

**Congress of the United States**  
**U.S. House of Representatives**  
**Committee on Small Business**  
2361 Rayburn House Office Building  
Washington, DC 20515-6315

To: Members, Committee on Small Business  
From: Committee Staff  
Date: July 13, 2015  
Re: Hearing: "Taking Flight: Small Business Utilization of Unmanned Aircraft"

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On Wednesday, July 15, 2015 at 11:00 am in Room 2360 of the Rayburn House Office Building, the Committee on Small Business will meet for the purpose of examining small business utilization of unmanned aircraft, commonly referred to as drones, for commercial activities. Currently, commercial operations of unmanned aircraft are very limited; however, the Federal Aviation Administration (FAA) is working towards safely integrating them into the national airspace system. Earlier this year, the FAA published a proposed rule to permit small unmanned aircraft (those weighing 55 pounds (lbs.) or less) to operate for non-hobby, non-recreational purposes. Once the regulation is finalized, the FAA expects that small businesses will conduct the majority of commercial operations.

### **I. Unmanned Aircraft Systems**

The "first practical unmanned airplane" took off from Cook Field in Dayton, Ohio in 1918. Invented by Charles Kettering, the Kettering Bug, which was designed as a top-secret weapon to deliver explosives, was five-feet across and six-feet long.<sup>1</sup>

Today, unmanned aircraft weight ranges from four ounces to over 20,000 pounds, and their wingspan is as small as six inches to as large as over 200 feet. They include devices as small as a remotely-controlled model aircraft that is flown for recreational purposes to a large, sophisticated surveillance aircraft used for military operations.<sup>2</sup> The term unmanned aircraft systems (UAS)<sup>3</sup> refers to all the components needed to efficiently and safely operate an unmanned aircraft including: the pilot and crew operating from a remote control device or control station based on the ground, on a ship or in the air; radio or satellite data links between the control station and aircraft; and the unmanned aircraft.<sup>4</sup>

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<sup>1</sup> John DeGaspari, *Look Ma, No Pilot!*, MECH. ENG'G, Nov. 2003, at 42. It is worth noting that Dayton, Ohio also is the hometown of the inventors of the first manned aircraft, Orville and Wilbur Wright.

<sup>2</sup> FAA, Notice of Policy, Unmanned Aircraft Operations in the National Airspace System, 72 Fed. Reg. 6689, 6689 (Feb. 13, 2007) [hereinafter "UAS Policy Notice"].

<sup>3</sup> The term UAS will be used in this memorandum interchangeably to refer to unmanned aircraft in both the singular and plural as unmanned aircraft systems.

<sup>4</sup> FAA, INTEGRATION OF CIVIL UNMANNED AIRCRAFT SYSTEMS (UAS) IN THE NATIONAL AIRSPACE SYSTEM (NAS) ROADMAP 7-8 (2013) [hereinafter FAA UAS Roadmap], available at [https://www.faa.gov/uas/media/UAS\\_Roadmap\\_2013.pdf](https://www.faa.gov/uas/media/UAS_Roadmap_2013.pdf). Unmanned aircraft also have been called models, radio control (R/C) aircraft, remotely piloted vehicles, unmanned aerial vehicles, as well as drones. *Id.* at 7.

The potential applications for UAS in the commercial space and the expected economic impacts are significant. UAS may be used for a range of operations including: aerial mapping and photography; precision agriculture; disaster management; filmmaking; freight transport; infrastructure inspections (e.g., bridge and railroad inspections); oil and gas exploration; television news gathering; telecommunication; weather monitoring; and wildfire mapping.<sup>5</sup> In the first three years of commercial UAS operations, the Association for Unmanned Vehicle Systems International estimates that integrating UAS will have an economic impact of \$13.6 billion and create more than 70,000 jobs. Over the next decade, the economic impact could grow to \$82.1 billion and 100,000 new jobs may be created.<sup>6</sup>

## II. Obstacles and Concerns Surrounding UAS Integration

Integrating routine commercial UAS operations is no simple task for the FAA, which is charged with regulating aircraft operations in the United States “to ensure the safety of aircraft and the efficient use of the airspace.”<sup>7</sup> Every day, there are over 102,000 flights in the national airspace system.<sup>8</sup> Two-thirds of those flights are general aviation (private planes and business jets, air taxi flights, and air cargo flights) and one-third of those flights are commercial carriers.<sup>9</sup>

