a requirement that the owner and operator ensure that all markings be readily accessible and maintained in a condition that is readable and legible upon close visual inspection prior to any operation. The Task Force believes that markings enclosed in a compartment, such as a battery compartment, should be considered "readily accessible" if they can be easily accessed without the use of tools.

#### 4.3.3 Penalties and Enforcement

The Task Force recommends that the FAA establish a clear and proportionate penalty framework for violations. Current registration-related penalties (perhaps exceeding \$25,000) were established in order to address and deter suspected drug traffickers and tax evaders who failed to register aircraft as part of larger nefarious schemes. Any person flying an sUAS, including consumers and juveniles, may now find themselves inadvertently in violation of this new system. The Task Force recommends that the FAA expressly establish a reasonable and proportionate penalty schedule that is distinct from those relating to traditional manned aviation. To the extent the FAA does not feel it has authority to alter penalty ranges indicated by statute, the Task Force recommends a change be made to Order 2150.3B, FAA Compliance and Enforcement Program, to set out the enforcement and penalty philosophy that the FAA will pursue, including a schedule of penalties.

## 5. CONCLUSION

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These recommendations were agreed upon in a spirit of cooperation and compromise. Many Task Force members approached the proceeding with strong convictions, derived both from their personal experience and from knowledgeable input from their organizations and users. In such a time-limited tasking, many of these convictions were necessarily set aside in order to reach a general consensus among the group and to provide the FAA with a workable solution that met its safety and policy requirements while not unduly burdening the nascent UAS industry and its enthusiastic owners and users of all ages.

Each of the recommendations for all the elements of this report required some level of compromise and mutual cooperation from various members of the Task Force. Therefore, the Task Force respectfully requests that the list of recommendations contained herein be viewed by the FAA as a holistic package, with elements of each recommendation closely interconnected with the others. Should the FAA find it necessary to significantly alter any element of its adopted registration system in a way that would contradict the findings and recommendations in this report, the members of the Task Force would respectfully request that the FAA reconvene the Task Force as soon as practicable. This would help to ensure complete industry and UAS community input into the registration system that is ultimately adopted by the agency.

## 6. APPENDIX Summary of Task Force Recommendations

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<b>UAS Registration Task Force Aviation Rulemaking Committee Recommendations Summary</b>	
What category of UAS is covered by the registration requirement?	UAS that weigh under 55 pounds and above 250 grams maximum takeoff weight, and are operated outdoors in the NAS.
Do owners need to register each individual UAS they own?	No. The registration system is owner-based, so each registrant will have a single registration number that covers any and all UAS that the registrant owns.
Is registration required at point-of-sale?	No. Registration is mandatory prior to operation of a UAS in the NAS.
What information is required for the registration process?	Name and street address of the registrant are required.  Mailing address, email address, telephone number, and serial number of the aircraft are optional.
Is there a citizenship requirement?	No.
Is there a minimum age requirement?	Yes. Persons must be 13 years of age to register.
Is there a registration fee?	No.
Is the registration system electronic or web-based?	The system for entry of information into the database is web-based and also allows for multiple entry points, powered by an API that will enable custom apps to provide registry information to the database and receive registration numbers and certificates back from the database. Registrants can also modify their information through the web or apps.
How does a UAS owner prove registration?	A certificate of registration will be sent to the registrant at the time of registration. The certificate will be sent electronically, unless a paper copy is requested, or unless the traditional aircraft registration process is utilized. The registration certificate will contain the registrant's name, FAA-issued registration number, and the FAA registration website that can be used by authorized users to confirm registration information. For registrants who elect to provide the serial number(s) of their aircraft to the FAA, the certificate will also contain those serial number(s). Any time a registered UAS is in operation, the operator of that UAS should be prepared to produce the certificate of registration for inspection.

<p>Does the registration number have to be affixed to the aircraft?</p>	<p>Yes, unless the registrant chooses to provide the FAA with the aircraft's serial number. Whether the owner chooses to rely on the serial number or affix the FAA-issued registration number to the aircraft, the marking must be readily accessible and maintained in a condition that is readable and legible upon close visual inspection. Markings enclosed in a compartment, such as a battery compartment, will be considered "readily accessible" if they can be accessed without the use of tools.</p>
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## Part VI

## Department of Transportation

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Federal Aviation Administration

14 CFR Parts 1, 45, 47, et al.

Registration and Marking Requirements for Small Unmanned Aircraft; Final Rule

**DEPARTMENT OF TRANSPORTATION****Federal Aviation Administration****14 CFR Parts 1, 45, 47, 48, 91, and 375**

[Docket No.: FAA–2015–7396; Amdt. Nos. 1–68, 45–30, 47–30, 48–1, 91–338]

RIN 2120–AK82

**Registration and Marking Requirements for Small Unmanned Aircraft**

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

**ACTION:** Interim final rule.

**SUMMARY:** This action provides an alternative, streamlined and simple, web-based aircraft registration process for the registration of small unmanned aircraft, including small unmanned aircraft operated as model aircraft, to facilitate compliance with the statutory requirement that all aircraft register prior to operation. It also provides a simpler method for marking small unmanned aircraft that is more appropriate for these aircraft. This action responds to public comments received regarding the proposed registration process in the Operation and Certification of Small Unmanned Aircraft notice of proposed rulemaking, the request for information regarding unmanned aircraft system registration, and the recommendations from the Unmanned Aircraft System Registration Task Force. The Department encourages persons to participate in this rulemaking by submitting comments on or before the closing date for comments. The Department will consider all comments received before the closing date and make any necessary amendments as appropriate.

**DATES:** This rule is effective December 21, 2015. Comments must be received on or before January 15, 2016.

**ADDRESSES:** Send comments identified by docket number FAA–2015–7396 using any of the following methods:

*Federal eRulemaking Portal:* Go to <http://www.regulations.gov> and follow the online instructions for sending your comments electronically.

*Mail:* Send comments to Docket Operations, M–30; U.S. Department of Transportation (DOT), 1200 New Jersey Avenue SE., Room W12–140, West Building Ground Floor, Washington, DC 20590–0001.

*Hand Delivery or Courier:* Take comments to Docket Operations in Room W12–140 of the West Building Ground Floor at 1200 New Jersey Avenue SE., Washington, DC, between 9

a.m. and 5 p.m., Monday through Friday, except Federal holidays.

*Fax:* Fax comments to Docket Operations at 202–493–2251.

*Privacy:* In accordance with 5 U.S.C. 553(c), DOT solicits comments from the public to better inform its rulemaking process. DOT posts these comments, without edit, including any personal information the commenter provides, to <http://www.regulations.gov>, as described in the system of records notice (DOT/ALL–14 FDMS), which can be reviewed at <http://www.dot.gov/privacy>.

*Docket:* Background documents or comments received may be read at <http://www.regulations.gov> at any time. Follow the online instructions for accessing the docket or go to the Docket Operations in Room W12–140 of the West Building Ground Floor at 1200 New Jersey Avenue SE., Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

**FOR FURTHER INFORMATION CONTACT:** Earl Lawrence, Director, FAA UAS Integration Office, 800 Independence Avenue SW., Washington, DC 20591; telephone (202) 267–6556; email [UASRegistration@faa.gov](mailto:UASRegistration@faa.gov).

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**I. Executive Summary**

*A. Purpose of the Regulatory Action*

This interim final rule (IFR) provides an alternative process that small unmanned aircraft owners may use to comply with the statutory requirements for aircraft operations. As provided in the clarification of these statutory requirements and request for further information issued October 19, 2015, 49 U.S.C. 44102 requires aircraft to be registered prior to operation. See 80 FR 63912 (October 22, 2015). Currently, the only registration and aircraft identification process available to

comply with the statutory aircraft registration requirement for all aircraft owners, including small unmanned aircraft, is the paper-based system set forth in 14 CFR parts 45 and 47. As the Secretary and the Administrator noted in the clarification issued October 19, 2015 and further analyzed in the regulatory evaluation accompanying this rulemaking, the Department and the FAA have determined that this process is too onerous for small unmanned aircraft owners and the FAA. Thus, after considering public comments and the recommendations from the Unmanned Aircraft System (UAS) Registration Task Force, the Department and the FAA have developed an alternative process, provided by this IFR (14 CFR part 48), for registration and marking available only to small unmanned aircraft owners. Small unmanned aircraft owners may use this process to comply with the statutory requirement to register their aircraft prior to operating in the National Airspace System (NAS).

The estimate for 2015 sales indicates that 1.6 million small unmanned aircraft intended to be used as model aircraft are expected to be sold this year (including approximately 50 percent of that total during the fourth quarter of 2015). With this rapid proliferation of new sUAS will come an unprecedented number of new sUAS owners and operators who are new to aviation and thus have no understanding of the NAS or the safety requirements for operating in the NAS.

The risk of unsafe operation will increase as more small unmanned aircraft enter the NAS. Registration will provide a means by which to quickly identify these small unmanned aircraft in the event of an incident or accident involving the sUAS. Registration of small unmanned aircraft also provides an immediate and direct opportunity for the agency to educate sUAS owners on safety requirements before they begin operating.

All owners of small unmanned aircraft, including small unmanned

aircraft operated as a model aircraft in accordance with the statutory requirements for model aircraft operations in section 336 of the FAA Modernization and Reform Act of 2012, Public Law 112–95, may take advantage of the new registration process in part 48. The part 47 paper-based registration process will remain available for owners to register small unmanned aircraft due to financing requirements, ownership arrangements, or intent to operate a sUAS outside of the United States. For more information regarding both the statutory requirements for model aircraft operations and the authorizations that may be needed for operations that do not satisfy the requirements for model aircraft, please consult the materials available on the FAA Web site, including the Know Before You Fly materials, available at [www.faa.gov/uas](http://www.faa.gov/uas).

#### *B. Summary of the Major Provisions*

Table 1 provides a brief summary of the major provisions of this IFR.

TABLE 1—SUMMARY OF MAJOR PROVISIONS.

Issue	Interim final rule requirement
Unmanned aircraft covered by the registration requirement.	Unmanned aircraft weighing less than 55 pounds and more than 0.55 pounds (250 grams) on takeoff, including everything that is on board or otherwise attached to the aircraft and operated outdoors in the national airspace system must register.
Timing of registration .....	§ 48.15 Owners of small unmanned aircraft must register their aircraft prior to operation of the sUAS.
Compliance dates .....	§ 48.15 December 21, 2015 <ul style="list-style-type: none"> <li>Any small unmanned aircraft to be used exclusively as model aircraft that have never been operated.</li> <li>Small unmanned aircraft to be used in authorized operations as other than model aircraft continue to use part 47 registration process.</li> </ul> February 19, 2016 <ul style="list-style-type: none"> <li>Small unmanned aircraft to be used exclusively as model aircraft and have been operated by their owner prior to December 21, 2015.</li> </ul> March 31, 2016 <ul style="list-style-type: none"> <li>Small unmanned aircraft to be used in authorized operations other than as model aircraft continue to use part 47 registration process or use part 48 process.</li> </ul> § 48.5
Minimum age to register a small unmanned aircraft.	Persons 13 years of age and older are permitted to use the part 48 process to register a small unmanned aircraft. If the owner is less than 13 years of age, then the small unmanned aircraft must be registered by a person who is at least 13 years of age.
Registration platform .....	§ 48.25 Registration will occur through an online web-based system.
Registration number .....	§ 48.100(c) Each small unmanned aircraft intended to be used other than as a model aircraft and owned by individuals or other persons, including corporations, will be issued a Certificate of Aircraft Registration with a unique registration number. § 48.110(a) A Certificate of Aircraft Registration and registration number issued to an individual intending to use small unmanned aircraft exclusively as model aircraft, constitutes registration for those small unmanned aircraft owned by that individual that are intended to be used exclusively as model aircraft.
Registration information .....	§ 48.115(a) Required information from persons registering small unmanned aircraft intended to be used as other than model aircraft. <ul style="list-style-type: none"> <li>Applicant name or name of authorized representative.</li> <li>Applicant physical address (and mailing address if different than physical address).</li> <li>Applicant e-mail address or email address of authorized representative.</li> <li>Aircraft manufacturer and model name, and serial number, if available.</li> <li>Other information as required by the Administrator.</li> </ul> Required information from individuals registering small unmanned aircraft intended to be used exclusively as model aircraft. <ul style="list-style-type: none"> <li>Applicant name.</li> <li>Applicant physical address (and mailing address if different than physical address).</li> </ul>

TABLE 1—SUMMARY OF MAJOR PROVISIONS.—Continued

Issue	Interim final rule requirement
Registration fee .....	<ul style="list-style-type: none"> <li>• Applicant e-mail address.</li> <li>• Other information as required by the Administrator.</li> </ul> § 48.100 Persons intending to use the small unmanned aircraft other than as model aircraft. <ul style="list-style-type: none"> <li>• \$5 to register each aircraft.</li> </ul> Individuals intending to use the small unmanned aircraft exclusively as model aircraft. <ul style="list-style-type: none"> <li>• \$5 to register an individual's fleet of small unmanned aircraft.</li> </ul> § 48.30
Delivery of Certificate of Aircraft Registration.	Upon completion of the registration process, the Certificate of Aircraft registration will be delivered to the aircraft owner via the same web-based platform used to register the aircraft. § 48.100(d)
Information contained on the Certificate of Aircraft Registration.	Small unmanned aircraft owner name, issue date and registration number.
Registration renewal and fee .....	A Certificate of Aircraft Registration issued in accordance with part 48 is effective once the registration process is complete and must be renewed every three years. The fee for renewal of a Certificate of Aircraft Registration is \$5. §§ 48.110(c), 48.115(c)
Marking .....	All small unmanned aircraft must display a unique identifier. <ul style="list-style-type: none"> <li>• A unique identifier is the FAA-issued registration number.</li> <li>• The Administrator may authorize the use of the small unmanned aircraft serial number.</li> </ul> § 48.200

### C. Summary of Costs and Benefits

In order to implement the new streamlined, web-based system described in this IFR, the FAA will incur costs to develop, implement, and maintain the system. Small UAS owners will require time to register and mark their aircraft, and that time has a cost. The total of government and registrant resource cost for small unmanned aircraft registration and marking under this new system is \$56 million (\$46 million present value at 7 percent) through 2020.

In evaluating the impact of this interim final rule, we compare the costs and benefits of the IFR to a baseline consistent with existing practices: for modelers, the exercise of discretion by FAA (not requiring registration) and continued broad public outreach and educational campaign, and for non-modelers, registration via part 47 in the paper-based system. Given the time to register aircraft under the paper-based system and the projected number of sUAS aircraft, the FAA estimates the cost to the government and non-modelers would be about \$383 million. The resulting cost savings to society from this IFR equals the cost of this baseline policy (\$383 million) minus the cost of this IFR (\$56 million), or about \$327 million (\$259 million in present value at a 7 percent discount rate). These cost savings are the net quantified benefits of this IFR.

### II. Compliance

Any small unmanned aircraft operated exclusively as a model aircraft by its current owner prior to December 21, 2015 must be registered no later than

February 19, 2016. The delayed compliance date provides a period of time to bring the existing population of small unmanned aircraft owners into compliance as it is not reasonable to expect that all existing small unmanned aircraft owners will register their aircraft immediately upon the effective date of this rule.

All other small unmanned aircraft intended to be used exclusively as model aircraft (*i.e.*, for hobby and recreational purposes in accordance with the requirements of section 336 of Pub. L. 112–95)—newly purchased or never before used—must be registered prior to the first operation outdoors. Thus, any small unmanned aircraft purchased, received as a gift, or otherwise acquired on or after December 21, 2015, and intended to be used exclusively as a model aircraft must be registered prior to operation.

Currently, small unmanned aircraft operated as other than model aircraft (*i.e.*, for operations for non-hobby or non-recreational purposes or as a public aircraft) must continue to complete the part 47 registration process in accordance with the conditions and limitations of exemptions issued under section 333 of Public Law 112–95. As exemplified by the growing number of petitions for exemption, the agency expects to see a continued high level of demand for registration of aircraft used for purposes other than model aircraft once the Operation and Certification of Small Unmanned Aircraft Systems notice of proposed rulemaking (the “sUAS Operation and Certification

NPRM”) is finalized.<sup>1</sup> The small unmanned aircraft registration system established by this final rule will be able to receive and process applications for Certificates of Aircraft Registration for aircraft operating pursuant to an exemption issued under section 333 of Public Law 112–95 beginning March 31, 2016. Thus, beginning on March 31, 2016, the agency will allow small unmanned aircraft operating pursuant to an exemption to use the new part 48 registration requirements in place of part 47, as well as aircraft used in operations authorized under the sUAS Operation and Certification rulemaking, once the rule is finalized.

### III. Good Cause for Immediate Adoption

Section 553(b)(3)(B) of the Administrative Procedure Act (APA) (5 U.S.C.) authorizes agencies to dispense with notice and comment procedures for rules when the agency for “good cause” finds that those procedures are “impracticable, unnecessary, or contrary to the public interest.” Under this section, an agency, upon finding good cause, may issue a final rule without seeking comment prior to the rulemaking.

The Secretary and the Administrator recently affirmed that all unmanned aircraft, including model aircraft, are aircraft consistent with congressional direction in Title III, Subtitle B of Public Law 112–95 and the existing definition of aircraft in title 49 of the United States Code. 49 U.S.C. 40102. As such, in accordance with 49 U.S.C 44101(a) and

<sup>1</sup> 80 FR 9544 (Feb. 23, 2015).

as further prescribed in 14 CFR part 47, registration is required prior to operation. *See* 80 FR 63912, 63913 (October 22, 2015). Aircraft registration is necessary to ensure personal accountability among all users of the NAS. *See id.* With the current unprecedented proliferation of new sUAS, registration allows the FAA a direct and immediate opportunity to educate sUAS owners. Aircraft registration also allows the FAA and law enforcement agencies to address non-compliance by providing the means by which to identify an aircraft's owner and operator.

Congress has also directed the FAA to "develop plans and policy for the use of the navigable airspace and assign by regulation or order the use of the airspace necessary to ensure the safety of aircraft and the efficient use of airspace." 49 U.S.C. 40103(b)(1). Congress has further directed the FAA to "prescribe air traffic regulations on the flight of aircraft (including regulations on safe altitudes)" for navigating, protecting, and identifying aircraft; protecting individuals and property on the ground; using the navigable airspace efficiently; and

preventing collision between aircraft, between aircraft and land or water vehicles, and between aircraft and airborne objects. 49 U.S.C. 40103(b)(2).

The FAA estimates that in calendar year 2014, 200,000 small unmanned aircraft were operated in the NAS in model aircraft operations. During this period, the FAA received 238 reports of potentially unsafe UAS operations. The estimate for 2015 sales indicates that 1.6 million small unmanned aircraft intended to be used as model aircraft are expected to be sold this year (including approximately 50 percent of that total during the fourth quarter of 2015).

For 2016, the FAA estimates sales of more than 600,000 sUAS intended to be used for commercial purposes.<sup>2</sup> Additionally, as evidenced by recent FAA enforcement action against SkyPan International,<sup>3</sup> the Department and the FAA have become aware that there may be commercial operators who may be risking operating without the requisite authority.

Since February 2015, reports of potentially unsafe UAS operations have more than doubled, and many of these reports indicated that the risk to manned aviation or people and property on the ground was immediate. For

example, the agency has received reports of unmanned aircraft at high altitudes in congested airspace, unmanned aircraft operations near passenger-carrying aircraft or major airports,<sup>4</sup> and interfering with emergency response operations such as efforts to combat wildfires.<sup>5</sup> As recently as August 2015, the FAA investigated reports by four pilots who spotted an unmanned aircraft flying between eight and thirteen miles from the approach to Newark Liberty International Airport.<sup>6</sup> The FAA also investigated a similar incident at John F. Kennedy International Airport in August.<sup>7</sup> The risk of unsafe operation will increase as more small unmanned aircraft enter the NAS, and are flown by individuals who have little to no knowledge of airspace restrictions or safety implications.

Over the past several months, the reports of unauthorized and potentially unsafe UAS operations have escalated at an increasing rate. There is good reason to believe that the numbers of incidents will continue to rise substantially with the projected rapid rise in UAS sales in the coming months. The following tables show the number of reports received during 2014 and 2015.

TABLE 2—UNMANNED AIRCRAFT REPORTS, 2014

2014		Unmanned aircraft reports											
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total
Count .....	0	1	2	5	11	16	36	30	41	41	33	22	238

TABLE 3—UNMANNED AIRCRAFT REPORTS, 2015

2015	Unmanned aircraft reports											
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Total
Count .....	26	50	85	64	95	132	128	193	127	137	96	1133

\* As of December 9, 2015.

Specific examples of UAS events include:

- June 17, 2015: Near the surrounding area of Big Bear City, CA, a fire erupted, quickly spreading and causing significant damage. By June 24, 2015, all surrounding affected areas were evacuated, 20,875 acres of land had been destroyed, and the fire was only

26% contained. Although the FAA issued a temporary flight restriction for the area surrounding the fire, unmanned aircraft penetrated the airspace and grounded all airborne firefighting efforts in support of continued fire containment. This event resulted in two reported evasive-action events, and forced the grounding of 4 responding

aircraft over a period of two and a half hours before airborne firefighting efforts could resume. Before landing, a DC-10 tanker plane diverted to a separate fire in Nevada to drop its fire retardant, while the remaining smaller planes were forced to dump fire retardant around the immediate area due to landing weight restrictions.<sup>8</sup> Officials

<sup>2</sup> This forecast is based on a largely unconstrained operating environment.

<sup>3</sup> FAA Press Release, "FAA Proposes \$1.9 Million Civil Penalty Against SkyPan International for Allegedly Unauthorized Unmanned Aircraft Operations," available at [http://www.faa.gov/news/press\\_releases/news\\_story.cfm?newsId=19555](http://www.faa.gov/news/press_releases/news_story.cfm?newsId=19555).

<sup>4</sup> *See, e.g.,* Keith Laing, *Feds investigating drone sighting near Newark airport*, The Hill, Aug. 10, 2015, <http://thehill.com/policy/transportation/250731-feds-investigating-drone-sighting-near-newark-airport>; *FAA Investigating Close Calls with*

*Drones Near JFK Airport*, Albany Business Review, Nov. 20, 2014, available at 2014 WLNR 32783307.

<sup>5</sup> *See, e.g.,* Associated Press, *Drones Interfering with Emergency Wildfire Responders*, CBSNEWS.com, Aug. 10, 2015, <http://www.cbsnews.com/news/drones-interfering-with-emergency-wildfire-responders> ("The U.S. Forest Service has tallied 13 wildfires in which suspected drones interfered with firefighting aircraft this year . . . up from four fires last year . . ."); Polly Mosendz, *Drones Interfere With Firefighters Battling California Wildfire*, Newsweek, June 26, 2015,

<http://www.newsweek.com/drones-interfere-firefighters-battling-california-wildfire-347774>.

<sup>6</sup> *See* Keith Laing, *Feds investigating drone sighting near Newark airport*, The Hill, Aug. 10, 2015, <http://thehill.com/policy/transportation/250731-feds-investigating-drone-sighting-near-newark-airport>.

<sup>7</sup> *See* FAA Investigating Close Calls with Drones Near JFK Airport, Albany Business Review, Nov. 20, 2014, available at 2014 WLNR 32783307.

<sup>8</sup> *Lake Fire Grew After Private Drone Flight Disrupted Air Flights*, Los Angeles Times, June 25,

Continued

said the failed mission cost between \$10,000 and \$15,000. This estimate only reflects operational costs and does not reflect the additional damage caused to property by the delay in being able to combat the fires.

- July 17, 2015: A fire began in California near Interstate 15, a highway that runs between Los Angeles and Las Vegas. Due to hot, 40 mile per hour winds, the fire spread at a rapid pace. The Air Attack Officer, upon arrival, observed small unmanned aircraft activity operating contrary to a temporary flight restriction in the area. This resulted in aircraft being removed from the area for a period of twenty minutes. The delay of 20 minutes in aircraft response was critical in the growth of the fire. With the heavy aviation response on the scene of the fire, Air Attack Officers estimate this fire could have been stopped at less than 100 acres if the small unmanned aircraft had not interfered by penetrating the airspace.<sup>9</sup> A total of eighteen vehicles and two trucks were destroyed by fire.

- September 3, 2015: An unmanned aircraft was flown into Louis Armstrong Stadium, which is located within 5 miles of LaGuardia Airport, during a U.S. Open tennis match. The unmanned aircraft crashed in an empty section of the stands.<sup>10</sup>

- October 26, 2015: An unmanned aircraft flew into primary conductors bringing down one span of power line in West Hollywood, California. The incident report from Southern California Edison indicates that initially 640 customers were impacted.<sup>11</sup>

- January 26, 2015: An unmanned aircraft operator crashed his unmanned aircraft on the grounds of the White House. The flight occurred in the White House prohibited flight zone, P56.<sup>12</sup>

- September 5, 2015: A University of Kentucky student flew an unmanned aircraft directly into the campus' stadium during the school's season-

opening football game.<sup>13</sup> No injuries were reported. The unmanned aircraft, which had hovered near parachuting military skydivers, crashed in the suite level of Commonwealth Stadium. The Kentucky campus police chief told a news conference that the same student operated an unmanned aircraft over a soccer match the previous week.

- September 12, 2015: Debris from an unmanned aircraft that had fallen near bystanders cut and bruised an 11-month-old girl in a stroller during an outdoor movie screening in Pasadena, California. The Pasadena Police Department said a 24-year-old man lost control of his small unmanned aircraft, causing it to crash to the ground. The 11-month-old received injuries to her head. She was treated at Huntington Memorial Hospital and then released.<sup>14</sup>

During the last quarter of this calendar year, approximately 800,000 new sUAS are expected to enter the system and begin operating. In 2016, the FAA expects sales of an additional 1.9 million small unmanned aircraft used as model aircraft. The FAA also expects sales of 600,000 aircraft used for other than model purposes, after the Operation and Certification of Small Unmanned Aircraft Systems notice of proposed rulemaking (the "sUAS Operation and Certification NPRM") is finalized.<sup>15</sup> Model aircraft sales alone are expected to grow by 23 percent each year for the next 5 years.<sup>16</sup> Sales for sUAS used for commercial applications will rapidly accelerate as well, with different growth rates in different applications. Sales are forecast to grow from very few sUAS employed commercially today, to nearly 11 million units by 2020 (about 40% of total units sold that year).

Many of the owners of these new sUAS may have no prior aviation experience and have little or no understanding of the NAS, let alone knowledge of the safe operating requirements and additional authorizations required to conduct certain operations. Aircraft registration provides an immediate and direct opportunity for the agency to engage and educate these new users prior to operating their unmanned aircraft and to hold them accountable for

noncompliance with safe operating requirements, thereby mitigating the risk associated with the influx of operations. In light of the increasing reports and incidents of unsafe incidents, rapid proliferation of both commercial and model aircraft operators, and the resulting increased risk, the Department has determined it is contrary to the public interest to proceed with further notice and comment rulemaking regarding aircraft registration for small unmanned aircraft. To minimize risk to other users of the NAS and people and property on the ground, it is critical that the Department be able to link the expected number of new unmanned aircraft to their owners and educate these new owners prior to commencing operations.

In addition to the safety justifications that support the immediate adoption of this rule, the FAA Aircraft Registration Branch (the Registry) will be unable to quickly process the total volume of expected small unmanned aircraft registration applications for existing unmanned aircraft and the proliferation of newly purchased unmanned aircraft. Thus, the FAA must implement a registration system that allows the agency greater flexibility in accommodating this expected growth.

In addition, the existing registration system requirements are incongruous with the characteristics of many of the small unmanned aircraft, small unmanned aircraft ownership, and small unmanned aircraft operations. For example, small unmanned aircraft are not required to be type certificated, may cost very little, making them widely accessible, and may have operating limitations that could affect the range of their operations. As reflected in greater detail in the regulatory evaluation supporting this rulemaking, the total costs for using the paper-based registry, for both the small unmanned aircraft owners and for the FAA, were projected to exceed \$775M over a 5-year period. The Department has determined it would be impracticable to require all small unmanned aircraft owners to use this system and that a stream-lined, web-based alternative is necessary to accommodate this population and ensure operations may commence in a safe and timely manner.

The streamlined registration process provided in this IFR will allow the agency to complete in the near-term the registration of existing and new small unmanned aircraft to be operated exclusively as model aircraft, where the FAA expects the largest growth in the coming months. In the spring of 2016, the FAA will open the streamlined registration process to small unmanned

2015, available at <http://www.latimes.com/local/lanow/la-me-ln-wildfires-southern-california-20150625-story.html>.

<sup>9</sup> SAFECOM (2015, July 18). Incident Report. Retrieved November 13, 2015 from <https://www.safecom.gov/searchone.asp?ID=19694>.

<sup>10</sup> Drone Crash at U.S. Open, New York City Teacher Arrested, NPR, September 4, 2015, available at <http://www.npr.org/sections/thetwo-way/2015/09/04/437539727/drone-crash-at-u-s-open-new-york-city-teacher-arrested>.

<sup>11</sup> Incident report from Robert Laffoon-Villegas, media relations, Southern California Edison, provided November 13, 2015.

<sup>12</sup> A Drone, Too Small for Radar to Detect, Rattles the White House. New York Times, Jan. 26, 2015, available at <http://www.nytimes.com/2015/01/27/us/white-house-drone.html>.

<sup>13</sup> Student Charged with Endangerment After Drone Crashes into Stadium, Ars Technica, September 11, 2015, available at <http://arstechnica.com/tech-policy/2015/09/student-charged-with-endangerment-after-drone-crashes-into-football-stadium/>.

<sup>14</sup> Fallen Drone Injures 11-month old near Pasadena City Hall, Pasadena Star News, September 15, 2015 available at <http://www.pasadenastarnews.com/general-news/20150915/falling-drone-injures-11-month-old-near-pasadena-city-hall>.

<sup>15</sup> 80 FR 9544 (Feb. 23, 2015).

aircraft used for purposes other than as model aircraft. By first addressing the registration of new small unmanned aircraft to be operated exclusively as model aircraft, the FAA expects to provide relief from the existing registration process to the largest population of new small unmanned aircraft operators while still realizing the fundamental goal of identification of small unmanned aircraft owners responsible for the aircraft operation.

Therefore, the FAA has determined that it is impracticable and contrary to the public interest in ensuring the safety of the NAS and people and property on the ground to proceed with further notice and comment on aircraft registration requirements for small unmanned aircraft before implementing the streamlined registry system established by this rule. As more small unmanned aircraft enter the NAS, the risk of unsafe operations will increase without a means by which to identify these small unmanned aircraft in the event of an incident or accident. Registration will also provide an immediate and direct avenue for educating users regarding safe and responsible use of sUAS. The public interest served by the notice and comment process is outweighed by the significant increase in risk that the public will face with the immediate proliferation of new small unmanned aircraft that will be introduced into the NAS in the weeks ahead.

In developing the IFR, the Department has considered the public comments regarding UAS registration received in response to the Operation and Certification of Small UAS NPRM, the Request for Information published in the **Federal Register** on October 22, 2015, and the recommendations from the UAS Registration Task Force. Although we have considered these comments in developing this IFR, the Department will consider additional comments received following publication of this IFR and make any necessary adjustments in the final rule. At this time however, due to the reasons set forth above, providing another opportunity for notice and comment in advance of this rule going into effect would be contrary to the public interest and impracticable.

Additionally, the APA requires agencies to delay the effective date of regulations for 30 days after publication, unless the agency finds good cause to make the regulations effective sooner. See 5 U.S.C. 553(d). Good cause exists for making this regulation effective less than 30 days from the date of publication because it relieves a significant number of owners from the

burden of complying with the paper-based, time-consuming part 47 registration process. It also is necessary to address immediate and ongoing safety risk identified in the discussion of above regarding good cause for forgoing notice and comment.

#### IV. Comments Invited

Prior to the issuance of this IFR, the Department and the FAA solicited public comment on the aircraft registration process for small unmanned aircraft through the sUAS Operation and Certification NPRM and a request for information issued on October 19, 2015. In developing this IFR, the agency has considered comments received in response to these requests.

In addition, consistent with the Regulatory Policies and Procedures of the Department of Transportation (DOT) (44 FR 11034; Feb. 26, 1979), which provide that to the maximum extent possible, operating administrations for the DOT should provide an opportunity for public comment on regulations issued without prior notice, the Department requests comment on this IFR. The Department encourages persons to participate in this rulemaking by submitting comments containing relevant information, data, or views. The Department will consider comments received on or before the closing date for comments. The Department will consider late filed comments to the extent practicable. This IFR may be amended based on comments received.

#### V. Authority for This Rulemaking

The FAA's authority to issue rules on aviation safety is found in Title 49 of the United States Code. Subtitle I, Section 106 describes the authority of the FAA Administrator. Subtitle VII, Aviation Programs, describes in more detail the scope of the agency's authority.

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. 44701(a)(5), which requires the Administrator to promote safe flight of civil aircraft in air commerce by prescribing regulations and setting minimum standards for other practices, methods, and procedures necessary for safety in air commerce and national security.

This rule is also promulgated pursuant to 49 U.S.C. 44101–44106 and 44110–44113 which require aircraft to be registered as a condition of operation and establish the requirements for registration and registration processes.

Additionally, this rulemaking is promulgated pursuant to the Secretary's authority in 49 U.S.C. 41703 to permit the operation of foreign civil aircraft in the United States.

#### VI. Background

##### A. Statutory Requirements Related to Aircraft Registration

For purposes of the statutory provisions in part A (Air Commerce and Safety) of subtitle VII (Aviation Programs) of title 49 of the United States Code (49 U.S.C.), title 49 defines "aircraft" as "any contrivance invented, used, or designed to navigate or fly in the air." 49 U.S.C. 40102(a)(6). Since a small unmanned aircraft is a contrivance that is invented, used, and designed to fly in the air, a small unmanned aircraft is an aircraft under title 49.

In Public Law 112–95, Congress confirmed that unmanned aircraft, including those used for recreation or hobby purposes, are aircraft consistent with the statutory definition set forth in 49 U.S.C. 40102(a)(6). See Public Law 112–95 sections 331(8) and 336 (defining an unmanned aircraft as "an aircraft that is operated without the possibility of direct human intervention from within or on the aircraft" and a model aircraft as "an unmanned aircraft that is capable of sustained flight in the atmosphere, flown within visual line of sight of the person operating the aircraft, and flown for hobby or recreational purposes."); see also *Administrator v. Pirker*, NTSB Order No. EA–5730 at 12 (Nov. 17, 2014) (affirming that the statutory definition of aircraft is clear and unambiguous and "includes any aircraft, manned or unmanned, large or small.").

Subject to certain exceptions, aircraft must be registered prior to operation. See 49 U.S.C. 44101–44103. Upon registration, the Administrator must issue a certificate of registration to the aircraft owner. See 49 U.S.C. 44103. Because small UAS, including model aircraft, involve the operation of "aircraft," the Secretary and the Administrator clarified that the statutory and regulatory aircraft registration requirements apply. See 80 FR 63912, October 22, 2015.

##### B. Regulatory Requirements Pertaining to Aircraft Registration and Identification

The regulatory requirements pertaining to aircraft registration serve several purposes. In order to operate in the NAS, the FAA must ensure not only that aircraft operators are aware of the system in which they are operating, but

also that the agency has a means to identify and track an aircraft, including unmanned aircraft, to its operator. One means to accomplish this is through aircraft registration and marking.

Aircraft registration and marking are essential elements in the regulatory structure that provides for safe and orderly aircraft activity within the NAS because registration ensures accountability among its users. The registration number provides a link to information about the aircraft and the owner responsible for its operations.

Aircraft registration information often has a direct and immediate impact on safety-related issues. For example, aircraft registration provides the FAA and law enforcement agencies an invaluable tool during inspections and investigations of inappropriate or prohibited behavior, during emergency situations and for purposes of sharing safety information. The Registry also serves as a valuable tool in enabling further research and analysis.

