State and Local Regulation of Unmanned Aircraft Systems (UAS)
Fact Sheet

Federal Aviation Administration
Office of the Chief Counsel

December 17, 2015

BACKGROUND

Unmanned aircraft systems (UAS) are aircraft subject to regulation by the FAA to ensure safety of flight, and safety of people and property on the ground. States and local jurisdictions are increasingly exploring regulation of UAS or proceeding to enact legislation relating to UAS operations. In 2015, approximately 45 states have considered restrictions on UAS. In addition, public comments on the Federal Aviation Administration's (FAA) proposed rule, "Operation and Certification of Small Unmanned Aircraft Systems" (Docket No. FAA-2015-0150), expressed concern about the possible impact of state and local laws on UAS operations.

Incidents involving unauthorized and unsafe use of small, remote-controlled aircraft have risen dramatically. Pilot reports of interactions with suspected unmanned aircraft have increased from 238 sightings in all of 2014 to 780 through August of this year. During this past summer, the presence of multiple UAS in the vicinity of wild fires in the western U.S. prompted firefighters to ground their aircraft on several occasions.

This fact sheet is intended to provide basic information about the federal regulatory framework for use by states and localities when considering laws affecting UAS. State and local restrictions affecting UAS operations should be consistent with the extensive federal statutory and regulatory framework pertaining to control of the airspace, flight management and efficiency, air traffic control, aviation safety, navigational facilities, and the regulation of aircraft noise at its source.

Presented below are general principles of federal law as they relate to aviation safety, and examples of state and local laws that should be carefully considered prior to any legislative action to ensure that they are consistent with applicable federal safety regulations. The FAA's Office of the Chief Counsel is available for consultation on specific questions.

WHY THE FEDERAL FRAMEWORK

Congress has vested the FAA with authority to regulate the areas of airspace use, management and efficiency, air traffic control, safety, navigational facilities, and aircraft noise at its source. 49 U.S.C. §§ 40103, 44502, and 44701-44735. Congress has 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).

A consistent regulatory system for aircraft and use of airspace has the broader effect of ensuring the highest level of safety for all aviation operations. To ensure the maintenance of a safe and sound air transportation system and of navigable airspace free from inconsistent restrictions, FAA has regulatory authority over matters pertaining to aviation safety.

REGULATING UAS OPERATIONS

In § 333 of the FAA Modernization and Reform Act of 2012 (Public Law No. 112-95), Congress directed the Secretary to determine whether UAS operations posing the least amount of public risk and no threat to national security could safely be operated in the national airspace system (NAS) and if so, to establish requirements for the safe operation of these systems in the NAS.

On February 15, 2015, the FAA proposed a framework of regulations that would allow routine commercial use of certain small UAS in today's aviation system, while maintaining flexibility to accommodate future technological innovations. The FAA's Notice of Proposed Rulemaking offered safety rules for small UAS (under 55 pounds) conducting non-recreational or non-hobby operations. The proposed rule defines permissible hours of flight, line-of-sight observation, altitude, operator certification, optional use of visual observers, aircraft registration and marking, and operational limits.

Consistent with its statutory authority, the FAA is requiring Federal registration of UAS in order to operate a UAS. Registering UAS will help protect public safety in the air and on the ground, aid the FAA in the enforcement of safety-related requirements for the operation of UAS, and build a culture of accountability and responsibility among users operating in U.S. airspace. No state or local UAS registration law may relieve a UAS owner or operator from complying with the Federal UAS registration requirements. Because Federal registration is the exclusive means for registering UAS for purposes of operating an aircraft in navigable airspace, no state or local government may impose an additional registration requirement on the operation of UAS in navigable airspace without first obtaining FAA approval.

Substantial air safety issues are raised when state or local governments attempt to regulate the operation or flight of aircraft. If one or two municipalities enacted ordinances regulating UAS in the navigable airspace and a significant number of municipalities followed suit, fractionalized control of the navigable airspace could result. In turn, this 'patchwork quilt' of differing restrictions could severely limit the flexibility of FAA in controlling the airspace and flight patterns, and ensuring safety and an efficient air traffic flow. A navigable airspace free from inconsistent state and local restrictions is essential to the maintenance of a safe and sound air transportation system. *See Montalvo v. Spirit Airlines*, 508 F.3d 464 (9th Cir. 2007), and *French v. Pan Am Express, Inc.*, 869 F.2d 1 (1st Cir. 1989); *see also Arizona v. U.S.*, 567 U.S. ___, 132 S.Ct. 2492, 2502 (2012) ("Where Congress occupies an entire field . . . even complimentary state regulation is impermissible. Field preemption reflects a congressional decision to foreclose any

state regulation in the area, even if it is parallel to federal standards."), and *Morales v. Trans World Airlines, Inc.*, 504 U.S. 374, 386-87 (1992).

