FAA/NASA UAS Traffic Management Pilot Program (UPP)

Industry Workshop #1
NASA Ames Research Center
March 15, 2018
<table>
<thead>
<tr>
<th>Meeting Topics</th>
<th>Name</th>
<th>Time</th>
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</thead>
<tbody>
<tr>
<td>Registration</td>
<td>All</td>
<td>8:30 am – 9:00 am</td>
</tr>
<tr>
<td>Welcome &amp; Introductions</td>
<td>NASA Parimal Kopardekar/Joseph Rios</td>
<td>9:15 am – 9:30 am</td>
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<tr>
<td>Overview of UTM Pilot Program (UPP)</td>
<td>FAA Biruk Abraham</td>
<td>9:30 am – 9:45 am</td>
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<tr>
<td>UPP Framework</td>
<td>NASA Joseph Rios</td>
<td>9:45 am – 10:30 am</td>
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<tr>
<td><strong>Break</strong></td>
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<td>10:30 am – 11:00 am</td>
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<tr>
<td>UPP Use Cases &amp; Scenarios</td>
<td>FAA Biruk Abraham/Collin Roche</td>
<td>11:00 am – 12:00 pm</td>
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<tr>
<td><strong>Lunch</strong></td>
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<td>12:00 pm – 1:30 pm</td>
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<tr>
<td>UPP Capabilities Discussion</td>
<td>FAA Biruk Abraham/Addam Jordan</td>
<td>1:30 pm – 2:00 pm</td>
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<tr>
<td>Execution &amp; Engagement Timeline Review and Next Steps</td>
<td>FAA Biruk Abraham</td>
<td>2:00 pm – 2:30 pm</td>
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<tr>
<td><strong>Break</strong></td>
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<td>2:30 pm – 3:00 pm</td>
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<tr>
<td>Questions &amp; Answers</td>
<td>All</td>
<td>3:00 pm – 3:30 pm</td>
</tr>
<tr>
<td>UPP USS/Operator Collaborative Hour</td>
<td>NASA Parimal Kopardekar/Joseph Rios</td>
<td>3:30 pm – 4:30 pm</td>
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</table>
Welcome & Introductions
Objectives

• FAA
  • The UTM Pilot Program’s (UPP) primary goal is to develop, demonstrate, and provide enterprise services that will support implementation of initial UTM operations. This enterprise service will support the sharing of intent and situational awareness information amongst UTM participants.

• NASA
  • Provide critical UTM overall architecture and key elements (e.g. FIMS) into FAA operational demonstration system for evaluation with existing and potential future air traffic management systems and processes.
Research Transition Team Plan & Key Deliverables

**Plans**
- Joint UTM Project Plan (JMP) – December 2016
- RTT Research plan – January 2017
- UTM Pilot Project – April 2017-2019

**Execution**
- RTT: March 2016 – December 2020

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**Key RTT Deliverables**
- Tech transfer - to FAA and industry
  - Concepts and requirements for data exchange and architecture, communication/navigation and detect/sense and avoid
  - Cloud-based architecture and ConOps
  - Multiple, coordinated UAS BVLOS operations
  - Multiple BVLOS UAS and manned operations
  - Multiple operations in urban airspace
- Tech transfer to FAA
  - Flight Information Management System prototype (software prototype, application protocol interface description, algorithms, functional requirements)

**FAA-NASA Key RTT Deliverable**
- Joint FAA-NASA UTM Pilot Program

RTT will culminate into key technical transfers to FAA and joint pilot program plan and execution
**UTM Technical Capability Levels (TCLs)**

**Capability 1: Demonstrated how to enable multiple operations under constraints**
- Notification of area of operation
- Over unpopulated land or water
- Minimal general aviation traffic in area
- Contingencies handled by UAS pilot

Product: Overall con ops, architecture, and roles

**Capability 3: Focuses on how to enable multiple heterogeneous operations**
- Beyond visual line of sight/expanded
- Over moderately populated land
- Some interaction with manned aircraft
- Tracking, V2V, V2UTM and internet connected

Product: Requirements for heterogeneous operations

**Capability 2: Demonstrated how to enable expanded multiple operations**
- Beyond visual line-of-sight
- Tracking and low density operations
- Sparsely populated areas
- Procedures and “rules-of-the road”
- Longer range applications

