



Hearing on

“Building a 21st Century Infrastructure for America: Enabling Innovation in the National Airspace”

Before the

Subcommittee on Aviation
Committee on Transportation and Infrastructure
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Testimony of

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Chairman LoBiondo and Ranking Member Larsen, thank you for inviting me to testify. My name is Sean Cassidy, and I am the Director of Safety and Regulatory Affairs for Amazon Prime Air. Unmanned aircraft systems (UAS), or drones, have the potential to revolutionize the way that businesses operate across a broad range of industries, delivering immense safety, utility, economic, environmental, and humanitarian benefits. I appreciate this Committee’s commitment to ensuring the United States realizes the tremendous benefits of this technology in a safe and secure manner. As a commercial airline pilot for nearly 20 years and previously First Vice President and National Safety Coordinator of the Air Line Pilots Association (ALPA), I am intimately familiar with the complexity of the National Airspace System (NAS) and the responsibility that all stakeholders have when it comes to safely integrating UAS.

I’d like to first provide a brief overview of the technology and safety systems behind Amazon Prime Air.

Amazon Prime Air

Amazon Prime Air is a service designed to safely deliver packages to customers in 30 minutes or less using drones. Flying below 400 feet, and generally above 200 feet, except for takeoff and landing, Prime Air UAS will utilize sophisticated equipment, including automated, on-board sense-and-avoid technologies, to ensure safe operations at distances well beyond the visual line of sight (BVLOS) of the operator.

We have Prime Air development centers in the United States, the United Kingdom, Austria, France, and Israel, and we are testing in multiple countries. In July 2016, we received permission from the UK government to conduct package delivery tests oriented around BVLOS operations. And as part of an ongoing customer delivery trial in the UK, in December 2016, we successfully completed our first Prime Air delivery near Cambridge – just 13 minutes after the customer placed the order. From the point that the package was loaded onto the drone, the operation was fully autonomous.

I am also pleased to announce that with the assistance of the Federal Aviation Administration (FAA), we performed our first U.S. delivery demonstration last month in Palm Springs, California. We have also committed to join NASA, the FAA, and the Nevada Institute for Autonomous Systems (NIAS) in an Unmanned Traffic Management (UTM) technical capabilities demonstration in May 2017, at the Reno test site.

The United States, through the hard work of the FAA, NASA, Congress, and industry stakeholders, has been a leader in the development of UAS technology. However, if the United States wants to maintain a leadership position – and keep the thousands of technical jobs associated with UAS development, deployment, and operations – there are three actions that this Committee and the FAA can take:

- 1) Enacting enabling regulations that establish the structural building blocks for safe and secure UAS integration into the NAS;
- 2) Allowing commercial operators to conduct BVLOS customer package delivery trials; and
- 3) Creating an expedited, performance-based, operator certification pathway for commercial UAS.

I. Structural Building Blocks for Safe and Secure Integration

Just as the introduction of traffic signals heralded a new era of safety and efficiency at the dawn of the 20th century, a critical component of a safe and successful commercial UAS industry in the United States is a UTM system that will facilitate operations of highly automated – and in some cases, completely autonomous – UAS, in low altitude airspace, BVLOS, and over people. UTM is an automated traffic management system that is separate from, but complementary to, the existing air traffic control system. Industry stakeholders, NASA, and the FAA are all working collaboratively to establish a UTM system that will allow UAS to safely and seamlessly integrate into the NAS by introducing protocols for real-time identification and separation of airborne traffic, which will be enabled by an interoperable and overlapping system of multiple service suppliers.

Operators will be able to access this cloud-based internet UTM system in a number of ways, including cellular or satellite connections that ensure reliability of communications. As we develop this UTM system, we should also look at leveraging automotive vehicle-to-vehicle and vehicle-to-infrastructure technologies. While the UTM system will be subject to FAA safety and policy oversight, it could be built and managed by operators without placing a significant cost burden on the government.