EXAMPLES OF STATE AND LOCAL LAWS FOR WHICH CONSULTATION WITH THE FAA IS RECOMMENDED

- Operational UAS restrictions on flight altitude, flight paths; operational bans; any regulation of the navigable airspace. For example – a city ordinance banning anyone from operating UAS within the city limits, within the airspace of the city, or within certain distances of landmarks. Federal courts strictly scrutinize state and local regulation of overflight. *City of Burbank v. Lockheed Air Terminal*, 411 U.S. 624 (1973); *Skysign International, Inc. v. City and County of Honolulu*, 276 F.3d 1109, 1117 (9th Cir. 2002); *American Airlines v. Town of Hempstead*, 398 F.2d 369 (2d Cir. 1968); *American Airlines v. City of Audubon Park*, 407 F.2d 1306 (6th Cir. 1969).
- Mandating equipment or training for UAS related to aviation safety such as geo-fencing would likely be preempted. Courts have found that state regulation pertaining to mandatory training and equipment requirements related to aviation safety is not consistent with the federal regulatory framework. *Med-Trans Corp. v. Benton*, 581 F. Supp. 2d 721, 740 (E.D.N.C. 2008); *Air Evac EMS, Inc. v. Robinson*, 486 F. Supp. 2d 713, 722 (M.D. Tenn. 2007).

EXAMPLES OF STATE AND LOCAL LAWS WITHIN STATE AND LOCAL GOVERNMENT POLICE POWER

Laws traditionally related to state and local police power – including land use, zoning, privacy, trespass, and law enforcement operations – generally are not subject to federal regulation. *Skysign International, Inc. v. City and County of Honolulu*, 276 F.3d 1109, 1115 (9th Cir. 2002). Examples include:

- Requirement for police to obtain a warrant prior to using a UAS for surveillance.
- Specifying that UAS may not be used for voyeurism.
- Prohibitions on using UAS for hunting or fishing, or to interfere with or harass an individual who is hunting or fishing.
- Prohibitions on attaching firearms or similar weapons to UAS.

CONTACT INFORMATION FOR QUESTIONS

The FAA's Office of the Chief Counsel is available to answer questions about the principles set forth in this fact sheet and to consult with you about the intersection of federal, state, and local regulation of aviation, generally, and UAS operations, specifically. You may contact the Office of Chief Counsel in Washington, D.C. or any of the following Regional Counsels:

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APPENDIX – LIST OF AUTHORITIES

Federal Statutes

- 49 U.S.C. §§ 40103, 44502, and 44701- 44735 (former Federal Aviation Act of 1958, as amended and recodified).

- FAA Modernization and Reform Act of 2012, Public Law No. 112-95 (Feb. 14, 2012), Subtitle B, "Unmanned Aircraft Systems."

Federal Regulations

- Title 14 of the Code of Federal Regulations, Chapter 1.

The U.S. Supreme Court

- "Congress has recognized the national responsibility for regulating air commerce. Federal control is intensive and exclusive. Planes do not wander about in the sky like vagrant clouds. They move only by federal permission, subject to federal inspection, in the hands of federally certified personnel and under an intricate system of federal commands. The moment a ship taxies onto a runway it is caught up in an elaborate and detailed system of controls. It takes off only by instruction from the control tower, it travels on prescribed beams, it may be diverted from its intended landing, and it obeys signals and orders. Its privileges, rights, and protection, so far as transit is concerned, it owes to the Federal Government alone and not to any state government." *Northwest Airlines v. State of Minnesota*, 322 U.S. 292, 303 (1944)(Jackson, R., concurring).

- "If we were to uphold the Burbank ordinance [which placed an 11 p.m. to 7 a.m. curfew on jet flights from the Burbank Airport] and a significant number of municipalities followed suit, it is obvious that fractionalized control of the timing of takeoffs and landings would severely limit the flexibility of FAA in controlling air traffic flow. The difficulties of scheduling flights to avoid congestion and the concomitant decrease in safety would be compounded." *Burbank v. Lockheed Air Terminal Inc.*, 411 U.S. 624, 639 (1973).