Product: Requirements for multiple BVLOS operations including off-nominal dynamic changes

**Capability 4: Focuses on enabling multiple heterogeneous high density urban operations**
- Beyond visual line of sight
- Urban environments, higher density
- Autonomous V2V, internet connected
- Large-scale contingencies mitigation
- Urban use cases

Product: Requirements to manage contingencies in high density, heterogeneous, and constrained operations

Risk-based approach: depends on application and geography
Overview of UTM Pilot Program (UPP)
Participants Questions

Join at slido.com #UPP
UTM is a traffic management “ecosystem” for UAS operations that is separate, but complementary to FAA’s Air Traffic Management (ATM) system.

**STEP 1**
Initial research efforts and prototype development underway by NASA and Industry to explore concepts, data requirements, and a framework to support sUAS operations safely and with efficiency.

**STEP 2**
Transfer NASA prototype and additional capabilities over to FAA for further evaluation and identification of services, and integrate LAANC and UAS Facility Maps (UASFM) as part of the UTM framework.

**STEP 3**
Assess the interoperability of the proposed UTM capabilities with FAA regulatory and operational frameworks to safely introduce sUAS flights 400ft. AGL.

**STEP 4**
Transition UPP and future UTM capabilities identified for Solution Implementation.
UTM Pilot Program (UPP) Overview

UTM Pilot Program

FAA Extension, Safety & Security Act of 2016
Pub. L. 114-190 § 2208
(July 15, 2016)

Directs FAA and NASA to coordinate/collaborate, develop, and publish an Unmanned Aircraft Systems Traffic Management (UTM) Research Plan and establish a UTM System Pilot Program.

UPP shall be completed not later than two (2) years following its establishment.
The UPP, and activities leading up to the demonstration event(s) planned in early 2019, are an important component of identifying the initial set of Industry and FAA capabilities required to support UTM operations.

<table>
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<tr>
<th>Goals</th>
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<tr>
<td>1. Demonstrate the initial integrated UTM ecosystem comprised of UTM Services, Low Altitude Authorization &amp; Notification Capability (LAANC) services for USS, and UAS Operators sharing intent and information collaboratively</td>
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<td>2. Demonstrate Dynamic Restrictions capability and the automation of Parts 101(e) and 107 notifications &amp; authorization</td>
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<td>3. Provide an understanding of the level of investment required for government and Industry stakeholders</td>
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<td>4. Final Report documenting UTM Pilot Program findings to further mature UTM</td>
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How Does UPP Complement IPP?

UAS Traffic Management Pilot Program (UPP)

- Congressional directive for FAA and NASA to partner in order to advance safe sUAS Integration at the lower altitudes through traffic management
- Forum for Industry collaboration with NASA and FAA to evaluate and demonstrate UTM technologies and capabilities
- Development of enterprise capabilities, testing, and evaluation leading up to a successful UPP demonstration

UAS Integration Pilot Program (IPP)

- Presidential directive for the Secretary of Transportation and FAA to create a partnership framework for private sector and state/local/tribal governments to achieve broader national policy
- Advances UAS Industry by informing regulations that permit more complex, demand-driven UAS operations
- Pushes the boundaries of UAS use by expanding what is routinely authorized under the sUAS rule
FAA UTM Activities

Research and Development
- NASA TCL Activities
- Integration Pilot Program (IPP)

Pre-implementation
- UTM Pilot Program
- FAA / NASA RTT
- Integration Pilot Program (IPP)

Operational Deployment
- LAANC
- UAS Registration

UTM Pilot Program Bridges the Research Activities and Operational Deployment of Future UTM Capabilities
Path to Full UAS Integration

Airspace Access

NAS System Integration
Aeronautical Information Infrastructure for UAS
Low Altitude Authorization Notification Capability (LAANC)
On-line Registration

Low-risk, isolated

Full UAS integration
Small Cargo/Passenger
Non-Segregated Operations
Expanded Operations
UAS Operations over People
Rulemaking to Address Security Concerns
Part 107 Operations
Operations By Exemption

