



Unmanned Aircraft Systems (UAS) Traffic Management (UTM)

UTM Pilot Program (UPP) Phase Two (2) Progress Report

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Steve Bradford

Steve Bradford (Mar 22, 2021 06:09 EDT)

Steve Bradford,
FAA Chief Scientist
NextGen Development, UTM RTT Co-Lead

Mar 22, 2021

Date

Parimal Kopardekar

Parimal Kopardekar (Mar 24, 2021 08:20 PDT)

Parimal Kopardekar,
NASA Senior Technologist for A Principal Investigator
NASA Ames Research Center, UTM RTT Co-Lead

Mar 24, 2021

Date

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1 Introduction

The Unmanned Aircraft Systems (UAS) Traffic Management (UTM) Pilot Program (UPP) is an important component for defining and expanding the next set of industry and Federal Aviation Administration (FAA) capabilities required to support UTM. In summer 2019, the FAA, National Aeronautics and Space Administration (NASA), and industry partners successfully completed UPP Phase 1 demonstrations. UPP Phase 2 began in spring 2020 and will conclude in early 2021 with the release of the final report.

This document provides an update on the progress for UPP Phase 2 to date.

1.1 Background

1.1.1 Unmanned Aircraft Systems (UAS) Traffic Management (UTM)

Operators of small UAS are continuously exercising new, beneficial applications for their operations, including activities such as goods delivery, infrastructure inspection, search and rescue, and agricultural monitoring. Currently, there is only a limited initial infrastructure available to manage the widespread expansion of UAS operations within the National Airspace System (NAS). A safe and efficient UTM environment of expanded services is needed to help ensure that this rapidly growing industry can be incorporated into the NAS safely and efficiently.

Incorporation of small UAS operations in the NAS presents a variety of novel challenges, particularly in low-altitude airspace (below 400 feet Above Ground Level [AGL]). The FAA and NASA have joint interests in identifying innovative and transformative integration solutions that can effectively respond to these challenges without compromising the safety or efficiency of the NAS. In 2015, a UTM Research Transition Team (RTT) was formed between the FAA and NASA to jointly develop and enable UTM framework to manage routine Visual Line of Sight (VLOS) and Beyond Visual Line of Sight (BVLOS) UAS operations in airspace where air traffic services are not provided.

UTM is the manner in which the FAA will support operations for UAS operating in low-altitude airspace. UTM utilizes industry's ability to supply services under FAA's regulatory authority where these services do not currently exist. It is a community-based, cooperative traffic management system in which the operators and entities providing operation support services (i.e., UAS Service Suppliers [USS]) are responsible for the coordination, execution, and management of operations, with rules established by FAA.

UTM development will ultimately identify services, roles and responsibilities, information architecture, data exchange protocols, software functions, infrastructure, and performance requirements for enabling the management of low-altitude UAS operations.

1.1.2 UTM Pilot Program (UPP) Phase 1

The FAA Extension, Safety, and Security Act of 2016 [1] directs the FAA Administrator, in coordination with the Administrator of NASA, to establish the UPP. The UPP was established as

an important component for identifying the next set of FAA and industry capabilities required to support UTM operations.

The primary goal for UPP is to enable the development, testing, and demonstration of a set of UTM capabilities. These capabilities support the sharing of information that promotes situational awareness and deconfliction (i.e., cooperative separation). Some of the UTM capabilities successfully demonstrated in the first phase of UPP included: (1) sharing of operational intent between operators, (2) the ability for a USS to generate a UAS Volume Reservation (UVR), and (3) providing access to FAA Enterprise Services to support shared information (accomplished via the Flight Information Management System [FIMS]).

