



Future Drone Operations: BVLOS & Remote ID

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SUAS - Small Unmanned Aircraft System



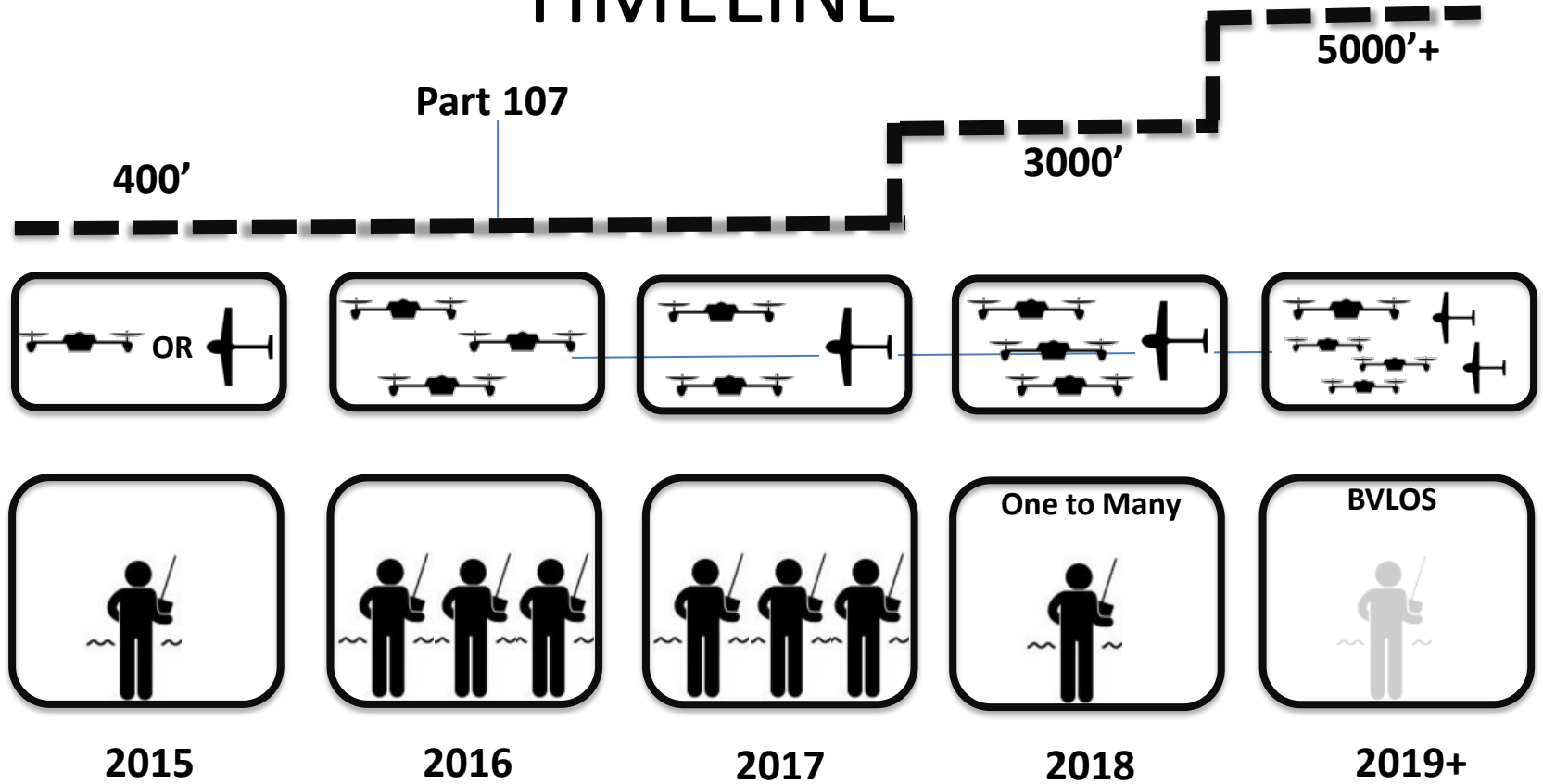


TIMELINE

Altitude

Platforms

Pilot



Class E Airspace



Manned AC Lower Altitude Limit

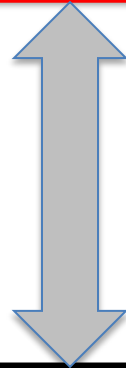


Buffer ZONE

400' AGL UA Ceiling (Part 107)



