

Drone Enable/3 - ICAO's UAS Industry Symposium Information Management Session



Next**GEN**

**UAS Traffic Management
(UTM)**

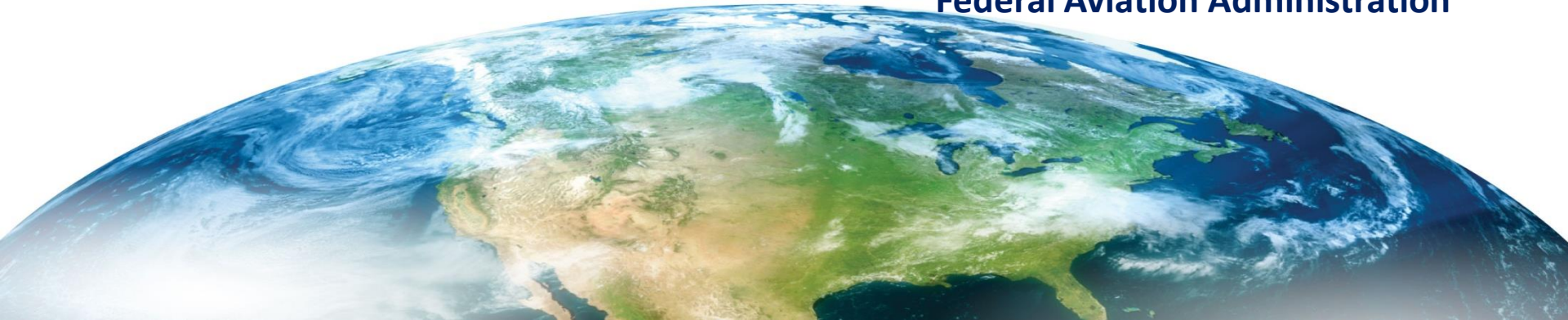
Information Architecture

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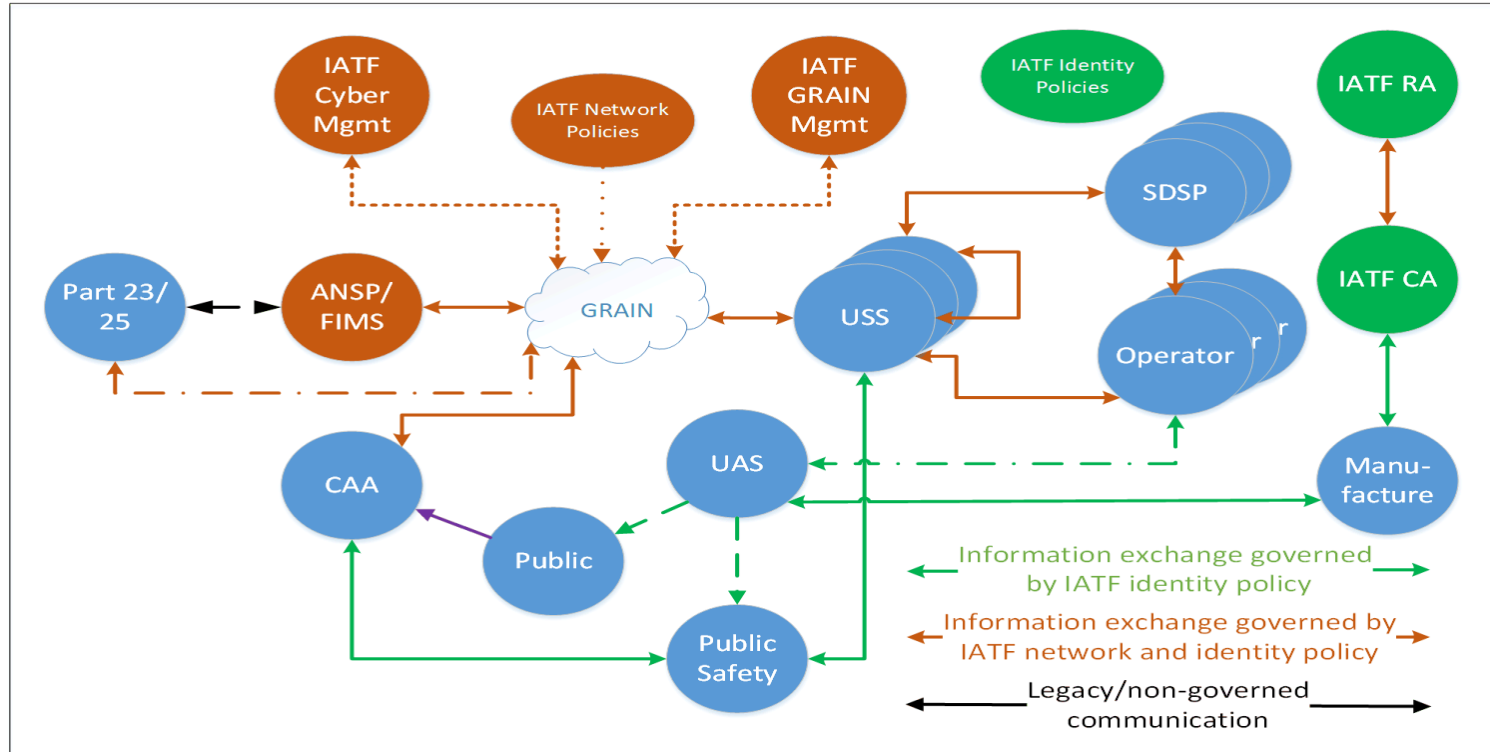
Federal Aviation Administration