Additionally, the aircraft registration requirements in part 47 together with the requirements pertaining to the recording of aircraft title and security documents in part 49 coalesce to establish a filing and recording system for the collection of ownership and financial interests in aircraft. This system supports the aviation industry by providing public notice of interests in aircraft in a reviewable format, generally to support the confidence or willingness of banks and others to provide financing for the development of the U.S. aviation industry and to promote commerce.

**Part 47:** Part 47 of 14 CFR implements the statutory requirements for aircraft registration by providing a registration process applicable to aircraft that are not registered under the laws of a foreign country and that meet one of the following ownership criteria:

- The aircraft is owned by a citizen of the United States;
- The aircraft is owned by a permanent resident of the United States;
- The aircraft is owned by a corporation that is not a citizen of the United States, but that is organized and doing business under U.S. Federal or State law and the aircraft is based and primarily used in the United States; or
- The aircraft is owned by the United States government or a state or local governmental entity.

This process is entirely paper-based and begins when a person who wishes to register an aircraft in the United States submits an Aircraft Registration Application (AC Form 8050-1) to the Registry. At a minimum, under part 47, applicants for a Certificate of Aircraft

Registration must provide evidence of ownership, an application for registration, which includes certification as to eligibility for registration, and a registration fee. Evidence of ownership may include, but is not limited to, a traditional bill of sale, a contract of conditional sale, a lease with purchase option, or an heir-at-law affidavit. Many applicants are required to provide additional documentation for aircraft imported from a foreign country, built from a kit, or that qualify as amateur built aircraft. Additional documentation may include a certification from the builder as to the type of aircraft and a complete description, to include information such as make, model, serial number, engine manufacturer, type of engine, number of engines, maximum takeoff weight, and number of seats. An applicant who applies as a limited liability corporation, a trustee, a non-citizen corporation, or submits documentation signed by “authorized signers,” must submit additional documentation to support registration. For amateur built aircraft, the owner or builder designates the aircraft model name and serial number. An applicant pertaining to an imported aircraft must provide evidence showing the aircraft has been removed from a foreign registry.

Once registered, the Registry issues a Certificate of Aircraft Registration (AC Form 8050-3) to the aircraft owner and mails it to the address on record. The Registry experiences a range in the amount of time required to issue a Certificate. While it typically takes 12–15 business days for the registry to issue a Certificate after an owner submits an application, due to an increase in registration applications, it currently takes approximately 22 business days for the registry to issue the certificate. The aircraft owner will typically receive a Certificate approximately 4 days after it is issued as a result of the time required for printing and mailing the certificate. The estimated times are extended if the application is rejected for document correction.

The certificate of registration must be carried in the aircraft and must be made available for inspection upon request. Upon registration, an aircraft is also eligible to apply for an airworthiness certificate for operational purposes. When applying for registration of an aircraft that is already on the U.S. civil registry, and has a valid airworthiness certificate, an owner may use the second (carbon) copy of the application as temporary operating authority for up to 90 days pending receipt of the “hard card” certificate. For aircraft not already

on the U.S. civil registry, there is no temporary operating authority.

An aircraft registration must be renewed every three years by either submitting a renewal application or using an online renewal process, and paying the renewal fee. The certificate of registration is generally valid until the owner's address changes, the aircraft is sold or destroyed, it has expired under the three-year renewal period, the owner's eligibility status changes, or the owner registers the aircraft in a foreign country.

Placing an aircraft on the U.S. civil aircraft registry in accordance with the part 47 process affords the aircraft the opportunity to operate within the United States and in most foreign countries.

**Part 45:** Under part 45 of Title 14 CFR, aircraft must display the unique registration number that corresponds with the number on the registration certificate. Part 45 prescribes the requirements for identification of U.S. registered aircraft and the display of the registration number. The number must generally be: (1) Painted on the aircraft or affixed to the aircraft by some other permanent means; (2) have no ornamentation; (3) contrast in color with the background; and (4) be legible. See 14 CFR 45.21(c).

Currently, small unmanned aircraft authorized to operate in the NAS under an exemption issued pursuant to the authority in section 333 of the FAA Modernization and Reform Act of 2012 must register in accordance with the paper-based process in 14 CFR part 47. Owners of unmanned aircraft with special airworthiness certificates and unmanned aircraft used by governmental entities in public aircraft operations also register via the part 47 registration process.

### C. Related FAA and DOT Actions

In the FAA Modernization and Reform Act of 2012 (Pub. L. 112-95), Congress mandated that the DOT, in consultation with other government partners and industry stakeholders, develop a comprehensive plan to safely accelerate the integration of civil UAS in the NAS. Since 2012, the Department and the Federal Aviation Administration have made progress in enabling UAS operations, by issuing exemptions per part 11 in conjunction with the authority of section 333 of Public Law 112-95 to permit commercial operations; creating a UAS test site program to encourage further research and testing of UAS operations in real-world environments; and developing a Pathfinder program to encourage research and innovation that

will enable advanced UAS operations. The Department requires UAS operators authorized under each of these integration programs to register their unmanned aircraft through the existing FAA paper-based registration process under 14 CFR part 47.

The Department and the FAA have taken several other related actions as provided in the preamble discussions that follow.

#### 1. Operation and Certification of Small Unmanned Aircraft Systems Notice of Proposed Rulemaking

The Secretary and the Administrator issued an NPRM, "Operation and Certification of Small Unmanned Aircraft Systems" (80 FR 9544 (Feb. 23, 2015)) (sUAS Operation and Certification NPRM),<sup>17</sup> that proposed a framework for integrating small UAS operations in the NAS. Specifically, the proposal would address the operation of small UAS, certification of small UAS operators, small UAS registration, and display of registration markings. The agency also proposed to exclude small UAS operations from the requirements for airworthiness certification under the authority of section 333 of the Act because the safety concerns related to airworthiness of small UAS would be mitigated by the other provisions of that proposed rule.

In the sUAS Operation and Certification NPRM, the Secretary and the Administrator asserted that small unmanned aircraft satisfy the statutory definition of "aircraft" and thus must be registered prior to operation. For this reason, the NPRM proposed to clarify the applicability of the part 47 aircraft registration requirements to sUAS expected to be operated under proposed part 107. See 80 FR at 9574. The NPRM also clarified that small unmanned aircraft must display a registration number in accordance with part 45. The agency proposed, however, to exclude small unmanned aircraft from the requirements in part 45, subpart B for fireproof marking. See 80 FR at 9574–9575.

The comment period for the sUAS Operation and Certification NPRM closed April 24, 2015. The FAA received more than 4,500 comments on this proposal; of those, approximately 125 commenters addressed the issue of small unmanned aircraft registration and the registration process, and approximately 110 addressed marking requirements. This IFR addresses the comments received regarding the registration, identification, and marking requirements as well as certain

definitions relevant to the registration process and proposed in the NPRM.

#### 2. Clarification of the Applicability of Aircraft Registration Requirements for Unmanned Aircraft Systems (UAS) and Request for Information Regarding Electronic Registration for UAS

On October 19, 2015, the Secretary and the Administrator issued a notice clarifying the applicability of the statutory requirements for aircraft registration to small unmanned aircraft (the "Clarification/Request for Information") (80 FR 63912, October 22, 2015). In addition, the Clarification/Request for Information announced the formation of a UAS Registration Task Force (Task Force) to explore and develop recommendations to streamline the registration process for small unmanned aircraft to ease the burden associated with the existing aircraft registration process. To facilitate the work of the Task Force, the Secretary and the Administrator sought information and data from the public through a number of questions identified in the **Federal Register** notice. Specifically, the Secretary and the Administrator sought information on the following questions:

1. What methods are available for identifying individual products? Does every UAS sold have an individual serial number? Is there another method for identifying individual products sold without serial numbers or those built from kits?

2. At what point should registration occur (e.g. point-of-sale or prior to operation)? How should transfers of ownership be addressed in registration?

3. If registration occurs at point-of-sale, who should be responsible for submission of the data? What burdens would be placed on vendors of UAS if DOT required registration to occur at point-of-sale? What are the advantages of a point-of-sale approach relative to a prior-to-operation approach?

4. Consistent with past practice of discretion, should certain UAS be excluded from registration based on performance capabilities or other characteristics that could be associated with safety risk, such as weight, speed, altitude operating limitations, duration of flight? If so, please submit information or data to help support the suggestions, and whether any other criteria should be considered.

5. How should a registration process be designed to minimize burdens and best protect innovation and encourage growth in the UAS industry?

6. Should the registration be electronic or web-based? Are there

existing tools that could support an electronic registration process?

7. What type of information should be collected during the registration process to positively identify the aircraft owner and aircraft?

8. How should the registration data be stored? Who should have access to the registration data? How should the data be used?

9. Should a registration fee be collected and if so, how will the registration fee be collected if registration occurs at point-of-sale? Are there payment services that can be leveraged to assist (e.g. PayPal)?

10. Are there additional means beyond aircraft registration to encourage accountability and responsible use of UAS?

See 80 FR at 63914. The comment period on the Clarification/Request for Information closed November 6, 2015. As of November 6, 2015, the FAA received over 4,500 comments on the Clarification/Request for Information. In the Clarification/Request for Information, the DOT stated, "[T]he docket will remain open after this time and the Department will consider all comments received in developing a registration process." The FAA considered more than 175 additional comments submitted after the close of the comment period. The FAA has considered the Clarification/Request for Information comments in the development of this IFR.

#### 3. Registration Task Force (Task Force)

The Administrator chartered the Unmanned Aircraft Systems (UAS) Registration Task Force (Task Force) Aviation Rulemaking Committee (ARC) on October 20, 2015. The Administrator selected Task Force members based on their familiarity with UAS, aircraft registration policies and procedures, retail inventory control and tracking, and electronic data capture. The membership was comprised of a diverse group of representatives from trade groups representing manned and unmanned aviation, UAS manufacturers and retailers, and law enforcement.

The Task Force was tasked with the following three objectives:

1. Develop and recommend minimum requirements for UAS that would need to be registered.

2. Develop and recommend registration processes.

3. Develop and recommend methods for proving registration and marking.

On November 21, 2015, the Task Force provided a final report with

<sup>17</sup> RIN 2120-AJ60.

recommendations pertaining to these three objectives.<sup>18</sup>

The following table, taken from the Task Force report, describes the Task Force's recommendations.

TABLE 4—SMALL UAS REGISTRATION TASK FORCE AVIATION RULEMAKING COMMITTEE RECOMMENDATIONS SUMMARY

Issue	Task force recommendation
What category of UAS is covered by the registration requirement?	UAS that weigh under 55 pounds and above 250 grams maximum takeoff weight, and are operated outdoors in the NAS.
Do owners need to register each individual UAS they own?	No. The registration system is owner-based, so each registrant will have a single registration number that covers any and all UAS that the registrant owns.
Is registration required at point-of-sale? .....	No. Registration is mandatory prior to operation of a UAS in the NAS.
What information is required for the registration process?	Name and street address of the registrant are required. Mailing address, email address, telephone number, and serial number of the aircraft are optional.
Is there a citizenship requirement? .....	No.
Is there a minimum age requirement? .....	Yes. Persons must be 13 years of age to register.
Is there a registration fee? .....	No.
Is the registration system electronic or web-based?	The system for entry of information into the database is web-based and also allows for multiple entry points, powered by an API [application programming interface] that will enable custom apps [applications] to provide registry information to the database and receive registration numbers and certificates back from the database. Registrants can also modify their information through the web or apps.
How does a UAS owner prove registration? .....	A certificate of registration will be sent to the registrant at the time of registration. The certificate will be sent electronically, unless a paper copy is requested, or unless the traditional aircraft registration process is utilized. The registration certificate will contain the registrant's name, FAA-issued registration number, and the FAA registration website that can be used by authorized users to confirm registration information. For registrants who elect to provide the serial number(s) of their aircraft to the FAA, the certificate will also contain those serial number(s). Any time a registered UAS is in operation, the operator of that UAS should be prepared to produce the certificate of registration for inspection.
Does the registration number have to be affixed to the aircraft?	Yes, unless the registrant chooses to provide the FAA with the aircraft's serial number. Whether the owner chooses to rely on the serial number or affix the FAA-issued registration number to the aircraft, the marking must be readily accessible and maintained in a condition that is readable and legible upon close visual inspection. Markings enclosed in a compartment, such as a battery compartment, will be considered "readily accessible" if they can be accessed without the use of tools.

In its report, the Task Force stated, "[T]he general consensus view of the Task Force is that the recommendations on the three objectives are to be presented together as a unified recommendation, with each of the individual recommendations dependent upon elements in the others. Compromises in positions were made whenever possible to obtain a general consensus, and changes to any of the components could further dilute support among the Task Force members and their constituencies for the final recommendations."

The agency has assessed the recommendations within statutory limitations provided for aircraft registration and with this final rule, will move forward with the elements of the Task Force report that support the best public policy for registering small unmanned aircraft.

## VII. Discussion of the Interim Final Rule

This IFR adds part 48 to title 14 to allow for a web-based registration process and marking appropriate for

small unmanned aircraft. For these aircraft, part 48 may be used in place of the paper-based, registration process in part 47 and the marking requirements in part 45 that would otherwise be required.

Unlike manned aircraft, small unmanned aircraft cost significantly less than manned aircraft and are available through a variety of different markets for purchase by individuals who may not be familiar with the federal safety requirements for operating in the NAS. As a consequence, small unmanned aircraft may become more common than manned aircraft, resulting in a significant volume of new aircraft registrations. This rule provides for a streamlined and simple registration process that is commensurate to the nature of small unmanned aircraft, can accommodate an expected high volume of registrations, and will facilitate compliance by using a web-based platform and limiting the information to that which can identify the aircraft and its owner. Upon registration under new part 48, the FAA will assign a unique registration number and provide a

registration certificate that can be stored electronically or printed by the aircraft owner.

The FAA recognizes that some small unmanned aircraft owners may choose to continue to register small unmanned aircraft under part 47. For example, some small unmanned aircraft owners may choose to register their small unmanned aircraft under part 47 due to financing requirements or if they wish to operate internationally, displaying registration marks in accordance with part 45. While this final rule does not require small unmanned aircraft owners to use the part 48 registration process in place of part 47, the agency strongly encourages small unmanned aircraft owners to take advantage of the more efficient part 48 method of aircraft registration. The FAA also notes that a new part 48 registration does not limit an owner's ability to later move to a traditional part 47 registration should its operational or financial interests change. Conversely, a traditional part 47 registration of small unmanned aircraft can be moved to a new part 48

<sup>18</sup> The Task Force final report can be found in the docket for this rulemaking and at [https://www.faa.gov/uas/publications/media/RTFARCFinalReport\\_11-21-15.pdf](https://www.faa.gov/uas/publications/media/RTFARCFinalReport_11-21-15.pdf).

[www.faa.gov/uas/publications/media/RTFARCFinalReport\\_11-21-15.pdf](https://www.faa.gov/uas/publications/media/RTFARCFinalReport_11-21-15.pdf).

registration at the discretion of the owner if they wish to pursue that venue.

### A. Applicability

#### 1. Small Unmanned Aircraft

The registration requirements in part 48 apply to small unmanned aircraft that are part of a small unmanned aircraft system and that satisfy the requirements to register in § 48.15 and the eligibility requirements in § 48.20. Although a small unmanned aircraft itself is one component of an sUAS, part 48 requires the registration of the aircraft only.<sup>19</sup> The registration requirement is limited to the small unmanned aircraft for two reasons. First, the small unmanned aircraft is the only part of the UAS that satisfies the definition of “aircraft” for purposes of the registration requirements in 49 U.S.C. 44101–44103, and second, components that control the unmanned aircraft can be used to control multiple aircraft. As discussed in this document, the FAA would continue to exercise enforcement discretion for aircraft that weigh less than 0.55 pounds, such as paper airplanes that are not linked to a system.

Registration does not provide authorization to operate any aircraft—and the same is true for small unmanned aircraft. Currently, operations using small unmanned aircraft other than as model aircraft must obtain authorization to operate in accordance with section 333 of Public Law 112–95, or through issuance of a special airworthiness certificate. Small unmanned aircraft operated exclusively as model aircraft may only be operated in accordance with requirements of section 336 of Public Law 112–95 (Feb. 14, 2012). See also Interpretation of the Special Rule for Model Aircraft, 79 FR 36171 (June 25, 2014). Any operation that does not follow the 336 framework needs authorization from the FAA. Once the sUAS Operation and Certification NPRM is finalized, operations intending to use small unmanned aircraft as other than model aircraft, and those operators who choose not to operate in accordance with the requirements of section 336 of Public Law 112–95, will need to operate in accordance with the sUAS Operation and Certification rule’s requirements.

<sup>19</sup> Sec. 331(9) of Public Law 112–95. Public Law 112–95 defines an “unmanned aircraft system” as “an unmanned aircraft and associated elements (including communication links and the components that control the unmanned aircraft) that are required for the pilot in command to operate safely and efficiently in the national airspace system.”

#### 2. Operations in U.S. Airspace

The registration process for small unmanned aircraft provided in part 48 may be used only if the aircraft is intended for use within the United States during the period of registration because this registration process is not intended to be consistent with International Civil Aviation Organization (ICAO) standards addressing registration and marking. The FAA notes that under Presidential Proclamation 5928, the territorial sea of the United States, and consequently its territorial airspace, extends to 12 nautical miles from the baselines of the United States determined in accordance with international law.

ICAO has stated that “[u]nmanned aircraft . . . are, indeed aircraft; therefore existing [ICAO standards and recommended practices] SARPs apply to a very great extent. The complete integration of UAS at aerodromes and in the various airspace classes will, however, necessitate the development of UAS-specific SARPs to supplement those already existing.”<sup>20</sup> ICAO has begun to issue and amend SARPs to specifically address UAS operations and registration. Regarding registration, ICAO standards in Annex 7 (Aircraft Nationality and Registration Marks) to the Convention require remotely piloted aircraft to “carry an identification plate inscribed with at least its nationality or common mark and registration mark” and be “made of fireproof metal or other fireproof material of suitable physical properties.” For remotely piloted aircraft, this identification plate must be “secured in a prominent position near the main entrance or compartment or affixed conspicuously to the exterior of the aircraft if there is no main entrance or compartment.”

The FAA agrees with ICAO that unmanned aircraft are indeed aircraft and as such, must be registered and identified. However, the agency has determined that it is possible to register and identify small unmanned aircraft using in a less restrictive manner and with more flexibility than current ICAO standards allow. Additionally, the FAA has determined that it can achieve the highest level of compliance with a registration requirement and thus identify more small unmanned aircraft to their owners by using the streamlined, web-based process in this final rule.

The FAA emphasizes that utilization of the registration process implemented by this final rule does not prohibit small UAS operators from operating in

<sup>20</sup> ICAO Circular 328 (Unmanned Aircraft Systems (UAS)) (2011).

international airspace or in other countries; however, the rule also does not provide authorization for such operations.

UAS operations that do not take place entirely within the United States will need to obtain the necessary authorizations from the FAA and the relevant foreign aviation authority.

#### 3. Public Aircraft Operations

*Clarification/Request for Information:* Several commenters addressed the applicability of registration requirements to small unmanned aircraft used in public aircraft operations. The Department of Defense Policy Board on Federal Aviation recommended the FAA “[c]learly state that all public aircraft operators with self-certification authority, by statute, are exempt from this registration.” Aviation Management Associates also said the FAA should exempt all public aircraft from the registration requirement. Another commenter said that any UAS that are owned or operated by the FAA Small UAS Center of Excellence, any of the six FAA UAS Test Sites or any other government agency or department, or are operated under a Certificate of Waiver or Authorization (COA) should be exempt from the registration requirement. In contrast, a few individuals specifically recommended that UAS operated by government should be required to register.

*IFR Requirement:* 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, and any such unregistered aircraft must be identified in a way satisfactory to the Administrator. Section 44102(a)(2)(A) and (B) describe those aircraft that may be registered as those of the United States Government and various state and local governments. This definition parallels the language used in 49 U.S.C. 40102(a)(41) and 40125 to describe public aircraft eligibility and operations. Accordingly, consistent with existing statutory requirements for registration, the IFR will not apply to small unmanned aircraft of the armed forces of the United States. 49 U.S.C. 44101(b)(2). 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. These aircraft may also be registered in accordance with the part 48 process that will be available for aircraft used for

other than model aircraft operations in the spring of 2016.

#### 4. Trusts and Voting Trusts

The FAA requires that a person holding legal title to an aircraft in trust must, when applying to register that aircraft in the United States, submit a “copy of each document legally affecting a relationship under the trust . . .” 14 CFR 47.7(c)(2)(i). The purpose of this requirement is to ensure the FAA has access to all documents relevant to the trust relationship when determining whether a trust provides an adequate basis for registering an aircraft in accordance with FAA regulations. A fundamental part of the registration process for aircraft held in trust is determining whether the underlying agreements meet and are not in conflict with the applicable requirements and therefore are sufficient to establish the trustee’s eligibility to register the aircraft. The analysis of voting trusts is similarly intricate.

Use of trusts and voting trusts involve complex relationships that have been used to obscure the identity of the beneficial owners of an aircraft. For this reason, part 47 applies a higher level of scrutiny when trusts and voting trusts seek to register aircraft. This higher level of scrutiny is inconsistent with the streamlined registration process established under part 48. Accordingly, trusts and voting trusts must continue to register small unmanned aircraft under part 47 so that the FAA can identify and evaluate the applicants.

#### B. Definitions

The new part created by this final rule includes definitions of several terms that are relevant to the registration of small unmanned aircraft. The definitions of “U.S. Citizen,” “resident alien,” and “Registry” have the same meaning as provided in the aircraft registration process provided by part 47. See § 47.2. The definition of “model aircraft” is identical to the definition provided in section 336(c) of Public Law 112–95.

Additionally, the agency finds it necessary to codify the statutory definitions of “small unmanned aircraft,” “unmanned aircraft,” and “small unmanned aircraft system” given the limited applicability of the new subpart to small unmanned aircraft that are an associated element of a small UAS. The agency proposed definitions of these three terms in the Operation and Certification NPRM. This rulemaking finalizes these proposed definitions because they are applicable to the small unmanned aircraft registration process provided by this

final rule. The definitions will be added to § 1.1 General definitions, because the agency expects them to be applicable to several parts throughout title 14.

#### 1. Unmanned Aircraft

In the sUAS Operation and Certification NPRM, the FAA proposed to define “unmanned aircraft” as “an aircraft operated without the possibility of direct human intervention from within or on the aircraft.”<sup>21</sup> This proposed definition would codify the statutory definition of “unmanned aircraft” specified in Public Law 112–95.<sup>22</sup>

The Management Association for Private Photogrammetric Surveyors (MAPPS) stated that the definition of “unmanned aircraft” needs to be clarified because the current definition leaves open the possibility that paper airplanes, model airplanes, model rockets, and toys could be considered unmanned aircraft. The Aviators Model Code of Conduct Initiative stated that this definition and the definition of small unmanned aircraft may permit infant passengers and asked the FAA to amend the definition to categorically prohibit the carriage of passengers on an unmanned aircraft.

Lastly, an individual said that because 14 CFR 1.1 defines aircraft as “a device that is used or intended to be used for flight in the air,” only a “whole” or “complete” aircraft can meet this definition for registration purposes.

The definition of unmanned aircraft as “an aircraft operated without the possibility of direct human intervention from within or on the aircraft” is a statutory definition, and as such, this rule will finalize that definition as proposed.<sup>23</sup>

#### 2. Small Unmanned Aircraft

In the sUAS Operation and Certification NPRM, the FAA proposed to define “small unmanned aircraft” as “an unmanned aircraft weighing less than 55 pounds including everything that is on board the aircraft.”<sup>24</sup> The NPRM noted that Public Law 112–95 defines a small unmanned aircraft as “an unmanned aircraft weighing less than 55 pounds.”<sup>25</sup> However, the NPRM pointed out that this statutory definition does not specify whether the 55-pound weight limit refers to the total weight of the aircraft at the time of takeoff (which would encompass the

weight of the aircraft and any payload on board) or simply the weight of an empty aircraft.<sup>26</sup> The NPRM proposed to define small unmanned aircraft using total takeoff weight because: (1) Heavier aircraft generally pose greater amounts of public risk in the event of an accident as they can do more damage to people and property on the ground; and (2) this approach would be similar to the approach that the FAA has taken with other aircraft, such as large aircraft, light-sport aircraft, and small aircraft.<sup>27</sup>

Commenters including the Aircraft Owners and Pilots Association (AOPA), Air Line Pilots Association (ALPA), Helicopter Association International (HAI), the Small UAV Coalition, the News Media Coalition, and the Professional Photographers of America, expressed support for the proposed definition. The New England Chapter of the Association of Unmanned Vehicles International supported the weight limitation as a reasonable starting point, but pointed out that there are commercial applications being developed that will need to exceed 55 pounds. Event 38 Unmanned Systems, Inc. stated that, rather than segregate small unmanned aircraft by total weight, FAA should use a “kinetic energy split” that combines weight and speed.

Several commenters asked that the 55-pound weight limit be lowered. Event 38 Unmanned Systems recommended an initial weight restriction of 10 pounds, with adjustments based on subsequent research. Prioria Robotics stated that the weight limitation for small unmanned aircraft should be less than 25 pounds, and that the definition should include a requirement that the aircraft be “hand-launchable.” An individual commenter asked for the weight limit to be reduced to 33 pounds.

Green Vegans stated that FAA must provide test data on the collision impact of a 55 pound UAS, traveling at various speeds, on both humans and birds. The advocacy group argued that the public cannot make informed comments on the proposed weight limitation without such data. The commenter also noted that such data would be provided by a National Environmental Protection Act Environmental Impact Statement, which the group stated FAA must do. Crew Systems similarly opposed the maximum weight limitation, arguing that FAA provided no justification for it. The company asserted that a 55 pound limit is large enough to be hazardous when operating in an urban environment, even if care is taken. Although it did not expressly object to

<sup>21</sup> 80 FR at 9586.

<sup>22</sup> 80 FR at 9556 (citing Pub. L. 112–95, section 331(8)).

<sup>23</sup> Pub. L. 112–95, section 331(8).

<sup>24</sup> 80 FR at 9586.

<sup>25</sup> 80 FR at 9556 (citing Pub. L. 112–95, section 331(6)).

<sup>26</sup> 80 FR at 9556.

<sup>27</sup> 80 FR at 9556.

the weight limitation, the United States Ultralight Association (UASA) also expressed concern about the significant damage that a 50-plus pound unmanned aircraft could do to light, open cockpit aircraft.

Other commenters asked the FAA to increase the 55-pound weight limit. Consumers Energy Company objected to the definition's proposed weight limitation as too light, arguing that a 55-pound weight restriction will negatively impact small UAS flight times and the usage of alternative fuel sources. The company urged FAA to consider fuel loads and to increase the weight restriction to 120 pounds. The company noted that, if FAA has concerns about safety, it could create subcategories under which maximum weight restriction is imposed on the fuel load, rather than adopt a blanket weight restriction. Several individual commenters also suggested higher weight limits, including: 80 pounds; a range of 30–100 pounds; and 150 pounds. Another individual commenter called the weight restriction “arbitrary,” and noted that other countries have defined small UAS up to 150 kg.

An individual commenter suggested that the FAA amend the definition of small unmanned aircraft to include aircraft weighing exactly 55 pounds. Another individual commenter stated that the definition of “small unmanned aircraft” must be clarified to account for different types of UAS (*e.g.*, fixed-wing, rotor-wing, small, medium, large).

The definition of “small unmanned aircraft” is a statutory definition. Specifically, Public Law 112–95 defines a small unmanned aircraft as “an unmanned aircraft weighing less than 55 pounds.”<sup>28</sup> Accordingly, this rule will retain the statutory definition, which includes 55 pounds as the weight limit for a small unmanned aircraft.

However, as the FAA pointed out in the sUAS Operation and Certification NPRM, the statutory definition contains an ambiguity with regard to how the 55-pound weight limit should be calculated. The Small UAV Coalition and Federal Airways & Airspace supported the inclusion of payload in the 55-pound weight limit. Conversely, DJI, the Associated General Contractors of America, and an individual commenter questioned whether the 55-pound weight limitation should include payload that is carried by the small unmanned aircraft. DJI argued that the FAA does not consider the weight of payload in its regulations governing the operation of ultralights. Kapture Digital Media stated that the total weight limit

of a small UAS should not include the weight of the battery.

As noted in the sUAS Operation and Certification NPRM, the FAA uses total takeoff weight for multiple different types of aircraft, including large aircraft, light-sport aircraft, and small aircraft.<sup>29</sup> One of the reasons that the FAA uses total takeoff weight in all of these regulations is because, in the event of a crash, a heavier aircraft can do more damage to people and property on the ground than a lighter aircraft. In evaluating this type of risk for a small UAS, it is the total mass of the small unmanned aircraft that is important; the manner in which that mass is achieved is irrelevant. In other words, a 50-pound unmanned aircraft carrying 30 pounds of payload does not pose a smaller risk than an 80-pound unmanned aircraft that is not carrying any payload. As such, this rule will retain the proposed inclusion of everything onboard the aircraft in the 55-pound weight limit of a small unmanned aircraft.

The General Aviation Manufacturers Association (GAMA) pointed out that, although FAA typically points to Maximum Takeoff Weight when identifying an aircraft's weight and associated mass, the proposed definition of the small UAS does not include the term “takeoff.” As such, the commenter recommended FAA modify the definition to reference the point of takeoff as follows: “Small unmanned aircraft means an unmanned aircraft weighing less than 55 pounds including everything that is on board the aircraft on takeoff.” An individual commenter stated that the choice of “on board” in the definition of “small unmanned aircraft” will create confusion, because these aircraft routinely have “attached” external payloads because there is little room for internal “on board” payloads.

The FAA agrees with these comments and has modified the proposed definition to refer to the total aircraft weight at takeoff and to include possible external attachments to the aircraft in the calculation of small unmanned aircraft weight. Accordingly, as provided in § 1.1, small unmanned aircraft means an unmanned aircraft weighing less than 55 pounds on takeoff, including everything that is on board or otherwise attached to the aircraft. If the unmanned aircraft is tethered by the cable in such a way that the cable, securely attached to an immovable object, prevents the unmanned aircraft from flying away in the event of loss of positive control,

only the portion of the cable which may be lift aloft by the small unmanned aircraft must be added to the weight of the unmanned aircraft when determining total weight.

### 3. Small Unmanned Aircraft System (Small UAS)

Finally, the sUAS Operation and Certification NPRM proposed a definition of “small unmanned aircraft system (small UAS)” as “a small unmanned aircraft and its associated elements (including communication links and the components that control the small unmanned aircraft) that are required for the safe and efficient operation of the small unmanned aircraft in the national airspace system.”<sup>30</sup> The NPRM explained that, with one exception, this proposed definition would be similar to the statutory definition of UAS specified in Public Law 112–95.<sup>31</sup> The difference between the two definitions is that the proposed definition of small UAS did not refer to a “pilot in command,” as that position did not exist under the NPRM.<sup>32</sup>

AirShip Technologies supported the proposed definition. Conversely, Transport Canada asked the FAA to consider whether it would be better to use the ICAO terminology of remotely-piloted aircraft system (RPAS) instead of small UAS. Foxtrot Consulting stated that the inclusion of the phrase “associated elements (including communications links and the components that control the small unmanned aircraft)” in the definition of small UAS creates a “regulatory nightmare,” because it means cellular network providers and their infrastructure are considered part of a small UAS. The commenter pointed out that small UAS can be controlled via Wi-Fi and cellular networks, which opens enormous capabilities to small UAS operations. The commenter went on, however, to question whether, as a result of the proposed definition, a cellular provider is liable if a UAS being controlled through their network causes damage to property, serious injury, or death.

The proposed definition of small UAS is derived from the statutory definition of “unmanned aircraft system” in Public Law 112–95.<sup>33</sup> As such, this rule will codify the proposed definition.

Because Congress has selected the term “unmanned aircraft system” to

<sup>28</sup> 80 FR at 9586.

<sup>31</sup> 80 FR at 9556 (citing Pub. L. 112–95, section 331(9)).

<sup>32</sup> 80 FR at 9556.

<sup>33</sup> Pub. L. 112–95, section 331(9).

<sup>28</sup> Pub. L. 112–95, section 331(6).

<sup>29</sup> See 14 CFR 1.1 (referring to “takeoff weight” for large, light-sport, and small aircraft in the definitions for those aircraft).

describe this type of a system, the FAA may not use a different term, such as RPAS, in this rule. In response to Foxtrot Consulting, the FAA notes that the requirements of this rule apply only to the sUAS operator, the owner of the small UAS, and people who may be involved in the operation of the small UAS. As such, a cellular provider would not be in violation of proposed part 107 when their involvement in a small UAS operation is limited to the operator's use of the provider's infrastructure. Additionally, the FAA does not opine on liability issues that are beyond the scope of this rule such as whether the provider may be liable to the sUAS operator or third parties under tort or contract law.

The NextGen Air Transportation Program at North Carolina State University and one individual commenter recommended FAA specifically state that tethered powered small UAS are considered small UAS under proposed part 107. In response to these comments, the FAA notes that the definition of small UAS in this rule includes tethered powered small UAS.

#### 4. Model Aircraft

This rulemaking includes the definition of the term "model aircraft" as it appears in section 336 of Public Law 112–95. Thus, in this IFR, "model aircraft" means an unmanned aircraft that is (1) capable of sustained flight in the atmosphere; (2) flown within visual line of sight of the person operating the aircraft; and (3) flown for hobby or recreational purposes.

#### C. Exclusion From the Requirement to Register

*Clarification/Request for Information:* The DOT and the FAA posed the following question in the October 22, 2015 Clarification/Request for Information document (80 FR at 63914):

Consistent with past practice of discretion, should certain UAS be excluded from registration based on performance capabilities or other characteristics that could be associated with safety risk, such as weight, speed, altitude operating limitations, duration of flight? If so, please submit information or data to help support the suggestions, and whether any other criteria should be considered.

The agency received many comments responding to this inquiry. A few commenters said this question is premature because there is insufficient data available to determine what, if any, safety risk is posed by various categories of UAS. One individual commenter said this question should not be asked until after there are "thorough, independent studies available showing the effects of

different hobby aircraft on the national airspace and potential interference with full scale aviation." The commenter further stated that once the results of that research are available, the public should have an opportunity to comment on them. Another individual said the FAA cannot make a determination about exclusions from the registration requirement until testing is conducted to see what the actual damage would be to buildings, cars, people, and manned aircraft from UAS of different sizes.

*No unmanned aircraft should be excluded from the requirement of registration:* Some commenters said that all unmanned aircraft should be registered. One individual commenter, for example, asserted that if the intent of registration is to have the ability to identify the operator of a UAS, then there is no logical reason to base the requirement to register on factors such as the speed, performance, capability, or size of a UAS. Another individual commenter said all unmanned aircraft should be registered because unmanned aircraft of any size or weight could pose a safety threat to manned aircraft (including, for example, helicopters on emergency or rescue missions that operate at all altitudes and from areas other than certificated airports). Chronicled, Inc. said that if the registration procedure is "efficient and seamless" then it should include all unmanned aircraft.

The National Association of Broadcasters asserted that UAS registration is a reasonable step to mitigate the dangers posed by a small minority of hobbyist UAS operators that are flying in a careless and reckless manner that endangers the public. The City of Arlington (Texas) Police Department stated that "the increasing popularity of the recreational use of UAS by model aircraft operators has presented significant public safety and regulatory challenges in Arlington and our nation's cities," and strongly urged the FAA to require the registration of all UAS systems. The Air Medical Operators Association stated that all UAS capable of entering the NAS and conflicting with manned aircraft in flight should be considered aircraft and be subject to the registration requirement.

The Colorado Agricultural Aviation Association (CoAAA) supported its position that all UAS need to be registered by pointing out that low altitude airspace is already being shared by manned and unmanned flight operations "without any definitive safety protocols beyond operate in a safe manner and yield to manned aircraft." As the number of unmanned aircraft

using the airspace increases, the commenter continued, so does the potential for a mid-air collision which could lead to loss of the aircraft, injuries, or death. CoAAA and the National Agricultural Aviation Association (NAAA) further supported their positions that there should be no exemption for light-weight UAS by pointing to bird-strike data from a joint report by the FAA and the USDA. Comparing the dangers associated with collisions between wildlife and civil aircraft to the dangers associated with collisions between light-weight UAS and civil aircraft, the commenters asserted that it does not take a very large bird to do significant damage to an airplane. By way of example, CoAAA noted that mallard ducks (which weigh between 1.6 and 3.5 pounds) and turkey vultures (which weigh between 1.8 to 5.1 pounds) can break through the windshield of aircraft used for agricultural purposes.