There are numerous challenges to the integration of commercial UAS operations in the United States airspace. First, UAS lack mature “detect and avoid” technology that would allow them to detect, sense, and avoid other aircraft and airborne objects. Second, UAS do not have robust control and communications technology that ensure safe UAS operation in the case of a disruption or loss of connectivity between the ground control station and the unmanned aircraft. Third, FAA aviation regulations and air traffic procedures are designed for manned aircraft, not UAS, and the agency must determine the best method of adapting current aviation rules for UAS.<sup>10</sup> Finally, the integration of UAS into the national air space raises privacy and national security concerns.

## III. Aviation Regulations and the FAA’s Existing UAS Policy

The FAA is required to promulgate air traffic regulations to protect individuals and property on the ground and prevent collisions of aircraft with other aircraft, land or water vehicles, and airborne objects.<sup>11</sup> “Aircraft” are statutorily defined as “any contrivance invented, used or designed to navigate or fly in the air.”<sup>12</sup> A person may not operate a civil aircraft requires unless the operator registers the aircraft.<sup>13</sup> In addition, operating an aircraft in “air commerce”<sup>14</sup> requires a person to obtain an

<sup>5</sup> ASSOCIATION FOR UNMANNED VEHICLE SYSTEMS INTERNATIONAL, THE ECONOMIC IMPACT OF UNMANNED AIRCRAFT SYSTEMS INTEGRATION IN THE UNITED STATES 2 (2013), available at <http://www.auvsi.org/econreport>.

<sup>6</sup> *Id.*

<sup>7</sup> 49 U.S.C. § 40103(b)(1).

<sup>8</sup> The national airspace system is the common network of United States airspace including: airport or landing areas; air navigation facilities, equipment, and services; rules, regulations, and procedures; aeronautical charts, information and services; technical information; and manpower and material. FAA UAS Roadmap, *supra* note 4, at 8.

<sup>9</sup> <http://www.faa.gov/nextgen/snapshots/nas/>.

<sup>10</sup> *U.S. Unmanned Aircraft Systems: Integration, Oversight, and Competitiveness: Hearing Before the Subcomm. on Aviation of the H. Comm. on Transportation and Infrastructure*, 113th Cong. 77-80 (2014) (statement of Matthew E. Hampton, Assistant Inspector General for Aviation, DOT).

<sup>11</sup> 49 U.S.C. § 40103(b)(2).

<sup>12</sup> *Id.* at § 40102(a)(6).

<sup>13</sup> *Id.* at § 44101(a).

<sup>14</sup> “Air commerce” is defined as “the operation of aircraft within the limits of a Federal airway, or the operation of aircraft that directly affects, or may endanger safety in, foreign or interstate air commerce.” *Id.* at § 44102(a)(3).

airworthiness certificate and airman certificate.<sup>15</sup> Finally, the FAA is required to promote safe flight of civil aircraft in air commerce by prescribing “regulations and minimum standards for other practices, methods, and procedure . . . necessary for safety in air commerce and national security.”<sup>16</sup>

The FAA’s existing policy regulates UAS operations in the national airspace system based on whether the UAS is a public aircraft, a model aircraft, or a civil aircraft.<sup>17</sup> UAS operations by public agencies and organizations for a particular type of aircraft, purpose, and geographic area have been allowed through the FAA’s issuance of certificates of waiver or authorization that incorporate special safety requirements.<sup>18</sup> Historically, model aircraft operators have been able to fly UAS without obtaining specific authorization from the FAA because the agency has recognized that model aircraft pose a lesser risk; however, the FAA has established a voluntary set of operating standards to mitigate safety risks.<sup>19</sup> Congress affirmed the FAA’s longstanding position on model aircraft in § 336 of the FAA Modernization and Reform Act of 2012 (Reform Act), which established a “special rule for model aircraft.”<sup>20</sup>

Before the passage of the Reform Act, the FAA only was issuing special airworthiness certificates in limited circumstances for civil UAS operations, and civil operations for commercial purposes were not permitted by the FAA.<sup>21</sup> However, the Reform Act provided the FAA with new authority and new mandates which will result in the FAA’s integration of UAS into the United States airspace.

