Unmanned Systems Alert

UAS Traffic Management Takes its Next Step

April 27, 2021

Last week, the Federal Aviation Administration (FAA) and the National Aeronautics and Space Administration (NASA) jointly released a progress report on Phase 2 of the Unmanned Aircraft Systems (UAS) Traffic Management (UTM) Pilot Program (UPP). Initial results proved successful in demonstrating a number of additional UTM capabilities and allowed the agencies and partners to gain valuable information. The data, lessons learned, surveys and other artifacts will be used to generate a final report, to be published later in 2021.

The primary goal of the UPP is to enable the development, testing and demonstration of a set of UTM capabilities to support the sharing of information that promotes situational awareness and deconfliction of drones. During the first phase of the UPP, the following capabilities were successfully demonstrated: (1) sharing of operational intent between operators; (2) generating a UAS Volume Reservation (UVR) by UAS Service Suppliers (USS) that work together to provide UTM; and (3) providing access to FAA Enterprise Services to support shared information among drone operators and USS.

In order to conduct adequate testing and demonstration activities for UPP Phase 2, the FAA chose two UAS test sites for UPP Phase 2. These sites were:

- Virginia Tech, Mid-Atlantic Aviation Partnership (VT-MAAP).
- New York UAS Test Site (NYUASTS).

Objectives for Phase 2 of the UPP included testing of Remote Identification (RID) tracking technologies and testing the functioning of the UTM as UAS operations increase in volume and density. Tests and demonstrations were conducted on the following:

- The FAA Flight Information Management System (FIMS) prototype and infrastructure, which gives the FAA access to UTM data from industry and other stakeholders.
- New technologies and data to validate the latest standards for RID and support authorized users with specific operator data.

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- In-flight separation from other UAS or manned aircraft in high-density airspace to validate recently proposed international UTM standards to help UAS avoid each other.
- UAS Volume Reservations (UVRs) to notify UAS operators of emergencies and make sure other UTM capabilities work properly in these scenarios.
- Secure information exchanges between the FAA, industry, and authorized users to ensure data integrity.

Throughout the spring and summer of 2020, the FAA worked with the test sites and their partners on software development, systems integration, definition of use case test cards and identifying data capture requirements, all to prepare for final flight demonstrations. USSs and the NextGen Integration and Evaluation Capability lab (NEIC) conducted numerous checkout tests to evaluate the required system interactions. The checkout process tested individual interactions between USS and FIMS, USS and USS, and UAS vehicles and USS to ensure that individual USSs were able to connect and communicate with the other UTM components prior to beginning the operational tests of the aforementioned capabilities.

Operational testing of UPP Phase 2 capabilities was conducted through a series of shakedown activities. Participants conducted increasingly complex tests to validate their software and hardware, addressing issues as they were identified. There were two shakedowns completed at each of the test sites: 172 operations were conducted during Shakedown 1, and 191 live flights and two simulated operations were conducted during Shakedown 2, 155 of which were either actual, pseudo or simulated Beyond Visual Line of Sight (BVLOS) operations.

The NYUASTS team tested simultaneous operations of 16 aircraft (13 live and three simulated) at Griffiss Airport and in downtown Rome, NY during Shakedown 2. This represented one of the highest-density operations tested in an urban environment using UTM capabilities targeted by the UPP. As Shakedown 2 was conducted with live flights, it was possible to successfully test capabilities such as broadcast RID. This allowed the testing of information exchanges supporting RID, including exchanges of experimental Temporary Flight Restriction (TFR) compliance details.

Final demonstrations for UPP Phase 2 were completed in the fall of 2020 with the goal of demonstrating and verifying services that will support implementation of initial UTM operations in a live and simulated manner. Although full results will not be released until the final report is issued, there were some key takeaways in the areas of cybersecurity and testing of new standards.

Understanding that cybersecurity is of critical concern today, UPP Phase 2 incorporated a layered message security approach using digital certificates and message signatures to improve the integrity and security of the information exchanges. Both of these security measures were applied to the onboarding and shakedown activities.

Cybersecurity efforts in the onboarding and checkout activities allowed partners to resolve technical details such as certificate formatting discrepancies and encryption key exchange to successfully obtain certificates. After obtaining authentication, the teams encountered technical issues but were able to develop a final protocol that successfully enabled the use of message signing and validation among USSs and

between the USS and FIMS. Lessons learned will improve specifications for message signing and validation for future activities.

The UPP Phase 2 progress report calls out the value of being able to test the new ASTM standard, ASTM F3411-19, for RID and tracking, which was released early last year. This document serves as an industry consensus specification for the performance requirements of RID of UAS and defines message formats, transmission methods and minimum performance standards for both broadcast and network RID. An effort to conduct an industry threat assessment led to recommendations on how to improve the ASTM standard as it further matures. There were a number of challenges faced by the team during both the onboarding process and the shakedowns while following the ASTM standard. The team worked to test the telemetry and data messaging elements to resolve the interoperability issues and ultimately concluded that the tests helped shed light on how the new ASTM standard API affects UTM in a real-world environment.

As noted above, the FAA will issue a final report detailing the full findings later in 2021.

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