The Electronic Privacy Information Center (EPIC) also opposed an exemption from the registration requirement for any UAS that operates in the NAS. EPIC stated that the size of a UAS is not strictly indicative of the privacy risks it poses and, in fact, that smaller UAS can more easily conduct "surreptitious surveillance on unsuspecting individuals."

Modovolate Aviation, LLC and a number of individual commenters recommended a limited exemption for unmanned aircraft that are operated exclusively indoors.

*All model aircraft should be excluded from the requirement of registration:* A large number of commenters recommended an exemption from the registration requirement for model aircraft. These commenters included many individual members of the Academy of Model Aeronautics (AMA), as well as other members of the recreational/hobby community. Among the reasons given by commenters for this position were the facts that traditional model aircraft have a long history of safe operations and that the FAA is not authorized to regulate model aircraft. The Aerospace Industries Association said the exemption of "hobby platforms" from registration would enhance the viability of the registration process by allowing the focus of the registry to remain on "commercial use platforms."

With respect to which aircraft would qualify as "model aircraft" for the purposes of an exemption from the registration requirement, some commenters said that any model aircraft flown recreationally should be exempt. One individual commenter asserted that

other countries, such as Australia, Canada and the United Kingdom have made this distinction between recreational and commercial use and not required registration of recreational use aircraft. The Minnesota Department of Transportation also stated that it has not required UAS operated solely for recreational use to register. Many other commenters specifically stated that any model aircraft operated within the safety programming of the AMA should be considered “model aircraft” and not “UAS” and therefore exempt from the registration requirement. A large number of those commenters asserted that the AMA has “an impeccable 80-year track record of operating safely,” and that requiring AMA members to register their aircraft will have no impact on that safety record. Several commenters recommended that the FAA require model aircraft operators to become AMA members. Some other commenters said that any model aircraft that meets the definition of model aircraft contained in the FAA Modernization and Reform Act of 2012 should be exempt from the registration requirement.

A number of individual commenters highlighted the distinction between traditional model aircraft that are home built or assembled from kits (which they characterized as separate from UAS) and Ready to Fly (RTF) aircraft that do not require assembly (which they characterized as UAS). These commenters claimed that traditional model aircraft do not pose a safety risk to the NAS because they are flown strictly within the operator’s visual line of sight, have no autonomous control, and have fairly limited ranges. Some commenters also pointed out that model aircraft that are operated within the auspices of the AMA can only be flown at AMA-sanctioned fields and must already display the owner’s AMA member ID. Commenters contrasted these models with ready-to-fly aircraft, which are easy to operate, capable of vertical take-off, payload carrying and flying autonomously and beyond visual line of sight, and are often equipped with other enhanced capabilities, such as cameras, GPS systems, and remote viewing electronics. Commenters asserted that the problems that have prompted the FAA to require registration are due to the proliferation of these ready-to-fly aircraft that can be flown beyond visual line of sight. One commenter said “their ease of use, intuitive controls, and overall availability have created a perfect storm, wherein inexperienced flyers are flying

in inappropriate and/or dangerous places.”

Some commenters recommended a blanket exemption for home-built model aircraft. One commenter explained that home-built models should be exempt from registration because individuals who build their own model aircraft “have the time, experience, personal investment and motivation to be aware of and observe safe modeling practices.” Another commenter asserted that exempting home- or scratch-built model aircraft “will allow experimenters, programmers, developers and beta testers to exercise their creativity without complicating or impeding the creative process with unnecessary restrictions.” Other commenters did not request a blanket exemption for home-built model aircraft but instead recommended exemptions based on performance capabilities, which would necessarily exclude traditional model aircraft. Those recommendations are discussed below.

*Unmanned aircraft under a certain weight should be excluded from the requirement of registration:* Many commenters recommended that the FAA create an exemption from the registration requirement for UAS that fall below a minimum weight threshold. One individual commenter said the FAA needs to collect some real data to determine the weight below which unmanned aircraft no longer pose a threat to people or manned aircraft. Another individual commenter stated any weight threshold chosen for exemption needs to be determined based on kinetic energy and lethality studies. Other commenters made both general and specific recommendations for a minimum weight threshold.

Some individuals based their recommendations on a comparison between the risks to manned aircraft from bird strikes and the risks from collisions with unmanned aircraft. One commenter said that any aircraft over the weight of a mallard duck should be registered. Another commenter recommended an exemption for UAS “which present a risk equivalent or less than an acceptable bird strike.” Another commenter recommended an exemption for UAS that weigh less than 1.5 times the heaviest flying bird’s weight. Another commenter noted that the FAA has regulations that define the requirements for aircraft to withstand impact from birds (14 CFR 25.631) and engine ingestion from birds (14 CFR 33.76), and recommended the FAA exempt any unmanned aircraft that would have equal or less impact than a bird with the characteristics described in those existing regulations. Another

individual commenter said a threshold weight of 2 pounds is “entirely reasonable” because crows weigh between 0.7 and 2.6 pounds. Another commenter stated that a weight threshold of 1 kilogram (or 2.2 pounds) is appropriate because it represents a small risk factor based on an FAA wildlife strike report that says “species with body masses < 1 kilogram (2.2 lbs) are excluded from database.”<sup>34</sup> Another individual commenter asserted that a weight threshold of 5 pounds is appropriate because damage is likely to be minimal in an emergency event and because manned aircraft already must have the ability to withstand a similar bird strike.

Some commenters based their recommendations on the weight threshold proposed by the FAA in the sUAS Operation and Certification NPRM for a possible micro UAS classification.<sup>35</sup> The News Media Coalition said that if the FAA adopts special rules for micro UAS, then those micro UAS should be exempt from the registration requirement. Aviation Management Associates, Inc. similarly stated that the weight threshold for registration should be 4.4 pounds—the weight proposed in the sUAS Operation and Certification NPRM—“or lesser weight if it is determined vehicles of less than 4.4 pounds create an unacceptable safety risk.” Aviation Management qualified its recommendation, however, by asserting that no UAS that weighs less than 1.5 pounds should be required to register. A few individual commenters also stated that the weight threshold for registration should be in line with the weight threshold chosen for a micro UAS classification.

The Agricultural Technology Alliance (ATA) asserted that if the FAA issues a blanket exemption from the registration requirement for all micro UAS registration, it can better focus its efforts on higher-risk UAS without compromising safety. ATA also noted that Canada has a similar exemption for micro UAS.

A number of commenters, including Aviation Management Associates, Inc., the National Retail Federation and numerous individuals, asserted that the FAA should exempt UAS that fit into the “toy” category. Many of those

<sup>34</sup> Wildlife Strikes to Civil Aircraft in the United States 1990–2014 (July 2015), available at [http://www.faa.gov/airports/airport\\_safety/wildlife/media/Wildlife-Strike-Report-1990-2014.pdf](http://www.faa.gov/airports/airport_safety/wildlife/media/Wildlife-Strike-Report-1990-2014.pdf).

<sup>35</sup> The sUAS Operation and Certification NPRM considered the creation of a micro UAS classification for UAS weighing no more than 4.4 pounds (2 kilograms) for purposes of operation and certification requirements. 80 FR at 9556–9558.

commenters did not suggest a minimum weight threshold for a toy category. Several individual commenters suggested the FAA use the AMA's guidelines for the Park Flyer Program (*i.e.*, aircraft weighing 2 pounds or less) to define what qualifies as a "toy" for purposes of this exclusion.

The Toy Industry Association said that for purposes of defining products that should be exempt from the registration requirement, it is not necessary to create an independent "toy UAS" category that is separate from the category of unmanned aircraft that should be exempt from registration requirements "due to their lower risk." Specifically, the association discouraged the FAA from creating a "toy" category based on factors unrelated to operational safety, such as cost of the UAS, how it is marketed, or where it is sold, and encouraged the agency to "instead look at targeted UAS performance indicators that directly speak to the operational risk of the product and exempt all UAS that fit in that category." The Toy Industry Association highlighted the weight of the UAS as "the most risk-related and measurable variable." The commenter noted that most of its members manufacture UAS that are below 1 kilogram, but that certain UAS that weigh more than 1 kilogram should also be considered for exemption (*i.e.*, products intended to be flown indoors, products than can only fly relatively low, and products that are equipped with technology that makes the product safer, such as crash avoidance technology or technology that limits the height the UAS can fly).

Prox Dynamics stated that smaller and lighter air vehicles generally display less risk than larger ones. The company asserted, for example, that "a fly-sized low energy drone has negligible risk, even if a direct impact is considered." The company further asserted that a class of "inherently safe" aircraft exists that should be exempt from the registration requirement. Specifically, the company recommended an exemption for aircraft with a maximum weight of less than 60 grams. A few individual commenters suggested 3.3 pounds because that weight is used as a threshold for regulating model rockets. Horizon Hobby recommended that products with a gross weight of less than 2 kilograms be exempt from the registration requirement, which the commenter asserted is in line with current FAA-approved exemption for hobby uses. An individual commenter stated that rules already exists for other unmanned objects operating in the NAS, including kites, balloons and rockets (14

CFR part 101), and that the FAA should follow the precedent set by those rules and only regulate UAS heavier than 4 to 6 pounds. Other commenters also recommended specific weight thresholds for exemption from the registration requirement ranging from 60 grams on the low end to 100–150 pounds on the high end.

A few individual commenters framed their proposals in terms of payload weight. One commenter recommended an exemption for unmanned aircraft that are not capable of carrying a payload of more than 1 or 2 pounds. Another commenter recommended that registration be required for unmanned aircraft that are capable of carrying more than 10 pounds of payload. Another commenter said registration be required for any unmanned aircraft that weighs more than 8 or 10 pounds and can carry a load of its weight or higher. An individual commenter asserted that even small, relatively light-weight models have dangerous rotors and can carry a risk of doing damage if they collide with, or are ingested into the engine of, a full-scale aircraft. This commenter further asserted that technology is advancing to enable a single control station to operate multiple UAS in a coordinate way, and a "swarm" of otherwise light-weight UAS would be dangerous if flown into the path of a full-scale aircraft.

Some commenters recommended minimum weight thresholds for specific types of UAS. A number of commenters, for example, said model aircraft that do not operate within existing AMA rules should be above 5 pounds to trigger the registration requirement. Another individual commenter said that only model aircraft that are one-half scale or larger should be subject to registration. One individual commenter recommended a 1 kilogram (2.2 pound) threshold for multicopters. The commenter noted that this threshold is commonly used in Europe and the United Kingdom. Another individual commenter recommended a weight threshold of 25 pounds for fixed-wing UAS and 10 pounds for non-fixed-wing UAS. One individual commenter recommended an exemption for quadcopters under 1,500 grams, while another individual commenter recommended an exemption for quadcopters under 20 pounds. One individual commenter recommended an exemption for "toy" unmanned aircraft that are 1 pound or less and registration only if used above 300 feet for "mini" UAS weighing between 1 and 7 pounds. A few commenters recommended an exemption for small unmanned aircraft that are made out of foam, although the

individual did not specify a weight threshold for these aircraft.

*Unmanned aircraft with certain performance capabilities should be excluded from the requirement of registration:* A large number of individual commenters recommended that the registration requirement apply only to UAS that possess certain performance capabilities or aircraft specifications. Many of those commenters, including individuals who submitted comments as part of an AMA form letter campaign, said the registration requirement should apply only to unmanned aircraft that have the ability to operate beyond the operator's visual line of sight. Other commenters, including Aviation Management Associates, Inc. and numerous individuals, also said that unmanned aircraft that are capable of beyond visual line of sight operations should be registered, but those commenters did not say that such unmanned aircraft are the only small unmanned aircraft that should be registered.

In addition to the ability to operate beyond visual line of sight, commenters recommended that the registration requirement apply only to unmanned aircraft that have one or more of the following performance capabilities:

- Have the ability to fly autonomously.
- Have automated control functions such as "return-to-home."
- Have RNAV capabilities (either through satellite base navigation or through inertial navigation).
- Have first person view capabilities.
- Have an onboard navigational system.
- Are equipped with GPS.
- Take off vertically.
- Are capable of hovering.
- Are capable of hovering during normal operation and are equipped with onboard photo or video recording equipment.
- Are capable of automated or remote-controlled pickup or drop-off of a payload.
- Are equipped with an onboard camera or audio recording equipment.
- Can transmit a video signal at more than ¼ mile.
- Are capable of flight for longer than a specified minimum period of time.
- Have a range that exceeds a specified minimum distance. One commenter characterized this as "electronic line of site."
- Have the ability to fly above a specified minimum altitude.
- Are capable of entering controlled or restricted airspace.

Some commenters suggested some minimum weight threshold in combination with one or more of the above-listed capabilities.

A group of academics recommended the FAA adopt a progressive approach that requires registration for only the most problematic technologies—which

they asserted to be long-range first person view and GPS waypoint navigation—and then “transparently assess” the results of this registration. These commenters noted that if the FAA determines that conventional model aircraft are still creating an undue hazard for aviation, then additional measures (such as a requirement for low-cost pressure altimeters that limit model aircraft below 400 feet) could be implemented.

The Aerospace Industries Association said that only aircraft capable of sustained, untethered flight should be registered. A few individual commenters similarly recommended exemptions for aircraft that are control-line operated (*i.e.*, tethered flight), that are hand-thrown or rubber-band powered (*i.e.*, “free flight” aircraft), and that are unpowered (*e.g.*, gliders).

Several members of the “free flight” community specifically recommended that the FAA create an exemption for light-weight, free flight model aircraft that weigh 10 ounces or less and have no means of externally controlling their aircraft while in flight.

Another individual similarly asserted that speed, altitude, and flight duration will depend on battery, motor, and propeller size, and that weight should therefore be used to determine which UAS should be exempt from the registration requirement. The commenter noted that consideration of factors such as speed, altitude, and flight duration raises the question of what defines the actual UAS (*e.g.*, the fuselage for a plane, the frame of a quadcopter). The commenter further noted that the same fuselage can have dramatically different performance characteristics if the battery, motor, or propeller is changed. The commenter asserted that registering each combination “would be absurd,” and any change in propeller, motor, or battery size would raise questions of when an owner needs to re-register the aircraft.

There were commenters, however, who disagreed with a requirement to register UAS that possess some of the above-listed capabilities. An individual commenter, for example, said that enhanced capabilities such as first person view or flight controls capable of autonomous flight should not be a reason for requiring registration. The commenter claimed that an aircraft that does not exceed safe mass/speed/altitude/duration thresholds is not automatically a threat to manned aircraft simply by virtue of being equipped with enhanced capabilities. Another individual commenter said that small UAS equipped with GPS should

not automatically be required to register because some small UAS flown by beginners use GPS to stabilize the aircraft, which increases their safety level. The commenter noted that these UAS have controls that will not let the aircraft fly above a certain altitude. Several commenters said that any requirement to register all UAS that have the ability to fly above a certain altitude or to enter controlled airspace should exclude UAS that are programmed with geofencing or “Safe Fly” technology, which limits altitude and restricts flight into controlled airspace. The Toy Industry Association cautioned against using altitude as a threshold for registration. The commenter noted that not all companies use technology that limits the height a UAS can fly and that it would be premature to spell out specific technological requirements to ensure that UAS fly below a certain altitude when other technology advancements may develop that achieve the same purpose. The Toy Industry Association also asserted that the issue of whether a UAS is equipped with a camera is not relevant to registration. The association stated that, while there are legitimate privacy concerns to consider, “this conversation should not take place in the context of the aviation industry safety at this time.”

The National Retail Federation said that unmanned aircraft “that are designated as ‘toys’ with limited performance capabilities” should be exempt from the registration process. The commenter did not, however, specify what qualifies as “toys,” or what performance capabilities would remove an unmanned aircraft from the “toy” category. Rather, the commenter said the FAA should require registration based on potential safety and security risks associated with performance capabilities or material specifications of the unmanned aircraft, or the age of the operator.

Some commenters stated more generally that aircraft capabilities should not be a consideration for exemption from registration. One individual said speed, altitude, and flight duration should not be criteria for registration because they can vary depending on a wide-variety of “user-selectable UAS components” such as props choice, battery size, and flight mode, among others. Another individual said that because unmanned aircraft are constantly changing and evolving, it would be a poor choice to develop limitations based on performance. Several other individuals stated that registration should only be required if the operator intends to

operate in the same airspace as manned aircraft. A few other individuals said all UAS flown in public spaces should be registered, regardless of aircraft capabilities. Another individual said capabilities of the aircraft have nothing to do with whether it is a safety risk or not; rather, it is the practices of the pilot that determine the safety risk.

*Unmanned aircraft should be excluded based on operations conducted:* Some commenters said that unmanned aircraft should be excluded from the registration requirement based on operations, rather than weight or aircraft specifications and capabilities. Modovolate Aviation, LLC and a number of individual commenters recommended a limited exemption for UAS that are operated exclusively indoors. As noted above, many commenters said that small UAS that are operated within the operator’s visual line of sight, or below a minimum altitude, or below a certain speed, should be exempt from the registration requirement. Also noted above, some individual commenters recommended an exemption from the registration requirement for UAS that are flown under AMA safety guidelines on AMA-sanctioned flying fields. A few other individual commenters recommended an exemption for UAS that are operated, with permission, over private property. Another individual commenter recommended an exemption for UAS engaged in semi-commercial/agricultural operations that are conducted under 500 feet above ground level and over sparsely populated areas. Another individual commenter recommended an exemption for UAS flying over “largely unpopulated areas.” Several individual commenters said the registration requirement should not apply to UAS that are used at schools and institutions for educational purposes. Another individual commenter recommended an exemption for UAS used for non-profit purposes.

The US Drone Racing Association said that drones used for racing—which generally stay under 100 feet and within visual line of sight—should not be required to register, unless their operations exceed some minimum operational thresholds such as beyond visual line of sight, range over half mile, or above 400 feet.

An individual commenter noted that, due to radio restrictions for video transmissions, first person view pilots are required by law to have a Federal Communications Commission (FCC) license for any transmitter over 25mW. Because those pilots are already required to register and place identifying markings on the transmitter,

the commenter recommended an exemption from the FAA registration requirement for a first person view pilot with an FCC license.

Other commenters phrased their recommendations in terms of UAS operations that should be included in the registration requirement. A number of commenters, including Aviation Management Associates, Inc. and many individuals, said any UAS used for commercial purposes should be registered. Several individual commenters said UAS operated in controlled airspace should be required to register. Another individual commenter said registration should be required for UAS that operate over private property, at altitudes over 400 feet, over populated areas, and within 5 miles of an airport.

*Other comments on whether certain UAS should be excluded from the registration requirement:* Some commenters recommended registration requirements based on aircraft type. Several individuals said that all fixed-wing UAS should be exempt from registration. A few other individuals said that only multirotor UAS should be required to register (because they are easy to fly and can take off from anywhere). Other categories of UAS that commenters said should be included in the registration requirements were high-volume production aircraft (*i.e.*, models produced in volumes greater than a specified value, such as 5,000 or 10,000 units per year) and UAS powered by gas/oil mixes. Some commenters suggested that UAS be excluded from the registration requirement based on frame size or prop size.

A number of commenters recommended a combination of factors to consider when determining what, if any, category of UAS should be excluded from the registration requirement.

Aviation Management Associates, Inc., said the FAA should exempt “any small UAS regardless of weight that is limited by manufacturing firmware or other acceptable means to operating below 500 feet above ground level, will not exceed a  $\frac{1}{2}$  range mile from the operator and the associated ground control station, as well as provides geofencing and altitude limitations that meets FAA exclusionary airspace.”

The Property Drone Consortium stated that micro-drones of some maximum weight, speed, and altitude should be exempt from registration. The commenter suggested the following possible thresholds: Weight under 1 pound, 15–20 mph maximum flight speed, and an altitude of under 100 feet. The commenter also stated that an

assessment could be made based on joules of imparted energy. The commenter further stated that region of operation should also be a point of consideration for a possible exemption from the registration requirement.

The Retail Industry Leaders Association said the FAA should adopt a risk-based approach and only require registration of UAS that present the greatest safety risks, based on consideration of factors including: Product weight and overall size, operating range, maximum speed, maximum altitude, fragility, and GPS and other navigation capability. Travelers Insurance Company similarly asserted that any unmanned aircraft that the FAA determines poses a risk to the national airspace or causes serious bodily injury or property damage should be registered. The commenter went on to say that the FAA should exercise discretion with respect to unmanned aircraft “that are so light in weight and lacking in capabilities so as to pose no meaningful threat to persons, property or the national airspace.” The commenter did not, however, specify what weight or what limited capabilities should be used as a threshold for registration.

Latitude Engineering, LLC asserted that “there exists a threshold of mass and speed under which the risk associated with the flight of an unregistered commercial UAS is more than offset by the value returned to the public.” The company stated that it reached this conclusion after evaluating the kinetic energy of various UAS airframe configurations from first principals and drawing from studies such as “UAS Safety Analysis” by Exponent (Dec. 16, 2014). The company’s specific recommendation was to exempt UAS that are near the following values: Mass of an upper limit of 1 pound, speed limited to 50 knots, and altitude limited to 200 feet above ground level or 100 feet from the highest obstacle within 200 lateral feet. The company also asserted that no unregulated flights should be allowed within 5 miles of an airport.

Delair-Tech asserted that it would make sense for a category of unmanned aircraft associated with a low risk of accidental damage to be exempt from registration. The company defined this category as unmanned aircraft that weigh less than 1 kilogram and have a flight performance that is limited to 50 meters in height. The company based its recommendation on the “toys and mini-drones” category defined by the European Aviation Safety Agency in Ref 5, Proposal 14.

ATA stated that the FAA should exempt from the registration requirement any UAS that is to be used solely in rural areas, which the commenter said should be defined as a certain distance from an airport or a major population center. ATA noted that Canada also has an exemption for operations in low-risk rural areas.

EPIC noted that the registration scheme, as currently envisioned, does little to solve the problem of identifying a UAS or UAS operator because the only UAS that will be identifiable are those that are recovered after a crash. EPIC also noted that the current registration plan does nothing to inform the public of surveillance capabilities of the drone, which is necessary to make UAS operators accountable to the public.

Another individual said the important criteria for a registration determination are wingspan dimensions, propeller diameter and type, energy source, and weight. Another individual stated that exemptions should be based on weight, speed, and operating height. This commenter suggested the FAA use a formula to calculate a UAS’s impact energy, where “E” is the impact energy, “m” is the mass, “v” is the maximum flight speed, “g” is gravitational acceleration (constant), and “h” is the height. This commenter stated that FAA could conduct a comprehensive study to determine the critical value of impact energy, and users could calculate the impact energy of their UAS, simply by filling the mass, maximum flights speed, and maximum height into an online formula available on the FAA Web site. Another individual said most “hobby class UAS” should be excluded from registration based on the empty weight of the aircraft and the potential kinetic energy of the unit. This commenter asserted that there is precedent for this method and that it has worked reasonably well with part 103 ultralight vehicles and light sport aircraft. This commenter claimed that a 55-pound model aircraft flown at 60 mph has around 12% of the kinetic energy of a part 103 vehicle traveling at the same speed, even with a payload of 40% of the empty weight. This commenter further claimed that a typical motorcycle driven at 40 mph would have nearly 4 times the kinetic energy of a 55-pound UAS flying at 60 mph. This commenter asserted that society accepts this level of risk for pedestrians, and questioned why one-quarter of that level of risk posed by an out-of-control UAS would also not be acceptable.

*Task Force Recommendation:* The Task Force accepted as a baseline that the registration requirement will only apply to small unmanned aircraft (*i.e.*,

aircraft weighing less than 55 pounds) that are operated outdoors in the NAS. Beyond that baseline, however, the FAA asked the Task Force for recommendations regarding additional minimum requirements for small unmanned aircraft that would need to be registered. In particular, the agency asked the Task Force to consider factors including, but not limited to, technical capabilities and operational capabilities such as size, weight, speed, payload, equipment, and other factors such as the age of the operator.

The safety of the non-flying public and of other users of the NAS was central to the Task Force's determination of what category of small unmanned aircraft to recommend for exemption from the registration requirement. With considerations of safety in mind, the Task Force addressed the possibility of recommending an exclusion based on various factors, including: Weight (alone and in combination with altitude or kinetic energy), mass, speed, kinetic energy, payload, equipment (e.g., camera, GPS), and operational capabilities, such as the ability to navigate the airspace, the ability to operate above a certain altitude above ground level, the ability to operate beyond the visual line of sight of the operator, the ability to operate autonomously, and flight duration.

The Task Force ultimately agreed to use a mass-based approach to determine an appropriate category of small unmanned aircraft to recommend for exclusion from the registration requirement. This was based upon the probability of a catastrophic event occurring (i.e., death or serious injury) due to a collision between a small unmanned aircraft and a person on the ground. The Task Force further stated that because of the lack of data on unmanned aircraft-aircraft collisions, engine ingestion, and propeller impacts by unmanned aircraft, the probability of a catastrophic event occurring due to those events was not part of its consideration. Rather, the task force noted that research in this area continues and as it becomes available, this threshold should be evaluated and adjusted accordingly. This approach best satisfied the Task Force's concerns about safety and provided a minimum weight threshold for registration that is easy to understand and apply and would therefore encourage compliance.

The formula considered by the task force is a standard aviation risk assessment formula used in consideration of manned aircraft safety. For ease of administration and small unmanned aircraft owner

understanding, the Task Force strongly advised a mass-based approach for determining the generally safe threshold below which a small unmanned aircraft system would not need to be registered.

The Task Force recommended that the FAA should exempt from the registration requirement any small unmanned aircraft weighing 250 grams (g) or less. The 250 grams or less exclusion was based on a maximum weight. The Task Force assumed maximum weight was defined as the maximum weight possible including the aircraft, payload, and any other associated weight.

The Task Force proposed this mass by considering: The maximum free-fall kinetic energy of a small unmanned aircraft from 500 feet (ft) above ground level; research papers assessing the lethality of inert debris based on kinetic energy; and a determination of the probability that a small unmanned aircraft with potentially lethal kinetic energy would strike a person on the ground. The Task Force's recommendation assumed population density for a densely packed urban environment, as well as a conservative estimate of the percentage of people in that crowded environment who may be unprotected and susceptible to injury from a falling small unmanned aircraft. To determine the probability of an accident, the Task Force provided an estimate of the mean time between failure (MTBF) for small unmanned aircraft. Mathematically, the Task Force predicts that the likelihood of a fatal accident involving a small unmanned aircraft weighing 250g or less is  $4.7 \times 10^{-8}$ , or less than 1 ground fatality for every 20 million flight hours of small unmanned aircraft 250g or less. The Task Force noted that the acceptable risk level for commercial air transportation is on the order of  $1 \times 10^{-9}$ , and general aviation risk levels are on the order of  $5 \times 10^{-9}$ .

The Task Force emphasized that this recommendation is conditioned on the premise that this and the Task Force's other recommendations will be accepted, without alteration. Certain members of the Task Force asked that it be noted that this is a nascent industry with very little experiential data to inform the assumptions and that periodic review of the data may be warranted. Certain Task Force members noted that the FAA's 25 years of bird strike data show that fatal aircraft accidents caused by small and medium birds (weighing four pounds on average) are extremely rare despite the presence of billions of birds within the low altitudes where small UAS typically fly, and urged the FAA to select a weight

that posed a similar safety risk. Task Force members representing manned aircraft organizations expressed specific concerns that data on UAS-aircraft collisions, engine ingestion, propeller, and rotor impacts by UAS was not available when determining the weight threshold. All members urged the FAA to expedite its work currently underway in this area. The Task Force also emphasized that 250-gram weight threshold was agreed to for registration purposes only and was not a validation of the underlying assumptions for any purpose other than the registration requirement. All Task Force members agreed that the threshold should not be used by the FAA as an index for operational restrictions or categories in any future rulemaking unless safety concerns require the FAA to take appropriate action.

**IFR Requirement:** The FAA has considered the comments received to the Clarification/Request for Information and the Task Force recommendations. As noted above, the formula considered by the Task Force is a risk assessment approach that results in a method to determine which small unmanned aircraft are required to be registered. In recognition of the potential risks posed by small unmanned aircraft highlighted by the Task Force's work, the FAA agrees with the Task Force recommendation and generally agrees with its approach for purposes of aircraft registration only. The Task Force recommendation results in a simple, straight forward method to determine which aircraft should be registered. Accordingly, this rulemaking adopts the Task Force recommendation to exclude small unmanned aircraft weighing an equivalent of 250 grams or less. (FAA is using the pound equivalent of 250 grams—0.55 pounds.) The agency emphasizes, however, that the Task Force approach may be different from the approach that will be used in the sUAS Operation and Certification rulemaking to develop operating requirements.

The FAA recognizes that the Task Force recommendation strikes a balance between many stakeholders, including modelers, unmanned aircraft manufacturers, operators, retailers, and the manned aviation community. As this aviation sector continues to develop, operating experience and new technologies may compel the agency to reconsider the appropriate weight threshold for unmanned aircraft registration. Additionally, new research may necessitate a change from the weight-based approach recommended by the Task Force. Since the Task Force's methodology only assessed the

risk to individuals on the ground, the agency recognizes that additional research is necessary to evaluate the risk of collisions between small unmanned aircraft and manned aircraft. The FAA has several tests, both in-progress and planned, in collaboration with our UAS Test Sites and UAS Center of Excellence.

The FAA considered comments that advocated for the use of weight in combination with other factors and determined that these scenarios would be more difficult to implement and could cause confusion. The FAA also considered comments that recommended exclusions from the registration requirement based on operational limitations, *e.g.*, altitude, speed, visual line of sight operations only. However, at this time, the FAA is concerned that these approaches could stifle innovation in the ongoing and rapid development of sUAS technology. Thus, the FAA determined that these were not viable methods to create exclusions.

Regarding commenters who recommended that the FAA exclude certain aircraft from the requirement of registration based on the locations at which those aircraft would be operated (*e.g.*, private property), such an approach would defeat the purpose of registration, which is to identify aircraft throughout the NAS and the owners of such aircraft. Registration based on intended location would not address that intent because the NAS extends over private property. In response to the comments urging the exclusion of some or all model aircraft from the registration requirement, the FAA has determined that doing so would be contrary to the policy adopted in the October 22, 2015 Clarification/Request for Information.

In response to the comments urging the exclusion of some or all model aircraft from the registration requirement, as stated in the Clarification/Request for Information, model aircraft are indeed aircraft and thus they are subject to the statutory requirement of aircraft registration. 80 FR at 63913–63914.

In response to the commenters who advocated for a limited exemption for unmanned aircraft operated exclusively indoors, the FAA reiterates that the requirement of registration pertains to aircraft operated in the NAS, thus outdoors. An exception is not required to stipulate that small unmanned aircraft operated exclusively indoors are not required to register with the FAA.

Regarding comments received to the Clarification/Request for Information pertaining to the micro UAS proposal

contained in the sUAS Operation and Certification NPRM, the FAA notes that issues pertaining to weight classifications for purposes of sUAS operation and certification purposes are outside of the scope of this rulemaking.

Regarding comments pertaining to privacy and operational concerns, the agency clarifies that this rulemaking is intended only to provide relief from the existing part 47 registration requirements. Pursuant to the Presidential Memorandum issued on February 15, 2015, Promoting Economic Competitiveness While Safeguarding Privacy, Civil Rights, and Civil Liberties in Domestic Use of UAS, the National Telecommunications and Information Administration (NTIA) is leading a multi-stakeholder engagement process to develop and communicate best practices for privacy, accountability, and transparency issues regarding commercial and private use of UAS in the NAS, and will address these issues through that process.

#### *D. Eligibility To Register*

##### *1. Citizenship*

This final rule includes the statutory eligibility requirements for aircraft registration as required by 49 U.S.C. 44102. An aircraft may be registered under 49 U.S.C. 44103 only when the aircraft is not registered under the laws of a foreign country and is owned by (1) a citizen of the United States; (2) an individual citizen of a foreign country lawfully admitted for permanent residence in the United States; or (3) a corporation not a citizen of the United States when the corporation is organized and doing business under the laws of the United States or a State, and the aircraft is based and primarily used in the United States. The FAA may also register aircraft owned by the United States government or a State or local governmental entity. *See* 49 U.S.C. 44102. Part 47 includes these statutory eligibility requirements.

*sUAS Operation and Certification NPRM:* The sUAS Operation and Certification NPRM addressed the applicability of the statutory aircraft-registration requirement by proposing to require all small unmanned aircraft subject to the proposal to be registered pursuant to the existing registration process of part 47. *See* 80 FR 9574. The NPRM did not address issues pertaining to the eligibility to register (including citizenship).

Although the sUAS Operation and Certification NPRM did not address the issue of aircraft owner citizenship as it relates to small unmanned aircraft in part 47, one commenter to the NPRM

raised the issue. DJI acknowledged the constraints the statutory aircraft registration requirements place on the FAA, but believed that those restrictions prevent most foreign citizens from operating a small UAS commercially in the United States. DJI presumed that tourists operating small UAS as model aircraft would be allowed to do so. DJI urged the FAA to consider asking Congress either to drop the aircraft registration requirement for all small UAS altogether or to withdraw the citizenship requirement (including its limited exceptions).

*Clarification/Request for Information:* Rotor Sport recommended against requiring U.S. citizenship for registration of small UAS because it would be “severely detrimental” to the rotor sport industry. In particular, Rotor Sport stated that requiring citizenship for small UAS that are already governed by the Amateur Competitive Sport regulations of the AMA “would severely and financially impact international drone racing events, including the 2016 World Drone Racing Championship being held in Hawaii.”

*Task Force:* As part of its discussions regarding who should register a small unmanned aircraft, the Task Force addressed the issue of citizenship status of applicants for registration. Considering the goals of encouraging the growth of the UAS industry and compliance with the registration requirement, the Task Force recommended there be no U.S. citizenship or residency requirement for registration eligibility. If, however, the FAA does include a U.S. citizenship requirement, the Task Force recommended that the agency use its discretion to permit non-citizen owners to operate in the U.S. by applying for a waiver from the registration requirement for a specified period of time (consistent with 49 U.S.C. 41703(a)(4)). The Task Force believed that eliminating the citizenship requirement would help achieve the goal that small unmanned aircraft owners are known to the FAA for safety purposes.

*IFR Requirement:* While the FAA can make certain changes to the registration system regarding the types of information to be collected, and how that information is collected, the statutory requirements pertaining to citizenship in 49 U.S.C. 44102 are clear. The statutory citizenship criteria must be satisfied in order to obtain a certificate of U.S. registration.

As noted above, registration is just one requirement that must be satisfied in order to operate an aircraft in the U.S. With respect to the operation of unmanned aircraft, Article 8 of the

Convention on International Civil Aviation, signed at Chicago on 7 December 1944 and amended by the ICAO Assembly (Doc 7300) addresses ‘pilotless aircraft’ and states that:

No aircraft capable of being flown without a pilot shall be flown without a pilot over the territory of a contracting State without special authorization by that State and in accordance with the terms of such authorization. Each contracting State undertakes to insure that the flight of such aircraft without a pilot in regions open to civil aircraft shall be so controlled as to obviate danger to civil aircraft.

For those that do not satisfy the citizenship requirements for U.S. registration, consistent with the authority in 49 U.S.C. 41703, the Secretary may authorize certain foreign civil aircraft to be navigated in the U.S. only (1) if the country of registry grants a similar privilege to aircraft of the U.S.; (2) by an airman holding a certificate or license issued or made valid by the U.S. government or the country of registry; (3) if the Secretary authorizes the navigation; and (4) if the navigation is consistent with the terms the Secretary may prescribe. *See also* 14 CFR part 375, Navigation of Foreign Civil Aircraft in the United States.