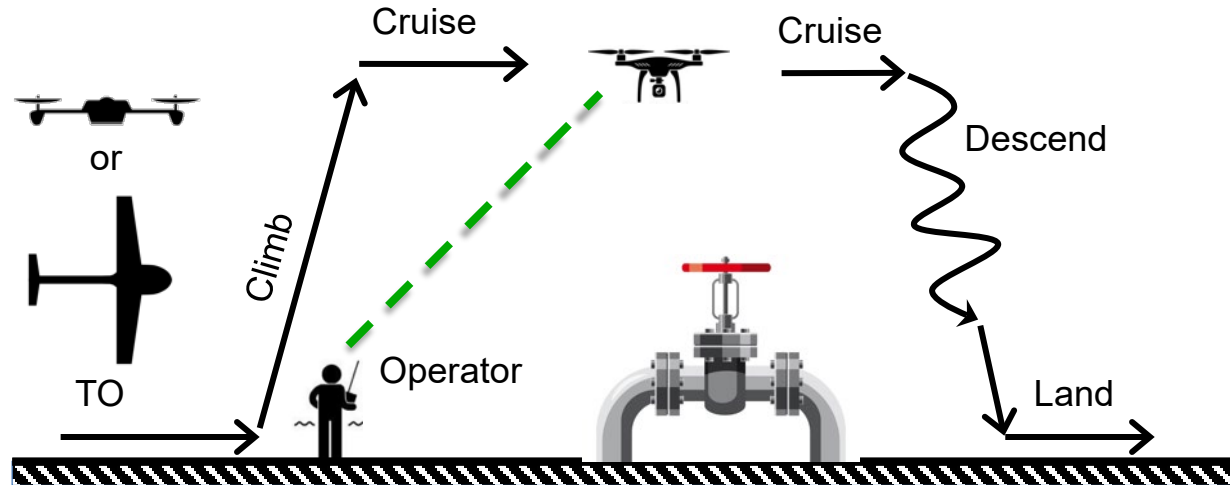
Class G Airspace



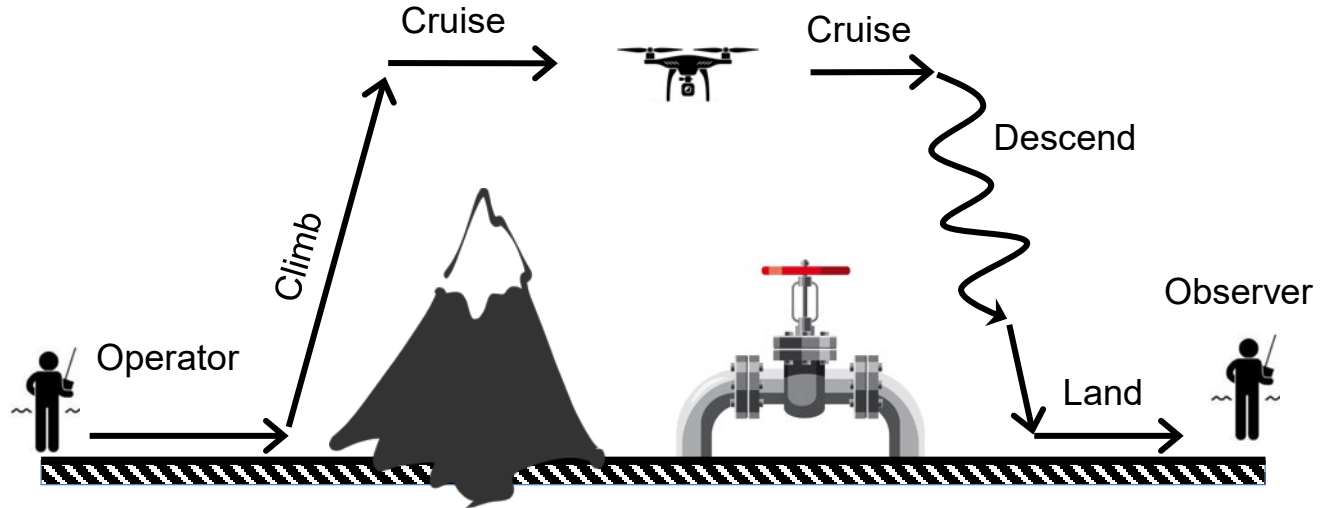
0' AGL UA Hard Floor



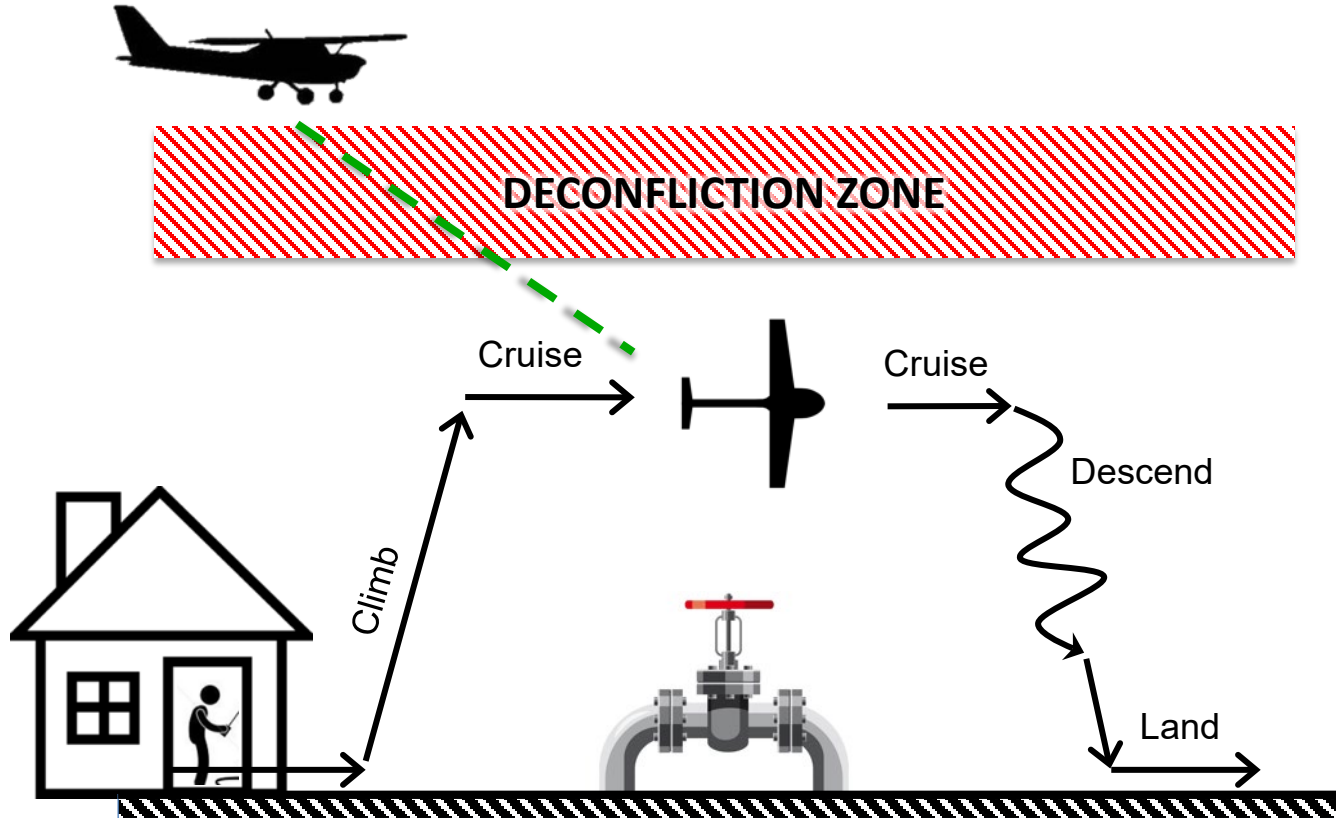
Paradigm: Direct Control - VLOS



Paradigm: Direct Control - BVLOS



Paradigm: Full Autonomy



FAA Remote ID

3 Ways of Remotely Identifying

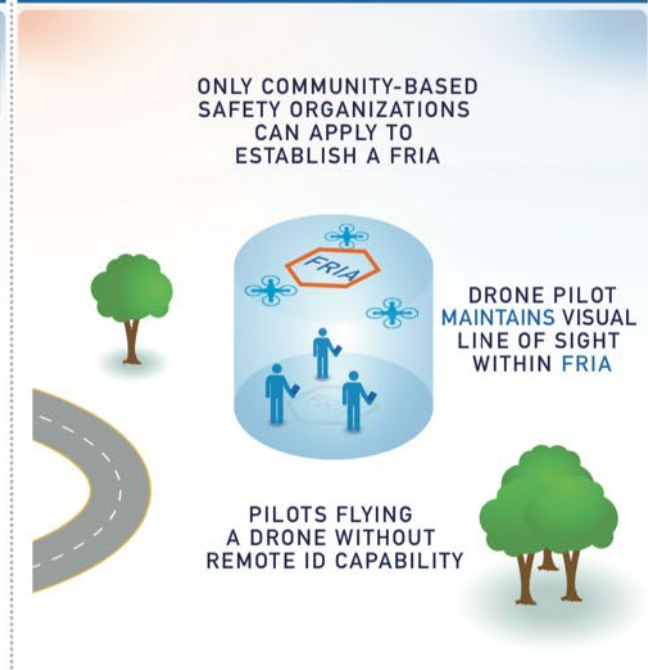