#### **IV. FAA’s Integration of UAS into the National Air Space**

The Reform Act directed the FAA to safely integrate civil UAS into the national airspace system by September 30, 2015.<sup>22</sup> It requires the FAA to: develop a comprehensive integration plan; conduct a rulemaking to permit small UAS civil operations; initiate pilot projects at six test ranges; determine whether certain UAS may operate safely in the national airspace system before completion of the plan and rule; and if certain UAS may safely operate, establish requirements to permit such operations.<sup>23</sup> The FAA has not met many of the statutory deadlines Congress established in the Reform

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<sup>15</sup> *Id.* at §§ 44711(a)(1), (a)(2)(A). An airworthiness certificate indicates that an aircraft conforms to its type certificate and, after inspection, is safe to operate. *Id.* at § 44704(d)(1). The FAA issues an airman certificate when it investigates and finds that an individual is physically able to, and qualified for, the position authorized by the certificate. *Id.* at § 44703(a).

<sup>16</sup> *Id.* at § 44701.

<sup>17</sup> UAS Policy Notice, 72 Fed. Reg. at 6689.

<sup>18</sup> [https://www.faa.gov/uas/public\\_operations/](https://www.faa.gov/uas/public_operations/).

<sup>19</sup> FAA, Notice of Interpretation of the Special Rule for Model Aircraft, 79 Fed. Reg. 36,172, 36,172 (June 25, 2014). These operating standards include: restricting operations to no higher than 400 feet above ground level; requiring models to yield to unmanned aircraft; and avoidance of manned aircraft flight space. *Id.*

<sup>20</sup> Pub. L. No. 112-95, § 336, 126 Stat. 11, 77-78 (2012). Section 336 states that the FAA may not promulgate any regulation for model aircraft if it meets the following conditions: the model is used for hobby or recreational use; the operator complies with a community-based set of safety guidelines; the aircraft weighs less than 55 lbs. or is certified by a community-based organization if it weighs more than 55 lbs.; flights do not interfere with manned aircraft; models yield to manned aircraft; and aircraft cannot operate within five miles of an airport, unless prior notice is given to the air operator and air traffic control tower. *Id.*

<sup>21</sup> UAS Policy Notice, 72 Fed. Reg. at 6690.

<sup>22</sup> Reform Act, § 332(a)(3), 126 Stat. at 73.

<sup>23</sup> *Id.* at §§ 332-333, 126 Stat. at 73-76.

Act.<sup>24</sup> Nevertheless, the agency has established an interim process to authorize commercial operations of UAS on a case-by-case basis. Furthermore, the FAA has proposed a rule that will establish a regulatory scheme to allow commercial operations of small UAS which it expects to finalize by June 2016.<sup>25</sup>

### **A. Current Civil UAS Operations**

One mechanism to obtain authorization for UAS operations is to apply for a special airworthiness exemption. Such exemptions are based on either the use of the UAS (experimental category including research and development, crew training and market surveys) or by the type of aircraft (referred to as the “restricted category”).<sup>26</sup>

Alternatively, the operator of a UAS may obtain authority to operate pursuant to § 333 of the Reform Act. Under § 333, the FAA has established a process by which a UAS operator may file an application for an exemption that, if granted, would permit commercial operations in low-risk, controlled environments.<sup>27</sup> If a UAS operator’s exemption is granted, the operator must also apply for a certificate of waiver or authorization (COA). A COA, which is defined as a “[FAA] grant of approval for a specific flight operation,”<sup>28</sup> provides a UAS operator authorization to use a particular block of airspace for a proposed operation prior to its conduct.<sup>29</sup> Since it can take up to 60 days to apply for and receive a COA, the FAA has streamlined the process for civil UAS operators that have been granted a § 333 exemption. Under the interim policy, the FAA will grant a COA to any UAS operator for flights at or below 200 feet as long as the operator observes daytime visual flight rule conditions, operates within visual line of sight of the pilots, and the UAS is kept certain distances away from heliports or airports.<sup>30</sup> Operations outside the scope of these blanket parameters require separate COAs.<sup>31</sup> As of July 6, 2015, the FAA has granted § 333 exemptions to 740 civil UAS operators.<sup>32</sup>