In this instance, with respect to those individuals who do not satisfy the citizenship requirements and yet wish to conduct model aircraft operations in the U.S., the Secretary has determined, consistent with Article 8, and the authority under 49 U.S.C. 41703, as implemented in 14 CFR part 375, that it is appropriate to allow these operations to occur provided that individuals complete the process set forth in 14 CFR part 48 and comply with the statutory requirements for conducting model aircraft operations in Public Law 112–95, section 336 (Feb. 14, 2012). For these individuals, recognizing that most ICAO member states have not imposed a registration or airworthiness requirement for these small unmanned aircraft, we will recognize these aircraft as “other foreign civil aircraft” as defined in 14 CFR 375.11. Consistent with the Secretary’s authority in section 333 of Public Law 112–95, provided the aircraft are operated exclusively as model aircraft in accordance with section 336 of Public Law 112–95, an airworthiness certificate will not be required. Section 375.38 will require individuals to comply with § 48.30 and pay a \$5 fee, complete the application and the registration process in §§ 48.100(b) and (c), 48.105, and 48.115; mark the aircraft in accordance with the provisions in §§ 48.200 and 48.205, and comply with the statutory model aircraft requirements in section 336 of Public

Law 112–95. The agency will consider the certificate that is issued to be a recognition of ownership rather than a certificate of U.S. aircraft registration. These conditions are consistent with and impose no greater burden than the requirements imposed on U.S. citizens conducting model aircraft operations in the U.S.

## 2. Commercial Activity Conducted by Non-U.S. Citizens

A corporation that is not a citizen of the United States may register an aircraft in the United States when the corporation is organized and doing business under the laws of the United States or a State, and the aircraft is based and primarily used in the United States. 49 U.S.C. 40102(a)(1)(C). This statutory limitation exists in order to prevent the United States registry from “becoming an international registry” and “United States aircraft registration from becoming a so-called ‘flag of convenience.’” *See* 44 FR 61937, 61937–61938 (October 29, 1979).

Part 47 implements the requirement to define “based and primarily used in the United States.” Under part 47, aircraft are deemed to be “based and primarily used in the United States” if one of the following conditions is satisfied: (1) The aircraft is used exclusively in the United States during the period of registration; or (2) the aircraft flight hours accumulated within the United States amount to at least 60 percent of the total flight hours of the aircraft, measured over six month intervals. § 47.9. Because operations by small unmanned aircraft registered in accordance with part 48 are limited to operations within the United States, it is not necessary to further define “based and primarily used in the United States” as provided in part 47.

With respect to foreign-owned or controlled entities or individuals who want to conduct non-recreational UAS operations but who do not satisfy the definition above and thus cannot register their aircraft in the United States under either 14 CFR part 47 or part 48, the Department and the FAA may consider allowing these operations to occur with additional authorization under the authority of 49 U.S.C. 41703, the provisions of 14 CFR part 375, and other safety authorizations as deemed necessary by the FAA. Comments are requested on what factors the FAA or the Department should consider in determining whether and when to grant such authorizations. The Department will address these authorizations in more detail in the sUAS Operation and Certification final rule, the final rule on sUAS registration, or other rulemaking

as appropriate. For more information and guidance regarding authorities for non-U.S. citizens, please contact the Department’s Foreign Air Carrier Licensing Division.

## 3. Minimum Age To Register

*Clarification/Request for Information:* In the Clarification/Request for Information document, the agency sought comments on whether there should be a minimum age at which a person would be permitted to register a small unmanned aircraft. An individual commenter opposed a minimum age requirement, noting that a 10 year old can be safer than a 30 year old. A few other individual commenters did, however, recommend a minimum age requirement to register and operate a UAS—one commenter recommended 21 years old (to purchase and operate a UAS), two commenters recommended 18 years old (to register a UAS), and one commenter recommended 16 years old (to register a UAS). Another individual commenter said there should be an age requirement to purchase UAS weighing more than 4 pounds. That commenter did not, however, suggest an age at which this requirement should be set. One commenter pointed to the existence of child protection laws and questioned how the FAA will protect privacy interests in the registration process.

*Task Force:* Due to the anticipated use of a Web-based application process for part 48, the Task Force considered age-related limitations applicable to Web-based information collection. Consistent with the Children’s Online Privacy Protection Act (COPPA), 15 U.S.C. 6501–6505, the Task Force recommended a requirement that individuals be 13 years or older to register a UAS.

*IFR Requirement:* In response to the comments from the Clarification/Request for Information, the agency notes that the comments did not provide justification for an age restriction for purposes of registration given that there is no minimum age for the operation of some sUAS and the agency proposed a minimum age of 17 for operation of sUAS used for commercial (non-hobby or non-recreational) purposes. Although one commenter proposed that the registration age should be linked to the weight of the aircraft, given that the registration process provided by this final rule is exclusively Web-based, protections for minor registrants must control. The FAA agrees with the Task Force recommendation to limit Web-based small unmanned aircraft registration to persons age 13 and older and has included this requirement in this IFR.

As a matter of policy (OMB Guidance for Implementing the Privacy Provisions of the E-Government Act of 2002), all Web sites and online services operated by the federal government and contractors operating on behalf of federal agencies must comply with the standards set forth in the Children's Online Privacy Protection Rule (16 CFR part 312). COPPA applies to Web site operators (including mobile apps) directed to children under 13 that collect, use, or disclose personal information from children. It also applies to operators of general audience Web sites or online services with actual knowledge that they are collecting, using, or disclosing personal information from children under 13. COPPA also applies to Web sites or online services that have actual knowledge that they are collecting personal information directly from users of another Web site or online service directed to children. Operators who are covered by COPPA must:

1. Post a clear and comprehensive online privacy policy describing their information practices for personal information collected online from children;
2. Provide direct notice to parents and obtain verifiable parental consent, with limited exceptions, before collecting personal information online from children;
3. Give parents the choice of consenting to the operator's collection and internal use of a child's information, but prohibiting the operator from disclosing that information to third parties (unless disclosure is integral to the site or service, in which case, this must be made clear to parents);
4. Provide parents access to their child's personal information to review and/or have the information deleted;
5. Give parents the opportunity to prevent further use or online collection of a child's personal information;
6. Maintain the confidentiality, security, and integrity of information they collect from children, including by taking reasonable steps to release such information only to parties capable of maintaining its confidentiality and security; and
7. Retain personal information collected online from a child for only as long as is necessary to fulfill the purpose for which it was collected and delete the information using reasonable measures to protect against its unauthorized access or use.

The Registry, through the small unmanned aircraft registration Web site, is expected to gather personal information as defined by COPPA, such

as first and last name, a physical or mailing address and online contact information. In light of these requirements, the registration Web site will require a responsible person age 13 or over to complete the registration application, providing their name in place of the child's name when the aircraft owner is a child under 13, as required by § 48.15.

All aircraft owners who are age 13 and older will be required to register in their name as the aircraft owner. The agency does not expect a person who turns 13 after the date on which the Certificate of Aircraft Registration is issued but before renewal is required, to reregister their small unmanned aircraft in their own name. The agency expects this change to take place at the time of registration renewal. Until such time, the responsible person can continue to meet the obligations of the owner for purposes of device identification.

We recognize that in order to register in the system, the payment of the fee requires the use of a credit, debit, gift, or prepaid card using the Visa, MasterCard, American Express, JCB, Discover, or Diners Club network. For owners who are age 13 and older who do not have access to one of these payment methods, a parent, guardian, or responsible person could submit payment on their behalf using one of these options.

#### *E. Registration Required Prior to Operation*

##### *1. Registration Prior to Operation*

*Clarification/Request for Information:* The FAA requested comments on the point at which registration should occur (e.g., point-of-sale or prior to operation). Several trade associations whose members use UAS (News Media Coalition, Air Medical Operators Association, Aerospace Industries Association (AIA), and Property Drone Consortium), Modovolate Aviation, LLC, and Morris P. Hebert, Inc. supported point-of-sale registration. A number of individuals stated that registration at point of sale was the only approach that would ensure that registration would occur at least for ready-to-fly UASs. These commenters stated that many operators would not register later. Some of these commenters, however, questioned whether point-of-sale registration could be applied to home-built or traded UASs. A few commenters compared the registration process to that which occurs for car and gun sales. Some commenters stated that an unlock process should be included so that the UAS could not be used until registration was complete.

Another suggested registering the beacon, not the UAS. Commenters stated that point-of-sale registration, with the seller handling the information, would reduce the burden on buyers. Some individuals stated that purchasers should have to demonstrate that they were familiar with the rules for operation.

Chronicle, Inc. stated that a registration system should be designed to integrate all POS systems that currently exist; this commenter assumed that each buyer would have an email address and government ID number that could be used to set up a registration account by downloading a mobile app. This company also assumed that the product would include a public key infrastructure (PKI) chip. The Real Time Technology Group stated that vendors could easily verify IDs presented by checking public records, and government watch lists.

The National Agricultural Aviation Association (NAAA), the Colorado Agricultural Aviation Association, and an individual stated that the burden on vendors would be no greater than submitting credit card charges. NAAA recommended that initial registration occur at the manufacturers, with all subsequent sales involving a transfer of ownership. A law firm and individual commenters generally supported having the vendor submit the information because, they argued, this would ensure that the registration occurred. One suggested that the vendor submit a temporary registration with the purchaser required to submit a final version.

Most commenters that addressed this issue expressed either opposition to the approach or concerns about the viability of point-of-sale registration for some sales. AT&T Services, Inc. questioned the FAA's legal authority to impose a registration requirement at the point-of-sale, given that the statutory authority underlying the UAS registration requirement, as well as its implementing regulation, applies to persons who "operate" aircraft. In this case, AT&T asserted, it is the owner of the UAS who "operates" it, and should therefore be responsible for registering it.

The Retail Industry Leaders Association (RILA) stated that point-of-sale registration would require the FAA to build new information technology systems to collect the information and retail outlets would have to build and test systems to link to the FAA. RILA stated that this was unlikely to happen in the short timeframe the FAA is proposing. RILA further stated that the practical realities of implementing a

point-of-sale registration system in time for this holiday season would impose heavy and costly administrative burdens on the FAA and retailers while at the same time raising serious consumer privacy concerns.

The National Retail Federation (NRF) stated that many retail point-of-sale systems are not configured to capture individual product identifying information. From a product's UPC code, many point-of-sale systems will identify the type of item, but cannot be configured to automatically capture information identifying each unique instance of an item type, such as a serial number. NRF stated that point-of-sale registration would require retailers to build a manual intervention process into their point-of-sale systems; cashiers would have to manually capture the serial number of the UAS and other required registration information. The commenter said this process would require training sales personnel, which imposes labor costs.

RILA and NRF stated that collecting personal information in a checkout line was problematic and presented data safety issues. RILA stated that it would cause significant delays in checking out for both UAS buyers and other customers. For both store and online sales, RILA stated that the retailer would have to explain the requirements to the customers because many would not be aware of the FAA rule. RILA also stated that point-of-sale registration would not capture the needed information for those UAS that are bought as gifts. Finally, RILA stated that a point-of-sale requirement would regulate sales rather than operations and questioned whether the FAA has the authority to regulate sales.

A number of individual commenters stated the point of sale would not work for people who build their own models from purchased parts or 3D-generated parts, for many online sales, and for purchases from foreign Web sites. One commenter stated that he bought parts without necessarily knowing exactly what kind of model he will build. Another commenter stated that some kits are sold by individuals operating small businesses from their homes. Several individuals suggested that the FAA provide identification numbers to purchasers so that the seller would only need to record the numbers. Other commenters recommended that AMA membership or proof of registration with the FAA be required at point of sale.

RILA, Horizon Hobby, and many individual commenters supported registration prior to operation. They stated that this approach would make it

possible to capture the many UAS that are purchased as gifts, from foreign Web sites, or sold privately and those that are constructed by the operator. A number of commenters suggested that this would allow the operator to affix the registration number on the UAS. Other commenters stated that they own multiple aircraft and asked that the operator, rather than the aircraft, be registered. A few individuals stated that the registration process could be handled when the owner filed the warranty card. One commenter stated that a prior to operation placement of name and contact information in the aircraft would be a more efficient means of ensuring the identity of the person piloting the aircraft is tied to the aircraft. Another individual stated that in some cases models are started by one person, passed on to others, and perhaps never finished or flown; including such models would serve no purpose.

The NRF stated UAS should be manufactured so that they can only be turned on and operated after the consumer registers the UAS and receives and applies an activation code. A manufacturer, Drone House Joint Stock Company, stated that this approach is its model for registration.

Another individual questioned how the FAA has authority to require registration of UAS that are "on the ground, not being flown, with the drone being turned off, in a box, and inside a building." This commenter asserted that, consistent with 14 CFR parts 1, 47, and 91 and 49 U.S.C. 44101(a), the FAA only has jurisdiction over a UAS that is in operation.

**Task Force:** The Task Force approached its discussions of the registration process with two goals in mind—to ensure accountability by creating a traceable link between aircraft and owner, and to encourage the maximum levels of regulatory compliance by making the registration process as simple as possible. To achieve the twin goals of accountability and compliance, the Task Force recommended the FAA institute a simple, owner-based registration system in which the FAA issues a single registration number to each registrant which covers all unmanned aircraft owned by that registrant.

The Task Force also addressed the question of registration process design. Because 49 U.S.C. 44101(a) stipulates that a person may only *operate* an aircraft when it is registered with the FAA, the majority of Task Force members believed the FAA cannot require registration of unmanned aircraft at the point-of-sale. Some

members of the Task Force expressed the opinion that maximum compliance can best be achieved with point-of-sale registration and those members therefore encouraged the FAA to include it as one of several options for registration. Several other members of the Task Force pointed out that, because the FAA's authority extends only to *operation* of aircraft, point-of-sale registration cannot be mandated.

**IFR Requirement:** The FAA agrees with the Task Force recommendation and comments stating that registration should be required prior to operation of the small unmanned aircraft, as opposed to at the point of sale. As referenced by the Task Force report, 49 U.S.C. 44101(a) stipulates that a person may only operate an aircraft once it is registered with the FAA.

Registration prior to operation as opposed to point-of-sale registration also avoids a number of logistical considerations associated with consumer product purchases identified by commenters, such as distinguishing the purchaser from the ultimate owner, and the burden placed on retailers when such a transaction occurs at a cash register in a store.

The agency emphasizes, however, that conformance to the statutory requirement to register prior to operation does not foreclose the opportunity for the development of a point-of-sale web-based application for registration that relieves the associated burdens identified by commenters. The agency encourages innovation in point-of-sale registration as it may provide the agency with a means by which to receive information regarding small unmanned aircraft in a seamless fashion, and hopes to work with retailers and manufacturers in the future to make the process as simple as possible.

In response to commenters' concern about whether a small unmanned aircraft that is not used in the NAS (*i.e.* indoors) would be inadvertently registered via point-of-sale registration, the agency confirms that only those small unmanned aircraft that are operated outdoors must register. Further, there is no obligation to register a small unmanned aircraft that will not be operated outdoors.

## 2. Registration of Each Aircraft

**Clarification/Request for Information:** Most commenters favored a requirement to register the owner<sup>36</sup> of the UAS

<sup>36</sup> Some commenters said the registration requirement should apply to the "owner" while other commenters said it should apply to the

instead of a requirement to register the UAS itself. Under this registration scheme, each owner would receive a single, unique registration number that would cover every UAS that person owns. Many commenters pointed out that this is how the AMA handles registration. Commenters asserted that a requirement to register each individual UAS is impractical and overly burdensome, particularly in light of the fact that most recreational users own multiple (often many) UAS. Commenters also pointed out that many UAS owners, especially those who build their own aircraft, regularly replace parts, as well as trade and sell their aircraft with other UAS owners. Those commenters asserted that a requirement to register the owner instead of the aircraft would alleviate the burdens associated with re-registering an aircraft each time such an event occurs. Commenters also claimed that registration of the owner of a UAS is all that is necessary to satisfy the DOT and FAA goals of traceability and accountability.

EPIC stated that a UAS registration requirement is an “absolutely essential” requirement to establish accountability for use of “autonomous surveillance devices” in the United States. EPIC further stated, however, that to ensure that the registry fosters accountability and responsibility among UAS operators, the registry must include provisions addressing privacy issues “to ensure a comprehensive baseline set of protections that facilitate the safe integration of drones.”

Union Pacific Railroad similarly stated support for “reasonable measures by the FAA to encourage accountability and responsibility among all UAS operators, including recreational users of sUAS.”

A number of commenters recommended that the FAA implement a licensing system like the FCC uses to register amateur radio operators. Commenters drew comparisons between amateur radio operators, most of whom own many different pieces of radio equipment, and hobby aircraft modelers, many of whom own many different model aircraft. Commenters explained that under the FCC licensing system the operator, not the equipment, is licensed for non-commercial operations after passing a safety test. Commenters asserted that registration alone does not guarantee a model aircraft operator understands the rules of safety for

operating in the NAS, so a licensing system with a testing component may be the best way to ensure safe operations in the NAS. One commenter acknowledged that licensing model aircraft operators would require a change in the law, but stated his belief that there is wide support for this in both Congress and the modeling community.

One commenter recommended that individuals be required to pass a background check before getting a license for UAS operations. Other commenters said the registration system should be more like the systems to obtain a license to hunt or to operate a boat, and less like firearm registration.

In contrast to those commenters who advocated for an owner-based registration system, Delair-Tech stated that each entry in the registration database “should be attached to exactly one UAV.” Aviation Management said the FAA should consider independent registration for a UAS operator in addition to registration of the unmanned aircraft and all of its support systems, including the ground control station.

The National Air Transportation Association expressed its support of the registration requirement, but acknowledged the ability to track an unsafe or noncompliant UAS back to the operator is limited to incidents in which the UAS is disabled, but not too damaged to obtain registration information. Several commenters, including the Competitive Enterprise Institute, questioned the usefulness of a registration number for identification purposes asserting a registration number would be impossible to read during flight, would only be useful after an incident has occurred and only if the UAS is recovered. Some commenters said affixing the name and contact information of the owner to or in the aircraft will serve the same purpose with much less expense. Other commenters said because it will be very easy for an individual to ignore the registration requirement, the small benefit of registration will be greatly outweighed by the burden placed on the model aircraft industry and the cost of implementing and maintaining the system.

NAAA and CoAA said registration will help track down who is responsible after an accident, but noted that FAA will not be able to enforce illegal and unsafe operations without requiring UAS to be equipped with an ADS-B like system through which to trace them.

**Task Force:** The Task Force recommended an owner-based registration system to achieve the goals of accountability and compliance.

Under the Task Force scheme, the FAA would issue a single registration number to each registrant that would be used to identify all unmanned aircraft owned and operated by that registrant.

**IFR Requirement:** The FAA sought to integrate the Task Force recommendation and comments regarding an owner registration approach while also considering the best public policy with respect to small unmanned aircraft registration. As addressed in the preamble discussion “Registration Process,” the registration system will differentiate between small unmanned aircraft intended to be used exclusively as model aircraft and small unmanned aircraft intended to be used as other than model aircraft in that different information will be collected for each population.

Small unmanned aircraft intended to be used exclusively as model aircraft will be registered with a single Certificate of Aircraft Registration issued to the aircraft owner. As with all other small unmanned aircraft, registration must be completed prior to operation of a small unmanned aircraft exclusively as a model aircraft. Owners of small unmanned aircraft intended to be used as model aircraft must complete the registration application process by submitting basic contact information, such as name, address, and email address. The owner will receive a Certificate of Aircraft Registration with a single registration number that constitutes the registration for each of this particular owner’s aircraft. There would be no limit to the number of small unmanned aircraft registered under the owner’s registration. This approach serves the purpose of the statutory aircraft registration requirement because each small unmanned aircraft must bear the owner’s registration number, thus allowing for the aircraft and its owner to be identified.

The agency notes that, once an aircraft is no longer exclusively used as a model aircraft, then the owner must complete a new registration application in accordance with the requirements for aircraft used as other than model aircraft.

The owner of a small unmanned aircraft intended to be used as other than a model aircraft must complete the registration application by providing aircraft-specific information in addition to basic contact information. The owner will receive a Certificate of Aircraft Registration with a registration number for each individual aircraft registered.

The agency determined that this registration approach is necessary for entities intending to use small

“pilot” or “operator.” Because these commenters were largely members of the model aircraft community, and therefore both the owners and operators of their aircraft, this seems to be a distinction without a difference.

unmanned aircraft as other than model aircraft because, based on the agency's experience with exemptions issued under section 333 of Public Law 112–95, these entities are expected to conduct a higher volume of operations, utilize multiple aircraft and at times conduct multiple simultaneous operations across the country, which introduces more risk into the NAS. In contrast, a small unmanned aircraft owner who operates small unmanned aircraft exclusively as a model aircraft is expected to use only one of his or her aircraft at a time and to do so on a less frequent basis than a person conducting operations with small unmanned aircraft intended to be used as other than as a model aircraft.

Components of the owner registration approach will still be available for small unmanned aircraft used as other than model aircraft in that the agency will utilize an owner profile for the registration Web site under which multiple aircraft can be registered. Owners will have a single profile that contains all of their aircraft, and although they may register multiple aircraft under that profile, each aircraft must have a unique number that exists under that profile. The FAA notes that persons using small unmanned aircraft other than as model aircraft will not be able to use the part 48 registration system until March 31, 2016.

The FAA notes that commenters comparing the registration requirement to licensure misconstrue the purpose of registration. While registration allows the agency an opportunity to educate sUAS operators, the primary purpose of registration is to identify the aircraft owner.

#### *F. Registration Process*

##### *1. Design of Registration System*

*sUAS Operation and Certification NPRM:* The sUAS Operation and Certification NPRM requested comments on the registration process. Both supporters and opponents of the proposed registration provision said FAA should take steps to ease the registration process. The Property Drone Consortium stated that a streamlined registration process was necessary to ensure growth in the UAS industry. Amazon, Association of Unmanned Vehicle Systems International, the American Farm Bureau Federation, and several others urged FAA to allow online registration of aircraft. Similarly, Small UAV Coalition and AUVSI, among other commenters, urged FAA to establish an electronic UAS registration database.

*Clarification/Request for Information:* In the Clarification/Request for Information, the Administrator and the Secretary requested information related to the logistics of the small unmanned aircraft registration process. Specifically, the FAA and DOT requested comments on how the registration process should be designed to minimize burdens and best protect innovation and encourage growth in the UAS industry. The FAA and DOT also requested comments on whether registration should be electronic or web-based, and whether there were existing tools that could support an electronic registration process.

In response to issues raised in the October 22, 2015 Clarification/Request for Information, commenters provided numerous suggestions for designing the registration process to minimize burdens and best protect innovation and encourage growth in the UAS industry. Suggestions included: Registering operators instead of individual aircraft; providing a variety of ways to register, including online, via telephone, through a mobile application, or at various locations, such as post offices or retail outlets; implementing a licensure procedure similar to that required by FCC for ham radio operators; allowing aircraft that already comply with AMA or FCC labeling practices to meet the labeling requirements to avoid conflicting requirements; and permitting operation of UAS upon submission of registration information rather than instituting a waiting period. Some commenters recommend that small unmanned aircraft manufacturers provide information to the FAA or assist owners in providing information to the FAA.

A law firm recommended the agency use the same registration system it uses for registering manned aircraft. The commenter noted the current registration system requires the following information: A notarized statement by the builder, manufacturer, or applicant for registration describing the UAS in detail, evidence of ownership, and an Aircraft Registration Application (FAA AC Form 8050–1), which identifies UAS and the owner. This commenter suggested manufacturers provide the information regarding the UAS and its capabilities, which would reduce burdens on retailers and consumers and result in a high degree of compliance.

Comments submitted as part of the AMA form letter campaign stated that the registration process should be as automated as possible and minimally intrusive. Those commenters stated that the system of aircraft identification used

by AMA members (*i.e.*, where members place their names and addresses or AMA numbers on their model aircraft) should be acceptable for AMA members as an alternative means of complying with the registration requirement. The Experimental Aircraft Association agreed that the identification used by AMA members could be allowed to meet the UAS registration requirements, which would alleviate some of the burden on the FAA while maintaining the accountability that DOT seeks through registration. However, EAA expressed doubts about the practicality of requiring registration of millions of UAS and model aircraft currently in use in the United States and feared the magnitude of the system would overshadow other safety measures.

An individual stated the main problem registration is intended to solve is the unsafe use of UAS by inexperienced or uninformed operators; therefore, the commenter recommended registrants be required to pass a test as part of the registration process.

The National Agricultural Aviation Association and the Colorado Agricultural Aviation Association stated FAA should focus on its aviation safety mission, including focusing on the safety of manned aircraft even if that resulted in requiring registration and more safety equipment for unmanned aircraft. These commenters said requiring items, such as indestructible data plate, ADS–B, and visible strobes, in addition to registration would encourage growth of the industry through accident prevention. In contrast, several individual commenters contended any registration requirement will stifle innovation and discourage growth.

Several individual commenters questioned whether the agency can handle the registration of millions of recreational UAS. One commenter noted that the registration database could become overloaded and unmanageable if every person registers every model aircraft they purchase or receive—many of which will not last past a single flight—but then fail to notify the FAA when a model is lost, destroyed, or sold. Also pointing to the short life span of most small UAS, another commenter similarly said the registration system will become overwhelmed if recreational users are required to register and re-register each model aircraft they obtain. Another commenter said that requiring UAS owners to renew their registration will “complicate everything” and lead to people involuntarily breaking the law when they forget to re-register their UAS.

*Task Force:* The Task Force broadly agreed that in order to promote greater acceptance of the registration requirement, the registration process should be as quick and easy as possible. The Task Force encouraged the FAA to consider implementing additional methods and strategies to maximize compliance with the registration requirement but without adding cumbersome steps into the process.

*IFR Requirement:* As has been noted previously, the FAA has developed and, by this rule, is creating an alternative, web-based registration system to register small unmanned aircraft prior to their operation. This web-based registration system is responsive to comments seeking an automated approach that is capable of managing the expected volume of registration. The agency expects that the web-based registration system will facilitate compliance with the aircraft registration requirement because of its accessibility and ease of use. Additionally, an electronic registration system complies fully with the Government Paperwork Elimination Act, Public Law 105–277, which requires that when practicable, federal agencies use electronic forms, filing, and signatures to conduct official business with the public.

As has been noted, the agency considered a point-of-sale registration approach, but ultimately determined that it would be not be feasible for manufacturers, retailers, and the agency to implement at this time. As discussed earlier in this preamble, the agency is evaluating how to address the burdens associated with point-of-sale registration identified by commenters.

## 2. Web-Based Registration Application

The FAA received many comments regarding whether or not the agency should create an online registration system to register UAS or their operators. The vast majority of commenters were supportive of the use of an electronic or web-based registration system to collect registration information. However, commenters articulated significant differences in how they preferred the system be established, implemented, and enforced. Several commenters said that web-based registration would be the least intrusive and burdensome method of registration. These commenters also suggested that an online system may be the cheapest way to register individuals, reducing paperwork and processing time.

*Clarification/Request for Information:* In responding to the Clarification/Request for Information, multiple commenters, including Horizon Hobby LLC, recommended that FAA create a

registration platform that would be accessible from anywhere and any web-based device, including mobile devices. As stated by commenters, this platform could then be accessed repeatedly by individuals, allowing them to update registration information as their device specifications change. Commenters said that this type of online system would allow individuals to add new small unmanned aircraft to the registry easily and in a minimally burdensome fashion.

ATA stated that an electronic registration system would dramatically shorten the registration process and make it more manageable for the FAA. ATA also noted that any cost associated with updating the FAA's system is likely to be fairly minimal and could be offset by charging a small registration fee.

Other commenters suggested that web-based registrations be integrated into online points of sale to ensure that those devices purchased from kits are registered without placing an outside burden on operators. Commenters said that this registration would be a part of the retailer's sale process and would be a requirement of purchase; however, registration and approval would be instantaneous. These commenters, including Aviation Management Associates, indicated that this type of online registration could also include educational material and a quiz that must be passed as a condition of registration. According to the commenters, the educational material and quiz could serve as a mechanism to ensure that operators understand basic aviation laws and safety guidelines.

While most commenters were supportive of electronic or web-based registrations, some expressed concern with an entirely electronic system. Many commenters expressed concern for the registration needs of those without consistent internet access. They instead recommended a paper alternative, in conjunction with online registration, be implemented to ease the registration burden of some operators.

Multiple commenters suggested that outside of new technologies, the agency could use existing electronic registration systems as a template from which to craft a specific FAA registration program. For example, a few commenters recommended using existing e-commerce registration templates as a model. One commenter suggested that FAA work with commercial retailers like DJI to use their current registration platforms as a basis for point of sale registration. Other commenters suggested that FAA implement the registration procedures of the AMA for all operators, or use the

AMA system as a template upon which the FAA can develop an equivalent system.

NetMoby and other commenters suggested that FAA leverage existing FAA and other Federal agencies' electronic registration systems to build a registration system unique to UASs. Examples provided by these commenters included creating a registration system similar to the one currently in place for FAA tail numbers, or developing a registration Web site with similar functionality to radio licensing sites. Skyward Inc, for example, recommended that FAA leverage its current FAA IT systems that it uses for other programs for use with UAS.

Several commenters remarked that there are multiple available technologies that FAA could use to aid an electronic registration process. Some of these included QR codes and RFID technologies. Commenters stated that both could be used to register and track the flight paths of UAS in the NAS. They said an RFID can be placed on aircraft that can then be read by interested parties from long distances. However, these same commenters indicated that there are potential security concerns with using RFID technology as well. Along with these technologies, commenters asserted that there are several private software development companies in operation that could produce a sufficient web-based registration product for FAA to use and implement. Two individuals noted the cost to design, implement, and maintain a centralized registration system will be significant, without an increase the safety of the NAS. Another individual said the cost of the registration program will hurt small businesses by adding an external expense to their operations.

*Task Force:* The Task Force also addressed the question of whether registration should be electronic or web-based, and what tools exist to support an electronic registration process. The Task Force believed the registration process should be web-based, and that the FAA should create an online registration system that allows for multiple entry points through an application programming interface (API). This would allow, for example, a sUAS manufacturer or trade organization to develop an application that communicates through an API by which it can register its customers or members by submitting registration information directly to the FAA database on their behalf. The registration information required and the certificate of registration received

would be the same regardless of what point of entry is used into the registration system. The online registration system should provide for an option for owners to edit and delete their registration information, as well as to view and print physical copies of their registration certificates through access to a password-protected web-based portal.

**IFR Requirement:** In § 48.30, the FAA sets out a process for streamlined registration of small unmanned aircraft. This streamlined process is exclusively web-based. The FAA agrees with commenters and the Task Force that a web-based system is much more functional than a paper system would be, and also agrees that registration compliance rates will increase dramatically when registration can be accomplished through a simple, web-based system. Additionally, the current FAA Registry would be unable to quickly process the dramatic increase in paper volume that the FAA would receive from small unmanned aircraft registration. With the implementation of the small unmanned aircraft registration process, small unmanned aircraft registration will be fully automated, allowing for the registration of small unmanned aircraft without delay. Therefore, a web-based system benefits both applicants and the FAA. The paper-based part 47 process will remain available for those applicants who are unable to avail themselves of the part 48 process.

The web-based registration system itself will be simple, easy to use, and mobile friendly. To complete the registration process, the owner of a small unmanned aircraft will enter the information identified in § 48.100 (identified within the registration system as data fields) and pay a fee through the web-based registration system. A Certificate of Aircraft Registration will be available to print within the registration system or sent to the registrant via email following the initial registration and subsequent renewals. The applicant will have 24 hours to correct registration information after the initial payment without having to pay a second time.

Once registered, owners will be able to access the registration Web site to update the information provided to register the aircraft as well as cancel registration as circumstances require (e.g., aircraft destruction, transfer, sale, change in owner eligibility to register). Aircraft owners may also view and print physical copies of their registration certificate through access to this password-protected web-based portal, but must only pay a fee for the initial

registration and renewals. There is no fee for updating personal information or accessing the registration certificate. For the initial release the user can add an alternate email address which can be used to reset the account password and all functionality of the system could still be utilized if the user lost access to their primary email address. For future releases we will have the ability to change the primary email address on file and revalidate the new one.

Canceling a registration would change the state of the registration in the database to “cancelled” or another state that is not associated with an active registration. Aircraft registration records are permanent records and would not be deleted or destroyed. Please refer to the NARA schedule for additional details.

With respect to Task Force and **Federal Register** comments regarding different technical aspects the database should contain, the agency expects to continuously evaluate the database and the web-based registration process and look for opportunities to further develop the technical functionality of both. The FAA’s goal in utilizing the least burdensome approach is to encourage prompt compliance by removing barriers. As with other aspects of sUAS integration into the NAS, our approach to registration will be incremental. The Administrator may authorize expanded technical capabilities going forward, but the initial goal is to make this process as minimally burdensome as possible to encourage compliance with the registration requirement, and provide the FAA and law enforcement the ability to quickly connect individuals to their aircraft with the least amount of steps possible.

With regard to comments addressing the use of RFI technology or use of small unmanned aircraft beacons to assist with registration and identification, the FAA believes that RFI and other technology could be cost prohibitive, and could add weight to smaller aircraft. The FAA believes that the same goal—identification of small unmanned aircraft and their owners—can be achieved through an online registration process with less expense and less technological investment.

### 3. Information Required

**sUAS Operation and Certification NPRM:** The sUAS Operation and Certification NPRM requested comments on what information should be required for registration. A few commenters provided feedback as to whether small UAS owners should be required to provide additional information during the registration process so that UAS could be

categorized. Amazon, American Farm Bureau Federation and an individual stated that small UAS owners should not be required to provide any additional information beyond what is currently required of manned aircraft. The University of North Dakota’s John D. Odegard School of Aerospace Sciences recommended that FAA adopt a simplified information-gathering process to include the following data: Manufacturer identification (if applicable); known performance and limitations; physical size, weight, and characteristics; and, if self-built, a list of major components similar to that provided by commercial manufacturers. The commenter stated that this minimal information would allow for future safety-related research by establishing base categories from which comparisons could be made. NOAA and Schertz Aerial Services, Inc. suggested that FAA impose similar requirements as those imposed on amateur-built aircraft. According to NOAA, UAS owners should be required, at a minimum, to describe the aircraft by class (UAS), size, color, number of motors/props/wings, serial number, make, and model. Predesa, LLC recommended that digital photos or video recordings of the aircraft, as well as written records of manufacturers’ part numbers of supporting equipment used by the operator, can satisfy the need for additional information to accurately describe a non-standardized small UAS.

**Clarification/Request for Information:** A majority of commenters stated that only basic information should be collected during the registration process because of commenters’ concerns about data security. Several commenters suggested that commercial UAS operators should provide more in-depth information than recreational operators. The vast majority of commenters, including individuals and organizational stakeholders, stated that owner/business name, address, telephone number, email address, and description of the UAS should be collected during the registration process. Some commenters further broke down the UAS’s description to include make, model, manufacturer’s serial number, weight, range, performance capability, flight controller serial number and whether the UAS was purchased or home-built. Many commenters also suggested that registrants should upload a picture of the UAS. Several commenters suggested that date of sale/purchase, point of sale, date of operation, intended use and geographic location of primary use would also be helpful information.

AMA members also stated that their AMA member numbers should be collected.

To provide further information about the aircraft owner, many commenters suggested that the operator's date of birth, driver's license, Social Security Number, and number of aircraft owned should be provided during the registration process. Other commenters specifically objected to providing their Social Security Numbers because of concerns about data security. A few individuals who identified as hobbyists stated that insurance information and professional license numbers should also be collected during registration. A small number of commenters suggested registrants should provide their passport numbers, credit card numbers, nationality, and proof of citizenship.