Operational Regulations

Level of Integration

Building the Regulatory Foundation
Types of Operations in UPP

• Visual Line of Sight (VLOS)
  • Operates in accordance with Part 101(e) or Part 107
  • UAS Operator uses a participating USS for 101 notification or 107 authorization if required for a particular operation
  • Operations conducted in controlled or uncontrolled airspace
  • May volunteer to share Operation Intent within UTM, but not required

• Beyond Visual Line of Sight (BVLOS)
  • Assumed to operate under Part 107 waiver
  • Required to share Operation Intent within UTM
UPP Actors

• Government
  • Maintains Federal Authority over operations in the demonstration
  • Provides constraints, information requests, etc. through the Flight Information Management System (FIMS)
  • Provides UAS Facility Maps via applicable LAANC systems

• UAS Operator
  • Responsible for the safe conduct of its UAS operations.
  • Ensure equipment, infrastructure, etc. meet applicable requirements.
  • Responsible for coordination with other UTM participants (when required)

• Remote Pilot in Command
  • Responsible for the safe conduct of a single operation
    • UAS Operator and RPIC roles may be held by the same entity
    • Example: A package delivery company acts as the UAS Operator for all of its package delivery flights, while individual employees act as the RPIC for a single delivery flight
• **UAS Service Supplier (USS)**
  • Third-party entity that provides various services to assist UAS Operators (and their RPICs) in meeting obligations
    • Planning
    • Conformance Monitoring
    • Information sharing with other UTM stakeholders via the USS Network
  • Individual UAS Operators subscribe to an individual USS
  • UAS Operators may provide their own services such that they are acting as a USS
  • Provides Automatic Notification and Authorization services to Part 101(e) and Part 107 operators, respectively
  • Sends information to the FAA via FIMS and applicable LAANC systems, as required

• **USS Network***
  • The conglomeration of all USSs; information is exchanged across the network as required/needed
  • A Local USS Network (LUN) includes those USSs that are operating within a limited geographical area
  • USSs share applicable information with each other via the Network

*USS Network concepts still being explored*
UPP Framework
UPP High-Level Operational Concept
UPP Capabilities Overview

- UAS to USS Communication
- USS to USS Communication
- Shared Information
- Dynamic Restrictions
- Notification & Authorization
  - Operation Intent
  - Operation Status
  - Operation Volume
  - Dynamic Restriction Distribution
  - Part 101(e) Notifications
  - Part 107 Authorizations
  - UAS Facility Maps (UASFM)

Key:
- Industry Capability
- FIMS Capability
- LAANC Capability
• UAS operators provide their planned operations to a USS system

• USS is to provide resource mitigation, contingency management, and system information to UAS Operators
USS to USS Communication

- Required interfaces that each USS (or USS Instance) must support to allow interoperability within the USS Network
- Focuses on data exchange between USSs
Shared Information: Operation Intent

• Operation Intent is a common data set that is made available by a UAS Operator to applicable UTM participants
  • Other Operators use this shared intent information when planning/conducting their own operations, fostering a shared situational awareness

• Operation Intent is developed during the planning stage for a flight, but it can be modified during flight as well

• The USS to which a UAS Operator is subscribed makes the Operation Intent available to its own subscriber base, as well as other USSs operating in the same area as the originating Operator

• Included in Operation Intent
  • Type of Operation
  • Operation Status
  • Operation Volume(s)
    • Location, Shape, Floor, and Ceiling
    • Active Times
  • RPIC Information
  • Equipment Information
  • Contingency Information
  • Additional Info
Operation Intent Sharing

Key
- Originator
- Recipient

FIMS → FAA

Operator A Operation Intent (if requested by the FAA)

USS A

UAS Operator A

Operator A Operation Intent

USS X

Operator A Operation Intent

UAS Operator

Other Operators Near Operator A who are Subscribed to USS A

Other USSs Active in the Same Area as UAS Operator A

NOTE: If an Operation is active, RPICs also transmit updates for their Operation Intent and receive updates regarding nearby operations.
Shared Information: Operation Status

