Committee on Transportation and Infrastructure
U.S. House of Representatives
Washington, DC 20515

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August 31, 2018

SUMMARY OF SUBJECT MATTER

TO: Members, Subcommittee on Aviation
FROM: Staff, Subcommittee on Aviation
RE: Subcommittee Hearing on "Airspace Integration of New Aircraft"

PURPOSE

The Subcommittee on Aviation will meet on Thursday, September 6, 2018, at 10:00 a.m. in 2167 Rayburn House Office Building to explore issues related to the integration of new aircraft into the National Airspace System (NAS). The Subcommittee will receive testimony from representatives of the government and industry.

BACKGROUND

The United States has the largest and busiest airspace in the world. The NAS is used by a diverse fleet of aircraft ranging from gliders, balloons, and single engine piston aircraft to very large turbine-powered transport airplanes and high-performance military jets. With notable exceptions, most conventional aircraft operate at altitudes between 500 feet above ground level up to 40,000 feet above sea level.

In fiscal year 2016, the Federal Aviation Administration (FAA) estimated that over 70,000 flights were operated in U.S.-controlled airspace each day.[1] Approximately 5,000 aircraft were aloft under instrument flight rules at any given time during peak periods.[2] On

[1] "Air Traffic by the Numbers.", Federal Aviation Administration., pp.7. (The figure reflects aggregated total instrument flight rules and visual rules operations). Available at: https://www.faa.gov/air_traffic/by_the_numbers/media/Air_Traffic_by_the_Numbers_2017_Final.pdf (last accessed on Aug. 15, 2018)

[2] *Id.* at 9. Instrument flight rules are "[r]ules and regulations established by the Federal Aviation Administration to govern flight under conditions in which flight by outside visual reference is not safe. IFR flight depends upon flying by reference to instruments in the flight deck, and navigation is accomplished by reference to electronic signals." *Pilot's Handbook of Aeronautical Knowledge,* Federal Aviation Administration, FAA-H-8083B-25, pp. G-16. Available at: https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/phak/media/pilot_handbook.pdf (last accessed on Aug. 27, 2018)

average, over 2.5 million passengers flew to and from U.S. airports each day.[3] That same year, aviation contributed 5.1 percent to the gross domestic product.[4]

Recent technological advances have led to the emergence of new types of aircraft that are expected to fundamentally transform aviation and the use of airspace, while also impacting numerous sectors of the economy.[5]

Emerging Aircraft Technologies

Unmanned Aircraft Systems

Unmanned aircraft systems (UAS) have been in military use for decades.[6] However, new and technically advanced UAS are increasingly used in a number of applications including agriculture, infrastructure inspection, photography, and public safety. Many civil UAS are relatively inexpensive and are widely available. The FAA estimates that the number of commercially operated UAS will grow from 110,604 aircraft in 2017 up to over 700,000 aircraft by 2022.[7] In addition, the number of model or "hobbyist" UAS is forecast to grow from approximately 1.1 million aircraft up to potentially 3 million aircraft by 2022.[8] UAS operate at altitudes up to 400 feet above ground level, [9] but in many cases, UAS are capable of flying at significantly higher altitudes.[10] As technology improves, industry observers anticipate greater numbers of UAS to be flown "beyond visual line of sight" (BVLOS) of operators which will enable additional applications in various economic sectors.[11]

"Flying Cars"

Several firms have announced plans for passenger-carrying, electrically propelled aircraft. These aircraft, commonly described as "flying cars", will typically carry five or fewer passengers as a new form of primarily local transportation. The firms announcing such plans

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[3] https://www.faa.gov/air_traffic/by_the_numbers/ (last accessed on Aug. 15, 2018)
[4] *Id.* (last accessed on August 15, 2018)
[5] While commercial space transportation vehicles will also transform the use of the airspace and greatly impact the United States economy, this hearing will focus on unmanned aircraft systems and flying cars. For a discussion of commercial space transportation and airspace integration challenges, please see the Subcommittee's June 26, 2018 hearing entitled, "Commercial Space Transportation Regulatory Reform: Stakeholder Perspectives" (https://transportation.house.gov/calendar/eventsingle.aspx?EventID=402613).