STANDARD REMOTE IDENTIFICATION DRONE



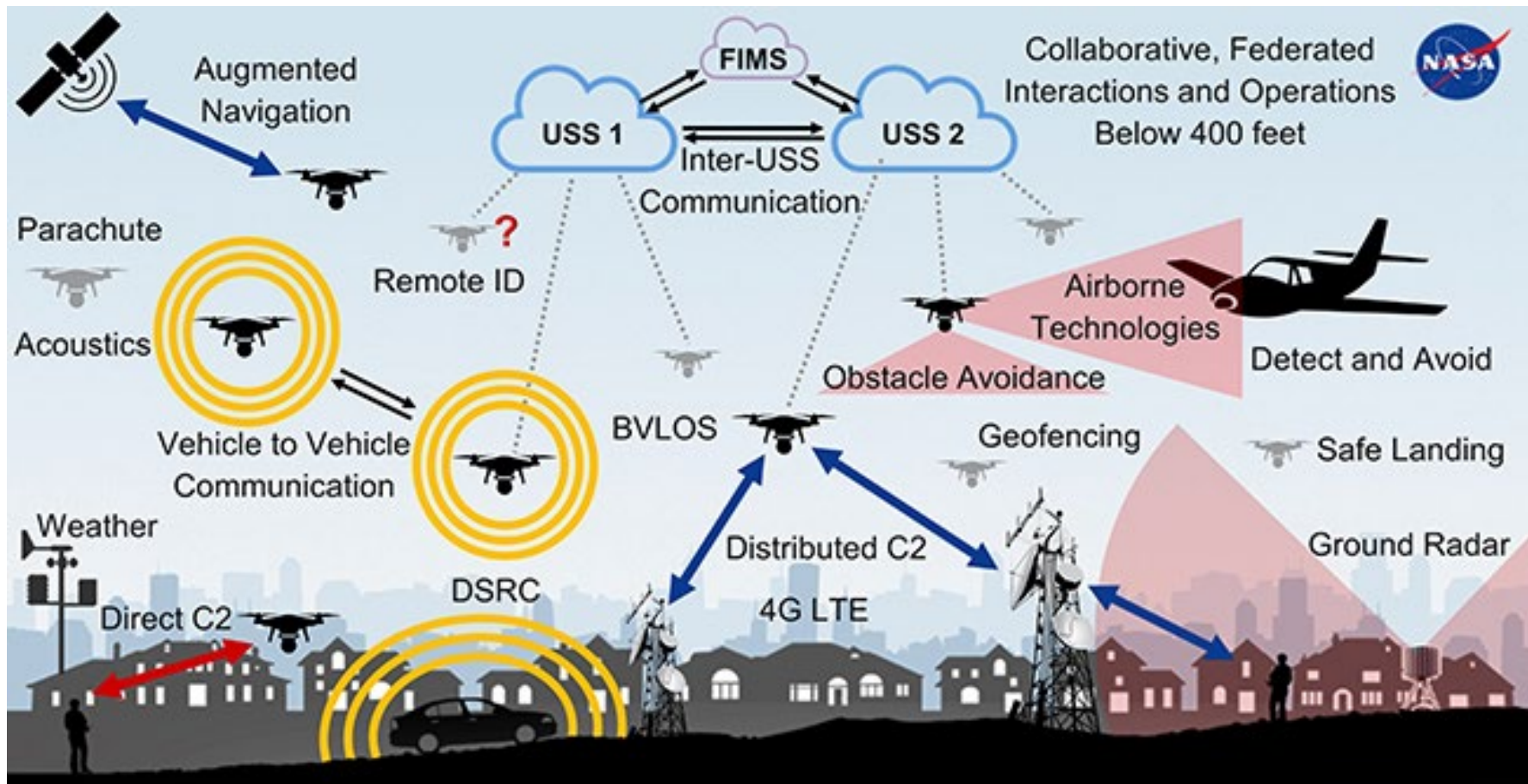
LIMITED REMOTE IDENTIFICATION DRONE



FAA-RECOGNIZED IDENTIFICATION AREA [FRIA]



Unmanned Traffic Management



Remote ID Applicability

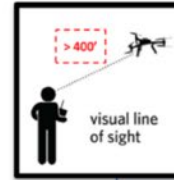
- Most contentious topic in the Remote ID ARC Recommendation Report: Simple starting point – align with UAS registration requirements:
- UAS registered under Part 48 or Part 47 (everything 250g and over)
- Simple end point – UAS operated under Part 91 would have to meet a higher bar:
- In class A, B, C, D, or E airspace without an authorization issued under 107.41 or 91.127(c), 91.129(d), or 91.130(a); or
- In class G airspace above 400' feet AGL