Amazon has been a NASA UTM research and development partner for years, and we were pleased to see Congress embrace the need for UTM in the FAA Extension, Safety, and Security Act of

2016 (FAA Extension Act), which directs the FAA to develop a UTM research plan and establish a two-year pilot program beginning April 2017. This is a welcome first step, yet the FAA Extension Act does not require implementation upon conclusion of the pilot program. Without an implementation requirement, this and other complementary efforts, such as the FAA Drone Advisory Committee's airspace integration work, may be lost.

Similarly, security and accountability are top priorities for government and the UAS industry alike. FAA's current UAS registration requirement mandates an onboard registration number for vehicles weighing more than 250 grams. This is a good first step, but it is incomplete insofar as it only provides for identification after an undesired event occurs. We agree with Congress that, with some exceptions, federal, state, and local law enforcement agencies should be able to easily and quickly identify UAS — both commercial and recreational — in a remote manner (Remote ID), as contemplated in section 2202 of the FAA Extension Act. This is similar to how cars can be linked to drivers via license plates and registration records.

As a part of a standardized Remote ID system, we assume the existence of a database, subject to FAA oversight, that contains one unique ID per registered UAS — commercial and recreational. This database would link this unique vehicle ID to a specific owner/operator. The details of this database would not be publically accessible, but the ability to confirm whether or not a given ID is valid — and that the operator is authorized to fly in a certain area (but not who the operator is) — would be viewable to all. Amazon does not support anonymous operations of UAS, with limited exceptions such as for those conducted in pre-approved model aircraft/hobbyist flying fields.

We were pleased to see the FAA Administrator's recent announcement that the FAA will establish a Remote Identification Aviation Rulemaking Committee (ARC) to develop standards for remotely identifying and tracking UAS. There are inexpensive and readily available solutions that

leverage technologies such as Wi-Fi and cellular communications that can be quickly and effectively implemented, and we look forward to participating in the ARC process.

Remote identification and the other aforementioned safety and security efforts are critically important, but if this industry is to succeed, these activities must move in parallel with the development of a forward-leaning regulatory framework for commercial UAS. Further, we believe the industry can provide critical assistance in developing mechanisms to mitigate security risks. The FAA was scheduled to publish a notice of proposed rulemaking (NPRM) for commercial UAS operations over people at the end of 2016, but the rulemaking process has been put on hold indefinitely until security concerns that were expressed by one or more agencies that sit on the UAS Executive Committee (ExCom) can be addressed. Therefore, we respectfully ask Congress to direct the ExCom to resolve these issues with industry stakeholders and move the NPRM forward expeditiously.

To further promote safe and secure UAS operations, a process should be established to designate no-fly zones above sensitive fixed site facilities and a pilot project should be created for airport safety and hazard mitigation, both of which would meet requirements in the FAA Extension Act. We also believe education and training requirements are critical to ensuring the safety of our skies and of people and structures on the ground.

Lastly, it is important that these structures provide national uniformity. There are a number of state and local UAS laws and ordinances that jeopardize safety and inhibit innovation. As noted by the FAA, a “patchwork quilt of different restrictions could severely limit the flexibility of FAA in controlling the airspace and flight patterns, and ensuring safety and an efficient air traffic flow.” (FAA Fact Sheet on State and Local UAS Regulation, December 2015.) National standards will prevent duplicative and burdensome restrictions on the UAS industry — just as they have for the broader aviation industry. There are already dozens of state and local drone laws in effect, and hundreds more that have been considered, which intrude on the FAA’s safety authority and may stifle the development of the UAS

industry. The industry is eager to work with the FAA, alongside state and local governments, to preserve traditional police powers and privacy rights; however, all state and local governments must recognize the FAA's authority over pilots, aircraft, and the navigable airspace.