- **Operation Status** – Indicates the state of the overall operation and includes the following possible states:
  - **Accepted** – Indicates that Operation Intent has been developed and shared with other applicable UTM stakeholders. The UAS is not yet flying in the volume(s)
  - **Activated** – Indicates that the UAS is flying and is operating in accordance with the Operation Intent
  - **Closed** – Indicates that the UAS has landed and the operation is concluded
  - **Non-Conforming** – Indicates that the UAS is not operating in accordance with the Operation Intent
  - **Rogue** – Indicates that the UAS state is unknown; it may not operating per its Operation Intent, and is also unlikely to return to a conforming state
Shared Information: Operation Volume

- Polygons with ceilings and floors
- Multiple Operation Volumes can be defined for a single operation (segmented)
  - Each volume has its own set of active times determining when they may be considered to have a UAS within the volume
- Other Operators may use this shared information to strategically separate themselves from another operation
Dynamic Restriction

• Restricts UAS from operating within the bounds of a Dynamic Restriction Volume
  • Permitted UAS may fly within the volume
• Created and Distributed by the FAA during demonstrations
  • Sent to the USS Network via FIMS
  • FAA Public Portal available
  • Sent to other applicable stakeholders (SDSPs, ATM Users, etc.)
• Created/activated on a relatively short times scale (less than an hour), and can be active over short or long periods (hours to days)
3-D View of Dynamic Restriction

NOTE: Vertical elements exaggerated for visualization (not to scale)

Dynamic Restriction Volume
Floor = 0 ft AGL
Ceiling = 1,000 ft AGL

Inspection Operation
Single Volume
Floor = 0 ft AGL
Ceiling = 350 ft AGL

Inspection Operation
Segment 1 Volume
Floor = 0 ft AGL
Ceiling = 225 ft AGL

Inspection Operation
Segment 2 Volume
Floor = 125 ft AGL
Ceiling = 225 ft AGL

Inspection Operation
Segment 3 Volume
Floor = 0 ft AGL
Ceiling = 225 ft AGL

2 miles
Dynamic Restriction Distribution

**Key**
- Originator
- Recipient

**NOTE:** If an Operation is active, RPICs also receive alerts from their USS regarding Dynamic Restrictions.
Part 101(e) Notifications & Part 107 Authorizations

• Part 107 UAS Operators are required to get ATC Authorization when operating within controlled airspace
  • The LAANC program has enabled Automatic Authorizations during its initial implementation phase
  • USSs are provided UAS Facility Maps (UASFM)s by FAA systems
    • UAS Operations that occur underneath the ceilings for a map grid are considered automatically authorized
    • The USS sends a notice of authorization to both the UAS Operator and ATC

• Part 101(e) Hobbyist UAS Operators are required to notify airports when operating within 5 miles
  • The LAANC program is still developing the process of sending notifications to FAA systems
    • The subject of notifying towered airports is not part of the current UPP concept
  • The UTM Pilot Program will demonstrate 101(e) notifications to non-towered airports operated by private or municipal organizations
    • An Airport Operator will provide contact information that allow USSs to send automated notifications
UAS Facility Maps

- Created for the lateral boundaries of controlled airspace that touches the ground
  - Class B core
  - Class C core
  - Class D
  - Class E (surface)
- The map to the right is for an airport with Class D and Class E (surface) airspace
- Each grid indicates the maximum height for which UAS Operators may be granted an automatic authorization
Part 101(e) Notifications & Part 107 Authorizations

Part 101(e) Notification
(for non-towered airport)

USS
- Notice of UASFM Ceilings
- Confirmation of Notification

LAANC Systems
UAS Facility Maps
101(e) Notification
- Contact Info
- Confirmation of Notification

Airport Operator

Operation Information
UAS Operator

Part 107 Authorization

ATC Facility
Automatic Authorization Record

LAANC Systems
UAS Facility Maps
Automatic Authorization Record

USS
Operation Information
UAS Operator

Key

NOTE: For 101(e) Operators, USSs only provide UAS Facility Map information as a warning threshold for where these Operators may start seeing manned operations when in controlled airspace; they may operate above the UASFM ceilings.
UPP Use Cases & Scenarios
Use Case 1

VLOS & BVLOS Operations in Uncontrolled Airspace

• Environment:
  • Uncontrolled Airspace
  • Remote/Rural

• Scenario:
  • An Off-road race bring media outlets who use UAS for videography. A nearby rancher uses a UAS to track a herd