- "The Federal Aviation Act requires a delicate balance between safety and efficiency, and the protection of persons on the ground … The interdependence of these factors requires a uniform and exclusive system of federal regulation if the congressional objectives underlying the Federal Aviation Act are to be fulfilled." *Burbank* at 638-639.

- "The paramount substantive concerns of Congress [in enacting the FAA Act] were to regulate federally all aspects of air safety … and, once aircraft were in 'flight,' airspace management…." *Burbank* at 644 (Rehnquist, J. dissenting).

U.S. Courts of Appeals

- "Air traffic must be regulated at the national level. Without uniform equipment specifications, takeoff and landing rules, and safety standards, it would be impossible to operate a national air transportation system." *Gustafson v. City of Lake Angeles*, 76 F.3d 778, 792-793 (6th Cir. 1996)(Jones, N., concurring).

- "The purpose, history, and language of the FAA [Act] lead us to conclude that Congress intended to have a single, uniform system for regulating aviation safety. The catalytic events leading to the enactment of the FAA [Act] helped generate this intent. The FAA [Act] was drafted in response to a series of fatal air crashes between civil and military aircraft operating under separate flight rules .... In discussing the impetus for the FAA [Act], the Supreme Court has also noted that regulating the aviation industry requires a delicate balance between safety and efficiency. It is precisely because of 'the interdependence of these factors' that Congress enacted 'a uniform and exclusive system of federal regulation.'" *Montalvo v. Spirit Airlines,* 508 F.3d 464, 471 (9th Cir. 2007), citing *City of Burbank v. Lockheed Air Terminal Inc.*, 411 U.S. 624, 638-39 (1973).

- "[W]hen we look to the historical impetus for the FAA, its legislative history, and the language of the [FAA] Act, it is clear that Congress intended to invest the Administrator of the Federal Aviation Administration with the authority to enact exclusive air safety standards. Moreover, the Administrator has chosen to exercise this authority by issuing such pervasive regulations that we can infer a preemptive intent to displace all state law on the subject of air safety." *Montalvo* at 472.

- "We similarly hold that federal law occupies the entire field of aviation safety. Congress' intent to displace state law is implicit in the pervasiveness of the federal regulations, the dominance of the federal interest in this area, and the legislative goal of establishing a single, uniform system of control over air safety. This holding is fully consistent with our decision in *Skysign International, Inc. v. Honolulu*, 276 F.3d 1109 (9th Cir. 2002), where we considered whether federal law preempted state regulation of aerial advertising that was distracting and potentially dangerous to persons on the ground. In upholding the state regulations, we held that federal law has not 'preempt[ed] altogether any state regulation purporting to reach into the navigable airspace.' *Skysign* at 1116. While Congress may not have acted to occupy exclusively all of air commerce, it has clearly indicated its intent to be the sole regulator of aviation safety. The FAA, together with federal air safety regulations, establish complete and thorough safety standards for interstate and international air transportation that are not subject to supplementation by, or variation among, states." *Montalvo* at 473-474.

- "[W]e remark the Supreme Court's reasoning regarding the need for uniformity [concerning] the regulation of aviation noise, see *City of Burbank v. Lockheed Air Terminal*, 411 U.S. 624 (1973), and suggest that the same rationale applies here. In *Burbank*, the Court struck down a municipal anti-noise ordinance placing a curfew on jet flights from a regional airport. Citing the 'pervasive nature of the scheme of federal

regulation,' the majority ruled that aircraft noise was wholly subject to federal hegemony, thereby preempting state or local enactments in the field. In our view, the pervasiveness of the federal web is as apparent in the matter of pilot qualification as in the matter of aircraft noise. If we upheld the Rhode Island statute as applied to airline pilots, 'and a significant number of [states] followed suit, it is obvious that fractionalized control ... would severely limit the flexibility of the F.A.A ….' [citing *Burbank*] Moreover, a patchwork of state laws in this airspace, some in conflict with each other, would create a crazyquilt effect … The regulation of interstate flight-and flyers-must of necessity be monolithic. Its very nature permits no other conclusion. In the area of pilot fitness as in the area of aviation noise, the [FAA] Act as we read it 'leave[s] no room for ... local controls.' [citing *Burbank*]. *French v. Pan Am Express, Inc.*, 869 F.2d 1, 6 (1st Cir. 1989).

Statement from FAA Administrator Michael Huerta

At the direction of the Secretary, the FAA announced the formation of a task force to develop a process for owners of small Unmanned Aircraft Systems (UAS) to register their aircraft. This group of experts embraced the challenge with the energy and creativity we expected and delivered its report to me today as scheduled. We thank them for their excellent and expeditious work.