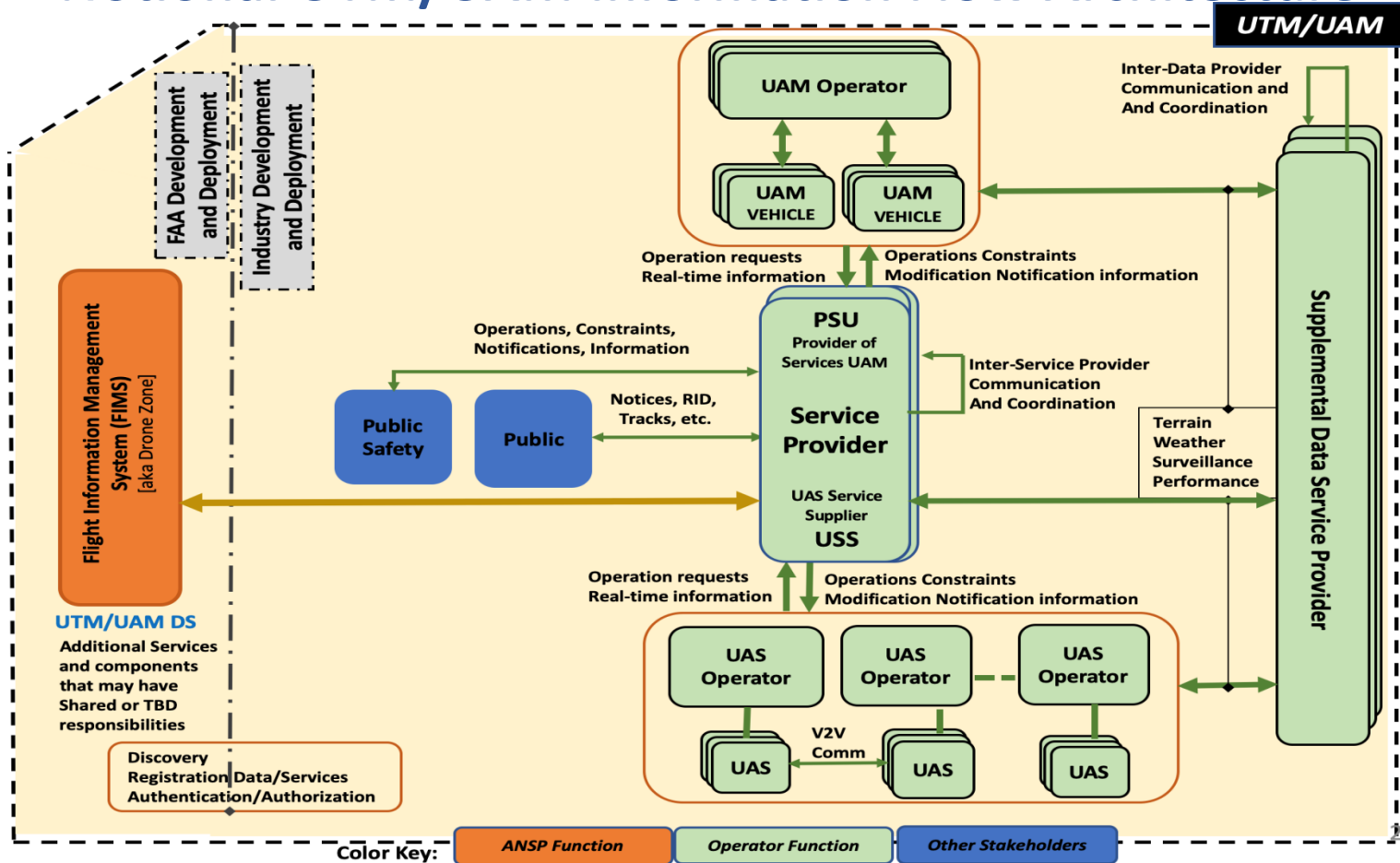
Importance of Managing Information for UTM Operations