• This use case Introduces:
  • Shared information between Operators
    • Information planning
    • Sharing of Intent via USS
    • VLOS (107) and BVLOS operations
VLOS & BVLOS Operations in Uncontrolled Airspace

Overview of Operations
VLOS & BVLOS Operations in Uncontrolled Airspace

• Operations:
  • 2 Part 107 Operations conducting media videography of an off-road truck race in the Nevada Desert
    • Uncontrolled airspace means no Part 107 Authorizations are required
    • The two media UAS Operators choose to participate in UTM by sharing their Operation Intent; both subscribe to USS ABC
  • 1 BVLOS Operation near the race event area conducted to track down cattle on a rancher’s property
    • The rancher UAS Operator is required to participate in UTM, due to the operation including BVLOS flight
    • The Rancher is subscribed to USS XYZ
VLOS & BVLOS Operations in Uncontrolled Airspace

• Events:
  • **Night before**: Media Outlet A creates and shares their Operation Intent, which is made available to USS ABC’s subscriber base (those who operate near Outlet A), as well as other USSs active in the area through a LUN (in this case, USS XYZ).
  
  • **Morning of race**: Media Outlet B creates and shares their Operation Intent (they are able to see the Operation Intent of Outlet A while planning). Outlet B’s Operation Intent is made available to the LUN; Outlet A gets notification of Outlet B’s planned operation.

  • **Beginning of race**: Both Media Outlets activate their operations; the status change is made available to the LUN by USS ABC.
    • Their volumes overlap, and each RPIC maintains separation for the other UAS through visual scanning of the area around their own UAS.

  • **During the race**: The Rancher is able to see the active operations while planning his flight. He creates an Operation Volume that maintains separation from the Media Outlets. His Operation Intent is shared with the LUN by USS XYZ.
    • USS A provides notification to the RPICs for Outlet’s A and B of the new nearby operation. Both RPICs determine it does not affect them and take no additional actions.
    • The Rancher conducts his flight, sharing position information with USS XYZ. USS XYZ monitors the position to make sure the UAS conforms to the shared Operation Intent.

  • All operations conclude per their shared intent. As each RPIC indicates to their applicable UAS the conclusion of their flight, the USS updates the Operation Status to “Closed” and makes it available to the LUN.
Use Case 2

Dynamic Restriction near VLOS/BVLOS Operations in Uncontrolled Airspace

• Environment:
  • Uncontrolled Airspace
  • Remote/Rural

• Scenario:
  • Search and Rescue (SAR) helicopter flight results in the FAA creating a Dynamic Restriction to keep UAS from interfering with the rescue

• This use case introduces:
  • Dynamic Restrictions

• Prior concepts also in this use case:
  • Shared information between Operators
    • VLOS (101(e)/107) and BVLOS operations
Dynamic Restriction near VLOS/BVLOS Operations in Uncontrolled Airspace

Overview of Operations
Dynamic Restriction near VLOS/BVLOS Operations in Uncontrolled Airspace

- Operations
  - 1 Part 101(e) hobbyist photography operation
    - No airport within 5 miles means no notification required
    - Does not share Operation Intent (considered to not be participating in UTM)
  - 1 Part 107 wildlife tracking operation
    - Not conducted in controlled airspace means no authorization is required
    - Participates in UTM by sharing Operation Intent and subscribes to the services of USS ABC
  - 1 BVLOS survey operation
    - Required to share Operation Intent and subscribes to USS XYZ
Dynamic Restriction near VLOS/BVLOS Operations in Uncontrolled Airspace