[6] John David Blom, Unmanned Aerial Systems: A Historical Perspective, Occasional Paper 37, pp 46. Combat Studies Institute Press, US Army Combined Arms Center Available at: https://www.armyupress.army.mil/Portals/7/combat-studies-institute/csi-books/OP37.pdf (last accessed on August 20, 2018)
[7] FAA Aerospace Forecast FY2018-38, pp. 43
[8] *Id.* at 43.
[9] Bart Elias. *Flying Cars and Drones Pose Policy Challenges for Managing and Regulating Low-Altitude Airspace*, Congressional Research Service. Jul. 23, 2018.
[10] Jay Bennett, "Drone Breaks Record (And the Law) By Allegedly Flying to 11,000 Feet", *Popular Mechanics*, Mar. 9, 2016. Available at: https://www.popularmechanics.com/flight/drones/a19854/drone-flown-11000-feet/ (last accessed on Aug. 17, 2018)
[11] See e.g., Alan Perlman, "Inside BVLOS, the Drone Industry's Next Game Changer", *UAV Coach*, Feb. 16, 2017. Available at: https://uavcoach.com/inside-bvlos/ (last accessed on Aug. 20, 2018)

include start-up technology companies, traditional aerospace firms, and automobile manufacturers.[12] These aircraft are expected to operate up to altitudes of 2,000 feet above ground level.[13] Like UAS, these aircraft will rely more extensively on automated flight controls, will be electrically propelled, and have relatively short ranges compared to conventional aircraft. Some companies have announced plans to commence services with these aircraft early in the next decade.

Airspace Integration Efforts

Role of the Federal Aviation Administration

The FAA regulates the use of the NAS. The agency also provides air traffic control services in United States airspace and also international airspace assigned to the United States.[14] The FAA's regulation of airspace encompasses operating rules, equipage requirements, and communication procedures, among other things, in different regions of airspace.[15] The FAA also determines the boundaries of various classes of airspace, separation standards, and flight paths.[16]

The introduction of UAS and flying cars on a large scale will require integration into the NAS. At a minimum, such integration efforts will entail measures to safely separate aircraft, clear obstacles, and protect persons and property on the ground. Airspace integration will also require addressing any gaps in operating rules and any required interoperability of existing and forthcoming air traffic control systems.

Low Altitude Authorization and Notification Capability

The FAA has commenced certain airspace integration efforts already. For instance, the Low Altitude Authorization and Notification Capability (LAANC) will provide near real-time processing of airspace authorization for certain UAS operations. These authorizations will enable airspace access for UAS in proximity to airports.[17] To date, the FAA has authorized five private firms to actually provide the service. LAANC is expected to be in the "beta" phase throughout 2018 and is being introduced in six "waves" throughout the United States.[18]

UAS Traffic Management (UTM)

The National Aeronautics and Space Administration (NASA), in partnership with the FAA, has been conducting research on a UAS traffic management (UTM) system.[19] UTM is

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[12] Manuel Carrillo III, "Automakers, aerospace and startups are baking on a 'flying car' future.", Jul. 26, 2018. https://www.cnet.com/roadshow/news/flying-car-vtol-roundup/ (last accessed on Aug. 20, 2018)
[13] Elias, *supra*.
[14] https://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/air_traffic_services/ (last accessed on Aug. 20, 2018).
[15] See e.g., 14 C.F.R. §§ 91.126-91.135 & 14 C.F.R. Part 93
[16] See e.g., "Amendment of Class E Airspace; New Castle, IN", 83 *Fed. Reg.* 42,022 (Aug. 20, 2018)
[17] https://www.faa.gov/uas/programs_partnerships/uas_data_exchange/ (last accessed on Aug. 20, 2018)
[18] *Id.* ; "Beta" testing is the second phase of software testing that precedes commercial release, *Merriam Webster Dictionary.*
[19] https://www.nasa.gov/ames/utm & https://utm.arc.nasa.gov/index.shtml (last accessed on Aug. 24, 2018)

expected to enable more advanced UAS operations by providing conflict avoidance, congestion management, and communications among other capabilities. The results from NASA research are expected to be transferred to the FAA in 2019 for additional testing.[20] A number of private firms are also working on UTM-related activities.[21] H.R. 4, the *FAA Reauthorization Act of 2018*, contains provisions intended to accelerate the development, licensing, and use of UTM.[22] The *FAA Extension, Safety, and Security Act of 2016* (P.L. 114-190) also contained a provision related to UTM research and a pilot program. [23]

Counter-UAS Technologies

Along with efforts to detect and regulate UAS operations in the NAS, the development of authorities and processes to counter unlawfully operated UAS for security or safety reasons are also underway. Technologies to counter UAS can have impacts on the airspace, including the operation of air traffic control, functioning of aircraft avionics, and other users of the NAS. The use of counter-UAS technologies will require careful consideration and application.

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[20] *Id.*
[21] See *e.g.*, https://gutma.org/full-members/ (last accessed on Aug. 20, 2018)
[22] H.R. 4 (115TH Cong.) §§ 45506 & 45507
[23] P.L. 114-190, § 2208, Jul. 15, 2016