- UTM is a community-based, cooperative traffic management system, where the Operators are responsible for the coordination, execution, and management of operations, with rules of the road established by FAA
- UTM provides a set of federated services that enable cooperative management of operations between UAS Operators, facilitated by third-party support providers through networked information exchanges. UTM operations are not managed via voice
- UTM framework presents challenges in cooperatively managing UAS flights through the automation of information exchanges between UTM stakeholders:
 - Security and Authentication – guard against potential malicious activities and prevent unlawful access to third-party and FAA systems
 - Information/Data integrity – ensure UTM information/data is conforming and trusted
 - Data Access – provide UTM data to local, state, tribal and federal entities (e.g., state police, FBI, DHS)
 - Remote ID Information and correlation
- UTM Information Management development will leverage International Aviation Trust Framework (IATF) framework and policies

Managing Information - UTM Cybersecurity and Network Policies



Notional UTM/UAM Information Flow Architecture



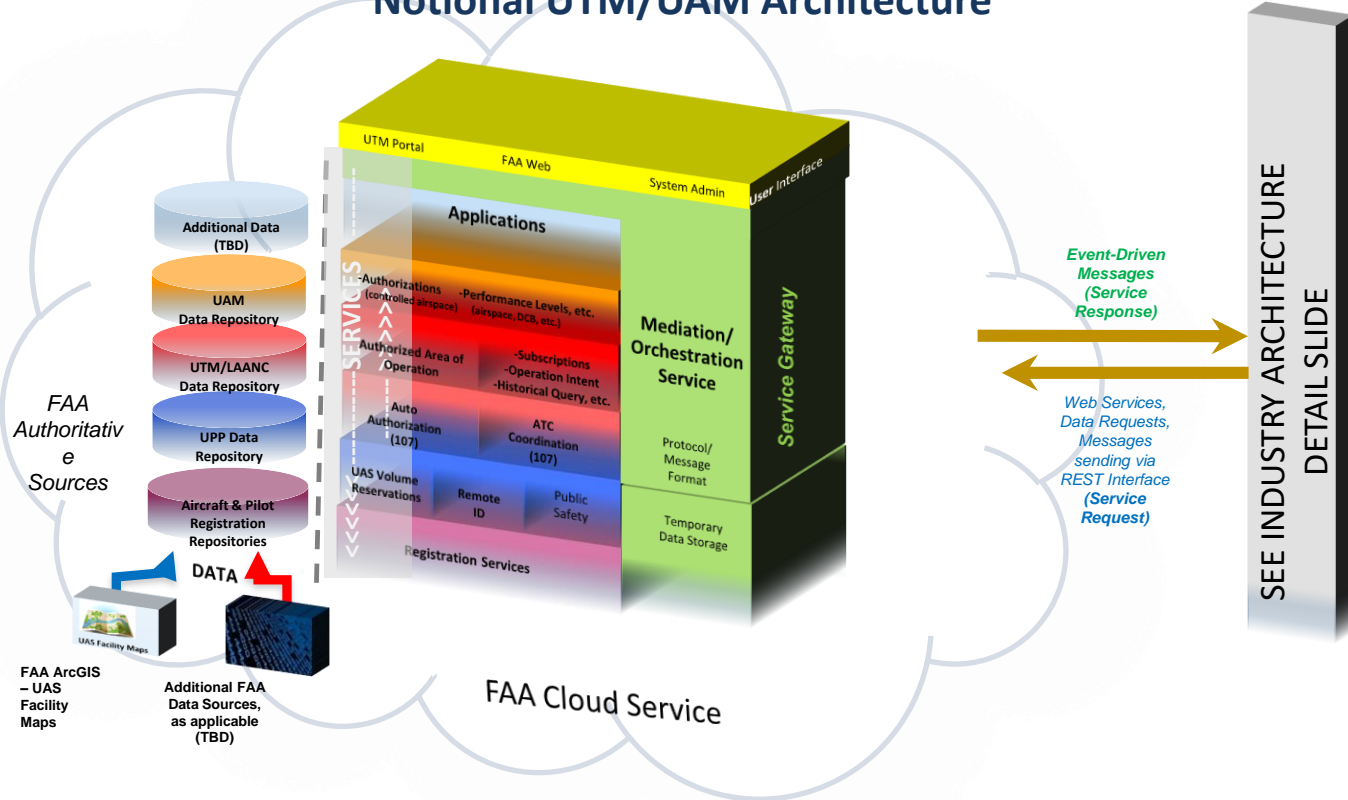
UTM Information Requirements & Responsibilities