Categories for Compliance



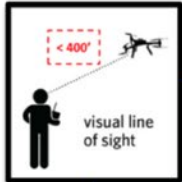
ID Locations / Sites

1



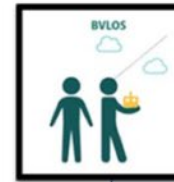
UA and Control Station Location

3



Control Station Location

2



UA with Local Transmitter and Control Station Location

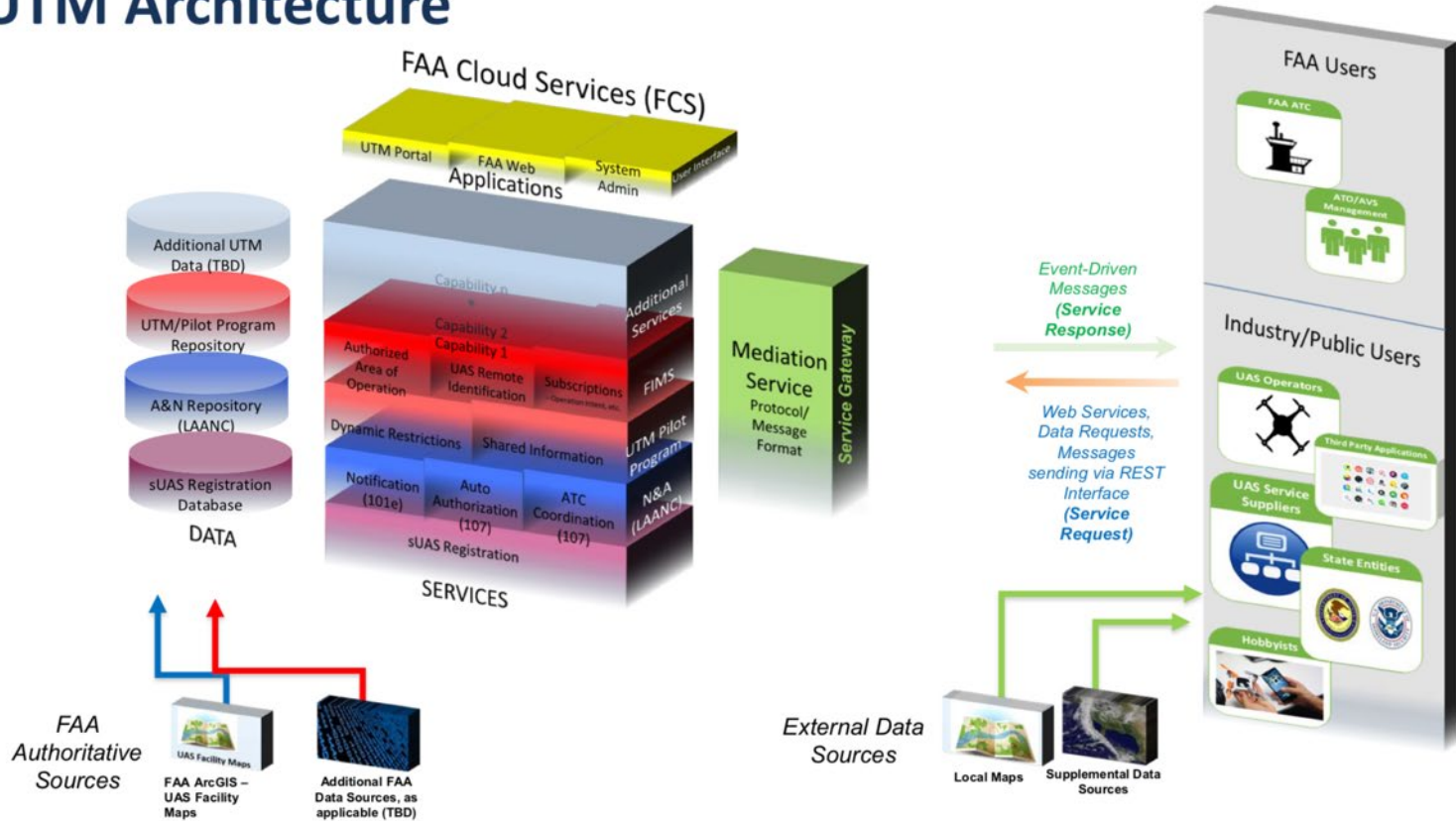
4



Not Included

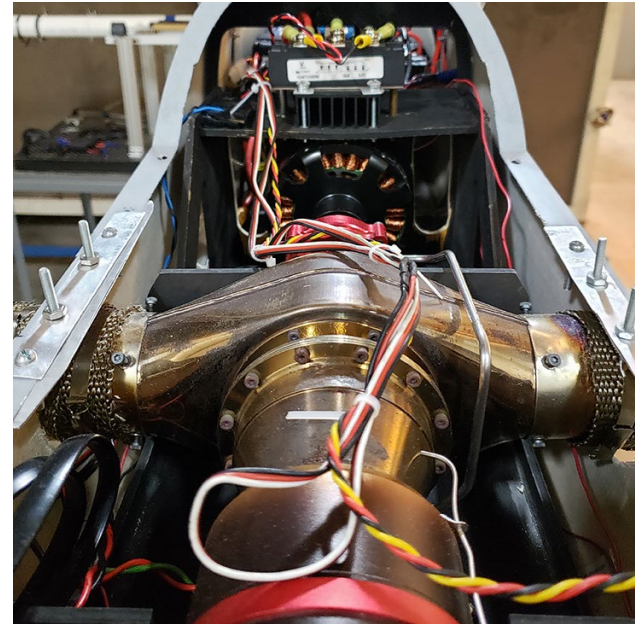