II. **Customer Package Delivery Trials**

As we look back, 2016 was a productive year for the nascent commercial UAS industry. The implementation of FAA's rule for the Operation and Certification of Small UAS, otherwise known as Part 107, was a positive initial step that enabled basic commercial UAS operations. However, to realize the full potential of this technology, the regulatory framework must continue to evolve. Part 107 focused predominately on operations within the operator's line of sight, and contained specific provisions that prohibited commercial delivery via BVLOS operations. BVLOS operations under current rules are permitted only by waiver, and not allowed in any respect when the flights involve carriage of property for compensation or hire. Similarly, operations directly over people are only permitted by waiver. To date, only one such waiver has been granted and its operational limitations would not permit delivery operations. For Amazon Prime Air, the collective effect of these restrictions greatly limits our ability to perform private customer delivery trials and expanded testing in the United States — similar to what we're already doing in the UK — that would provide a bridge to full commercial operations.

FAA reauthorization bills passed in 2016 by the Senate and the House Transportation and Infrastructure Committee, as well as sections 2207 and 2210 of the Extension Act, recognized the value of BVLOS operations; however, to date, only a few BVLOS waivers have been granted by the FAA. Delivery operations are contingent upon the ability to reach consumers and businesses that are located beyond the immediate vicinity of the operator. UAS must also be able to fly in populated areas to efficiently conduct a variety of operations beyond delivery, such as building structural inspections and land surveys, which underscores the need to move forward with the FAA's NPRM for operations over

people. A regulatory structure that relies upon time consuming and complex processes for waivers and exemptions will not adequately support the development of this industry.

III. Expedited Operator Certification Pathway for Commercial UAS Delivery Providers

While we have been encouraged by the level of responsiveness shown by the FAA's UAS Integration Office, Air Traffic Organization and Flight Standards and Certification branches, significant challenges still exist in making the transition to commercial operations.

Since Part 107 was created to provide operating approvals absent formal underlying airworthiness certifications for UAS, a regulatory gap exists between the operations permitted by the rule and more complex commercial BVLOS operations. Currently, there is no difference between the operating certificate and airworthiness requirements for manned cargo aircraft, and those for any UAS operation not covered by Part 107, which includes commercial delivery operations. They fall into the same category, yet their risk profiles could not be more different. This demonstrates the need for a more clearly defined regulatory pathway that establishes required safety and performance standards specific to commercial BVLOS operations. We have had collaborative discussions with the FAA regarding the certification pathway for package delivery operations; but in the absence of a specific regulatory framework, the process could take several years.

Enacting comprehensive FAA reauthorization legislation in 2017 represents a major opportunity to support and expedite the continued growth of the U.S. commercial UAS industry by providing for safe, routine, and widespread UAS operations, including delivery.

The 2016 FAA reauthorization bill that passed out of this Committee included a bipartisan provision directing the Department of Transportation (DOT) to establish a new class of air carrier for UAS package delivery providers. In order to prevent regulatory delay and ensure a path forward for operational approvals, we respectfully request that Congress again direct the DOT and the FAA to

quickly establish a streamlined and risk-based air carrier certification process specifically tailored to UAS package delivery operations.

The success of the UAS industry and its ability to provide services such as package delivery to customers is contingent upon a regulatory framework that does not require operators to go through a complex waiver and exemption process for what will eventually become routine operations. Requirements for UAS research and development testing, obtaining operational permissions, and establishing the FAA rulemaking processes necessary to support safety and innovation, should be streamlined to ensure the United States keeps pace with this technology.

Conclusion

In conclusion, while Prime Air is driven by our desire to meet customer's demand for safe, rapid and efficient delivery capabilities, we are also incredibly excited about the benefits such a service will have on the overall transportation system. Not only will it increase the overall safety and efficiency of the current transportation system, Prime Air's commitment to reducing overall carbon footprint through the use of electrically-powered UAS will also make a positive overall environmental impact.

We applaud Administrator Huerta for recognizing the urgency of the situation in stating that, with regards to UAS, we need "regulation at the pace of innovation." We agree with this sentiment and look forward to continuing to work with Congress, the FAA, and all stakeholders to establish the structural building blocks for safe and secure UAS integration, to enable commercial operators to conduct customer package delivery trials, and to create an expedited operator certification pathway for UAS delivery providers. We are committed to ensuring that important commercial UAS services become available in the United States safely and soon. I am happy to answer any questions.

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