EPIC stated that the FAA should limit the collection of registrant information to what is necessary to maintain the aircraft registry and UAS safety. In particular, EPIC stated that the FAA should not collect "highly restricted personal information," including "an individual's photograph or image, social security number, medical or disability information."<sup>37</sup>

EPIC also recommended that the FAA require disclosure of each UAS's technical and surveillance capabilities, including data collection and storage. EPIC asserted that UAS are "surveillance platforms" that are able to carry a multitude of different data-collection technologies, including high-definition cameras, geolocation devices, cellular radios and disruption equipment, sensitive microphones, thermal imaging devices, and LIDAR. EPIC further asserted that UAS owners should be required to make clear at registration the specific capabilities of any video or audio surveillance technologies the UAS is carrying. EPIC stated that the public should not be left to wonder what surveillance devices are enabled on a UAS flying above their heads. EPIC further stated that the registration framework the FAA is considering does not go far enough, and should include a requirement that a UAS broadcast its capabilities and its registration number during operation, to allow members of the public and law enforcement officials to easily identify the operator and responsible party.

EPIC also suggested that the FAA consider collecting aggregate data to

assist research into UAS flights and usage. EPIC clarified, however, that such research data should not include personal information.

**Task Force:** To ensure accountability, the Task Force recommended the FAA require all registrants to provide their name and street address, with the option to provide an email address or telephone number. While the Task Force recognized that a registrant's email address and telephone number may be useful for the FAA to disseminate safety-related information to UAS owners, the Task Force nevertheless believed disclosure of such information should be optional.

Because the Task Force recommended the FAA institute an owner-based registration system, it believed registrants should not be required to provide any vehicle information, such as serial number or make and model of the UAS, during the registration process. Registrants should, however, have the option to provide the aircraft's manufacturer serial number, so that the serial number can then be used to satisfy the marking requirement. Additionally, to ensure the broadest possible participation, this registration system should make no distinction for, or impose additional requirements upon, sUAS manufactured or purchased outside the United States.

**IFR Requirement:** For small unmanned aircraft used exclusively as model aircraft, the FAA adopts the Task Force recommendation to provide only basic contact information (name, address, and email address) for the small unmanned aircraft owner. This basic contact information is appropriate for registration of small unmanned aircraft intended to be used exclusively as model aircraft because owners typically only operate one aircraft at a time, which limits the variables in terms of owner identification. Accordingly, the FAA is requiring an applicant's name, physical address, mailing address if the applicant does not receive mail at their physical address, and email address. An accurate mailing address is necessary because the FAA often relies on regular mail via the United States Postal Service to provide notice of administrative actions, serve enforcement documents and provide other information. Although email will reduce the agency's reliance on regular mail for certain purposes such as the provision of educational material, a mailing address is still required to support the agency's compliance and enforcement actions.

At this time, the FAA will not be accepting manufacturer name, model name, and serial number from

individuals registering small unmanned aircraft intended to be used exclusively as model aircraft. However, as discussed in the preamble discussion on registration marking, the Administrator will continue to evaluate whether serial number can serve the purpose of aircraft identification and in the future, may require use of serial number for aircraft marking purposes in place of an FAA-issued registration number. In that case, this information would be acquired at point of sale by a manufacturer.

The agency considered comments pertaining to the use of a membership number issued by an aeromodeling club such as the AMA as the registration number for an individual. After considering the design of the web-based information system, which will automatically assign a registration number to each individual applying for registration, the FAA determined that use of an aeromodeling club registration number would add unnecessary complexity.

For persons expecting to operate small unmanned aircraft as other than model aircraft, in addition to the same basic contact information required for model aircraft, registrants must provide aircraft-specific information. A manufacturer and model name, and serial number must be provided for each aircraft being registered. As previously noted, based on the agency's experience with exemptions issued under section 333 of Public Law 112–95, persons seeking to operate small unmanned aircraft other than as model aircraft are expected to conduct a higher volume of operations, utilize multiple aircraft and at times conduct multiple simultaneous operations across the country, which thereby introduces more risk into the NAS. Moreover, these entities may operate multiple identical small unmanned aircraft at one time in different locations, with different persons operating the owner's aircraft. Accordingly, the FAA has determined that aircraft data is necessary to identify aircraft used as other than model aircraft due to the range of variables with respect to the operations they conduct. The aircraft-specific data will also allow the agency to assess the demand of these small unmanned aircraft on the NAS and whether additional safety-related actions are necessary as the FAA works to integrate sUAS into the NAS.

With respect to the Task Force's recommendation that the provision of an email address should be optional, the FAA generally agrees that personal information that is not necessary for law enforcement and FAA to identify an owner should not be a mandatory entry. However, in this instance, an email

<sup>37</sup> To support its position, EPIC cited to and quoted from 18 U.S.C. 2725(4). Title 18 of the United States Code covers *Crimes and Criminal Procedure*. Section 2725 covers the definitions used in Chapter 123—*Prohibition on Release and Use of Certain Personal Information from State Motor Vehicle Records*.

address is necessary to create an account for a web-based registration system that includes email delivery of the Certificate of Aircraft Registration. Additionally, email allows for targeted delivery of educational other safety-related materials directly to small unmanned aircraft owners. Thus, the FAA has determined that an email address will be required for registration under part 48. However, individual's email addresses would not be released to the general public. For more information regarding the privacy protections afforded to this system and intended use of the data, please review the privacy impact assessment for this rulemaking, as well as the accompanying System of Records Notice (SORN), available for review in Docket No. DOT-OST-2015-0235.

Regarding other suggested information, such as date of birth, Social Security number, driver's license number, or specific information about components or capabilities of small unmanned aircraft being registered, the FAA believes the data identified in new part 48 is sufficient for the purposes of this registry and is the minimum that would be necessary for connecting an individual to their aircraft.

#### 4. Fee for Registration

Currently, the FAA assesses a fee of \$5 for a Certificate of Registration for each aircraft. *See* 14 CFR 47.17(a). The FAA has not updated this fee since it was initially established in 1966. *See* 31 FR 4495 (Mar. 17, 1966).

*sUAS Operation and Certification NPRM:* The sUAS Operation and Certification NPRM did not differentiate the process of registering a small unmanned aircraft from that of a manned aircraft and thus did not directly address fees. Under that proposed rule, an applicant registering a small unmanned aircraft would pay the same \$5 fee as an applicant seeking a Certificate of Registration for a manned aircraft.

Three commenters responded to the issues related to fees for aircraft registration. One individual recommended FAA require all "amateur enthusiasts" to pay a fee to use the NAS. Another individual argued that the fees associated with any licensing, required yearly maintenance, and registry should be kept affordable for the small business operator.

*Clarification/Request for Information:* Commenters also responded to the issue of a registration fee and how the fee should be collected based on questions posed in the Clarification/Request for Information. Of the commenters that supported a registration fee, the majority

stated that the fee should be nominal and suggested between \$1 and \$40. Other commenters suggested fees as high as \$250 for hobbyists and \$1,000 for commercial users. Several commenters stated that the amount of registration fee should be based upon the value of the UAS *e.g.*, a more expensive UAS would necessitate a higher registration fee. The Minnesota Department of Transportation stated that its department charges registration fees commensurate with the base price of the aircraft. This commenter explained that it charges \$100 for registration for UASs valued less than \$500,000. Other commenters proposed that only commercial operators should pay a registration fee. Several AMA members stated that registration should be free for AMA members. Many commenters stressed that the fee should only be used for maintenance of the Web site, education, and enforcement actions.

Many commenters said registration should be free. A number of commenters participating in a form letter campaign stated that a registration fee "would place an unfair burden on those who may barely be able to afford to purchase model aircraft in the first place and may place barriers to continued education and technological advancement."

A large number of commenters were concerned that registration fees for each individual UAS would be unduly burdensome because many hobbyists own several UASs and the cumulative cost of registration would be prohibitively expensive. As an alternative, many commenters suggested that the FAA should charge one registration fee per operator and allow the operator to register multiple UASs.

The vast majority of commenters objected to the imposition of any registration fee. Many commenters expressed concern that imposition of a fee would only serve to increase the size of the Federal Government and not contribute in any way to the safe operation of UASs. Commenters stated that a fee will deter registration and place an unnecessary financial burden on hobbyists. Several commenters suggested that instead of charging a registration fee, the FAA should collect fines from operators who fail to register.

The majority of commenters suggested that if registration occurs at point of sale, the cost of registration should be collected in the same manner as a sales tax. Other commenters suggested that registration fees should be collected by the retailer or built in to the purchase price. Retail Industry Leaders Association and National Retail

Federation expressed opposition to point of sale registration and collection of registration fees by retailers. They cited concern about collecting personal information from customers in a checkout line and the complexity of refunding the registration fee if the UAS is returned by the customer. Commenters also expressed concerns that foreign vendors would not comply with registration requirements and consumers would be adversely impacted.

Many commenters commented generally on the collection of a registration fee and expressed that UAS operators should be able to pay the registration fee online. Commenters specifically identified support for online payments via PayPal, Amazon payments, and Bitcoin. Commenters also stated that mailing in checks or money orders should also be supported.

Skyward, Inc. and individual commenters said the system must have safeguards against false registrations, unauthorized ownership transfers, and other malicious activity.

*Task Force:* The Task Force believed the FAA should not impose a registration fee so as to encourage the highest level of compliance with the registration requirement. In the event that the FAA must charge a fee, the Task Force suggested a fee of 1/10th of one cent (\$0.001).

*IFR Requirement and Responses to Comments/Recommendations:* Although 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. 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. Accordingly, the revenue stream generated by the fees collected under this IFR support the development, maintenance and operation of the Registry. The agency notes that section 45305 also directs the FAA to adjust these fees when the Administrator determines that the cost of the service has changed.

Given that the registration process established under part 48 differentiates between registration of small unmanned aircraft used exclusively as model aircraft and registration of small unmanned aircraft used as other than model aircraft, registration fees also differ between the two populations.

An individual owner registering small unmanned aircraft operated exclusively as model aircraft must pay a single fee of \$5 for the issuance of a Certificate of

Aircraft Registration and registration number and an additional \$5 fee every three years for renewal of the registration. As previously noted, for owners of small unmanned aircraft used exclusively as model aircraft, this registration constitutes registration for all small unmanned aircraft of a single owner, provided those aircraft are all used exclusively as model aircraft. Thus, for this population, part 48 provides cost reduction as compared to part 47, which requires aircraft owners to submit a separate application and \$5 fee for each aircraft the owner would like to register.

The FAA will require persons owning small unmanned aircraft used as other than model aircraft (e.g., for a commercial purpose) to pay a fee of \$5 to register each aircraft in accordance with part 48, and a \$5 fee every three years for renewal of each aircraft registration. The fees for small unmanned aircraft registration and renewal for this population is the same as that currently required by part 47.

This fee structure is in line with the recommendations from commenters who believed that the FAA should charge one fee for individuals who own small unmanned aircraft for hobby or recreational purposes. As sought by commenters, the registration requirement and fee structure for small unmanned aircraft used exclusively as model aircraft alleviates the need for these owners to complete frequent, multiple registration applications and submit a new fee each time they build or rebuild an aircraft or change out parts.

The fee for small unmanned aircraft registration must be submitted through the web-based registration application process. The registration system will permit the use of any credit, debit, gift or prepaid card using the Visa, MasterCard, American Express, JCB, Discover, or Diners Club network. If none of these methods of payment are available to the small unmanned aircraft owner, that owner may register the aircraft using the existing paper-based system under 14 CFR part 47, which allows payment by check or money order. Credit card payment is one of the attributes of the part 48 registration process that streamlines the registration process. Consistent with the requirements of 49 U.S.C. 45305, the fees are based on the estimated costs to develop and maintain the registry under 14 CFR part 48. The FAA will adjust these fees based on the actual costs of the system.

Regarding the Minnesota Department of Transportation's recommendation for a fee structure based on the value of the

small unmanned aircraft, FAA's statutory authority for charging a fee for the registration of a small unmanned aircraft relates to the amount it costs for the FAA to maintain the registry, and not the value of an unmanned aircraft.

In response to comments stating that, in place of the registration fee, the FAA should collect fines for failure to comply with registration requirements, the FAA clarifies that such a fine would constitute a civil penalty. Civil penalties for failure to register are discussed in the Enforcement section of this preamble. In addition to civil penalties, however, the law requires the FAA to collect a fee for registration of aircraft. 49 U.S.C. 45305. Congress requires this fee assessment in order for the agency to offset the cost of registration. The agency does not have authority to use civil penalties to offset its costs.

#### 5. Transfer of Ownership

*Clarification/Request for Information:* Commenters to the Clarification/Request for Information responded to the FAA's request for input on transfer of small unmanned aircraft.

The Aerospace Industries Association stated that transfer of ownership would require that the new end-user registers his or her identification and the platform registration. This would allow a re-check of intended use, changes/modifications to the platform, and the indication that the new user is aware of the rules of use. Delair-Tech stated that the seller should surrender ownership by deactivating the ground control software; the new owner would then register to reactivate it.

A law firm stated that the existing FAA Aircraft Bill of Sale and Aircraft Registration Application would be equally applicable to UAS. The firm also said that the current regulatory framework contains an aircraft registration renewal requirement that would be beneficial for updating records regarding ownership of UAS. The firm went on to say that the regulatory obligation to collect and submit the registration information should be placed on the seller who would have an incentive to properly transfer the registration, or otherwise risk facing certain penalties or fines related to the illegal operation of the UAS by a future owner.

Individual commenters stated that if the registration database is available online, the seller could easily record transfers of registration. A few commenters stated that the FAA should impose a fee for transfers. Individuals differed on whether the seller or buyer should be responsible for registering the transfer. A few commenters stated that

the seller could remove the identification markings before sale. One suggested that the seller remove the beacon before sale. Another stated that the only registration should be the name and contact information placed on the UAS.

Modovolate Aviation stated that recording transfers would be burdensome and unenforceable. An individual stated that UASs are often altered after purchase so that transferring a registration for the original UAS may not accurately reflect the UAS that is being resold. The commenter also stated that there is no way for the seller to ensure that the buyer will register.

*Task Force:* Because the Task Force recommended an owner-based registration system, it believed that questions concerning how to deal with transfers of ownership are easily addressed by the registrants' marking methods.

*IFR Requirement:* The registration requirements in part 48 do not differentiate between methods of aircraft transfer. The registration requirements are the same whether a person or other entity acquires an aircraft by gift, purchase or other method.

The FAA agrees in part with the commenters who state that the seller should register or take other action upon a transfer and in part with the commenters who state that the buyer must register. Different actions will be necessary upon transfer or sale of a small unmanned aircraft, because the registration system differentiates between aircraft used exclusively as model aircraft and aircraft used other than as model aircraft and thus collects different information for each population.

As discussed elsewhere in the preamble, individual owners of small unmanned aircraft used exclusively as model aircraft are not required to submit aircraft-specific information. Thus, there is no need to update the registration system upon a transfer or sale. The owner, however, should remove his or her unique identifier from the aircraft before transfer or sale. The buyer or recipient of a transfer must create a new registration prior to operation only if that buyer does not already have an owner registration number. A buyer or recipient of a transfer of a small unmanned aircraft who wishes to use the aircraft as other than a model aircraft must register that aircraft and obtain a registration number specific to that aircraft. The only time a fee would be required is if the buyer or recipient must create a new registration.

Part 48 requires owners of small unmanned aircraft used other than as model aircraft to update the registration system upon transfer of ownership, destruction or export of a registered small unmanned aircraft. Thus, once a transfer of ownership has taken place, the aircraft owner must access their profile on the registration system and update the aircraft information to indicate that the aircraft has been transferred. By indicating that the aircraft has been transferred, the registration of that aircraft will be cancelled in its entirety.

Any new owner, who acquires a small unmanned aircraft by any means, and intends to use the aircraft other than as a model aircraft must register that aircraft prior to operation and mark the device with the appropriate information as discussed in the preamble discussion entitled, "Marking." Consistent with the comment on the payment of a fee for a transfer, a new owner intending to use a small unmanned aircraft other than as a model aircraft must register the aircraft and thus pay the same registration fee as any other person who acquires such a device and wishes to operate it in the NAS.

In response to commenters' concerns about the identification of a transferred aircraft, owners may determine the best approach for ensuring that once they transfer an aircraft, that they are no longer identified as the owner. One commenter noted that the seller may want to remove the registration information from the aircraft. The agency supports this as a best practice but it is not required.

The agency considered comments suggesting other methods to approach the registration of transferred small unmanned aircraft (e.g., deactivation of ground control software), but has determined that this approach will ensure complete and current registration information for each aircraft in the least burdensome manner.

#### G. Certificate of Aircraft Registration

*sUAS Operation and Certification NPRM:* The agency received comment on issues pertaining to certificates of registration from commenters to the sUAS Operation and Certification NPRM. In the sUAS Operation and Certification NPRM, the agency proposed to extend the part 47 registration process to sUAS but did not propose any changes to the delivery, content, or duration of registration. In the NPRM preamble, however, the agency specifically addressed its intent to retain the existing requirement for registration renewal every three years for small unmanned aircraft registration

because it would increase the likelihood that the FAA's registration database contains the latest information on small unmanned aircraft and aircraft owners.

An individual recommended that aircraft registration for small UAS expire after a period of 12 to 24 months, reasoning that an annual or bi-annual renewal of registration will ensure the registration system does not become bogged down with UAS's that are no longer in operation. Furthermore, the commenter argued that the renewal process would give FAA a secondary means of verifying that operators are current and/or maintaining their licensing requirements to operate. The Kansas Farm Bureau suggested lengthening the time before a registration would expire to 6 years to assist in managing program costs from both the FAA and the small UAS operator standpoint. The News Media Coalition encouraged FAA to consider requiring re-registration only upon the sale of a UAS.

Another individual commenter suggested that UAS operators be required to store their "official registration document" on the card reader contained in the UAS's camera. That commenter also recommended that the "official registration document" contain the registrant's name, registration number, date of registration, and type of operator license (i.e., commercial or hobby).

*Clarification/Request for Information:* Commenters to the Clarification/Request for Information also provided comments related to the Certificate of Aircraft Registration. One individual commenter recommended that UAS operators should be issued a registration card that contains basic safety information and UAS rules and regulations. Another individual suggested that UAS operators be required to store their "official registration document" on the card reader contained in the UAS's camera. This commenter also recommended that the "official registration document" contain the registrant's name, registration number, date of registration, and type of operator license (i.e., commercial or hobby).

*Task Force:* The Task Force developed and recommended methods for proving registration and marking of small unmanned aircraft. In doing so, it addressed the issue of how Certificates of Aircraft Registration would be issued. The Task Force recommended that the FAA issue a certificate of registration to each registrant at the time of registration and that the certificate should be issued electronically (perhaps in PDF form), unless the registrant specifically requests a paper copy.

The Task Force also provided recommendations regarding the content of the certificate. The certificate should contain the registrant's name, the registrant's FAA-issued registration number, and the address of the FAA registration Web site that is accessible by law enforcement or other authorities for the purposes of confirming registration status. For registrants who elect to provide the serial number(s) of their aircraft, the certificate should also contain those serial number(s). The Task Force encouraged the FAA to include safety and regulatory information with the certificate of registration. Any time a registered sUAS is in operation, the operator of that sUAS should be prepared to produce a legible copy of the certificate of registration for inspection, in either electronic or printed form.

*IFR Requirement:* The agency agrees with Task Force recommendations and comments recommending delivery and availability of the Certificate of Aircraft Registration. Since the part 48 registration process is exclusively web-based, the FAA can immediately issue an electronic Certificate of Aircraft Registration, an efficiency not available under part 47.

Recognizing the prevalence of handheld electronic devices, once the registrant completes the part 48 registration process, the Certificate will be available for download. Owners may also print a hard copy of the Certificate if they wish. The applicant will also receive a copy of the Certificate via email, with accompanying educational information. Although some commenters addressed certificate storage options, the final rule does not restrict how the Certificate is stored as long as the certificate is readily available to the owner or operator, as applicable. See §§ 91.9(b) and 91.203(a)(2); see also Legal Interpretation from Mark W. Bury to John Duncan, August 8, 2014. Persons operating a small unmanned aircraft are required under 49 U.S.C. 44103(d) to present the certificate of registration when requested by a United States Government, State, or local law enforcement officer.

The Certificate of Aircraft Registration will include information that will allow the FAA and law enforcement agencies to identify the owner of each small unmanned aircraft registered under part 48. As a result, although the FAA received comments suggesting varying information that should appear on the Certificate, the FAA has determined that the Certificate will include the small unmanned aircraft owner name and FAA-issued registration number. At this

time, these two pieces of information suffice to identify the small unmanned aircraft and its owner. The agency does not agree with the comment suggesting that the Certificate include information pertaining to the “type of operator license” because this information is not relevant to the identification of the aircraft’s owner and notes that at the time of this rulemaking, there is no “license” required for sUAS operations. Additionally, the FAA emphasizes that the Certificate does not imply authorization to operate.

Certificates of Aircraft Registration issued to owners who are using their small unmanned aircraft exclusively as model aircraft constitute valid registration for all of the small unmanned aircraft owned by the individual specified on the application, regardless of how many small unmanned aircraft the owner owns, though all being operated are required to be marked with the registration number. Certificates of Aircraft Registration issued to owners who are not using their aircraft exclusively as model aircraft constitute valid registration only for the specific aircraft identified on the Certificate of Aircraft Registration.

A Certificate of Aircraft Registration issued in accordance with part 48 will be effective once the registration process is complete and must be renewed every three years to provide for regular validation of aircraft registration and owner contact information. To facilitate the identification of a valid Certificate of Aircraft Registration, each Certificate will contain the issue date.

The agency agrees with comments suggesting that aircraft registrations should be renewed but does not agree with the purpose of the renewal and the time frame for renewal provided by commenters. The registration process does not collect information on airman qualifications so it may not be used to validate any related requirements. A Certificate of Aircraft Registration issued to a person using their small unmanned aircraft as a model aircraft must simply be renewed by the owner every three years, regardless of when aircraft are added to the owner’s registration. Certificates of Aircraft Registration issued for aircraft used for other than model aircraft purposes must be renewed for the specific aircraft designated on the Certificate every three years.

Further, the agency has determined that three years is the appropriate duration of a certificate. This period of time is consistent with the aircraft registration renewal requirement in part 47. It also balances the cost concerns

raised by the Kansas Farm Bureau with the individual’s comments suggesting renewal on 12–24 month intervals.

The renewal process consists of a simple verification of existing registration information. The renewal must be completed through the web-based registration system at any time within 6 months prior to the expiration date. The system will send out a reminder at 6 months prior to certification expiration. Once completed, the Certificate will be extended for three years from the expiration date. The agency expects renewal to be efficient, particularly if the aircraft owner has ensured that the information provided to the Registry in accordance with the final rule registration process remains current during the term of the registration. If the information provided to register the aircraft changes during the period of registration, the aircraft owner must update the Registry through the web-based registration system within 14 days of the change. No fee is charged for updating information during the period of registration.

The agency agrees with the intent of the recommendation from the Task Force and the commenter to the Clarification/Request for Information regarding owner and operator education. One of the purposes of small unmanned aircraft registration is to educate sUAS owners regarding safe operations within the NAS as well as other safety information relevant to UAS operations and equipment. As discussed later in this preamble, the agency expects to accomplish its sUAS education goals by providing information to the aircraft owner during the registration process and through follow-up email communication.

Although the News Media Coalition suggested reregistration only upon a sale, there are other circumstances that would result in a need to re-register an aircraft (e.g., expiration of registration due to failure to renew) and have been captured in the final rule.

#### H. Registration Marking

The purpose of aircraft registration marking is to provide a means for connecting an aircraft to its owner. The agency received comments on the information that should be used to identify that the aircraft is registered as well as the methods by which to display the identifying information.

*sUAS Operation and Certification NPRM:* The sUAS Operation and Certification NPRM proposed a requirement for small unmanned aircraft to be marked in accordance with part 45, subpart C. Subpart C provides

requirements for size, spacing, and location of nationality and registration marks.

Many commenters, including the Small UAV Coalition, Aircraft Owners and Pilots Association, California Agricultural Aircraft Association, Aerospace Industries Association, Modovolate Aviation, LLC, Professional Photographers of America, Airlines for America, National Association of Mutual Insurance Companies, National Association of Realtors, DJI, and Google, generally supported the marking requirement as proposed in the NPRM.

*Information that may be used for aircraft identification:* Other commenters suggested alternatives to the marking requirement proposed in the NPRM. Commenters including the Association of Unmanned Vehicle Systems International, Associated General Contractors of America, the University of North Carolina System, Property Drone Consortium and Cherokee Nation Technologies suggested the FAA require registration based only on the manufacturer’s serial numbers, instead of requiring an “N” registration number. Several individuals proposed the use of cell phone numbers in lieu of, or to augment, the registration number. The Virginia Department of Aviation supported the use of a bar code system, while Schertz Aerial Services, Inc., favored a parts-tracking requirement to facilitate a more efficient and accurate assessment of responsibility in the event of an accident. An individual commenter recommended a labeling requirement for all UAS, similar to the labeling the FCC requires for all transmitters that can be purchased at electronic outlets. Another individual commenter said that instead of requiring small unmanned aircraft to be registered with “N” numbers, the aircraft should be identified with an exterior label with the owner/operator’s name, address, and phone number, as well as an operator certificate number where appropriate. Several other individual commenters suggested that affixing operator name and phone number to a small unmanned aircraft is a more efficient way to identify the aircraft in the event of an incident.

The New Jersey Institute of Technology and the Kansas State University UAS Program recommended the FAA add a unique designator to the “N” registration number (e.g., “NX”) to clearly identify the aircraft as a UAS. ASTM pointed out that it is in the process of developing consensus practice standards for the registration and marking of unmanned aircraft systems, which an individual

commenter recommended the FAA follow.

*Methods to display aircraft identification:* Another individual commenter said the marking requirement should be consistent with recent certificates of waiver or authorization provided to persons issued exemptions under section 333 of the FAA Modernization and Reform Act, which allow for “appropriate” sized markings, or as large as practicable for the particular aircraft. Other commenters, including a joint submission from the State of Nevada, the Nevada Institute for Autonomous Systems and the Nevada FAA-designated UAS Test Site, similarly said small unmanned aircraft should be required to display registration numbers in the largest size that is appropriate. An individual commenter questioned whether the markings should be on the underside of the small unmanned aircraft to increase visibility from the ground. The University of North Dakota’s John D. Odegard School of Aerospace Sciences urged the FAA to require small UAS manufacturers to provide at least one additional manner of identifying a device other than the registration number. The commenter suggested a VIN-type system or simply etching the manufacturer’s serial number on a substantial component of the small UAS.

Several commenters proposed various electronic means to aid in small unmanned aircraft identification. Washington State Department of Transportation, Aviation Division and Drone Labs proposed having the registration numbers transmitted as part of the transponder signal or other means. The Center for Democracy and Technology advocated for an unmanned aircraft to emit a signal, such as a radio signal, to aid in identification. SkyView Strategies, Inc., recommended a microchip on each unmanned aircraft programmed with the registration number so that a device, such as a smart phone app, could read the microchip and display the aircraft’s registration number. SkyView recognized this requirement could not go into effect until it is technologically feasible.

Several commenters opposed the requirement that small unmanned aircraft display their registration numbers because it would be impractical due to the small size of the aircraft. Some of those commenters, including the Association for Unmanned Vehicle Systems International, noted that many small unmanned aircraft have limited surface area available and often have no adequate fuselage for placement of

registration markings. Those commenters said the FAA should develop alternative means of displaying a registration number more conducive to small unmanned aircraft. An individual commenter pointed out that for small unmanned aircraft with no “hull” or fuselage, the only place available for markings is on the booms, which are not permanently attached to the hub plate. Thus, the commenter noted, the marking would not be permanent, but, rather, on an “easily removed and easily replaced” component. Associated General Contractors of America said the requirement “would serve little or no useful purpose” because even when displayed in the “largest practicable manner” such numbers would be invisible from anything more than a few feet away.

Kansas State University UAS Program said the final rule should describe acceptable means for locating registration markings for nontraditional aircraft (or reference an industry consensus standard that does so) that cannot meet current subpart C in part 45 requirements. Prioria Robotics, Inc. also expressed concern about the applicability of the markings requirement to certain small unmanned aircraft airframes, and questioned whether, if a vehicle undergoes repair and a fuselage is changed, the operator will need to re-register the aircraft.

Several commenters recommended the sUAS operator make the aircraft’s registration number visible to others on the ground. Trimble Navigation Limited and Federal Airways & Airspace favored having the sUAS operator display an ID badge with the registration number of the aircraft on their person. Trimble Navigation clarified that a badge display would be helpful if the FAA intends to use registration of an aircraft to identify the operator, but that visual or electronic identification of the aircraft is appropriate if the intent is to assist in the investigation of accidents. Federal Airways & Airspace clarified that this may be useful for very small unmanned aircraft but may not be necessary if the unmanned aircraft is large enough to display markings to the standard size. Predesa, LLC stated that the sUAS operator should be required to post aircraft registration information in their vicinity on the ground.

Regarding whether the rule should require small unmanned aircraft to have a fireproof identification plate, as required by part 45 subpart B, the Small UAV Coalition, Aviation Management Associates, Predessa, LLC, and the University of North Dakota’s John D. Odegard School of Aerospace Sciences agreed with the FAA that a requirement

for small UAS manufacturers to install a fireproof identification plate would not be cost-effective. The National Business Aviation Association, DJI, Modovolate Aviation, LLC, and several individual commenters also agreed that fireproof plating should not be required.

Crew Systems, on the other hand, said small unmanned aircraft should have a data plate installed, as required by 14 CFR 45.11. Aerospace Industries Association also said UAS manufacturers should install fireproof identification information on every unmanned aircraft, “[p]erhaps through an electronic device (*i.e.*, imbedded chip) or other easy-to-read and damage-resistant means of identification.”

Other commenters addressed the need for “indestructible” identification plates, although they did not comment specifically on whether small UAS manufacturers should be required to attach fireproof identification plates in compliance with subpart B of part 45. The Air Line Pilots Association said a fire proof plate should be attached to the small UAS “as a permanent identification of the registration of the sUAS.” The Civil Aviation Authority of the Czech Republic said a fireproof identification plate should be required and enforced according to ICAO Annex 7, which requires the nationality, registration mark, and operator name and phone number. The National Agricultural Aviation Association, Colorado Agricultural Aviation Association, and CropLife America said small UAS should have a registered N-number on “an indestructible and unmovable plate” attached to the UAS for identification in case of an accident or incident. Reabe Spraying, Inc. said each UAS should have an “indestructible and non-removable data tag with a unique ID code.” Texas A&M University Corpus Christi/LSUASC said that if the registration number is not easily displayed on the aircraft, then an “identifying tag” should be permanently attached to the small UAS. The Aircraft Owners and Pilots Association said the FAA should implement “additional requirements” to ensure that a UAS can be identified in the event of an accident, incident, or violation, but the commenter did not specify what those additional requirements should be.

The Motion Picture Association of America, Inc., the National Association of Broadcasters, National Cable & Telecommunications Association, and Radio Television digital News Association, and the International Association of Amusement Parks and Attractions favored not having registration marks on small unmanned

aircraft that will be seen in theatrical and television productions.

*Clarification/Request for Information:* In addition to the comments on identification and marking provided in response to the sUAS Operation and Certification NPRM, the agency also received comments on aircraft identification and marking in response to the clarification/Request for Information. The Clarification/Request for Information sought specific information pertaining to aircraft identification and marking. Specifically, the document asked for information regarding methods currently available for identifying unmanned aircraft, whether every unmanned aircraft sold has an individual serial number, and methods to identify unmanned aircraft sold without serial numbers or those built from kits.

*Information that may be used for aircraft identification:* Commenters said that no standard method of aircraft identification exists for UAS and they recommended ways to identify UAS for registration purposes. Chronicle, Inc., wrote that it explored several options for including unique identifiers in consumer products, including serial number, radio frequency identification (RFID), near field communication (NFC), Bluetooth low energy (BLE), QR code, and DNA marker. This commenter determined that serial number or encrypted (PKI) microchips are the best options currently available and recommended the agency initially require the use of serial numbers for registration and then over a two year period, require PKI microchips to be included in all UAS. Aerospace Industries Association said various methods to identify platforms exist, but recommended that FAA seek to collect as much information as possible. According to this commenter, high value commercial platforms have a serial number to manage warranty claims while other commercial platforms, at a minimum, have a stock keeping unit (SKU) that can be used to identify the product model number. Morphism, LLC recommended using identifiers that encode information regarding the type of airframe, operating limitations and operators' contact information. Researchers at the University of California, Berkeley said UAS should receive and display an identification code to enable people and other aircraft to identify them. These researchers developed an identification system based on LEDs and unique color sequences. NetMoby, Inc. recommended that FAA adopt the Federal Communications Commission's

registration process and tailor it to meet FAA's needs.

Several commenters noted that many UAS are assembled by consumers using parts from a range of sources, which presents a challenge for identifying individual products. Additionally, UAS components are frequently modified, replaced or upgraded. Some commenters recommended that the registration system require use of either a serial number for UAS that have serial numbers, or an FAA-generated identification number that can be applied to the UAS for those without serial numbers. Other commenters recommended that FAA issue a single registration number to the UAS operator rather than to each aircraft because hobbyists often have dozens of aircraft and it would be too burdensome to register every aircraft they buy or build. Several AMA members suggested the agency allow AMA members to place their names and addresses or AMA numbers on their aircraft as an alternative means of complying with the registration requirement.

Another individual suggested identifying consumer grade UAS by serial number and hobby built UAS by radio transmitter and receiver. A number of commenters participating in a form letter campaign stated that "there is fundamentally no way to define any major component on a model aircraft that could reasonably be registered."

Commenters addressing whether each unmanned aircraft sold has a unique serial number generally stated that every unmanned aircraft sold does not have individual serial numbers, though some UAS do. The University of Illinois at Urbana-Champaign said serial numbers are not required on UAS and they are not required to be distinct across manufacturers, so the agency could not rely on them for identifying UAS. Modovolate Aviation, LLC said most UAS have serial numbers and asserted it would impose a relatively small burden on manufacturers to imprint a serial number as part of the manufacturing process. A law firm suggested the agency require manufacturers assign a serial number to all UAS operated in the United States. This commenter also said that products manufactured before this requirement and other UAS without serial numbers could be assigned a registration number by FAA and the number would be affixed to the UAS. Delair-Tech suggested if no serial number is available for the UAS, the serial number of the autopilot module should be used. The Retail Industry Leaders Association said most UAS models on the market today do not contain product-specific

unique identification numbers that consumers can use when registering UAS. This commenter noted manufacturers will need time to implement process changes to incorporate identification numbers and urged the agency to take the time to work with manufacturers with respect to this requirement. The commenter cautioned that if FAA adopts the registration requirement without waiting for manufacturers to make the necessary process changes, the only information consumers will be able to provide during registration is the model or inventory number of the UAS, which will not be helpful to identify a UAS owner involved in an incident.

Commenters suggested various methods for identifying UAS sold without serial numbers or those built with kits. The Wireless Registry suggested including a UAS' wireless signal identifier as part of the information collected as part of the registration process. The commenter explained the UAS' MAC address, a wireless identifier that cannot be altered, tied to a specific device would enable FAA to match the UAS to other information in the registry, including operator information. An individual stated the FCC already requires that all model aircraft operate on a very narrow frequency band and UAS manufacturers adhere to those rules. This commenter suggested FAA and FCC work together to establish a method of encoding each radio system with an identifier that would enable the FAA to monitor airspace in which UAS are not allowed. The Air Medical Operators Association said any UAS with the potential to conflict with a manned aircraft in flight must possess a unique identification that can allow for registration. This commenter also recommended that product packaging should clearly inform the consumer of his or her responsibilities as operator. Other commenters suggested the following methods for identifying UAS sold without serial numbers or those built from kits:

Digital photo.

Detailed description of aircraft (e.g., black quadcopter, white hexcopter).  
QR code with 8-digit unique alphanumeric identifier that can be affixed to aircraft.

RFID tags or transponders.

FAA-issued registration number.

Name and address or AMA number affixed to the inside or outside of the airframe.