Unmanned Traffic Management

UTM Architecture



Next Leaps

- Long endurance electric
 - Electric power, HC energy: fuel cells, and hybrid

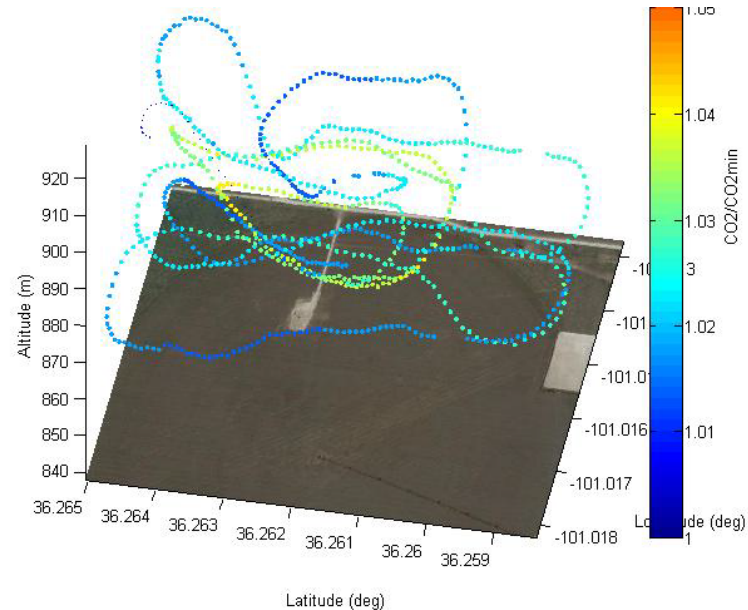


Next Leaps: Long Range Inspection

- Needs both BVLOS and long endurance problems solved



EOR-CCUS Monitoring at Farnsworth





AIRSPACE AND REGULATIONS

Airspace Classification