On January 14, 2019, The Honorable Elaine L. Chao, Secretary of the United States Department of Transportation, announced the FAA's selection of three industry teams to partner with the agency in the UPP:

- The Virginia Tech, Mid-Atlantic Aviation Partnership (VT-MAAP)
- The Northern Plains UAS Test Site (NPUASTS)
- The Nevada Institute for Autonomous Systems (NIAS)

In summer 2019, the FAA, NASA, and their industry partners successfully completed the UPP demonstrations. This consisted of a series of preparation flights and final flight demonstrations, with both live UAS flights and simulated UTM operations at each test site. The flight activities were executed while participating vehicles (live and/or simulated) were connected to FIMS via communication with a USS, and with that USS connected to the UPP demonstration platform. Through the planning and execution of the UPP activities, each of the three UPP partnerships successfully demonstrated all the requisite capabilities. While the specifics of each use case varied between the partnerships, the key UTM capabilities were exercised with success at each site.

1.1.3 Initiation of UPP Phase 2

Recognizing the importance in defining and expanding capabilities needed to support UTM, the FAA Reauthorization Act of 2018 [2] required the UPP to meet additional objectives prior to completion, initiating UPP Phase 2. Objectives for UPP Phase 2 include testing of Remote Identification (RID) tracking technologies and operations with increasing volumes and density. In cooperation with NASA, FAA UAS test sites, industry stakeholders, and UAS Integration Pilot Program (IPP) participants, testing and demonstration activities were conducted to support these objectives.

In April 2020, the FAA selected two FAA UAS test sites (shown in Figure 1) to partner with the agency in UPP Phase 2:

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



Figure 1: UPP Phase 2 Test Sites, Locations, and Partners

The UPP results will provide a proof of concept for UTM capabilities and serve as the basis for policy considerations, standards development, and the implementation of a UTM system.

1.2 Document Scope

This report provides a status of UPP Phase 2, including the shakedown activities, which ensured that participants were ready to conduct the final demonstrations. The document includes an overview of UPP Phase 2, descriptions of key UTM elements being examined in UPP Phase 2 activities, details on test sites and other participants, and a summary of UPP Phase 2 progress to date. The progress update includes information from the onboarding and checkout process, shakedown 1, and shakedown 2. To conclude, it provides initial takeaways from UPP Phase 2 activities, as well as next steps. Results of the final demonstrations will be presented in 2021.

2 UPP Phase 2 Overview

This section provides a high-level overview of the UPP Phase 2 project, including a review of the capabilities to be demonstrated, background information on key UTM elements applicable to phase 2, an overview test site partners and supporting actors, and a review of project activities.

2.1 Capabilities for Demonstration

UPP Phase 2 demonstrates the following emerging UTM capabilities that will support BVLOS operations.

Appendix B Acronyms

All acronyms used throughout this document are provided in Table 2.

Table 2: Acronyms

Acronym	Definition
AGL	Above Ground Level
API	Application Programming Interface
ATC	Air Traffic Control
ATM	Air Traffic Management
BVLOS	Beyond Visual Line of Sight
COVID-19	Coronavirus Disease 2019
DSS	Discovery and Synchronization Service
FAA	Federal Aviation Administration
FIMS	Flight Information Management System
HITL	Hardware-in-the-Loop
HTTP	Hypertext Transfer Protocol
IATF	International Aviation Trust Framework
IPP	UAS Integration Pilot Program
LTE	Long Term Evolution
NAS	National Airspace System
NASA	National Aeronautics and Space Administration
NIEC	NextGen Integration and Evaluation Capability
NUAIR	Northeast UAS Airspace Integration Research
NYUASTS	New York UAS Test Site
RID	Remote Identification
RTT	Research Transition Team
SDSP	Supplemental Data Service Provider
SITL	Software-in-the-Loop
TFR	Temporary Flight Restriction
UA	Unmanned Aircraft
UAS	Unmanned Aircraft Systems

Acronym	Definition
UPP	UTM Pilot Program
USS	UAS Service Supplier
UTM	UAS Traffic Management
UVR	UAS Volume Reservation
VLOS	Visual Line of Sight
VT-MAAP	Virginia Tech, Mid-Atlantic Aviation Partnership









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