*Methods to display aircraft identification:* Several people commented on how operators should

display markings of their registration number on the UAS. Commenters' recommendations included: registration numbers should be prominently displayed on the exterior of the unmanned aircraft and be sized based on the largest single dimension of the unmanned aircraft; the markings should be visible from the ground; registration numbers should be displayed using a placard of some sort, or bar code, placed on the aircraft; and registration markings should be replaceable because UAS operators change parts on a regular basis. A number of commenters suggested using a sticker similar to automobile registration tags, which would provide visual confirmation of compliance and allow for consistency of data. Other commenters expressed concern about required markings adding weight to their unmanned aircraft or ruining the appearance of their scale models of real aircraft.

One commenter recommended a registration system in which individuals can request from the FAA a reasonable number of stickers that are pre-printed with successive serial numbers, and the FAA will then record to whom those stickers were sent in a publicly accessible database. The individuals can then apply those serial-numbered stickers to any model aircraft they own. The commenter contemplated that the stickers will self-destruct if the owner attempts to remove them to reuse them on a different aircraft. The commenter also suggested that if an aircraft is destroyed or sold, the original owner can log onto the FAA database to update the information associated with that aircraft's serial number.

Several other commenters noted that a marking system is problematic because many aircraft do not have a large enough area on which to place an identifier that would be visible from a distance. Some of these commenters stated the only reason for a unmanned aircraft to carry a registration number is to identify the owner after a crash. These commenters asserted that it would make more sense to require UAS operators to affix a label with their contact information inside their aircraft than to develop and implement a registration system. Noting markings will not be visible on most unmanned aircraft during flight, Delair-Tech recommended using a position reporting mechanism to enable authorities to access information on in-flight devices. This commenter said following an accident, a marking of the manufacturer name, serial number and type designator, designed to withstand a certain degree of damage, would enable

authorities to find the UAS owner through the registration system.

*Comments on the use of the N-numbering system to register UAS:* A few commenters recommended that the registration system for UAS be separate from the current N-numbering system used for manned aircraft. To ensure that the FAA does not run out of N-numbers, one individual suggested moving to a 6- or 7-digit number for UAS, while another individual suggested the FAA open up the first 3 spaces to allow the use of letters, which the commenter asserted will increase the availability of the numbers by 44,279,424 spaces. Another individual said the registration number should be "sufficiently long/random" to prevent people from creating registration numbers without actually registering.

One individual commenter suggested that the registration numbering system delineate between commercial users (for which the N-numbering system could be used) and private users. Another individual said the N-number given to small UAS intended for commercial use should be followed by a "-C" designation to clearly show that this aircraft is going to be used commercially. Several other individuals recommended the FAA use alternate prefixes for the registration number (e.g., "U," "UX," "UAS," "UAV," "NQ," or "M" for model aircraft).

The Property Drone Consortium pointed out that an N-number on a UAS will not be visible to observers while the UAS is in flight, and will therefore only be used to identify the owner of a UAS that has been involved in an incident and recovered. This commenter also questioned whether it will be sufficient to self-register based on a serial number, requiring an FAA assigned N-number only when a serial number is not available or easily accessible. An individual commenter said the manufacturer serial number should be sufficient for identification purposes, instead of a separate N-number. Another individual also supported the use of a manufacturer serial number, but said an "N" should still be placed in front of the serial number to show that it is registered.

One individual commenter stated that because some UAS are too small to effectively display an N-number, an electronic version of an N-number should be used. This commenter asserted that the electronic serial number (ESN) can be encoded into the receiver/transmitter used to control the UAS, and then broadcast whenever the transmitter commands the aircraft. The commenter suggested that authorities could then identify the UAS in

question, and that that interception would be legal as the ESN is broadcast over the 2.4 GHz publicly shared frequencies.

One individual commenter recommended a separate category of N-numbers for historic airplanes, similar to what has been done for full-scale historic cars and aircraft.

A few individual commenters supported the use of the current N-numbering system for UAS, with one commenter asserting that it is already working well for commercial UAS operations.

*Task Force:* The FAA asked the Task Force to develop and recommend methods for proving registration and marking. Factors to consider included, but were not limited to, how a small unmanned aircraft will be able to be identified with the registered owner (i.e., a marking requirement).

*Information that may be used for aircraft identification:* Because the main goal of registration is to create a connection between the aircraft and its owner, the Task Force recognized that it is necessary to mark each registered small unmanned aircraft with a unique identifier that is readily traceable back to its owner. The Task Force recommended two options for complying with this marking requirement. Specifically, registrants can either affix a single FAA-issued registration number to all the aircraft they own or they can rely on a manufacturer's serial number that is already permanently affixed to the aircraft. A small unmanned aircraft owner may only rely on the manufacturer's serial number, however, if the owner provided that serial number to the FAA during registration and if it appears on the owner's certificate of registration.

*Methods to display aircraft identification:* The Task Force further recommended a requirement that the owner and operator ensure that all markings are readily accessible and maintained in a condition that is readable and legible upon close visual inspection prior to any operation. The Task Force believed that markings enclosed in a compartment, such as a battery compartment, should be considered "readily accessible" if they can be easily accessed without the use of tools.

*IFR Requirement:* Information that may be used to identify an aircraft. The IFR requires all small unmanned aircraft to display a unique identifier. As discussed throughout this preamble, individuals registering aircraft that will be used exclusively as model aircraft will receive a Certificate of Registration

with a single registration number that constitutes registration of all of the individual's small unmanned aircraft. This number must be displayed on each small unmanned aircraft owned by this individual and used exclusively as model aircraft as proof of registration and to connect the small unmanned aircraft with an owner.

Each aircraft used as other than a model aircraft will receive a Certificate of Aircraft Registration with a unique registration number that must be displayed on the aircraft.

The FAA received a variety of recommendations pertaining to the information that should be affixed to the small unmanned aircraft for purposes of identification (e.g., phone numbers, bar codes, QR codes, operator contact information and AMA number). In some cases, commenters recommended information in addition to a registration number. The agency considered these recommendations but determined that once an aircraft is registered, the registration number provides sufficient information to locate the aircraft's owner in the FAA's registration database. Therefore, requiring the owner to display additional contact information on the aircraft would create an unnecessary burden.

Regarding the comment seeking to display an AMA number in particular, the Civil Aircraft Registry and the registration system implemented in this IFR are premised on the ability to uniquely identify an owner and their aircraft. The FAA does not govern the membership structures of section 336 organizations and cannot be assured of the uniqueness of those organizations' identification systems. Therefore, the FAA has no assurance that such a member number will provide the requisite unique identifier. Thus, the FAA will maintain an FAA-issued registration number for the marking scheme for small unmanned aircraft used as model aircraft.

With regard to ASTM consensus and marking standards, the FAA notes that, as of this writing, those standards are still in development, and thus, they cannot be used for this rulemaking.

Finally, a number of commenters assumed that an FAA registration number would include the "N" prefix that is used for identification of U.S. registered aircraft. The agency clarifies that the registration numbers issued to small unmanned aircraft under the IFR are not intended to be used for nationality identification and thus will not include the "N" prefix because the part 48 registration process is available only to small unmanned aircraft operating within the United States.

*Methods to display aircraft identification:* To ensure that the small unmanned aircraft can be identified, the FAA will require that the unique identifier must be maintained in a condition that is legible. The unique identifier must be affixed to the small unmanned aircraft by any means necessary to ensure that it will remain affixed to the aircraft during routine handling and all operating conditions.

For small unmanned aircraft registered under this part, the FAA does not specify a particular surface upon which the unique identifier must be placed. Rather, recognizing commenters' concern about the small size of many of the small unmanned aircraft that must be registered, the FAA simply requires that the unique identifier must be readily accessible and visible upon inspection of the small unmanned aircraft.

In accordance with Task Force recommendations, a unique identifier is deemed readily accessible if it can be accessed without the use of any tools (e.g., battery compartment). This flexibility is expected to resolve the concerns of the television and motion picture industry and preserve the authenticity of a replica if so desired, given that the unique identifier need not be displayed on the exterior of the small unmanned aircraft.

Additionally, the flexibility with respect to the location of the unique identifier will facilitate the use of a small unmanned aircraft serial number as the unique identifier at such time as the Administrator determines that serial numbers can be effectively used to identify aircraft owners within the small unmanned aircraft registration system. The FAA notes that, currently, serial numbers may be repeated since 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 sUAS manufacturers to collectively standardize aircraft serial numbers, such that each small unmanned aircraft will receive a unique serial number in production.

With regard to comments on the visibility of the markings, the FAA cannot require all small unmanned aircraft to display a registration number visible to people on the ground because some small unmanned aircraft may be too small to satisfy this requirement. The agency notes, however, that during operation of the sUAS, a Certificate of Aircraft Registration must be readily available to the person operating the sUAS, so that they may provide it to federal, state, or local law enforcement when requested. *See* 49 U.S.C. 44103(d);

14 CFR 91.9(b) and 91.203(a); *see also* Legal Interpretation from Mark W. Bury to John Duncan, August 8, 2014. The Certificate of Registration can be a legible paper copy (or photocopy), or it may be provided by showing it in a legible electronic form, such as on a smartphone. Thus, while the agency considered comments suggesting additional documentation requirements such as an ID badge or placard on or near the sUAS operator, the FAA has determined that such requirements would not serve a valid purpose.

Additionally, commenters' recommendations pertaining to a requirement to identify a small unmanned aircraft using certain equipment are beyond the scope of this rule. Neither the sUAS Operation and Certification NPRM nor this rule contain minimum equipage requirements for small UAS, such as a transponder. Thus, small unmanned aircraft may not have the equipage necessary to electronically transmit a registration number.

Regarding comments related to the installation of fireproof plates, Executive Order 12,866 prohibits an executive agency from adopting a regulation unless the agency determines "that the benefits of its intended regulation justify its costs."<sup>38</sup> In the sUAS Operation and Certification NPRM, the FAA explained its belief that requiring the installation of identification plates would not be cost-justified. None of the commenters advocating for the use of fireproof identification plating or other forms of fireproof marking submitted data that would allow the FAA to find that adopting this requirement would result in benefits sufficient to justify the costs of this requirement. Additionally, the FAA notes that for some of the smaller and lighter weight unmanned aircraft that operate under this rule, an identification plate would add additional weight, which could result in reduced flight performance and/or endurance. Accordingly, the FAA has decided against including a requirement for a fireproof identification plate in this rule.

#### *I. Education*

*sUAS Operation and Certification NPRM:* Availability of education materials was addressed in the sUAS Operation and Certification NPRM. The National Association of REALTORS, SkyView Strategies, Inc., and others recommended that FAA initiate a campaign to educate the general public on UAS due to the abundance of misinformation currently available. The Air Line Pilots Association urged FAA to take advantage of internet-based

communication of safety material, training resources, databases of airport locations and airspace restrictions, best practices, in-service irregularity reports and the like, because this is possibly the only practical means of reaching the small UAS pilot population.

**Clarification/Request for Information:** Many commenters, including the National Air Transportation Association (NATA) and the National Retail Federation, stated that a public education campaign and the development of guidance materials and handbooks to ensure users know the rules for flying UAS is essential to promote responsible use of UAS. Other commenters said that requiring manufacturers to include a pamphlet with each aircraft that describes these rules would also be effective. Another commenter suggested that online retailers require purchasers to navigate to a page describing UAS safety requirements before completing the purchase. Many commenters, including the Experimental Aircraft Association, lauded FAA's existing Know Before You Fly program and recommended continuing to expand it. Some commenters suggested creating a GPS-enabled app that would identify safe and unsafe areas for flying, while others said FAA should further develop its existing B4UFLy app for all mobile platforms. A commenter said that off-limit areas should be marked or advertised as such. Some commenters said that operators should be required to pass a training course, a practical exam, or obtain an operator certificate before flying a UAS.

**Task Force:** Recognizing how important it is that all users of the NAS receive information on safety in the NAS, the Task Force recommended the registration process contain some sort of education component and acknowledgment, with controls in place such that the registration process would be incomplete until the registrant has acknowledged receipt of this information. The information provided could be similar to the existing content in the *Know Before You Fly* program.

**IFR Requirement:** The FAA establishes regulatory standards to ensure safe operations in the NAS. The FAA's safety system is largely based on, and dependent upon, voluntary compliance with these regulatory standards. An essential element of this strategy is FAA's effort to encourage a safety culture, and, to that end, ensure comprehensive educational material is readily available to every user of the NAS. The FAA agrees with commenters and the Task Force with respect to the

importance of educational information in the registration process.

The small unmanned aircraft registration platform described in this rule will require the registrant to review a summary of sUAS operational guidelines before completing small unmanned aircraft registration. The FAA believes this is an invaluable access point to deliver sUAS operational safety information. The information will also direct registrants to additional sources of safety information generated by the FAA and other stakeholders, such as *faasafety.gov* and *knowbeforeyoufly.org*.

To reach registrants after they complete the registration process, the FAA will develop a process to use the small unmanned aircraft registry information (such as email and mailing address) to offer safety-related information. Delivering post-registration safety information to registrants on a continuing basis will help to remind the registrant of their safety-of-flight obligations and help reduce sUAS risks in the NAS. The FAA will develop, maintain, and deliver easily-accessible safety information directed specifically to sUAS owners and operators. To maximize usage of the information by the recipient, the FAA will carefully meter its delivery of information via these access points to maximize effective consumption.

#### *J. Compliance Philosophy and Enforcement*

**Clarification/Request for Information:** The FAA received several comments about enforcement. Modovolate Aviation, LLC expressed support of FAA's proposed registration requirement of UAS stating it will improve the ability for law enforcement officials "to investigate unsafe and reckless practices and to take enforcement action when appropriate."

The Minnesota Department of Transportation's (MnDOT) Office of Aeronautics, the Arlington Police Department (APD) and several individual commenters raised concerns about enforcing a registration requirement. MnDOT Office of Aeronautics noted one challenge associated with enforcement of the current program is a general lack of awareness of the State's role in regulating UAS and aviation, as well as a lack of awareness among operators, airports, law enforcement and the general public of the aircraft registration requirements and commercial operators licensing requirements. This commenter noted that registration could be used as a vehicle for providing information to the public about program requirements

and the States in regulating UAS and aviation.

APD said it and other local law enforcement agencies across the country do not have the capacity or the authority to enforce FAA's UAS rules and regulations. While APD will assist the FAA as witnesses or reporting entities for UAS rules violations, the commenter said the FAA must retain the responsibility for enforcement.

A number of individual commenters raised general concerns about the enforceability of a registration requirement. Several commenters asserted extending registration requirements to recreational users will be difficult to enforce and will not be worth the expense required to develop and implement the program, including the cost to train local law enforcement officials. Others noted no Federal, State or local law enforcement agency has the budget or work force to enforce a registration requirement for all aircraft, including model aircraft. One commenter compared this registration requirement to the Federal Communications Commission's effort to require Citizen Band radio users to apply for a license to operate, which, according to the commenter, ultimately was too costly to enforce. Other commenters questioned whether the FAA has sufficient manpower to enforce the registration requirement and how enforcement responsibilities will be shared with local law enforcement.

Some individuals provided general comments about penalties for failing to register a UAS. One commenter recommended a one-time allowance for anyone caught violating the registration requirement and a large fine for subsequent violations, while other commenters suggested a large fine for all offenses.

Several commenters addressed the issue of penalties. One commenter remarked that registration will be worthless unless there are negative consequences (*e.g.*, fines or revocation of registration certificate) for operators who fail to register or mark their aircraft. Another commenter suggested that a penalty similar to the penalty for driving an unlicensed car be imposed for operating a UAS without the proper registration.

**Task Force:** The Task Force recommended that the FAA establish a clear and proportionate penalty framework for violations. It cited the FAA's current registration-related penalties and stated they were established in order to deter suspected drug traffickers and tax evaders who failed to register aircraft as part of larger nefarious schemes. The Task Force

recommended a separate FAA policy driving a proportionate response for inadvertent sUAS registration violations, without which operators could find themselves exposed to aggressive enforcement.

**FAA Response:** The FAA Administrator has the authority to prescribe, revise, and enforce standards in accordance with Title 49 of the United States Code, Subtitle VII, Chapter 447, Safety Regulation. This authority is used to protect the public's safety and the agency's enforcement authority is exercised to obtain compliance with applicable aviation safety and security requirements.

Earlier this year, the FAA announced a new compliance philosophy that uses a strategic approach to safety oversight.<sup>39</sup> The FAA believes that its compliance philosophy, supported by an established safety culture, is instrumental in ensuring both compliance with regulations and the identification of hazards and management of risk. If an individual or entity is found to have not registered the aircraft prior to its operation, the FAA's compliance philosophy will be applied appropriately.

To mitigate risks in the NAS and ensure compliance FAA has used and will continue to use outreach and education to encourage compliance with regulatory requirements that pertain to the registration of unmanned aircraft. The FAA may also use administrative action or legal enforcement action to gain compliance. Failure to register an aircraft can result in civil penalties up to \$27,500. Criminal penalties for failure to register can include fines of up to \$250,000 under 18 U.S.C. 3571 and/or imprisonment up to 3 years. 49 U.S.C. 46306.

#### K. Privacy

**sUAS Operation and Certification NPRM:** In the NPRM for the sUAS Operation and Certification rule, one commenter addressed database accessibility. Event 38 Unmanned Systems suggested that FAA create a database of registered operators, but limit accessibility to FAA and law enforcement.

**Clarification/Request for Information:** The Clarification/Request for Information requested information about the storage of registration data.

**Registration Data Storage Method:** Many commenters expressed concern about the security of personal identifying information in light of recent

breaches, and recommended that data be stored in some sort of secure database (e.g., encrypted database, secured server, database under the control of FAA, central database with 256 bit AES digital encryption, protected with HIPAA-type controls) in compliance with government requirements. Several commenters noted the data should be stored in a nationally accessible database so that it can be shared with local law enforcement agencies responsible for enforcing the rules. Other commenters recommended the FAA store registration data the same way the FCC stores amateur (HAM) radio licenses. Another commenter suggested registration data for model aircraft should be maintained by the AMA. Some commenters said there should not be a central registry due to data security concerns, while others recommended storing the registration information on paper to reduce the possibility of personal information being hacked or stolen.

EPIC stated that recreational UAS operators have an expectation of privacy, so the FAA should adopt safeguards to protect those registrants' information from improper release and use by both the public and other government agencies.

Multiple commenters, including South Florida UAV Consortium and Morris P. Hebert, Inc., expressed concern with the security of online registration systems. Some commenters indicated that they would be supportive of electronic or Web-based registration if the agency could guarantee that the registration site would be secure. A commenter also suggested to ensure that an electronic signature be included in the registration process to increase security. Along with adding security measures to any online site, an individual expressed concern with the authentication process of online registrations. A few commenters suggested that it would be difficult for the agency to create and implement an authentication program sufficient to verify the identity of those registering prior to the proposed December 2015 deadline.

The Air Medical Operators Association and the Colorado Agricultural Aviation Association said the data should be stored and maintained by the FAA and easily accessible to the agency and law enforcement agencies for enforcement purposes. The National Retail Federation asserted retailers should not be required to store any kind of UAS registration information; the system should be maintained by the FAA for use by the FAA and local law

enforcement agencies. Similarly, the Toy Industry Association said manufacturers should not be required to maintain UAS registration information.

Chronicle, Inc. suggested using a distributed blockchain based system in which the FAA would not own the data, but would have complete access to the data. In a blockchain-based system, the registrants would own their registration data and the UAS product history would pass on to any subsequent owners of the UAS. Travelers Insurance Company recommended the data be stored in a searchable database that would allow for data mining with respect to all the registration information, including manufacturer, type, serial number, vendor and purchaser with protections for personally identifiable information.

**Registration Data Accessibility:** In the Clarification/Request for Information, DOT and FAA asked who should have access to the registration data. Many commenters, including Modovolate Aviation, LLC, and NetMoby, said that the UAS registration data should be available to the public via the same search methods as the current manned aircraft registration data. Many commenters noted the data must be available to the public in order for the public to identify the owner of a UAS involved in an incident and to notify the appropriate government authority. NetMoby also said State laws require the exchange of information for automobile accidents and asserted the same should be required for UAS incidents.

Aerospace Industries Association, Property Drone Consortium, Real Time Technology Group and individual commenters suggested all stakeholders require access to the data, but different stakeholders have different information needs. These commenters said the type of information each stakeholder should have access to should be controlled on a need to know basis. Aerospace Industries Association also cited FAA's Federal Records Center (FRC) as an example of how the data could be managed. The commenter explained licensees are registered and have access to their detailed information, while third parties have access to a limited amount of the information necessary to conduct business, but not to all of the detailed information. A law firm noted concerns about confidential proprietary information could be addressed by allowing for redaction of certain confidential financial information, as is currently done with the FAA Civil Aircraft Registry.

Several commenters said only the registrant and authorized government

<sup>39</sup> See FAA Order 8000.373 available at [http://www.faa.gov/documentLibrary/media/Order/FAA\\_Order\\_8000.373.pdf](http://www.faa.gov/documentLibrary/media/Order/FAA_Order_8000.373.pdf).

agencies, including DOT, FAA, the National Transportation Safety Board, and Federal Bureau of Investigation, and local law enforcement officials should have access to the registration data because of privacy concerns. One commenter said the data should only be available to law enforcement and FAA personnel via the existing National Crime Information Computer datalinks. Some commenters said law enforcement officials should have access to this data only when there is an active investigation into a particular registration and registrants should be informed when their data is accessed. Many commenters said the data should be treated as confidential information and a few suggested DOT or FAA personnel should have the ability to access the data only with a court order, warrant or FOIA request. A few commenters expressed concern that if the registration data were publically available, owners of expensive UAS would be targets of robbery.

EPIC stated that there must be strict restrictions against the general disclosure of registrants' personal information to government agencies and private entities, except as necessary to promote the FAA's mission of establishing safety and privacy in UAS operations. Noting that privacy concerns are greater for hobbyists (who are more likely to register with private home addresses) than for commercial operators, EPIC recommended that the registration database of commercial operators be publicly accessible, but the database of recreational operators only be accessible for limited purposes related to protecting the safety and privacy of the public. EPIC claimed that, given the fast-growing market for UAS, a publicly accessible database of operators would implicate privacy and safety concerns comparable to those that inspired the Driver's Privacy Protection Act, which generally prohibits the release and use of registered drivers' personal information except for limited purposes. As such, EPIC asserted that UAS registration information should be treated the same as the driver records collected by state departments of motor vehicles.

The Arlington, Texas, Police Department said that local law enforcement agencies should be given real-time access to the database to enable them to seek information about a specific UAS registration and to provide notification about unregistered UAS.

*Usage of Registration Data:* Many of the commenters who responded to this question, including the National Retail Federation and individuals, said the

data should only be used for law enforcement purposes. Other commenters suggested additional uses of the data. For example, Travelers insurance company recommended the data be available for use for underwriting, risk assessment, and for establishing loss history. AIA said regulators could use the metadata to determine market size, concentration and type and volume of operations. Aerospace Industries Association also said registration should not prompt additional State tax collection processes as it does with manned aircraft purchases. Real Time Technology suggested the data could be used at FAA's discretion for a number of purposes, including: To maintain an accurate association of UAS with multiple users over time; to compile accurate records of corporate UAS assets; to assure compliance with registration requirements for UAS operations; to authenticate registration for operational integrity in the field; to track incidents associated with UAS or owners; and to collect operational flight data from participating facilities. An individual said FAA could use the data to generate aggregate statistical data on commercial UAS activities to gauge commercial UAS impact on the NAS. A few commenters noted registration data could be used to recover stolen or lost property, alert owners of recalls, or to disseminate safety information, including Notices to Airmen, to registrants. Some commenters expressed concern that registration data could be used to abuse or harass UAS owners. Others expressed concern that in asking how the data should be used, the agency does not seem to know why it is seeking to collect the data.

EPIC stated its position that recreational operators have a legitimate privacy interest in avoiding the disclosure of their names, addresses, and telephone numbers, and that it would serve no legitimate purpose to make such personal information available beyond the scope of a particular privacy or security threat.<sup>40</sup> As such, EPIC stated the FAA should adopt a general prohibition against the

disclosure of personal information, including the name, address, and number of the registration. EPIC further stated that permitted uses of the registry should be limited to serve the FAA's stated purposes of allowing "individuals and title search companies to determine the legal ownership of an aircraft" and to "provide aircraft owners and operators information about potential mechanical defects or unsafe conditions of their aircraft in the form of airworthiness directives." To that end, EPIC suggested that appropriate uses of registration data by the FAA would include providing information to identify the operator of a UAS that has caused injury, or in connection with a legal proceeding, and providing UAS owners and operators information on any relevant mechanical defects or unsafe aircraft conditions.

*Other General Comments:* Commenters raised additional concerns regarding a UAS registration system. Skyward, Inc. said in 2013 the DOT's Office of the Inspector General found that the aircraft registration system had experienced significant data quality and security issues. The commenter noted data quality and security issues are exacerbated when data are hard to update or there is little incentive for individuals to provide updated information. Skyward, Inc. was "concerned (1) that the Department's focus on enforcement may alienate potential registrants, (2) about questions related to managing registration of aircraft owned by individuals who are not US citizens or are not permanent residents, and (3) about how such a registration system may manage [s]UAS that are passing through the US by visitors who bring drones into the US temporarily."

Skyward, Inc. also expressed concern about unintended consequences that could result from "hasty implementation" of the registration system. Similarly, an individual stated that based on the questions posed in the Clarification/Request for Information, it appears "the FAA has not done the necessary preparation to stand-up a registration system to handle the necessary volume of registrants."

*Task Force:* The Task Force recommended that the FAA collect only name and street address of applicants for registration. While the Task Force recognized that a registrant's email address and telephone number may be useful for the FAA to disseminate safety-related information to UAS owners, the Task Force nevertheless believed disclosure of such information be optional. With the exception of information released to law

<sup>40</sup> EPIC cited legal precedent to support the propositions that individuals have a legitimate privacy interest in avoiding disclosure of their names, addresses, and telephone numbers (*see Dep't of Defense v. Fed. Labor Relations Auth.*, 510 U.S. 487, 500 (1994)) and that this privacy interest remains intact even when the information is properly disclosed to the public under certain circumstances (*see U.S. Dept. of Justice v. Reporters Comm. for Freedom of the Press*, 489 U.S. 749, 767, 770 (1989)). EPIC further stated that limiting the use and disclosure of personal information submitted by registrants is consistent with their expectations of privacy.

enforcement, the Task Force urged the FAA to prevent the release of any personal information that the agency is not specifically required by law to disclose. Because this new requirement will impact unmanned aircraft owners who do not have the means to protect their identities and addresses behind corporate structures (as some manned aircraft owners currently do), the Task Force believed that it is important for the FAA to take all possible steps to shield the information of privately owned aircraft from unauthorized disclosure, including issuing an advance statement that the information collected will be considered to be exempt from disclosure under the Freedom of Information Act.

**IFR Requirement:** This rule provides a Web-based process for registration of small unmanned aircraft and issuance of Certificates of Aircraft Registration. The privacy impacts have been analyzed by the FAA in the Privacy Impact Assessment (PIA) for the Civil Aviation Registry Applications (AVS Registry) and the Privacy Act System of Records Notice (SORN) DOT/FAA 801 Aircraft Registration System has been updated accordingly.

The FAA conducted a PIA of this rule as required by section 522(a)(5) of division H of the FY 2005 Omnibus Appropriations Act, Public Law 108–447, 118 Stat. 3268 (Dec. 8, 2004) and section 208 of the E-Government Act of 2002, Public Law 107–347, 116 Stat. 2889 (Dec. 17, 2002). The assessment considers any impacts of the rule on the privacy of information in an identifiable form. The FAA has determined that this rule would impact the FAA's handling of personally identifiable information (PII). As part of the PIA that the FAA conducted as part of this rulemaking, the FAA analyzed the effect this impact might have on collecting, storing, and disseminating PII and examined and evaluated protections and alternative information handling processes in developing the rule in order to mitigate potential privacy risks. The PIA has been included in the docket for this rulemaking.

The FAA agrees with the Task Force that accessibility of this information to law enforcement and the FAA is the utmost priority in establishing this registry. As such, the security, simplicity, and accessibility of the system to those groups were the foremost goals in the FAA's determinations of system design.

Routine uses are described in the SORN.<sup>41</sup>

Commenters were mainly concerned with two issues: information security and access to the registry information. First, regarding the security of the registry information, the FAA developed this Web-based registration system in compliance with all federal information technology requirements and guidelines regarding security and protection of information including the Federal Information Security Management Act of 2002 as amended by the Federal Information Security Modernization Act of 2014 and OMB and National Institute of Standards and Technology guidelines. Access to the system depends on a validated email address and a password created by the user. The system is identified by a digital certificate so that the public has confidence that they are interacting with the authentic registration site. The system encrypts all of the information provided by the users while they use the system as well as user information stored within the system. The system has also been designed to protect information based on the potential for serious impact from a security compromise. In addition, the system protects credit card information in accordance with PCI Data Security Standards.

Second, regarding the accessibility of the system data, the Privacy Act System of Records Notice DOT/FAA 801 Aircraft Registration System, provides notice to the public of the agency's privacy practices regarding the collection, use, sharing, safeguarding, maintenance, and disposal of information that affects individuals and their personally identifiable information (PII). The SORN identifies the routine uses for the PII collected for small unmanned aircraft registration. The SORN has been published in the **Federal Register** and addresses the disclosure of the small unmanned aircraft owner's name and address.

The FAA disagrees with commenters who say that the Registry should reside with the AMA or any other organization. By statute, the FAA is charged with establishing such a registry.

As provided in the SORN, all information in the database will be available to law enforcement in order to achieve one of the FAA's primary priorities in creating this system, which is to ensure a safe and secure NAS. Accomplishing this goal involves

prioritizing the ability of law enforcement to help us identify the owner of a sUAS that has violated an operating rule or has been used to either accidentally or intentionally endanger other NAS users or people on the ground.

Additionally, as provided in the SORN, the general public will be able to search the part 48 registry database by the unique identifier. The name and address associated with that unique identifier will populate in accordance with that search.

#### *L. Other Methods To Encourage Accountability and Responsible Use of the National Airspace System*

**Clarification/Request for Information:** The FAA received comments from many organizations and individuals on additional means beyond aircraft registration to encourage accountability and responsible use of UAS.

The agency received comments affirming the registration requirement as a method to encourage accountability and responsible use of UAS. The Air and Surface Transport Nurses Association said that a registration requirement would be a "step in the right direction in terms of safety." EAA stated that while registration will create a system of accountability, safety is dependent on the knowledge and decisions made by UAS users. An individual commenter noted registration would help recreational operators to take UAS use seriously. Another individual stated requiring all operators to register their UAS and to obtain a pilot license are both necessary to document the aircraft are airworthy and the operators are properly trained in safe operation. Rotor Sport and other commenters recommended the FAA look to the AMA for guidance and counsel so that the agency can create policies that foster acceptable use and safety for the public while at the same time are intelligent and flexible to meet the needs of all model aviation stakeholders.

Most of the commenters addressing this issue asserted that a registration requirement would not encourage accountability and responsible use of UAS. Two of the main reasons given for this assertion were that registration would only be useful in rare cases when a registered UAS is recovered after an incident, and "bad actors" will simply not register. Several commenters, including the Competitive Enterprise Institute, noted registration numbers on a UAS would be invisible to those observing a reckless or malicious UAS operation, thereby limiting the enforcement benefits. These

<sup>41</sup> Persons wishing to access or comment on the System of Records Notice should consult docket No. DOT-OST-2015-0235.

commenters said FAA has not provided any evidence to demonstrate that registration of these aircraft will improve safety of the NAS or people on the ground. They believe the safety rules are important, but a registration requirement would have no effect on safety. One commenter noted registration of UAS will enable FAA to identify the operator in case of an accident, but it does not address the actual problem: untrained pilots operating in the NAS. This commenter stressed the importance of a type certificate stating, "It certifies that the UAS is airworthy, and also requires a trained pilot to operate in the NAS."

A few commenters asserted FAA has not been able to accurately track many of the 357,000 aircraft registered under the current registration program, and questioned the agency's ability to manage the registration of hundreds of thousands of UAS. A number of commenters participating in a form letter campaign stated that registration of model aircraft, in particular, "would have had little to no effect on the few rogue pilots that have caused concern with the FAA and DOT and would only serve to prevent law abiding citizens from enjoying the freedom and liberty set forth by the US Constitution." Many commenters said instead of encouraging accountability and responsible use, a registration requirement would increase burdens on responsible operators, waste tax payer dollars, and punish those who follow the rules.

Several individual commenters asserted that the proposed registration requirement is unnecessary as the registration issue is already being addressed in the current section 333 exemption process and proposed part 107 (the sUAS Operation and Certification NPRM).

A few commenters proposing other methods to encourage accountability and responsible UAS use said that manufacturers should be required to install geo-fencing software in their models to prevent UAS from flying in restricted areas. Other commenters said they should be required to install transponders that would transmit the registration number.

Modovolate Aviation said the following would encourage accountability and responsible use of UAS: "(1) Prompt promulgation of a general rule for sUAS, following the FAA's 25 February 2015 proposal; (2) streamlining and acceleration of the section 333 exemption process; and (3) eventual replacement of this system of regulation with one requiring vendor self-certification of specific

technological safety features as a condition of sale."

Delair-Tech recommended various options that would require the manufacturer to install software that would trigger the need to register before the UAS would be operational. The South Florida UAV Consortium recommended that UASs be restricted to a limited operation until the operator completes a training course and receives a code to unlock the software to allow it to fly its full range. An individual commenter said there should be an identification process that requires a name and address to be registered to a serial number before electronic operating software can be downloaded to the UAS.

Skyward, Inc. said the Task Force should examine approaches that promote safety "by providing opt-in conduits for registrants to receive educational material, safety/recall information from manufacturers, insurance discounts, and other benefits." In addition, Skyward suggested that the proposed registration system serve as a facilitator for subsequent services such as automated delivery of temporary flight restrictions. Other commenters similarly recommended the registration system contain some sort of educational or training component. Aviation Management Associates said the FAA should encourage registration of all UAS (including those that are not required to register) by providing information and services of value, such as enabling operators to receive discounted insurance rates by virtue of meeting educational requirements that qualify for registration.

EPIC recommended that any UAS operating the NAS include a mandatory GPS tracking feature that would broadcast the location, course, speed over ground, and owner identifying and contact information, similar to the Automated Identification System (AIS) for commercial vessels. EPIC noted that, unlike with aircraft that are equipped with ADS-B, aircraft information about aircraft equipped with AIS is available to the public through freely available apps.

Union Pacific Railroad stated that it supports other reasonable measures to encourage accountability and responsibility in small UAS operations, including restrictions on any unauthorized commercial or recreational operations over certain safety-sensitive locations, such as railroad facilities.

*Task Force:* While the Task Force did not make a specific recommendation on encouraging accountability and

responsible use of UAS outside the registration process, it asserted within its report that operator accountability and responsible use were its principal goals of registration. The NPRM did not request comment on this issue.

*IFR Requirement:* Accountability and responsible sUAS operation along with identification of the aircraft owner are the desired outcomes for this rule. While commenters provided a number of recommendations for further action toward these goals that are outside of the scope of this rulemaking, the FAA found that one predominant recurring theme addressed education regarding safe sUAS operations. As described in the preamble discussion pertaining to education, the FAA agrees that education is a key component for reaching the agency's aircraft registration goals and is an overarching tenet in ensuring the safety of the NAS. The FAA will continue to evaluate these additional methods recommended by the commenters for encouraging safe and responsible use among sUAS operators for future guidance material and rulemaking.

#### *M. Legal Implications of the Registration Requirement*

A number of comments were received to the Clarification/Request for Information regarding the legal implications of the registration requirement.

1. Comments addressing Section 336 of the FAA Modernization and Reform Act of 2012

Many commenters stated that the FAA's decision to require registration of model aircraft is in violation of section 336 of the FAA Modernization and Reform Act of 2012, Public Law 112-95, which stipulates that the FAA "may not promulgate any rule or regulation regarding a model aircraft" that meets certain criteria. Commenters pointed out that one such criterion is that the model aircraft be operated "in accordance with a community-based set of Safety Guidelines and within the programming of a nationwide community-based organization." Commenters stated that the AMA is one such organization, and that the FAA must therefore exempt AMA members from the registration requirement. Other commenters stated more generally that FAA must identify all nationwide community-based organizations and exempt their members from any rule or regulation (including registration) when the aircraft is operated in accordance with a community-based set of safety guidelines.