Function		Actors/Entities		
		UAS Operator	USS	FAA
		✓ = Primary responsibility		
		S = Support		
Separation	UAS from UAS (VLOS and BVLOS)	✓	S	
	VLOS UAS from Low-Altitude Manned Aircraft	✓	S	
	BVLOS UAS from Low-Altitude Manned Aircraft ¹	✓	S	
Hazard/ Terrain Avoidance	Weather Avoidance	✓	S	
	Terrain Avoidance	✓	S	
	Obstacle Avoidance	✓	S	
Status	UTM Operations Status	S	✓	
	Flight Information Archive	✓	S	
	Flight Information Status	✓	S	
Advisories	Weather Information	✓	S	
	Alerts to Affected Airspace Users of UAS Hazard	✓	S	
	Hazard Information (e.g., Obstacles, terrain)	✓	S	
	UAS-Specific Hazard Information (e.g., Power-Lines, No-UAS Zones)	✓	S	
Planning, Intent & Authorization	Operation Plan Development	✓	S	
	Operation Intent Sharing (pre-flight)	✓	S	
	Operation Intent Sharing (in-flight)	✓	S	
	Operation Intent Negotiation	✓	S	
Operations Management	Controlled Airspace Authorization		S	✓
	Control of Flight	✓		
	Airspace Allocation & Constraints Definition		S	✓ ²

¹ Manned aircraft pilots share responsibility for separation with UAS BVLOS operations.

² Non-FAA authorized entities can also issue airspace constraints (e.g., state/municipality airspace preemptions)