- Events:
  - Prior to the Dynamic Restriction:
    - UAS Operation Planning:
      - The survey and tracking UAS Operators create and share their Operation Intent with the LUN via their respective USSs. Similar to the previous use case, each participating UAS Operator is made aware of the other through sharing of intent information
      - The photo UAS Operator does not share any information
    - All 3 UAS Operators take off and are in active flight once the SAR helicopter is dispatched
  - Creation of the Dynamic Restriction (DR):
    - SAR operator contacts the FAA to request the DR; an FAA originator uses DR Builder to generate the DR
    - DR Builder sends the DR to FIMS, which forwards it to the public portal, the USS Network, and other applicable stakeholders capable of communication with FIMS
    - The 2 UTM participants receive notification of the DR from their respective USS. The non-participant gets information about active DRs through the FAA public portal
      - The survey Operation Volume does not overlap with the Dynamic Restriction Volume, so no action is taken
      - The wildlife tracking Operation Volume is fully overlapped by the Dynamic Restriction Volume. Flying any further than the limits of the volume would result in BVLOS flight, which they are not capable of supporting, so they land; their USS updates the Operation Status to “closed”, and no further actions are taken
      - The photo hobbyist is outside of the Dynamic Restriction Volume and is not required to take any action
Use Case 3

Dynamic Restriction near VLOS Operations in Controlled Airspace

• Environment:
  • Controlled Airspace
    • Lanai Airport - Class E (surface)
    • Airport is operated by the State of Hawaii (no ATC facility at the airport)
  • Suburban

• Scenario:
  • Firefighting helicopter operations in Lanai City results in the FAA creating a Dynamic Restriction to keep UAS from interfering with the operations

• This Use Case Introduces
  • UTM operations in controlled airspace
  • Part 107 Automatic Authorization
  • Part 101(e) Notification

• Prior concepts also in this use case
  • Shared information between Operators
    • VLOS operations only in this use case
  • Dynamic Restrictions
Dynamic Restriction near VLOS Operations in Controlled Airspace

- Operations
  - 1 Part 101(e) hobbyist operation (recreation flight)
    - Lanai Airport is less than 5 miles away; notification is required to the Airport Operator
      - Lanai Airport is not towered, so notification to ATC is not required
      - The hobbyist subscribes to USS ABC to provide notification to the airport; also voluntarily shares Operation Intent
    - The hobbyist also voluntarily shares Operation Intent
  - 2 Part 107 operations
    - Real estate photography and golf course inspection
    - Operations in controlled airspace require ATC Authorization
    - Both UAS Operators subscribe to USS XYZ to get automatic authorization
    - Both participate in UTM by sharing Operation Intent and subscribes to the services of USS ABC
Dynamic Restriction near VLOS Operations in Controlled Airspace

• Events:
  • Part 101(e) notification*
    • The hobbyist UAS Operator develops his Operation Intent
    • The USS determines notification to Lanai Airport is needed
    • The USS sends notification to the airport via an email address the airport has made available to the USS Network
    • The airport operator system responds to the email, indicating receipt
    • The USS forwards the receipt notice to the hobbyist
    • The hobbyist also opts to share the Operation Intent with the LUN
  • Part 107 automatic authorizations
    • Both UAS Operators develop their Operation Intent
    • The USS determines that each operation is in controlled airspace for Lanai Airport and that ATC Authorization is required
    • The USS receives UAS Facility Map (UASFM) data from FAA LAANC systems
    • The USS verifies that the Operation Volume for each UAS Operator falls under the ceiling for applicable grids of the UASFM
    • The USS sends notice to the Operators that each of their operations is automatically authorized by ATC. A record of the automatic authorization is sent to the ATC facility servicing the Class E airspace around Lanai Airport
    • Both UAS Operators also opt to share their Operation Intent with the LUN
  • All three (3) UAS Operators know of the other operations near them due to the sharing of Operation Intent

* Part 101 (e) notification capability exploration is underway
Dynamic Restriction near VLOS Operations in Controlled Airspace

• Events, continued...
  • Dynamic Restriction Event
    • Similar to the previous use case, a Dynamic Restriction (DR) is created to support the manned helicopter operation (in this case, a firefighting operation). The process for creating/distributing the restriction is similar
    • At the moment the DR is sent to the USS network:
      • The hobbyist is already flying
      • The real estate photographer is already flying
      • The golf course inspector has not started flying
        • The inspection operation starts after the DR will be active
    • USS ABC sends notice to the hobbyist; USS XYZ sends notice to the photographer and inspector
      • The hobbyist determines the DR Volume does not overlap his Operation Volume; he continues to fly with no actions taken with respect to the DR
      • The real estate photographer determines the DR Volume completely overlaps his Operation Volume. He lands, ceases operations for the day, and updates his Operation Intent to indicate the operation concluded earlier than planned
      • The golf course inspector determines the DR volume does not overlap his Operation Volume; he makes no changes to his planned operation
    • The firefighting operations finish earlier than the DR end time. The FAA originator updates the restriction to end at an earlier time. This update is made available to stakeholders as previously noted
UPP Capabilities Discussion
# FAA Technical Capabilities