### **B. FAA’s Small UAS Rulemaking**

On February 23, 2015, the FAA issued a proposed rule to amend its regulation to allow the operation of small UAS, those weighing less than 55 lbs., in the national airspace system.<sup>33</sup> The proposed rule includes a number of operational limitations on UAS to mitigate risks of collision with manned aircraft if the operator does not see and avoid another aircraft or loses positive control of the

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<sup>24</sup> *U.S. Unmanned Aircraft Systems: Integration, Oversight, and Competitiveness: Hearing Before the Subcomm. on Aviation of the H. Comm. on Transportation and Infrastructure*, 113th Cong. 20-22 (statement of Matthew E. Hampton, Assistant Inspector General for Aviation, DOT).

<sup>25</sup> Rachel Adams-Heard and Alan Levin, *FAA Plans Final Regulation on Commercial Drone Use by Mid-2016*, BLOOMBERGBUSINESS, June 17, 2015, available at <http://www.bloomberg.com/news/articles/2015-06-17/faa-plans-final-regulation-on-commercial-drone-use-by-mid-2016>.

<sup>26</sup> [https://www.faa.gov/uas/civil\\_operations/](https://www.faa.gov/uas/civil_operations/).

<sup>27</sup> *Id.*

<sup>28</sup> Reform Act, § 331(2), 126 Stat. at 72.

<sup>29</sup> FAA, PUBLIC GUIDANCE FOR PETITIONS FOR EXEMPTION FILED UNDER SECTION 333, 7 (2014), available at [https://www.faa.gov/uas/legislative\\_programs/section\\_333/how\\_to\\_file\\_a\\_petition/media/section333\\_public\\_guidance.pdf](https://www.faa.gov/uas/legislative_programs/section_333/how_to_file_a_petition/media/section333_public_guidance.pdf).

<sup>30</sup> <https://www.faa.gov/news/updates/?newsId=82245>.

<sup>31</sup> [https://www.faa.gov/uas/legislative\\_programs/section\\_333/how\\_to\\_file\\_a\\_petition/](https://www.faa.gov/uas/legislative_programs/section_333/how_to_file_a_petition/).

<sup>32</sup> [https://www.faa.gov/uas/legislative\\_programs/section\\_333/](https://www.faa.gov/uas/legislative_programs/section_333/).

<sup>33</sup> FAA, Operation and Certification of Small Unmanned Aircraft Systems; Proposed Rule, 80 Fed. Reg. 9543.

unmanned aircraft through loss of the data link between the aircraft and operator.<sup>34</sup> Once these rules are finalized the need for a § 333 exemption would be obviated under most circumstances.

The proposed rule, which defines the person who manipulates the small UAS flight controls as the “operator,” would require the operator to be certified, abide by operational limits, perform aircraft maintenance, register the aircraft, and display the registration marking. The operator would be required to pass an initial aeronautical exam at a FAA-approved knowledge testing center and pass a recurrent knowledge test every 24 months. In addition, the operator would be vetted by the Transportation Security Administration and be required to obtain an unmanned aircraft operator certificate with a small UAS rating from the FAA. The operator also would be required to maintain visual line-of-sight of the small unmanned aircraft either directly or by contact with a visual observer that has visual line-of-sight.<sup>35</sup>

Under the proposed regulatory requirements, a small UAS only may operate in daylight, must yield the right of way to other aircraft (manned or unmanned), and may not directly operate over any people not involved in the operation. In addition, the small UAS may not fly at a speed of more than 100 miles per hour, may not fly more than 500 feet above ground level, and may not be operated from a moving vehicle or aircraft, except for a watercraft. While an FAA airworthiness certification for small UAS would not be required, the operator would be required to conduct a preflight inspection before every flight. A small UAS operator also would be required to report any small UAS accident that results in damage to a person or property to the FAA within 10 days of its occurrence.<sup>36</sup>

Recognizing that a very small UAS poses a minimal hazard to any person or object with which it may collide, the FAA also has proposed imposing a lighter regulatory touch on micro UAS, those that weigh 4.4 lbs or less.<sup>37</sup> Under the framework the FAA is considering, micro UAS would not be allowed to fly higher than 400 feet above ground level but would be permitted to fly over any person. Micro UAS operators would not be required to take an aeronautical knowledge test; they would be permitted to self-certify. The operator would be required to maintain control of the flight path of the micro UAS at all times. In addition, the micro UAS would have to maintain a distance of at least 5 nautical miles from any airport. Operators of micro UAS would not be permitted to use automation to control the unmanned aircraft’s flight path.<sup>38</sup>