Notional UTM/UAM Architecture

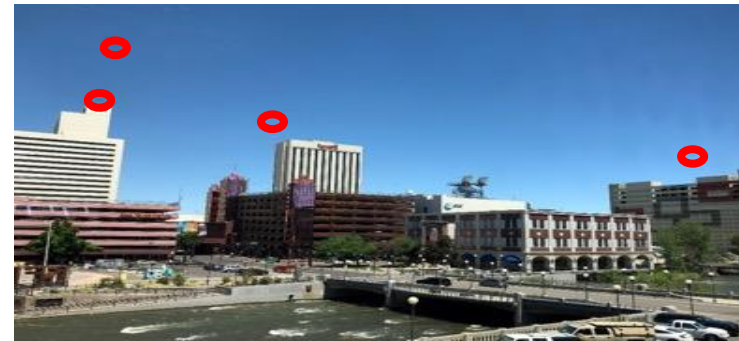


UTM Highlights: TCL 4 Testing Completed

- TCL 4 testing was conducted in two cities
 - Reno, NV - June 17-28, 2019
 - Corpus Christi, TX - August 12-23, 2019
- NASA TCL 4 report to be published at AIAA Aviation 2020
- TCL 4 testing demonstrates how UTM can manage high density, Unmanned Aircraft System (UAS) air traffic in urban environments:
 - Complex multi-aircraft operations over buildings and near densely populated areas
 - A network of traffic management services provided by industry successfully coordinating and separating UAS
 - UTM safely managed large numbers of UAS in crowded air space
 - Cloud-based UTM provided a secure and efficient platform for all users
 - Network-based remote identification using UTM
 - Effective coordination with local municipalities to conduct trials in urban environments
 - The integration of multiple onboard technologies to address hazards of dense urban operations



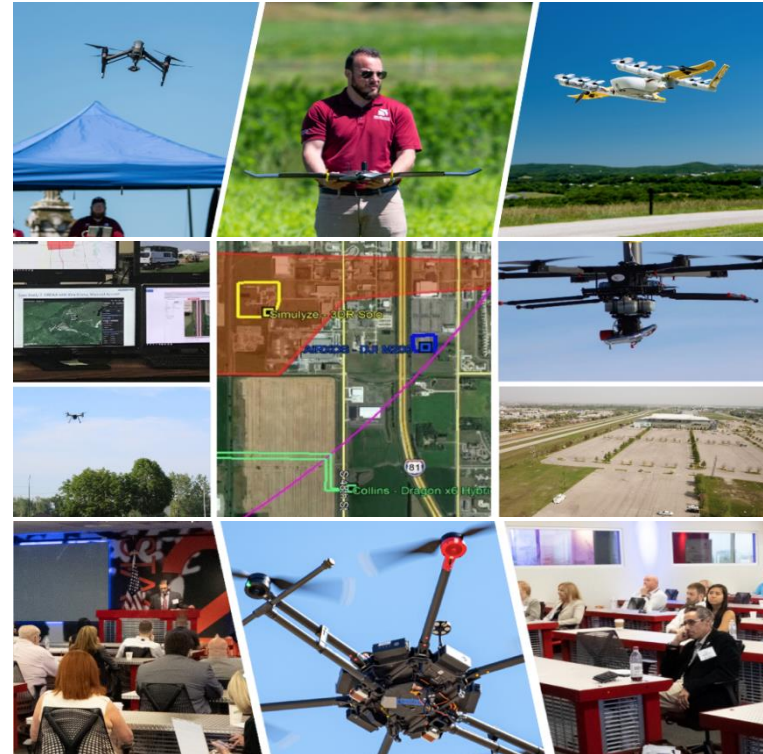
UTM generated flight volumes for each UAS



Four UAS autonomously flying over Reno managed by UTM

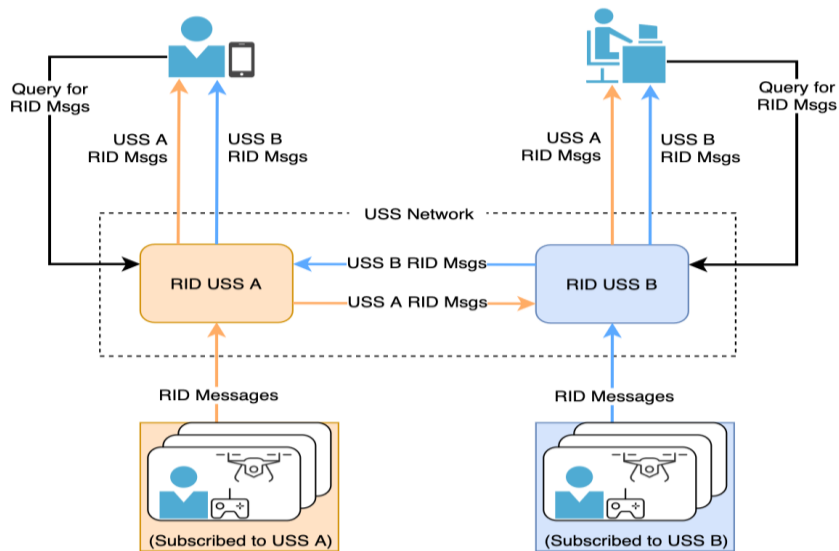
UTM Highlights: UTM Pilot Program (UPP)