The Competitive Enterprise Institute asserted that the FAA conceded in its interpretation of section 336 that “a model aircraft operated pursuant to the terms of section 336 would potentially be excepted from a UAS aircraft rule,” an interpretation that the commenter said “would logically lend itself to a UAS aircraft registration rule as well.” This commenter accused the FAA of ignoring both the plain language of the statute and its own interpretation of it, and asked the FAA to explain how it has the jurisdiction to regulate small UAS operated by hobbyists.

Several commenters found fault with the FAA’s justification for requiring registration of model aircraft—*i.e.*, that it is applying existing law that applies to all “aircraft” and not promulgating new regulations regarding model aircraft. The Mercatus Center at George Mason University asserted that the current proceeding “relied quite directly on laws that by statute may not be used as justification for an expansion of the regulatory obligations of model aircraft operators;” namely, its UAS integration mandate under the FAA Modernization and Reform Act. This commenter further asserted that if the FAA does not restart the process without references to that mandate there is a possibility that registration of non-commercial UAS will be overturned if challenged in court. An individual commenter stated that if, as the FAA asserts, the definition of model aircraft as “aircraft” means that all existing federal aviation regulations retroactively apply to model aircraft, the congressional prohibition on regulating them would be pointless. This commenter further stated that the clear intent of Congress was to prohibit the FAA from regulating model aircraft at all, and that if Congress meant instead to apply the full array of existing aviation regulations to model aircraft, it would have said so. This commenter also asserted that, even if the FAA is correct that all existing aviation regulations apply to model aircraft, it is not acting consistently with that principle because it is picking only one of the many regulations that apply to manned aircraft and arbitrarily applying it to model aircraft. This commenter further asserted that this “is the very epitome of arbitrary and capricious, and clearly shows that the FAA is being disingenuous when it claims it is merely applying existing regulations.” This commenter went on to say that “[t]he fact that the FAA finds it necessary to request public comments in a sort of expedited unofficial NPRM, followed by assembling a special Task Force (somewhat like an Advisory Rulemaking

Committee (ARC) to determine what steps are necessary to implement the registration process, clearly reveals the FAA’s proposal to be in fact a new regulation regarding model aircraft in direct contravention of [FAA Modernization and Reform Act] Sec. 336.”

Another individual stated that the FAA is not being forthright in averring that its decision not to register model aircraft until now was “discretionary.” This commenter expressed doubt that a regulatory document exists in which the agency explicitly stated that “model aircraft need not be registered, as a discretionary exclusion from 49 U.S.C. 44101,” and that if such a document does exist it should have been referenced in the Clarification/Request for Information. This commenter further asserted that the absence of such a document destroys the premise of the “clarification” the FAA has now put forth.

Two individual commenters challenged the agency’s reliance on the NTSB ruling in *Administrator v. Pirker* (NTSB Order No. EA–5739), noting that the ruling only held that model aircraft qualify as “aircraft” as the term is used in 14 CFR 91.13(a), which prohibits careless and reckless operation.<sup>42</sup>

Two individual commenters stated that the FAA’s authority to pursue enforcement action against persons who endanger the safety of the NAS (under section 336(b) of Public Law 112–95) cannot reasonably be interpreted to mean the agency has the blanket authority to mandate registration of model aircraft.

The FAA disagrees with the comments asserting that the registration of model aircraft is prohibited by section 336 of Public Law 112–95. While section 336 bars the FAA from promulgating new rules or regulations that apply only to model aircraft, the prohibition against future rulemaking is not a complete bar on rulemaking and does not exempt model aircraft from complying with existing statutory and regulatory requirements. As previously addressed, Public Law 112–95 identifies model aircraft as aircraft and as such, the existing statutory aircraft registration requirements implemented by part 47 apply.

This action simply provides a burden-relieving alternative that sUAS owners may use for aircraft registration. Model aircraft operated under section 336 as well as other small unmanned aircraft are not required to use the provisions of

part 48. Owners of such aircraft have the option to comply with the existing requirements in part 47 that govern aircraft registration or may opt to use the new streamlined, web-based system in part 48.

## 2. Comments Addressing Requirements Under the Administrative Procedure Act

A number of commenters questioned the FAA’s approach to rulemaking pertaining to small unmanned aircraft registration. Several commenters said the FAA does not have good cause to issue a rule without notice and comment. The Competitive Enterprise Institute (CEI) stated that under section 553(b)(3)(B) of the APA, agency rulemakings are required to include a notice and comment period of at least 30 days unless “the agency for good cause finds (and incorporates the finding and a brief statement of reasons therefor in the rules issued) that notice and public procedure thereon are impracticable, unnecessary, or contrary to public interest.” Citing to a legal treatise on administration law, CEI asserted that the good cause exception “is not an escape clause,” and “should be narrowly construed and only reluctantly countenanced,” with “the agency bear[ing] the burden of demonstrating the ground for good cause.” CEI further asserted that notice and comment in this case is not “impractical,” because “[i]mpracticality exists when the agency cannot both follow the notice-and-comment procedure and execute its statutory duty.” CEI stated that in this case the FAA is arguably proceeding with a UAS registration mandate in direct contradiction of its statutory duty “not [to] promulgate any rule or regulation regarding a model aircraft.” CEI also stated that the notice and comment process cannot be said to be “unnecessary,” because a rule that mandates hobbyists register their model aircraft creates a substantial new burden on the public. Finally, CEI stated that notice and comment is not “contrary to public interest.” CEI claimed that, although the FAA will presumably argue that providing notice and comment would result in significant harm to the public interest by failing to immediately mitigate UAS safety risks that only mandatory registration can address, “there is little evidence that registration will, on its own, do much of anything to mitigate UAS safety risk, which itself is likely very low relative to other aircraft safety risks, such as birds.”

The Mercatus Center at George Mason University stated that “agency inaction leading to perceived deadline pressure

<sup>42</sup> The commenter cited to *Administrator v. Pirker*, NTSB Order No. EA–5739 at 12 (Nov. 17, 2014).

does not constitute good cause to dispense with public notice and comment.”<sup>43</sup> The Mercatus Center asserted that a public notice-and-comment period is necessary and in the public interest because any requirement to register UASs potentially adversely affects numerous non-commercial operators. The Mercatus Center further asserted that the issuance of a final rule without notice and comment opens up the registration requirement to reversal if challenged in court.

A number of individual commenters similarly asserted that the FAA has not presented any data to substantiate the need to proceed with this rulemaking on an emergency or expedited basis. Like CEI, these commenters pointed to a lack of data showing either that there is an increased safety risk that needs to be addressed or that registration will, on its own, adequately address that risk. Some commenters specifically found fault with FAA’s reliance on increased number of UAS “incidents” reported to the FAA by manned aircraft pilots. Several commenters noted that the AMA analyzed those reported “incidents” and found that out of the 764 reported records, only 27 (or 3.5%) were identified as a near mid-air collision, with nearly all of those involving government-authorized military drones.<sup>44</sup> The commenters noted that most of the “incidents” have merely been sightings of UAS. One individual pointed out that the FAA has published no analysis of its own “sightings” data; nor has it disputed the AMA’s analysis of that data. This individual also asserted that a doubling in the rate of UAS “sightings” in 2015 is consistent with the rate of growth of consumer small UAS, and is not cause for overreaction.

Another individual claimed that FAA statistics show that birds are far more of a threat to air traffic than toy helicopters, and that not one single incident of a toy model causing an accident has been reported, while bird strikes number over 7,000 a year. Several other commenters noted that there has only been one recorded collision between a manned aircraft and a model aircraft. One such individual stated that it was a well-known incident

in which a biplane struck a large model airplane that was hovering over a runway at an air show. This individual further stated that even though that model airplane was larger than the vast majority of models most hobbyists fly, the biplane received only a minor dent to its wing. Another individual questioned whether the FAA has examined empirical evidence from the millions of model flight operations to determine if lack of compliance with the labeling requirement had any correlation to the frequency or severity of mishaps. Another individual pointed to a recent NTSB interpretation (NTSB–AS–2015–0001) that clarifies that “model aircraft” do not fall within the definition of unmanned aircraft for accident notification/investigation purposes. Quoting that interpretation, this commenter stated that the NTSB “has historically not investigated the rare occasions in which a model aircraft has caused serious injury or fatality,” and clearly does not believe unregistered small UAS to be a significant threat to the NAS.

A number of commenters characterized the registration requirement as a “knee jerk” reaction to a perceived problem based solely on anecdotal evidence, which will punish the many for the acts of a few. Other commenters said that any UAS-related incidents can easily be remedied by stricter enforcement of existing laws.

In contrast to those commenters who claimed that the FAA does not have good cause to issue a rule without going through notice and comment rulemaking, Modovolate Aviation, LLC that the FAA does have good cause to issue a rule without notice and comment, and should therefore set up a simple database and registration interface immediately and issue an emergency rule requiring compliance. This commenter asserted that such authority comes from both the APA (5 U.S.C. 553(b)(3)(B)) and the FAA’s own rules (14 CFR 11.29(a)), and that the FAA’s statements that the growing number of pilot reports of UAS sightings reveals an imminent problem and serves as an appropriate basis for such an “emergency rule.” This commenter also asserted that the FAA will not achieve its goals by engaging in another protracted rulemaking process that takes two years.

In the preamble discussion of the agency’s good cause for proceeding with an IFR, the agency explains its rationale for forgoing notice and comment prior to the effective date of this rulemaking and issuing this immediately effective IFR. The agency also notes that it is seeking comment on this rulemaking

and may modify the rule based on comments received.

### 3. Comments Addressing Other Legal Issues With the Proposed Registration Requirement

The Mercatus Center at George Mason University stated that under Executive Order 12866, a rule on non-commercial UAS registration may be economically significant and therefore require a cost-benefit analysis. The Mercatus Center claimed that past experience with national registry systems suggests that there will be dramatic implementation and compliance costs that the DOT may be systematically underestimating. The Mercatus Center further claimed that these costs will be exacerbated by factors such as fast UAS depreciation and replacement rates, difficulty of enforcing retroactive compliance, and the sheer volume and speed at which UASs are being produced, among other factors.

Several other commenters also stated that the FAA needs to conduct cost-benefit analysis before proceeding with this rulemaking. For example, one individual stated that a cost benefit analysis “based on a scientific collection of unbiased safety data” should be conducted before any new registration program is put in place. This individual asserted that the FAA has not provided a convincing case that small UAS pose a safety risk to the NAS, or that that a registration program will be any more successful than an approach, such as the AMA’s Safety Code, that requires owners to put their name and address on the aircraft. A few other individuals said the FAA needs to consider that a registration requirement may expose UAS owners to additional state-imposed taxes and fees. Another individual pointed to the potential economic impact a registration requirement may have on small businesses. This individual asserted that the requirement may impact small hobby shops, as well as major distributors like Horizon Hobby and Hobbico, because people will not want to register their aircraft with the FAA and will therefore choose to participate in other consumer hobbies that do not require registration with the government. The News Media Coalition stated that any registration process established by the FAA “must avoid placing undue burden on the First Amendment right to gather and disseminate news.”

Several individual commenters stated that a registration requirement is an invasion of privacy. EPIC discussed its concerns about the privacy and civil liberty risks posed by the use of UAS in

<sup>43</sup> The commenter cited *Air Transport Association of America v. Department of Transportation*, 900 F.2d 369 (D.C. Cir. 1990) (“Insofar as the FAA’s own failure to act materially contributed to its perceived deadline pressure, the agency cannot now invoke the need for expeditious action as ‘good cause’ to avoid the obligations of section 553(b).”).

<sup>44</sup> A few commenters provided a link to the AMA report. [http://www.modelaircraft.org/gov/docs/AMAAAnalysis-Closer-Look-at-FAA-Drone-Data\\_091415.pdf](http://www.modelaircraft.org/gov/docs/AMAAAnalysis-Closer-Look-at-FAA-Drone-Data_091415.pdf).

the United States, and asserted that the enhanced surveillance capabilities of UAS raise significant Fourth Amendment implications.<sup>45</sup>

Consistent with comments regarding Executive Order 12866, the FAA has completed an economic analysis of this rulemaking. The economic analysis for this rulemaking can be found in the docket with the IFR.

Regarding comments pertaining to free speech and privacy, the agency clarifies that this IFR does not provide operating restrictions. Rather, this rulemaking is intended only to establish a streamlined approach for small unmanned aircraft registration.

#### *N. Alternatives to Registration*

The FAA received a number of comments recommending alternatives to a requirement of registration.

*Clarification/Request for Information:* Several commenters suggested a requirement for small UAS operators to become members of a community-based organization, instead of a registration requirement. One commenter recommended that an organization similar to the USPA (United States Parachute Association) be formed to manage UAS training, licensing, and registration. Another commenter said it would make more sense for the DOT and FAA to mandate that small UAS pilots join any community-based organization that follows a set of standardized rules. Several commenters recommended that the FAA specifically require model aircraft operators to become AMA members. One commenter suggested that AMA be put in charge of the registration of small UAS users, with the registration database maintained by the AMA independently, or with a subsidy from the DOT/FAA. Several other commenters, however, opposed the idea of requiring AMA membership or allowing the AMA to be any part of the official registration requirement. One individual stated that registration is an inherently governmental function that should not be ceded to any dues collecting organization. This commenter pointed out that neither the Experimental Aircraft Association nor the Aircraft Owners and Pilots Association register manned aircraft. Another individual said the AMA should not be part of the registration

process because it is “a privately run optional insurance consortium for hosting a common airfield,” not an authority regarding model aircraft design, standards, and practices. The Drone User Group Network said that the AMA “while a venerable association, does not have the interests of responsible and dedicated UAS operators at the core of its mission.” Another individual listed a number of concerns about the AMA’s safety programming (e.g., failure to enforce their own requirement to have AMA number and/or address in their member’s aircraft) and said that he is not comfortable with the AMA being permitted to manage the inherently governmental function of registration.

Several commenters who opposed a registration requirement said the FAA should review the FCC’s experience with the explosive growth of mobile Citizen Band radios some years ago, which ultimately resulted in abandoning the licensing requirement for those radios. One commenter recommended that driver’s licenses be used for registration, instead of creating a new registry system. Another commenter said recreational operators could be required to carry a current driver’s license and a safety card, which would be issued after the operator watched an FAA video on proper flying procedures.

A number of commenters said the FAA needs to clarify what it will consider to be a UAS for purposes of the registration requirement. Some commenters asserted that relying on the FAA’s definition of “aircraft” is problematic because that definition can be construed to mean any device which takes to air, including, for example, a Frisbee, a paper airplane, a foam airplane, or a balsa wood rubber-band powered airplane. As discussed above, many commenters urged the agency to exclude traditional model aircraft from the definition of UAS for purposes of the registration requirement. Some of those commenters questioned why model aircraft would be included in a registration requirement while other types of “aircraft,” such as ultralights, model rockets and kites, would not. Several commenters pointed out that ultralights can weigh up to 249 pounds, carry up to 5 gallons of flammable fuel, carry an unlicensed pilot, be unregistered, and still operate in the NAS (in many, but not all areas).

Several individual commenters questioned whether the agency can handle the registration of millions of recreational UAS. One commenter noted that the registration database could become overloaded and unmanageable

if every person registers every model aircraft they purchase or receive—many of which will not last past a single flight—but then fail to notify the FAA when a model is lost, destroyed, or sold. Also pointing to the short life span of most small UAS, another commenter similarly said the registration system will become overwhelmed if recreational users are required to register and re-register each model aircraft they obtain. Another commenter said that requiring UAS owners to renew their registration will “complicate everything” and lead to people involuntarily breaking the law when they forget to re-register their UAS. Several commenters wondered how the registration process will be funded.

Several commenters addressed the effect of a registration requirement on innovation and growth. The National Association of Mutual Insurance Companies (NAMIC) encouraged the FAA and the Task Force to consider how the registration system will be integrated into or used in conjunction with the commercial development of UAS. Specifically, NAMIC said the FAA and Task Force should consider how industries that are critical to UAS development will depend on or require UAS registration. NAMIC asserted that “streamlining requirements for UAS registration would certainly be in the interest of avoiding duplication, minimizing burdens, and best protecting innovation and encouraging growth in the UAS industry. Similarly, TIA said the FAA must implement UAS regulations that do not inhibit advancement but rather spur growth and inspire future innovators. The University of Illinois at Urbana-Champaign urged the FAA and DOT to consider alternatives to a registration (which is said is likely to prove both burdensome and ineffective) because “onerous regulations applied to UAS research will stifle innovation and put the United States at a competitive disadvantage.” An individual commenter similarly said that regulation “will increase costs, drive people from the activity, and retard innovation.” One individual commenter argued that model aircraft “represent a huge employment, technological, and economic opportunity for our country (and world), and we cannot afford to squash this potential with more laws.” A group of academics noted that traditional model aircraft have inspired generations of our scientists, engineers, and inventors. A number of other commenters also expressed concern that a registration requirement will

<sup>45</sup> EPIC made reference to its 2012 petition to the FAA to undertake a rulemaking to establish privacy regulations prior to the deployment of commercial drones in the national airspace, and its lawsuit against the FAA for denying that petition. EPIC also made reference to its testimony before Congress regarding the need to adopt comprehensive legislation to limit drone surveillance in the United States.

discourage young people from becoming involved in model aviation which, in turn, will discourage them from entering careers in STEM-related fields.

A commenter who had been issued an exemption under section 333 of Public Law 112–95 questioned whether he or she would have to re-register their UAS, and what the time-frame for that would be. Another commenter questioned how the registration requirement would apply to UAS that are flown infrequently or not at all. Another individual commenter questioned what the process would be for removing non-functional UAS from the registration system. Another commenter working overseas wondered whether he would have to register his UAS to be permitted to operate it during visits to the United States.

Delair-Tech recommended the following registration process for manufactured UAS: (1) Each UAS produced is assigned an aircraft type designator (assigned by ICAO) and a unique serial number (assigned by the manufacturer); (2) the user manual for each UAS instructs its owner to turn on the UAS and its ground control station/software within internet connectivity coverage; (3) the ground control software detects an unregistered UAS and opens a registration window, which prompts the owner to enter their contact information (including phone number); (4) the registration information is transmitted to the national registration system, which sends a verification code to the owner via text message; (5) the owner enters the code through the ground control software and then the registration system verifies the code and sends a registration number to the ground control station; (6) the ground control software programs the registration number into the UAS, which enables the owner to fly the UAS. As an alternative to using the ground control software to connect directly to the national registration system, Delair-Tech suggested the owner be given the URL of the registration system, through which the owner would input contact information and receive a verification code. The owner would also receive the registration number through the web application, which they would then input into the UAS through the ground control software.

An individual commenter suggested that as an alternative to issuing an expedited registration rule the agency issue a temporary, immediately effective rule mandating point-of-sale distribution of agency materials summarizing the operational restrictions for model aircraft. This commenter stated that acting promptly to require

retailers to communicate the core regulatory message would more directly address the fear of improperly operated UAS becoming a safety risk as more are sold to hobbyists. The commenter also stated that such materials largely already exist and the requirement for distributing the information could be satisfied, particularly by online retailers, by a check-box acknowledgment or an emailed link to existing FAA educational Web sites. The commenter cited legal authority that would support an exercise of authority to compel commercial speech when it is in the service of a significant public interest.

RILA urged the establishment of a preemptive federal standard for UAS to allow for uniformity, consistency, and alleviate potential burdens on both retailers and consumers if states are left to legislate potentially inconsistent UAS safety.

Some commenters said an education program, geo-fencing, and strict enforcement of the safety rules would be more effective than requiring registration of these aircraft.

A few commenters advocated for a tiered licensing process, allowing operators who have qualified for higher tiers (e.g., through additional training or testing) to operate UAS with advanced capabilities. Several commenters said that FAA should regulate UAS operators in the same way the FCC licenses amateur (ham) radio operators, and one commenter also said that retailers of certain UAS should require proof of FCC licensing before purchase.

The Mercatus Center at George Mason University stated that the DOT and FAA should define a threshold “that liberalize most small UASs, requiring registrations for only the largest and highest-powered UASs, while continuing to focus on integrating all nongovernmental UASs within a framework based on the principles of permissionless innovation.” This commenter went on to say that, instead of an “impractical” registration scheme, the FAA should adopt Transport Canada’s model and require simple online notification for commercial operations within a middle weight class. Other commenters said that operators should have to abide by the AMA safety code.

The South Florida UAV Consortium recommended that UASs be restricted to a limited operation until the operator completes a training course and receives a code to unlock the software to allow it to fly its full range.

One commenter recommended two categories of licenses—one for commercial products that can be purchased off the shelf (with limitations

on the degree to which they can be modified) and one for home-built or substantially modified aircraft. The commenter asserted that this second category of licenses “would address the impossibility of implementing a per-device registration scheme in a world of imported electronics and homebrew experimentation.” Within the two categories of licenses, the commenter recommended different classes based on the available power carried on the aircraft.

*IFR Requirement:* The FAA disagrees with commenters who stated that all small unmanned aircraft should be registered with the AMA and that AMA should be exclusively responsible for the registry. The FAA is specifically directed by statute to develop and maintain an aircraft registry. Accordingly, the FAA cannot abdicate its responsibility to AMA or any other organization outside the FAA.

Some commenters on this topic addressed the need for a clear definition of which aircraft require registration and which do not; the FAA has addressed that definition in an earlier section. In response to the comments about capacity issues and streamlining registration, the web-based registration system established by this rule will allow the Registry to better accommodate the aircraft registration required for owners of small unmanned aircraft.

#### *O. Comments Beyond the Scope*

The nature of the FAA’s request for comment in the Clarification/Request for Information resulted in some commenters providing information that did not fall within the twelve comment areas. The FAA is summarizing those comments that were outside the scope of the twelve questions in this section.

A few commenters remarked on the make-up of the Task Force. One individual stated that the presence of Amazon, Walmart and Best Buy, among other major corporations, “gives the impression, as face value, of being politically driven by major corporations to restrict tax paying citizens in this country from using their airspace and the enjoyment of flying their model aircraft in favor of a major corporation.” This individual asserted that these corporations would prefer to eliminate model aviation in order to have open skies to operate their delivery service. Two other commenters similarly said that the UAS industry representatives on the Task Force “have a penchant for regulations and may actually benefit from such regulation given that they have the resources to cover the cost required by such regulation and that

inevitably such regulation will limit free enterprise.” These commenters questioned why the FAA did not invite grass-roots small UAS organizations, such as the Small UAV Coalition.

A commenter suggested reducing risk to aviation by permitting local authorities to utilize a transmitter to electronically disable UAS that are being flown illegally. The commenter also suggested developing a means to report illegal UAS operation. Another commenter said that law enforcement should be able to confiscate UAS that are flown illegally. The National Association of Mutual Insurance Companies, Minnesota Department of Transportation, and other commenters suggested requiring UAS operators to purchase liability insurance. Additionally, NetMoby and other commenters remarked that FAA should impose significant fines and other civil or criminal penalties on operators who fail to register or fly in a dangerous or illegal manner.

The Toy Industry Association urged FAA to implement an IFR instead of a final rule at this point. The commenter said that an interim rule would permit the agency and UAS Task Force to create a pilot registration system that would include only UAS that have “high risk” capabilities, and study this system before implementing a final rule. Other commenters, including the News Media Coalition, encouraged FAA to finalize the small UAS rule proposed for commercial users to provide an example of clear guidelines for all users.

Skyward, Inc. recommended that FAA develop a more comprehensive approach to UAS management, including technical standards for a UAS system for the NAS, and said that FAA should review NASA’s UAS Traffic Management program and the Department of Homeland Security’s STIX and TAXII standards as examples of technical standards development. Skyward said that, for example, a comprehensive UAS system could include “detection capabilities that are able to detect and localize non-participating or malfunctioning aircraft as part of expanded airspace radar and surveillance systems.”

Many commenters expressed concern about the expedited timeframe in which the DOT and the FAA plan to implement the registration system. UAVUS said the plan to create a registration system this holiday season is “overly ambitious, and could add to the confusion created by the absence of the FAA’s final rulemaking for the commercial use of small UASs.” RILA stated its appreciation for the agency’s goal of increasing safe and responsible

UAS use, but asserted that the logistical challenges in implementing such a system within the current expedited timeframe “make doing so responsibly and coherently impossible.” Given the expedited timeframe, RILA, NRF, and TIA encouraged the FAA to consider the use of an interim final rule instead of a direct final rule. NRF alternatively suggested a pilot program to evaluate the operational needs of a registration system.

The National Agricultural Aviation Association (NAAA), Colorado Agricultural Aviation Association, and Alaska Legislative Task Force on Unmanned Aircraft Systems recommended that UAS should be required to be more visible to manned aircraft to avoid collision by requiring UAS to be equipped with strobe lights and painted conspicuous colors.

Two commenters suggested that as an alternative to registering individual UAS, that owners be required to register their transmitters. One of those commenters asserted that the transmitter registration would provide an easy way to identify operators without having to physically locate them or their UAS because transmitters broadcast a radio signal that can be picked up by anyone in the vicinity. This commenter further asserted that relying on markings on the aircraft will do nothing to identify a problem unless the UAS crashes, but, as technology advances, transmitters can transmit a personal ID that can be read with receiver equipment. A few other individual commenters recommended a requirement to register the flight controller instead of the aircraft.

#### *P. Miscellaneous*

The FAA has updated § 91.203(a)(2) to allow the Certificate of Aircraft Registration issued under part 48 to satisfy the requirements of that paragraph.

The FAA has also made the following technical amendments to part 47: The Department of Homeland Security currently exercises the oversight responsibilities of the former Immigration and Naturalization Service. Part 47 has been updated to reflect this change.

The agency has also clarified that the reference to “armed forces” includes only those armed forces of the United States.

#### **VIII. Section-by-Section Discussion of the Interim Final Rule**

In part 1, definitions and abbreviations, definitions for “model aircraft,” “small unmanned aircraft,”

“small unmanned aircraft system,” and “unmanned aircraft” are added.

In part 45, identification and registration marking, § 45.1 is revised to add a specific cross-reference to 14 CFR part 47 to indicate that the marking requirements of part 45 only relate to aircraft registered under part 47.

In part 47, aircraft registration, in § 47.2 the definition of “resident alien” is revised to remove the reference to the Immigration and Naturalization Service and replace it with a reference to the Department of Homeland Security. The term “U.S. citizen” is revised to read “Citizen of the United States or U.S. citizen” to conform to other uses of this term.

Section 47.3 is revised to make clear that, when stating that no person may operate an aircraft that is eligible for registration under 49 U.S.C. 44101–44104, Armed Forces refers to Armed Forces of the United States.

Section 47.7 is revised to remove the reference to the Immigration and Naturalization Service and replace it with a reference to the Department of Homeland Security.

The FAA is adding new 14 CFR part 48, registration and markings for small unmanned aircraft.

Section 48.1 provides the applicability for the part. It states that small unmanned aircraft eligible for registration in the United States must be registered and identified in accordance with either the registration and identification requirements in part 48, or the registration requirements in part 47 and the identification and registration marking requirements in subparts A and C of part 45. Section 48.1 also explains that small unmanned aircraft intended to be operated outside of the territorial airspace of the United States, or registered through a trust or voting trust, must be registered in accordance with part 47 and satisfy the identification and registration marking requirements of subparts A and C of part 45.

Section 48.5 provides the compliance dates for small unmanned aircraft used exclusively as model aircraft, and the compliance dates for small unmanned aircraft used as other than model aircraft.

Section 48.10 provides definitions of “Citizen of the United States or U.S. citizen,” “Registry,” and “resident alien.” These are the same definitions found in part 47.

Section 48.15 provides that no person may operate a small unmanned aircraft that is eligible for registration under 49 U.S.C. 44101–44103 unless the owner has registered and marked the aircraft in accordance with the requirements of

part 48; the aircraft weighs 0.55 pounds or less on takeoff, including everything that is on board or otherwise attached to the aircraft; or the aircraft is an aircraft of the Armed Forces of the United States.

Section 48.20 provides the criteria for eligibility of the small unmanned aircraft for registration.

Section 48.25 describes the requirements for applicants wishing to register a small unmanned aircraft using part 48. Applicants must provide the required information, and must meet other ownership requirements listed in the section.

Section 48.30 provides the fees for small unmanned aircraft registration.

Section 48.100 describes information applicants must submit when registering a small unmanned aircraft intended to be used as other than a model aircraft, and the information applicants must submit when registering a small unmanned aircraft intended to be used exclusively as a model aircraft.

Section 48.105 requires small unmanned aircraft owners to maintain current information in the registration system.

Section 48.110 provides the Certificate of Aircraft Registration information for small unmanned aircraft intended to be used other than as model aircraft. It provides the effective date of the Certificate, information regarding registration renewal, and describes events affecting the effectiveness of the Certificate of Aircraft Registration.

Section 48.115 provides the Certificate of Aircraft Registration information for small unmanned aircraft intended to be used exclusively as model aircraft. It provides the effective date of the Certificate, information regarding registration renewal, and describes events affecting the effectiveness of the Certificate of Aircraft Registration.

Section 48.120 discusses circumstances in which a small unmanned aircraft registration is invalid. Circumstances include when the aircraft is registered in a foreign country; the applicant is not the owner, except when the applicant registers on behalf of an owner who is under 13 years of age; the applicant is not eligible to submit an application under part 48; or the interest of the applicant in the aircraft was created by a transaction that was not entered into in good faith, but rather was made to avoid (with or without the owner's knowledge) compliance with 49 U.S.C. 44101–44103.

Section 48.125 explains that for those persons who do not meet the citizenship

requirements for U.S. registration, the certificate issued under part 48 constitutes a recognition of ownership.

Section 48.200 contains general provisions for small unmanned aircraft marking.

Section 48.205 provides the requirements for the display and location of the unique identifier.

In part 91, general operating and flight rules, § 91.203 is revised to reference Certificates of Aircraft Registration provided in part 48.

In part 375, navigation of foreign civil aircraft within the United States, § 375.11 is clarified to note that this includes a small unmanned aircraft.

Section 375.38 authorizes owners of foreign civil aircraft that are small unmanned aircraft used exclusively as model aircraft to operate within the U.S. and requires owners of aircraft engaged in such operations to complete the part 48 registration process prior to operation.

## IX. Regulatory Notices and Analyses

### A. Regulatory Evaluation

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. 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 (Pub. L. 96–39 as amended) prohibits agencies from setting standards that create unnecessary obstacles to the foreign commerce of the United States. In developing U.S. standards, the Trade Agreements Act requires agencies to consider international standards and, where appropriate, that they be the basis of U.S. 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). This portion of the preamble summarizes the FAA's analysis of the economic impacts of this IFR. We suggest readers seeking greater detail read the full regulatory evaluation, a copy of which we have placed in the docket for this rulemaking.

In conducting these analyses, FAA has determined this IFR has benefits that justify its costs, and is a “significant regulatory action” as defined in section 3(f) of Executive Order 12866 because it raises novel policy issues contemplated under that executive order. The rule is also “significant” as defined in DOT's Regulatory Policies and Procedures. The IFR will have a positive economic impact on a substantial number of small entities, will not create unnecessary obstacles to international trade, and will not impose an unfunded mandate on state, local, or tribal governments, or on the private sector. These analyses are summarized below.

### Total Benefits and Costs

There are problems arising from the rapid proliferation of small unmanned aircraft and these problems are occurring more frequently. Sales projections show the number of small unmanned aircraft continuing to increase dramatically, and thus addressing the problem is urgent. Registration provides an immediate and direct opportunity to educate new users of unmanned aircraft who may have no knowledge of the system in which they are operating, and thus, no knowledge of how to operate safely within it. Registration and marking of small unmanned aircraft will provide owners education regarding operating in the NAS and will promote accountability in those operations, at a minimal cost to operators and the government.

Currently aircraft registration is a paper-based process defined in part 47. Under current statutory and regulatory policy, the FAA could require UAS model aircraft owners,<sup>46</sup> at a significant cost, to register their small unmanned aircraft under part 47 using the legacy paper-based system. Commercial owners<sup>47</sup> that have been granted exemptions or certificates of authorization to operate small unmanned aircraft in the NAS have been required to register their aircraft under part 47. Also, the sUAS Operation and Certification NPRM would require non-model aircraft owners (e.g., commercial and public owners of sUAS) to register their aircraft under part 47 as outlined in the NPRM. The agency expects to finalize that rulemaking in 2016.

<sup>46</sup> For purposes of the economic analysis of this IFR, the term “modeler” means the owner of a small unmanned aircraft that satisfies the definition of “model aircraft” added to 14 CFR 1.1

<sup>47</sup> For purposes of the economic analysis of this IFR, the term “commercial owners” or “non-modeler” means the owner of a small unmanned aircraft used for non-model purposes.

The FAA has used agency discretion in the past by not requiring owners of small unmanned aircraft intended to be used as model aircraft in accordance with section 336 of Public Law 112–95 to register their aircraft although as noted commercial operators of small unmanned aircraft have been required to register their aircraft. Due to the rapid increase in sUAS for hobby use (and soon at much greater volumes for commercial purposes), the FAA is creating an alternative simple, web-based registration process to significantly reduce the time to register small unmanned aircraft. In addition, to ease the burden to modelers this regulation will allow those owners to register once and use the same identification number for all their aircraft, instead of registering each of

their small unmanned aircraft separately.

In order to implement the new streamlined, web-based system described in this IFR, the FAA will incur costs to develop, implement, and maintain the system. Small UAS operators will require time to register and mark their aircraft, and that time has a cost. The total of government and registrant resource cost for small unmanned aircraft registration and marking under this new system is \$56 million (\$46 million present value at 7 percent) through 2020.

In evaluating the impact of this rule, we compare the costs and benefits of the IFR to a baseline consistent with existing practices: for modelers, the exercise of discretion by FAA (not requiring registration), and for non-

modelers, registration via part 47 in the paper-based system. We also calculate the costs of the rejected alternative: requiring modelers and non-modelers alike to register aircraft via the paper-based system.

In order to compare the costs of this rule to this baseline, the FAA estimated the costs of registering sUAS aircraft under the web-based registration system resulting from this part 48 rulemaking (the IFR). The two populations, modelers and non-modelers, have slightly different processes as noted in this evaluation. In all of these scenarios, sUAS weighing 0.55 pounds or less are excluded from registration. In these analyses, we estimate the private-sector compliance costs and government costs for each scenario.

TABLE 5—SUMMARY OF QUANTIFIED COSTS AND BENEFITS (\$M)

Year	Calendar year	Total cost		Difference	7% P.V.
		Baseline	IFR		
0 .....	2015	\$ 0.0	\$ 5.5	–\$ 5.5	–\$ 5.47
1 .....	2016	21.3	6.3	15.0	14.00
2 .....	2017	86.5	8.3	78.1	68.25
3 .....	2018	89.0	12.1	76.9	62.77
4 .....	2019	91.6	11.6	80.0	61.03
5 .....	2020	94.2	11.8	82.5	58.79
Total .....	.....	382.5	55.6	327.0	259.4

Note: numbers may not add due to rounding.

Who is potentially affected by this rule?

All owners of small unmanned aircraft which weigh more than 0.55 pounds and less than 55 pounds on takeoff.

Assumptions and Data

The benefit and cost analysis for the regulatory evaluation is based on the following factors/assumptions. Technology, markets, and uses for small unmanned aircraft are evolving rapidly and there is a high degree of uncertainty how the future will unfold and so the FAA requests comments (supported with data) on these assumptions.

- The period of the regulatory impact analysis begins in 2015 (denoted Year 0) and ends in 2020 (denoted Year 5).
- This analysis considers the benefits and costs of requiring the registrations of sUAS weighing less than 55 pounds and more than 0.55 pounds on takeoff. We use a seven percent discount rate for the benefits as prescribed by OMB in Circular A–4.

Population and Forecast

- Most of these assumptions, unless otherwise noted, were based on

interviews with manufacturers, retailers, and other industry experts.