The out-of-pocket costs for a small UAS operator to be certified by the FAA are estimated to be less than \$300.<sup>39</sup> The FAA expects the proposed rule, once finalized, will have significant benefits. The agency examined the impact that using small UAS would have on aerial photography, precision agriculture, search and rescue law enforcement, and bridge inspection. It found that using small UAS would improve safety and reduce costs.<sup>40</sup>

The FAA expects that the rule would allow the creation of a small UAS aerial photography market that could become a less costly alternative to manned aerial photography. Small UAS also

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<sup>34</sup> *Id.* at 9546, 9548-49.

<sup>35</sup> *Id.* at 9546-47.

<sup>36</sup> *Id.* at 9546.

<sup>37</sup> *Id.* at 9557-58.

<sup>38</sup> *Id.* at 9557.

<sup>39</sup> *Id.* at 9577.

<sup>40</sup> DOT, FAA, Office of Aviation Policy and Plans, Economic Analysis Division, Notice of Proposed Rulemaking Regulatory Evaluation, Small Unmanned Aircraft Systems 15-16 (2015), available at <http://www.regulations.gov/#!documentDetail:D=FAA-2015-0150-0001>.

could be used in agricultural operations to better manage the application of water, insecticides, herbicides, and fertilizer. For example, studies have estimated that farmers producing high-yield corn could reduce their costs by \$5 to \$15 per acre by using precision agriculture to guide their fertilizer applications.<sup>41</sup>

Small UAS operators could be hired by federal, state, and local government entities to perform search and rescue missions and provide disaster relief as small UAS can be deployed more quickly than manned aerial operations. Based upon actual cost data from a law enforcement agency, use of small UAS instead of a helicopter could save approximately \$550 an hour.

Small UAS might be able to inspect the nearly 600,000 bridges in the United States. A small UAS is far less costly than the deployment of snoopers or aerial lifts currently used to inspect bridges. In addition, small UAS would be safer than physically lifting a human into position to examine a bridge.<sup>42</sup>

Pursuant to the Regulatory Flexibility Act, 5 U.S.C. §§ 601-12, the FAA published an initial regulatory flexibility analysis with the proposed rule that describes the expected impact of the proposed rule on small businesses. The agency concluded the proposed rule will have a positive significant economic impact on a substantial number of small businesses, as it expects most small UAS operators will be small businesses.<sup>43</sup>

While small businesses are generally supportive of the proposed rule, a comment letter to the FAA from the Office of the Chief Counsel for Advocacy, which is located within the Small Business Administration, discussed concerns about the proposed operational restrictions and the pace at which the rulemaking is proceeding that were raised by small businesses and their representatives at an April 9, 2015 roundtable.<sup>44</sup> In particular, small businesses believe the FAA's approach should be "risk-based" and "technology neutral" so that no particular UAS technology is favored under the regulatory framework. This will ensure that the small UAS regulatory framework keeps up with technology innovation that will inevitably solve problems such as "loss of positive control" and the ability of UAS to automatically "detect and avoid" other aircraft and airborne objects.<sup>45</sup>

## V. Conclusion

Commercial UAS operations will make dirty, dangerous, and dull tasks safer, more efficient, and less costly. While obstacles and concerns about UAS integration remain, the benefits are significant. Allowing routine commercial small UAS operations will provide business opportunities to startups and permit small businesses that use their services to more effectively run their businesses.

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<sup>41</sup> *Id.* at 16-19.

<sup>42</sup> *Id.* at 19-21, 25.

<sup>43</sup> 80 Fed. Reg. at 9580.

<sup>44</sup> Letter from Claudia Rodgers, Acting Chief Counsel for Advocacy and Bruce Lundegren, Assistant Chief Counsel for Advocacy, to FAA Administrator Michael Huerta, 1-2 (Apr. 24, 2015), *available at* <https://www.sba.gov/advocacy/42415-comments-faas-proposed-operation-and-certification-small-unmanned-aircraft-systems>.

<sup>45</sup> *Id.* at 2-3