- UPP Phase 1 Completed
 - FAA Connectivity with industry UAS Service Suppliers (USS)
 - Creation & Sharing of UAS Volume Reservations (UVRs)
 - Tested USS Discovery Service
 - UPP Summary Report is currently in coordination, to be released shortly
- UPP Phase 2 Announced for 2020
 - Will leverage partnerships with industry, various FAA Test Sites, and IPP Participants
 - UPP Phase 2 partners should be capable of supporting the following capabilities:
 - Operations in High Density Airspace
 - Remote ID Services
 - USS Transmission of Flight Information during Off-Nominal UTM Events
 - Public Safety Operations
 - UAS Volume Reservations (UVR) Service

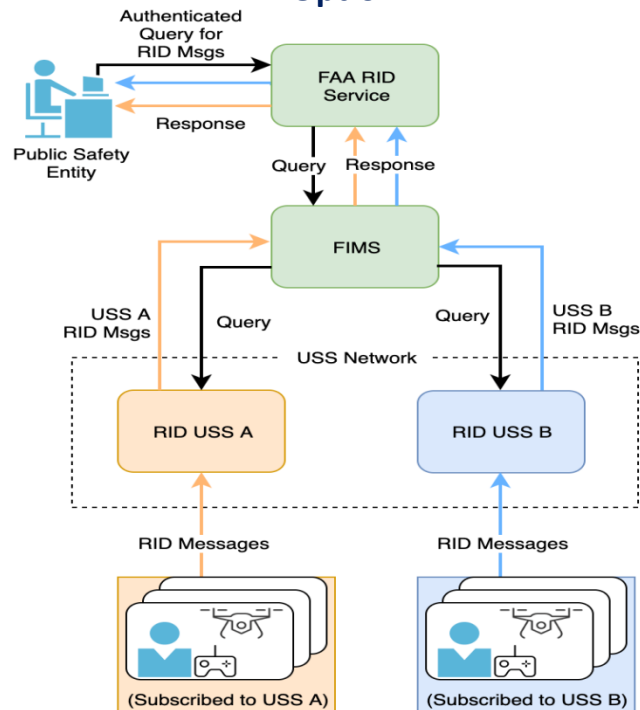


Options for Scenario V2-4: Use of UTM to Remotely Identify UAS

Option 1



Option 2



Summary of UTM ConOps v2.0 Scenarios

Scenario	Title	Summary	Relationship to ConOps V1.0
V2-1	Nominal UTM Operations in Uncontrolled and Controlled Airspace	Explores commercial VLOS and BVLOS operations participating in UTM via use of various services, including planning, Operator messaging, de-confliction, and Airspace Authorization.	Encompasses and expands upon Scenarios V1-1 and V1-4
V2-2	UVRs and Associated Operational Impacts	Explores the establishment of a USS providing public safety services to a MedEvac helicopter Operator landing to retrieve a patient in medical distress. The servicing USS generates and distributes the UVR notification to the USS Network and the FAA. Operators with planned or active operations directly impacted by the UVR take appropriate actions to maintain safe flight. Also explores indirect impacts to other operations.	Updates Scenario V1-2. Dynamic Restriction concept replaced by UAS Volume Reservation concept
V2-3	Interactions between UAS and Manned Aircraft at Low Altitudes	Explores various methods by which UAS Operators and low-altitude manned aircraft Operators gain situational awareness of each other, including information sharing via the USS Network, cooperative V2V communications, and DAA technologies.	Based on and similar to Scenario V1-3
V2-4	Use of UTM to Remotely Identify UAS	Explores methods by which a private citizen and public safety entity each gather information about UAS operations occurring over a residence. The citizen uses the services of a RID USS, while the public safety entity uses FAA services to obtain relevant RID information.	New Scenario
V2-5	Federal Public Safety Request for UTM Information	Explores methods by which a public safety entity obtains Operator information not available to the general public, using RID information as a query. The public safety entity uses the services of a federal public safety USS to query the USS Network and the FAA for information relating RID information.	New Scenario



Backup