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<tr>
<th>Description</th>
<th>Demonstrate a developed API with the following technical capabilities:</th>
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<tr>
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<td>- Dynamic restriction information</td>
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<td>- Information sharing between FAA, UAS operators, and multiple USSs, as applicable</td>
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<td>- Part 101(e) Notifications &amp; Part 107 Authorizations</td>
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<td>- Connectivity to the FAA service gateway</td>
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<td>- Establish and manage the interface with USS(s)</td>
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| Reference Documents | UPP Specification Document |
|                     | LAANC-AP ICD              |
|                     | FAA sUAS LAANC Phase 1 USS Operating Rules                           |
## USS Technical Capabilities

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<td>Communication between the LAANC, FIMS and the set of USSs is central to the UTM System</td>
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<table>
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<th>Capabilities</th>
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| - Demonstrate a developed API with the following technical capabilities:  
  - Receive information from subscribing UAS operators  
  - Receive Part 107 authorization requests  
  - Receive and translate UAS facility map information  
  - Allow UAS operators to create Part 101(e) notifications  
  - Enable information sharing between FAA, UAS operators, and multiple USSs, as applicable  
  - Issue and communicate a dynamic restriction  
  - Connectivity to the FAA service gateway for mediation services  
  - USS tracking of subscribing BVLOS UAS real-time position data  
  - Establish and manage the interface with UAS Operator(s) |

<table>
<thead>
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<th>Reference Documents</th>
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| - UTM-USS Specification  
- LAANC-AP ICD  
- FAA sUAS LAANC Phase 1 USS Operating Rules |
## UAS Operator Capabilities

**Description**
Operator communication within UTM is performed through a USS. UAS Operators do not communicate directly with LAANC and FIMS.

**Capabilities**
- Client Implementation to connect to USS
- Illustrate situational awareness of UTM data

**Reference Documents**
- UTM-UAS Operator ICD
# Test Site Capabilities

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<tr>
<th>Description</th>
<th>Test Site Organizations (TSO) that are interested in hosting the UPP Demo and events leading to the successful demo in late 2018/early 2019</th>
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| Requirements | - Meet range requirements to perform planned operations (i.e., situational awareness tools and radar equipment in place as needed)  
- Provide appropriate staffing to meet the daily mission requirements as prescribed in the demo plan  
- Assist proponents on obtaining necessary approvals to fly the tests (COAs, spectrum approvals, etc.) |
| Reference Documents | - Communication Protocol Plan  
- Data Management Plan |
Partnership Engagement Timeline Review & Next Steps
Planned Partnership & Execution Schedule

Mar 2018
1st Partnership Workshop
- Define Pilot Program with Industry
- Review Scenarios & Use Cases
- Review Requirements

Jun 2018
2nd Partnership Workshop
- Detailed Requirements
- Specify Pilot Program Execution Roles and Responsibilities

Aug 2018
FAA Test Environment Open

Oct 2018
3rd Partnership Workshop
- Initialize End to End Testing
- Finalize Plan for Flight Testing

Jan 2018
NASA/FAA Industry Conference Call

Dec 2017 - Mar 2018
Requirements Specification

Apr 2018
SIR Released to TSOs

May 2018
Proposals Due

Jun 2018
Partnership Agreement

Jun 2018 - Jan 2019
Development and Testing

Oct 2018
Industry Development Complete

Apr 2019
Pilot Program Complete

Jan 2019 - Mar 2019
Flight Tests and Demonstration Activities

* Subject to change
Next Steps

- Provide feedback on today’s discussion by March 30 to faautm@faa.gov
- Test Site Organizations
  - Form partnerships to meet required functionality
  - Be on the lookout for SIR release
- USS, UAS Operators, and other potential partners
  - Interested parties should work with the FAA Test Sites Organizations to form partnerships and participate in UPP
Questions & Answers