- Estimates of small unmanned aircraft registrations are based on projections of sUAS sales for the period of analysis. A sales forecast was developed based on use cases and likely adoption rates by commercial application and consumer electronic s-curve analysis for non-commercial applications. This forecast was then adjusted to obtain the number of modelers and the number of non-modeler sUAS units.
- Two basic populations are estimated: (1) Model aircraft owners and their sUAS units and (2) the number of commercial/public owners and their sUAS units. In this document, the term “modeler” means the owner of a small unmanned aircraft that satisfies the statutory definition of “model aircraft” now codified in 14 CFR 1.1. The term “commercial owner” or “non-modeler” means the owner of a small unmanned aircraft used for non-model aircraft purposes.
- For non-modelers, we assume that on average, all sUAS fail within a year and are replaced in the next year. For modelers we use the assumption that an

average of ten percent of the modelers’ sUAS survive into a second year, because they are used less intensively. These assumptions are based on manufacturers’ information.

- Unmanned aircraft weighing 0.55 pounds or less are excluded from the registrations forecast. We assume 20 percent of the sales forecast will be unmanned aircraft weighing 0.55 pounds or less. This analysis is based on an examination of the current unit size distribution. While there may be some incentive for manufacturers to increase the number of aircraft produced below the registration size cut-off, the FAA believes the inherent limitations of the weight and available technology will not drive large shifts during analysis period. SUAS flown exclusively indoors need not be registered. FAA assumes most sUAS over 0.55 pounds will be flown outdoors and must be registered.
- The entire existing fleet of model aircraft and 2015 fourth quarter sales are assumed to be registered in Period 0 or 2015.
- Most non-modelers will register their aircraft after the FAA has finalized the sUAS Operation and Certification

NPRM, anticipated to go into effect in June 2016.

- On average, model aircraft owners are assumed to own an average fleet size of 1.5 sUAS.

- 80 percent of model aircraft owners replace each aircraft as it is destroyed. (In other words, 20 percent of modelers drop out of the hobby each year).

- On average, non-model sUAS owners are assumed to own 2 aircraft at a time. Every year all of the non-model sUAS owners go through the registration system replacing their two aircraft.

#### Time

- The estimated time to register an aircraft via the part 47 (paper-based system) system is 30 minutes.<sup>48</sup>

- The estimated time for a model aircraft owner to establish an online account and register an aircraft, under this rulemaking, is estimated to take 5 minutes; a registration renewal for these owners is also estimated to take 5 minutes. The bulk of this time includes reading and acknowledging basic safety information presented during the registration process.

- The estimated time for a non-modeler registrant to establish an online account and register two small unmanned aircraft is 7 minutes; 5 minutes to establish an account plus 1 minute per small unmanned aircraft.

- The estimated time for a non-modeler registrant to de-register each aircraft is three minutes.

- The time for an owner to mark an aircraft with its registration number is de minimis.

- The analysis assumes that all sUAS owners will comply with the registration processes considered in the regulatory analysis (part 47 baseline system and the web-based systems resulting from this part 48 rulemaking).

#### Costs

- The FAA assigns an hourly value of \$19.13 per hour for the value of time for model aircraft registrants and \$24.89 per hour for the value of time for non-

modeler registrants in 2015. These hourly values are in 2013 dollars adjusted to reflect the growth of real changes in median household income over the analysis interval.<sup>49</sup>

- FAA estimates that its costs are \$22 for the registration of an aircraft in the current paper-based system. This estimate is based on an internal cost model developed by FAA's Civil Aviation Registry for managerial purposes.

- FAA cost information for the streamlined, web-based registrations was developed based on cost models and FAA data. Costs for the web-based system include startup costs, costs to provide interfaces for retailers and manufacturers, the cost of providing for public search function based on the unique identifier, the cost of providing for law enforcement access, and maintenance costs, whether incurred by FAA personnel or FAA's contractors.

We do not include costs for manufacturers or retailers to provide information to the registration system or to change packaging as those are voluntary actions. FAA expects that retailers will make point-of-sale interfaces available in the future.

- As is standard practice, FAA does not include costs of enforcement of this rule.

#### Safety

- We assume this regulation does not affect the levels of FAA manpower or resources expended on UAS safety education and outreach but it will allow the FAA to target those efforts, making those on-going efforts more effective.

- We do not attempt to quantify any safety benefit from this regulation. (See "Qualitative Benefits" section in the Regulatory Evaluation for further discussion).

#### Fees

- The fee to register an aircraft under part 48, as well as in the current paper-based system in part 47, is \$5. This fee is required by statute and is based on an

estimate of the costs of the system and services associated with aircraft registration. If actual costs for the web-based system are known before a final rule is issued, we will adjust the fee accordingly in the final rule. If not, we will continue to monitor and determine the actual costs and adjust the fee in a subsequent rulemaking. FAA notes that under part 47, the registration fee using the paper-based system is \$5 per aircraft. FAA has begun a rulemaking to update this fee based on current costs. (Aircraft Registration and Airmen Certification Fees, RIN 2120-AK37).

- We have estimated the registration fee for the new web-based system to be \$5, based on the projected costs to build and maintain the system and provide the registration service. Model aircraft owners will pay \$5 to register and will be assigned a unique identifier that can be marked on the owner's entire fleet of model aircraft. Model aircraft owners will be required to renew their registration every 3 years and pay a \$5 fee. There would be no charge for de-registration. Fees will be adjusted based on actual costs.

- Non-modeler aircraft owners will also pay a \$5 fee to establish an online account and register an initial aircraft in the new web-based system. They will also pay a \$5 fee to add each additional sUAS to their existing account. Aircraft must be re-registered after three years, but as noted above, FAA expects very few, if any, sUAS to last that long. Non-modeler aircraft owners will not pay a fee to de-register a sUAS.

- Government fees and taxes are considered transfers and, by Office of Management and Budget guidance, transfers are not considered a societal cost. These transfers are estimated separately from the costs and benefits of this IFR. The FAA acknowledges fees and transfers can create incentives for behavior change.

#### Costs of This Rule

TABLE 6—COST SUMMARY  
[\$M]

Year	Calendar year	Total cost			Total costs 7% P.V.		
		Baseline	Interim final rule	Rejected alternative	Baseline	Interim final rule	Rejected alternative
0 .....	2015	\$ 0.0	\$ 5.5	\$ 44.2	\$ 0.0	\$ 5.5	\$ 44.2
1 .....	2016	21.3	6.3	65.1	19.9	5.9	60.9

<sup>48</sup> See Supporting Statement, OMB 2120-0042 Aircraft Registration Including Assignment and Cancellation of U.S. Identification Marks

<sup>49</sup> The hourly opportunity cost for modelers is based on the mid-point estimate of the range values

as specified in Section 1.2.3 of FAA's Treatment of Time: Economic Values for Evaluation of FAA Investment and Regulatory Decisions ([http://www.faa.gov/regulations\\_policies/policy\\_guidance/benefit\\_cost/](http://www.faa.gov/regulations_policies/policy_guidance/benefit_cost/)). The hourly opportunity cost for non-modelers is estimated as the median gross

compensation which is the sum of median hourly wage and an estimate of hourly benefits. This estimate is reported in DOT guidance titled Revised Departmental Guidance on Valuation of Travel Time in Economic Analysis (Washington DC, 2015).

TABLE 6—COST SUMMARY—Continued  
[\$M]

Year	Calendar year	Total cost			Total costs 7% P.V.		
		Baseline	Interim final rule	Rejected alternative	Baseline	Interim final rule	Rejected alternative
2 .....	2017	86.5	8.3	140.6	75.5	7.3	122.8
3 .....	2018	89.0	12.1	155.7	72.6	9.9	127.1
4 .....	2019	91.6	11.6	173.9	69.9	8.8	132.7
5 .....	2020	94.2	11.8	195.9	67.2	8.4	139.6
Total .....	.....	382.5	55.6	775.4	305.1	45.7	627.3

Totals may not add due to rounding.

### Benefits of This Rule

In this section, we discuss beneficial impacts to the non-modeler from the cost savings of this rule over registering sUAS aircraft using the baseline system. The cost savings offsets, by an order of magnitude, the new costs associated

with modelers and non-modelers registering aircraft in the streamlined Web-based system.

The baseline column in Table 7 shows the total costs for non-modelers to register their aircraft using the paper-based system, while modelers do not register their aircraft. The IFR column

shows the total costs to FAA and registrants (modelers and non-modelers) of the new web-based system. Table 7 shows the significant cost savings of subtracting the costs of registration between the baseline system from the registration costs imposed by this rulemaking.

TABLE 7—COST SAVINGS OF THE BASELINE VERSUS THE PART 48 RULEMAKING  
[\$M]

Year	Calendar year	Total Cost		Difference	7% P.V.
		Baseline	IFR		
0 .....	2015	\$ 0.0	\$ 5.5	–\$ 5.5	–\$ 5.5
1 .....	2016	21.3	6.3	15.0	14.0
2 .....	2017	86.5	8.3	78.1	68.3
3 .....	2018	89.0	12.1	77.9	62.8
4 .....	2019	91.6	11.6	80.0	61.0
5 .....	2020	94.2	11.8	82.5	58.8
Total .....	.....	382.5	55.6	327.0	259.4

Note: numbers may not add due to rounding.

This IFR also brings qualitative benefits. Registrants will be required to read and acknowledge some basic safety information during the registration process. The email and mailing addresses provided during the registration process provides further opportunity for future targeted safety education and information.

This rulemaking will improve the education of recreational sUAS owners and operators by making them aware of the regulatory and safety requirements affecting their activities. At the same time, it will provide essential educational tools to the legions of new and current flyers that are taking to the skies, so that they can use their unmanned aircraft safely.

The requirement to mark the aircraft with the registration number links the owner to the aircraft; providing accountability should an accident, incident, or regulatory violation occur. This IFR also has the potential to benefit sUAS owners. In the event of a mistake

where the aircraft flies away from the owner, the registration marking provides a means for the aircraft to be returned to its owner.

Requiring aircraft registration and display of marking information often has a direct and immediate impact on safety-related issues. For example, aircraft registration and marking provides the FAA and law enforcement agencies an invaluable tool during inspections and investigations of inappropriate or prohibited behavior, as well as during emergency situations. One of the FAA's goals is to provide the FAA and local law enforcement agencies the immediate ability to quickly connect individuals to their aircraft with the fewest number of steps possible.

### B. Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 (Public Law 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.

The Regulatory Flexibility Act analysis requirements are limited to rulemakings for which the agency “is required by section 553 . . . or any other law, to publish a general notice of proposed rulemaking for any proposed rule.” 5 U.S.C. 603(a). In this instance, the agency has determined under section 553(b)(3)(B) of the APA that there is good cause for forgoing notice and comment for this rulemaking. Thus,

compliance with the RFA is not required in this instance.

Nonetheless, the FAA believes that this IFR will have a positive economic impact on a substantial number of entities for the following reasons. Individuals using small unmanned aircraft exclusively as model aircraft are not small business entities. For owners of aircraft used for commercial or non-model purposes, the \$5 registration fee per small unmanned aircraft under this IFR is the same as what was proposed under the sUAS Operation and Certification NPRM. However this IFR reduces the burden for these small entities to register their small unmanned aircraft as compared to the current paper-based FAA registration system. Thus, due to the relieving nature of this IFR, there will be a positive economic impact on a substantial number of small entities.

### C. International Trade Impact Assessment

The Trade Agreements Act of 1979 (Public Law 96–39), as amended by the Uruguay Round Agreements Act (Public Law 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 U.S. standards. The FAA has assessed the potential effect of this IFR and determined that it has a legitimate

domestic objective—the protection of safety—and does not operate in a manner that excludes imports that meet this objective. Further, it is not an unnecessary obstacle because currently, there is no foreign registry that the FAA can recognize and the other requirements (compliance with provisions of part 48) impose no greater burden than that which is imposed on U.S. citizens.

### D. Unfunded Mandates Assessment

Title II of the Unfunded Mandates Reform Act of 1995 (Public Law 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 one 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 \$155.0 million in lieu of \$100 million. This IFR 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. According to the 1995 amendments to the Paperwork Reduction Act (5 CFR 1320.8(b)(2)(vi)), an agency may not collect or sponsor the collection of information, nor may it impose an information collection requirement unless it displays a currently valid Office of Management and Budget (OMB) control number.

This action contains the following new information collection. As required by the Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)), the FAA has

submitted this information collection to OMB for its review.

**Summary:** Persons owning small unmanned aircraft, whether intended to be used as model aircraft or as other than model aircraft, are required to register those aircraft with the FAA pursuant to 49 U.S.C. 44101–44103. Persons may register small unmanned aircraft pursuant to the requirements of 14 CFR part 48 as an alternative to the registration requirements of 14 CFR part 47. Aircraft registration is necessary to ensure personal accountability among all users of the national airspace system. Aircraft registration also allows the FAA and law enforcement agencies to address non-compliance by providing the means by which to identify an aircraft's owner and operator.

**Use:** Information will be used to identify small unmanned aircraft owners and to provide educational information regarding use of small unmanned aircraft in the national airspace system.

**Respondents (including number of):** See Table 8.

**Frequency:** As needed. Persons will register small unmanned aircraft prior to operation and, if they continue to own the aircraft, will renew registration every three years thereafter.

**Annual Burden Estimate:** For the modelers and non-modelers, the following table shows the total number of modelers, their time, and their costs to fill out the on-line system and register plus the time to re-register and for the non-modelers, the number of total respondents (small unmanned aircraft), their time to fill out the online system and register, the time to register each of their small unmanned aircraft, and their time de-register their aircraft after they retire their aircraft. There are no costs associated with this information collection aside from the time spent to complete registration.

TABLE 8—AVERAGE ANNUAL BURDEN ESTIMATES  
[Years 0–5 (6 Years)]

Category	Number of responses (M)	Minutes per response	Frequency	Hours (000)
Modeler				
Owner Registration .....	0.57	5	1 time .....	47.8
Owner Re-Registration .....	0.16	5	Every 3 years .....	12.9
Non-Modeler				
Small Unmanned Aircraft Registration .....	1.82	3.5	1 Time .....	121.9
Small Unmanned Aircraft De-Registration .....	1.66	3	1 Time .....	69.0

Rows may not sum due to rounding.

The agency is soliciting comments to—

(1) Evaluate whether the proposed information requirement is necessary for the proper performance of the functions

of the agency, including whether the information will have practical utility;

(2) Evaluate the accuracy of the agency's estimate of the burden;

(3) Enhance the quality, utility, and clarity of the information to be collected; and

(4) Minimize the burden of collecting information on those who are to respond, including by using appropriate automated, electronic, mechanical, or other technological collection techniques or other forms of information technology.

Individuals and organizations may send comments on the information collection requirement to the address listed in the **ADDRESSES** section at the beginning of this preamble by January 15, 2016. Comments also should be submitted to the Office of Management and Budget, Office of Information and Regulatory Affairs, Attention: Desk Officer for FAA, New Executive Office Building, Room 10202, 725 17th Street NW., Washington, DC 20503.

#### *F. International Compatibility and Cooperation*

In keeping with U.S. obligations under the Convention on International Civil Aviation, it is FAA policy to conform to International Civil Aviation Organization (ICAO) Standards and Recommended Practices to the maximum extent practicable. In the instance of this rulemaking, the FAA does not intend to comply with international standards. The registration and marking requirements in this IFR apply only to operations within the United States. The agency will file differences as is appropriate.

#### *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 in the absence of extraordinary circumstances. The FAA has determined this rulemaking action qualifies for the categorical exclusion identified in paragraph 5–6.6f and involves no extraordinary circumstances.

### **X. Executive Order Determinations**

#### *A. Executive Order 13132, Federalism*

The FAA has analyzed this immediately adopted final rule under the principles and criteria of Executive Order 13132, Federalism. The agency determined that this action will 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, does not have Federalism implications.

#### *B. Executive Order 13211, Regulations That Significantly Affect Energy Supply, Distribution, or Use*

The FAA analyzed this immediately adopted final rule under Executive Order 13211, Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use (May 18, 2001). The agency has determined that it is not a “significant energy action” under the executive order and it is not likely to have a significant adverse effect on the supply, distribution, or use of energy.

#### *C. 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 reduce, eliminate, or prevent unnecessary differences in regulatory requirements. The FAA has analyzed this action under the policy and agency responsibilities of Executive Order 13609, Promoting International Regulatory Cooperation. The FAA has analyzed this action under the policies and agency responsibilities of Executive Order 13609, and has determined that this action would have no effect on international regulatory cooperation.

### **XI. How To Obtain Additional Information**

#### *A. Rulemaking Documents*

An electronic copy of a rulemaking document may be obtained via the Internet by—  
Searching the Federal eRulemaking Portal (<http://www.regulations.gov>);  
Visiting the FAA's Regulations and Policies Web page at [http://www.faa.gov/regulations\\_policies/](http://www.faa.gov/regulations_policies/) or  
Access the Government Publishing Office's Web page at: <http://www.gpo.gov/fdsys/>.

Copies may also be obtained by sending a request (identified by notice, amendment, or docket number of this rulemaking) to the Federal Aviation Administration, Office of Rulemaking, ARM–1, 800 Independence Avenue SW., Washington, DC 20591, or by calling (202) 267–9677.

#### *B. Comments Submitted to the Docket*

Comments received may be viewed by going to <http://www.regulations.gov> and following the online instructions to search the docket number for this

action. Anyone is able to search the electronic form of all comments received into any of the FAA's dockets by the name of the individual submitting the comment (or signing the comment, if submitted on behalf of an association, business, labor union, etc.).

#### *C. Small Business Regulatory Enforcement Fairness Act*

The Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996 requires 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 [http://www.faa.gov/regulations\\_policies/rulemaking/sbre\\_act/](http://www.faa.gov/regulations_policies/rulemaking/sbre_act/).

### **List of Subjects**

#### *14 CFR Part 1*

Air transportation.

#### *14 CFR Part 45*

Aircraft, Signs and symbols.

#### *14 CFR Part 47*

Aircraft, Reporting and recordkeeping requirements.

#### *14 CFR Part 48*

Aircraft, Reporting and recordkeeping requirements, Signs and symbols, Small unmanned aircraft, Unmanned aircraft.

#### *14 CFR Part 91*

Air traffic control, Aircraft, Airmen, Airports, Aviation safety, Reporting and recordkeeping requirements.

#### *14 CFR Part 375*

Administrative practice and procedure, Aircraft, Foreign relations, Reporting and recordkeeping requirements.

### **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 is revised to read as follows:

**Authority:** 49 U.S.C. 106(f), 106(g), 40113, 44701.

■ 2. In § 1.1, add the definitions of “Model aircraft”, “Small unmanned aircraft”, “Small unmanned aircraft

system”, and “Unmanned aircraft” in alphabetical order to read as follows:

#### § 1.1 General definitions.

\* \* \* \* \*

*Model aircraft* means an unmanned aircraft that is:

(1) Capable of sustained flight in the atmosphere;

(2) Flown within visual line of sight of the person operating the aircraft; and

(3) Flown for hobby or recreational purposes.

\* \* \* \* \*

*Small unmanned aircraft* means an unmanned aircraft weighing less than 55 pounds on takeoff, including everything that is on board or otherwise attached to the aircraft.

*Small unmanned aircraft system (small UAS)* means a small unmanned aircraft and its associated elements (including communication links and the components that control the small unmanned aircraft) that are required for the safe and efficient operation of the small unmanned aircraft in the national airspace system.

\* \* \* \* \*

*Unmanned aircraft* means an aircraft operated without the possibility of direct human intervention from within or on the aircraft.

\* \* \* \* \*

## PART 45—IDENTIFICATION AND REGISTRATION MARKING

■ 3. The authority citation for part 45 is revised to read as follows:

**Authority:** 49 U.S.C. 106(f), 106(g), 40103, 40113–40114, 44101–44105, 44107–44111, 44504, 44701, 44708–44709, 44711–44713, 44725, 45302–45303, 46104, 46304, 46306, 47122.

■ 4. In § 45.1, revise paragraph (b) to read as follows:

#### § 45.1 Applicability.

\* \* \* \* \*

(b) Nationality and registration marking of aircraft registered in the United States in accordance with part 47.

## PART 47—AIRCRAFT REGISTRATION

■ 5. The authority citation for part 47 is revised to read as follows:

**Authority:** 4 U.S.T. 1830; Public Law 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, 45302, 45305, 46104, 46301.

■ 6. Revise § 47.2 to read as follows:

#### § 47.2 Definitions.

The following are definitions of terms used in this part:

*Citizen of the United States or U.S. citizen* means one of the following:

(1) An individual who is a citizen of the United States or one of its possessions.

(2) A partnership each of whose partners is an individual who is a citizen of the United States.

(3) A corporation or association organized under the laws of the United States or a State, the District of Columbia, or a territory or possession of the United States, of which the president and at least two-thirds of the board of directors and other managing officers are citizens of the United States, which is under the actual control of citizens of the United States, and in which at least 75 percent of the voting interest is owned or controlled by persons that are citizens of the United States.

*Registry* means the FAA, Civil Aviation Registry, Aircraft Registration Branch.

*Resident alien* means an individual citizen of a foreign country lawfully admitted for permanent residence in the United States as an immigrant in conformity with the regulations of the Department of Homeland Security (8 CFR Chapter 1).

■ 7. In § 47.3, revise paragraph (b)(3) to read as follows:

#### § 47.3 Registration required.

\* \* \* \* \*

(b) \* \* \*

(3) Is an aircraft of the Armed Forces of the United States.

\* \* \* \* \*

■ 8. In § 47.7, Revise paragraph (b) to read as follows:

#### § 47.7 United States citizens and resident aliens.

\* \* \* \* \*

(b) *Resident aliens.* An applicant for aircraft registration under 49 U.S.C. 44102 who is a resident alien must furnish a representation of permanent residence and the applicant’s alien registration number issued by the Department of Homeland Security.

\* \* \* \* \*

■ 9. Add part 48 to read as follows:

## PART 48—REGISTRATION AND MARKING REQUIREMENTS FOR SMALL UNMANNED AIRCRAFT

### Subpart A—General

Sec.

48.1 Applicability.

48.5 Compliance dates.

48.10 Definitions.

48.15 Requirement to register.

48.20 Eligibility for registration.

48.25 Applicants.

48.30 Fees.

### Subpart B—Certificates of Aircraft Registration for Small Unmanned Aircraft

48.100 Application.

48.105 Requirement to maintain current information.

48.110 Registration: Persons intending to use small unmanned aircraft for purposes other than as model aircraft.

48.115 Registration: Individuals intending to use the small unmanned aircraft exclusively as a model aircraft.

48.120 Invalid registration.

48.125 Foreign civil aircraft.

### Subpart C—Aircraft Marking

48.200 General.

48.205 Display and location of unique identifier.

**Authority:** 49 U.S.C. 106(f), 106(g), 40101, 40103, 40113–40114, 41703, 44101–44103, 44105–44106, 44110–44113, 45302, 45305, 46104, 46301, 46306.

### Subpart A—General

#### § 48.1 Applicability.

(a) This part provides registration and identification requirements for small unmanned aircraft that are part of a small unmanned aircraft system as defined in § 1.1 of this chapter.

(b) Small unmanned aircraft eligible for registration in the United States must be registered and identified in accordance with either:

(1) The registration and identification requirements in this part; or

(2) The registration requirements in part 47 and the identification and registration marking requirements in subparts A and C of part 45.

(c) Small unmanned aircraft intended to be operated outside of the territorial airspace of the United States, or registered through a trust or voting trust, must be registered in accordance with subparts A and B of part 47 and satisfy the identification and registration marking requirements of subparts A and C of part 45.

#### § 48.5 Compliance dates.

(a) *Small unmanned aircraft used exclusively as model aircraft.* For small unmanned aircraft operated by the current owner prior to December 21, 2015, compliance with the requirements of this part or part 47 is required no later than February 19, 2016. For all other small unmanned aircraft, compliance with this part is required prior to operation of the small unmanned aircraft.

(b) *Small unmanned aircraft used as other than model aircraft.* Small unmanned aircraft owners authorized to conduct operations other than model aircraft operations must register the small unmanned aircraft in accordance

with part 47 of this chapter. Beginning March 31, 2016, small unmanned aircraft operated as other than model aircraft may complete aircraft registration in accordance with this part.

#### **§ 48.10 Definitions.**

For purposes of this part, the following definitions apply:

*Citizen of the United States or U.S. citizen* means one of the following:

(1) An individual who is a citizen of the United States or one of its possessions.

(2) A partnership each of whose partners is an individual who is a citizen of the United States.

(3) A corporation or association organized under the laws of the United States or a State, the District of Columbia, or a territory or possession of the United States, of which the president and at least two-thirds of the board of directors and other managing officers are citizens of the United States, which is under the actual control of citizens of the United States, and in which at least 75 percent of the voting interest is owned or controlled by persons that are citizens of the United States.

*Registry* means the FAA, Civil Aviation Registry, Aircraft Registration Branch.

*Resident alien* means an individual citizen of a foreign country lawfully admitted for permanent residence in the United States as an immigrant in conformity with the regulations of the Department of Homeland Security (8 CFR Chapter 1).

#### **§ 48.15 Requirement to register.**

No person may operate a small unmanned aircraft that is eligible for registration under 49 U.S.C. 44101–44103 unless one of the following criteria has been satisfied:

(a) The owner has registered and marked the aircraft in accordance with this part;

(b) The aircraft weighs 0.55 pounds or less on takeoff, including everything that is on board or otherwise attached to the aircraft; or

(c) The aircraft is an aircraft of the Armed Forces of the United States.

#### **§ 48.20 Eligibility for registration.**

A small unmanned aircraft may be registered under 49 U.S.C. 44103 and under this part only when the aircraft is not registered under the laws of a foreign country and is—

(a) Owned by a U.S. citizen;

(b) Owned by an individual citizen of a foreign country lawfully admitted for permanent residence in the United States;

(c) Owned by a corporation not a citizen of the United States when the corporation is organized and doing business under the laws of the United States or a State within the United States, and the aircraft is based and primarily used in the United States; or

(d) An aircraft of—

(1) The United States Government; or

(2) A State, the District of Columbia, a territory or possession of the United States, or a political subdivision of a State, territory, or possession.

#### **§ 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 § 48.100 to the Registry in the form and manner prescribed by the Administrator. Upon submission of this information, the FAA issues a Certificate of Aircraft Registration to that person.

(b) A small unmanned aircraft must be registered by its owner using the legal name of its owner, unless the owner is less than 13 years of age. If the owner is less than 13 years of age, then the small unmanned aircraft must be registered by a person who is at least 13 years of age.

(c) In accordance with 49 U.S.C. 44103(c), registration is not evidence of aircraft ownership in any proceeding in which ownership of an unmanned aircraft by a particular person is in issue.

(d) In this part, “owner” includes a buyer in possession, a bailee, a lessee of a small unmanned aircraft under a contract of conditional sale, and the assignee of that person.

#### **§ 48.30 Fees.**

(a) The fee for issuing or renewing a Certificate of Aircraft Registration for aircraft registered in accordance with § 48.100(a) is \$5.00 per aircraft.

(b) The fee for issuing or renewing a Certificate of Aircraft Registration for aircraft registered in accordance with § 48.100(b) is \$5.00 per certificate.

(c) Each application for and renewal of a Certificate of Aircraft Registration must be accompanied by the fee described in paragraphs (a) and (b), as applicable, paid to the Federal Aviation Administration through the web-based aircraft registration system, or in another manner if prescribed by the Administrator.

### **Subpart B—Certificates of Aircraft Registration for Small Unmanned Aircraft**

#### **§ 48.100 Application.**

(a) *Required information: Persons intending to use the small unmanned*

*aircraft as other than a model aircraft.* Each applicant for a Certificate of Aircraft Registration issued under this part must submit all of the following information to the Registry:

(1) Applicant 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 for the authorized representative. If the applicant or authorized representative does not receive mail at their physical address, a mailing address must also be provided.

(3) Applicant’s email address or, for applicants other than individuals, the email address of the authorized representative.

(4) The aircraft manufacturer and model name.

(5) The aircraft serial number, if available.

(6) Other information as required by the Administrator.

(b) *Required information: Individuals intending to use the small unmanned aircraft exclusively as a model aircraft.* Each applicant for a Certificate of Aircraft Registration issued under this part must submit all of the following information to the Registry:

(1) Applicant name.

(2) Applicant’s physical address and if the applicant does not receive mail at their physical address, a mailing address must also be provided.

(3) Applicant’s email address.

(4) Other information as required by the Administrator.

(c) *Provision of information.* The information identified in paragraphs (a) and (b) 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.

(d) *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) or (b) of this section as applicable.

#### **§ 48.105 Requirement to maintain current information.**

(a) The holder of a Certificate of Aircraft Registration must ensure that the information provided under § 48.100 remains accurate.

(b) The holder of a Certificate of Aircraft Registration must update the information using the web-based small unmanned aircraft registration system within 14 calendar days of the following:

(1) A change in the information provided under § 48.100.

(2) When aircraft registration requires cancellation for any reason including sale or transfer, destruction, or export.

**§ 48.110 Registration: Persons intending to use small unmanned aircraft for purposes other than as model aircraft.**

(a) *Certificate of Aircraft Registration.* A Certificate of Aircraft Registration issued in accordance with § 48.100 for aircraft used for purposes other than as model aircraft constitutes registration only for the small unmanned aircraft identified on the application.

(b) *Effective date of registration.* An aircraft is registered when the applicant receives a Certificate of Aircraft Registration for the specific aircraft. The effective date of registration is shown by the date of issue on the Certificate of Aircraft Registration issued for the aircraft.

(c) *Registration renewal.* A Certificate of Aircraft registration issued under this part expires 3 years after the date of issue unless it is renewed.

(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 § 48.100 of this subpart 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.

(2) A certificate issued under this paragraph expires three years from the expiration date of the previous certificate.

(d) *Other events affecting effectiveness of Certificate.* Each Certificate of Aircraft Registration issued by the FAA under this subpart is effective, unless registration has ended by reason of having been revoked, canceled, expired, or the ownership is transferred, until the date upon which one of the following events occurs:

(1) Subject to the Convention on the International Recognition of Rights in Aircraft when applicable, the aircraft is registered under the laws of a foreign country.

(2) The small unmanned aircraft is totally destroyed or scrapped.

(3) The holder of the Certificate of Aircraft Registration loses U.S. citizenship.

(4) Thirty days have elapsed since the death of the holder of the Certificate of Aircraft Registration.

(5) The owner, if an individual who is not a citizen of the United States, loses status as a resident alien, unless

that person becomes a citizen of the United States at the same time.

(6) The owner is a corporation other than a corporation which is a citizen of the United States and one of the following events occurs:

(i) The corporation ceases to be lawfully organized and doing business under the laws of the United States or any State thereof; or

(ii) The aircraft was not operated exclusively within the United States during the period of registration under this part.

**§ 48.115 Registration: Individuals intending to use small unmanned aircraft exclusively as a model aircraft.**

(a) *Certificate of Aircraft Registration:* A Certificate of Aircraft Registration issued in accordance with § 48.100 for small unmanned aircraft used exclusively as model aircraft constitutes registration for all small unmanned aircraft used exclusively as model aircraft owned by the individual identified on the application.

(b) *Effective date of registration.* An aircraft is registered when the applicant receives a Certificate of Aircraft Registration. The effective date of registration is shown by the date of issue on the Certificate of Aircraft Registration issued under this part.

(c) *Registration renewal.* A Certificate of Aircraft registration issued under this part expires 3 years after the date of issue unless it is renewed.

(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 § 48.100(b) and (c) of this part 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.

(2) A certificate issued under this paragraph expires three years from the expiration date of the previous certificate.

(d) *Other events affecting effectiveness of Certificate.* Each Certificate of Aircraft Registration issued by the FAA under this part is effective, unless registration has ended by reason of having been revoked, canceled or expired, or until the date upon which one of the following events occurs:

(1) The holder of the Certificate of Aircraft Registration loses U.S. citizenship.

(2) Thirty days have elapsed since the death of the holder of the Certificate of Aircraft Registration.

(3) The owner, if an individual who is not a citizen of the United States, loses status as a resident alien, unless that person becomes a citizen of the United States at the same time.

**§ 48.120 Invalid registration.**

The registration of a small unmanned aircraft is invalid if, at the time it is made—

(a) The aircraft is registered in a foreign country;

(b) The applicant is not the owner, except when the applicant registers on behalf of an owner who is under 13 years of age;

(c) The applicant is not eligible to submit an application under this part; or

(d) The interest of the applicant in the aircraft was created by a transaction that was not entered into in good faith, but rather was made to avoid (with or without the owner's knowledge) compliance with 49 U.S.C. 44101–44103.

**§ 48.125 Foreign civil aircraft.**

Except for corporations eligible to register under § 48.20(c), the FAA will issue a recognition of ownership to persons required to comply with the provisions of this part pursuant to an authorization to operate issued under part 375 of this title. The recognition of ownership does not have the effect of U.S. aircraft registration.

**Subpart C—Aircraft Marking**

**§ 48.200 General.**

(a) No person may operate a small unmanned aircraft registered in accordance with this part unless the aircraft displays a unique identifier in accordance with the requirements of § 48.205 of this subpart.

(b) A unique identifier is one of the following:

(1) The registration number issued to an individual or the registration number issued to the aircraft by the Registry upon completion of the registration process provided by this part; or

(2) If authorized by the Administrator and provided with the application for Certificate of Aircraft Registration under § 48.100 of this part, the small unmanned aircraft serial number.

**§ 48.205 Display and location of unique identifier.**

(a) The unique identifier must be maintained in a condition that is legible.

(b) The unique identifier must be affixed to the small unmanned aircraft by any means necessary to ensure that it will remain affixed for the duration of each operation.

(c) The unique identifier must be readily accessible and visible upon

inspection of the small unmanned aircraft. A unique identifier enclosed in a compartment is readily accessible if it can be accessed without the use of any tool.

## **PART 91—GENERAL OPERATING AND FLIGHT RULES**

- 10. The authority citation for part 91 continues to read as follows:

**Authority:** 49 U.S.C. 106(f), 106(g), 1155, 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, articles 12 and 29 of the Convention on International Civil Aviation (61 Stat. 1180), (126 Stat. 11).

- 11. In § 91.203, revise paragraph (a)(2) to read as follows:

### **§ 91.203 Civil aircraft: Certifications required.**

(a) \* \* \*

(2) An effective U.S. registration certificate issued to its owner or, for operation within the United States, the second copy of the Aircraft registration Application as provided for in

§ 47.31(c), a Certificate of Aircraft registration as provided in part 48, or a registration certification issued under the laws of a foreign country.

\* \* \* \* \*

## **PART 375—NAVIGATION OF FOREIGN CIVIL AIRCRAFT WITHIN THE UNITED STATES**

- 12. The authority citation for part 375 continues to read as follows:

**Authority:** 49 U.S.C. 40102, 40103, and 41703.

- 13. Revise § 375.11 to read as follows:

### **§ 375.11 Other Foreign Civil Aircraft.**

A foreign civil aircraft, including unmanned aircraft as defined in § 1.1 of this title, other than those referred to in § 375.10 may be navigated in the United States only when:

(a) The operation is authorized by the Department under the provisions of this part, and

(b) The aircraft complies with any applicable airworthiness standards of the Federal Aviation Administration for its operation.

- 14. Add § 375.38 to subpart D to read as follows:

### **§ 375.38 Other foreign civil aircraft: Small unmanned aircraft operated exclusively as model aircraft.**

Foreign civil aircraft that are small unmanned aircraft used exclusively as model aircraft may be operated in the United States only when the individual:

(a) Completes the registration process in accordance with §§ 48.30, 48.100(b) and (c), 48.105, and 48.115 of this title;

(b) Identifies the aircraft in accordance with the aircraft marking requirements in §§ 48.200 and 48.205 of this title; and

(c) Complies with the requirements of Sec. 336 of Pub. L. 112–95 (Feb. 14, 2012).

Issued under the authority of 49 U.S.C. 106(f), 41703, 44101–44103, in Washington, DC on December 14, 2015.

**Anthony R. Foxx,**  
*Secretary of Transportation.*

**Michael P. Huerta,**  
*Administrator.*

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