I will work with my team at the FAA to review their recommendations, as well as public comments we received, as we present the recommendations to Secretary Foxx. We will work quickly and flexibly to move toward the next steps for registration.

Registration will instil a sense of accountability and responsibility among UAS pilots, and also will prompt them to become educated about safe flying in the National Airspace System (NAS). For those who choose to ignore the rules and fly unsafely, registration is a tool that will assist us and our law enforcement partners in finding them.

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Secretary Foxx makes UAS announcement

We are moving quickly and flexibly to establish this new registry. Our first step was to appoint a UAS Task Force to develop recommendations for a streamlined registration process, and suggest which UAS could be exempt from registration due to a low safety risk. A group of 25 experts were chosen, based on experience, from across the UAS and manned aviation communities. They included hobbyists, retailers, manufacturers, law enforcement, airports and commercial and general aviation. They were advised by the Departments of Commerce, Defense, Homeland Security, Interior, and State along with the Office of Management and Budget and the National Aeronautics and Space Administration. We also accepted public comments on the same questions we asked the Task Force to consider.

On Saturday, the Task Force will deliver its report to the Federal Aviation Administration. We will consider their recommendations and the public comments as we develop an Interim Final Rule on registration, which will likely be released next month and go into effect shortly thereafter. This

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step will be followed by another opportunity for the public to comment as we move toward issuing a final rule on registration.

The FAA's evolving work to integrate small unmanned aircraft into the NAS is the beginning of a new era for aviation, and we all have a stake in making sure UAS are operating safely in the world's busiest airspace. The FAA receives reports on a daily basis about instances in which small unmanned aircraft fly too close to manned aircraft, often near airports and sometimes at altitudes of up to 10,000 feet — much higher than they should be. This is an unnecessary threat to safety that demands the attention of the entire aviation community.

By some estimates, as many as 400,000 new unmanned aircraft will be sold during the holiday season. Pilots with little or no aviation experience will be at the controls of many of these aircraft. Many of these new aviators may not even be aware that their activities in our airspace could be dangerous to other aircraft — or that they are, in fact, *pilots* once they start flying their unmanned aircraft.

From the moment pilots of traditional aircraft embark on their first solo flights, they are on a journey of lifelong learning in a culture that values safety above all else. We in the Department of Transportation believe this registration process is a positive step toward laying a similar lasting foundation among small unmanned aircraft pilots.

Sources: Press Release, Fast Lane

Posted in Regulatory Matters on November 23, 2015 by The Editor. Leave a comment

← TRITON BEGINS OPERATIONAL ASSESSMENT SMART DRONES ON DISPLAY AT DRONE WORLD EXPO →

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FAA UAS Registration Task Force Final Report

The UAS Registration Task Force Committee's Recommendations Final Report (Recommendations) was published as promised on Saturday. 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

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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 summarised 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.

The full report is available here.

Source: FAA

Posted in Non-Military & Commercial UAS, Regulatory Matters on November 24, 2015 by The Editor. Leave a comment

← CH- 5 - CHINA'S BIGGEST UAS ON DISPLAY SUKHOI SU-24 DOWNED BY F-16S ON SYRIAN BORDER →

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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

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

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

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).
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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

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:

Drag coefficient: $C_d = 0.3$

Projected area: $S = 0.1m * 0.2m = 0.02m^2$

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:

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

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

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

$$KE = \frac{1}{2}mv^2$$

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.[1]

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:

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

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:

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

(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.

[1] "A New Paradigm for Small UAS," Andrew Lacher and David Maroney, *available at* 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:

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

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

$$\boldsymbol{S_{UAS}} = 0.1 * 0.2 = 0.02\, m^2 \textbf{\textit{Note: as above}}$$

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

$$\boldsymbol{P_l} = \textit{Probability of Lethality} = 0.3$$

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

$$\boldsymbol{P_{event}} = \frac{0.02 * 0.0039 * 0.2 * 0.3}{100}$$

$\mathbf{P_{event}} = 4.7\text{x}10^{-8}$, 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 $1\text{x}10^{-9}$, and general aviation actual risk levels are on the order of $5\text{x}10^{-5}$, this level of risk at $4.7\text{x}10^{-8}$ 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 $5\text{x}10^{-5}$.

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 $1/10^{th}$ 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

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

UAS Registration Task Force Aviation Rulemaking Committee Recommendations Summary	
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.

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.

LOD