Class A

18,000' MSL

14,500' MSL

Class B

Class E

Class C

Class D

Class G

Nontowered airport with instrument approach

Class G

Class G

Class G

Nontowered airport with no instrument approach

1,200' AGL
700' AGL

1,200' AGL
700' AGL

1,200' AGL
700' AGL

Examples:

DFW – Class B











OKC – Class C

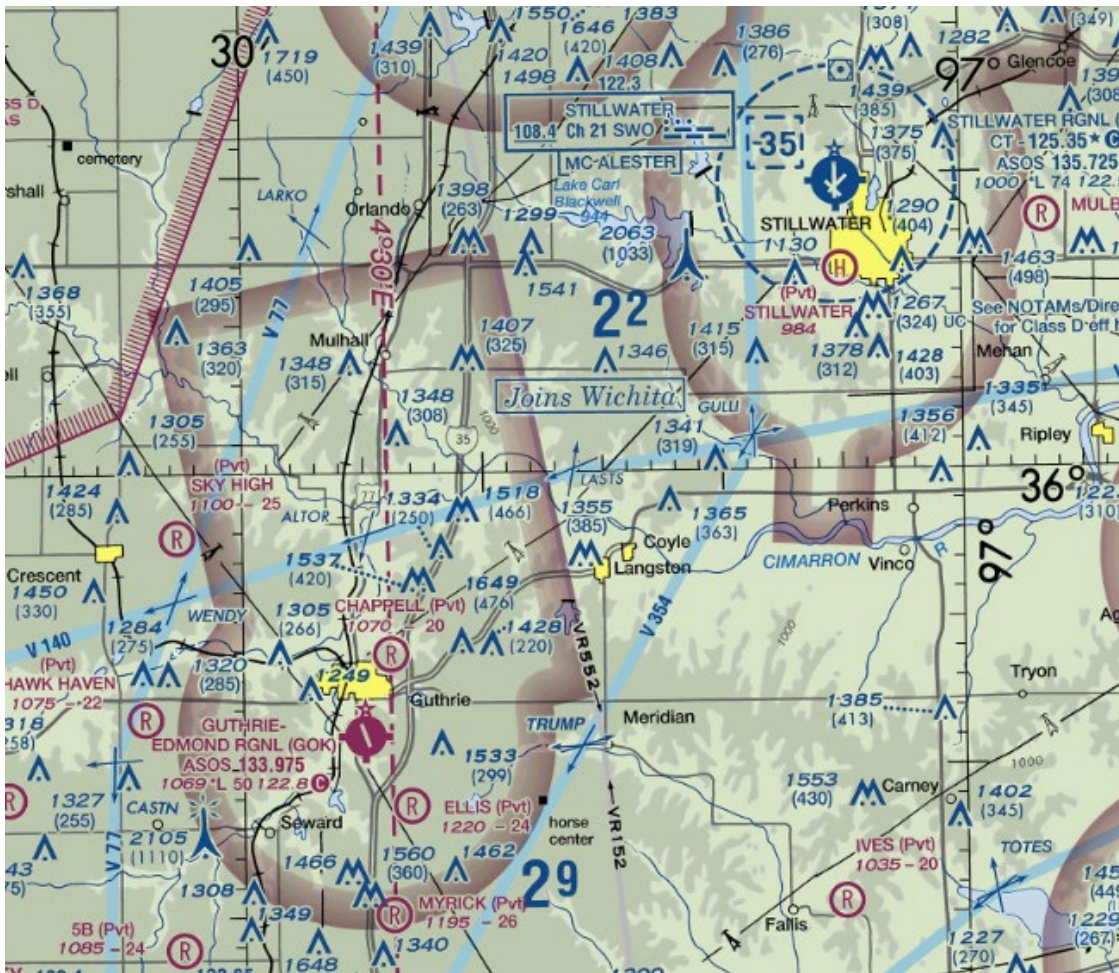
SWO – Class D

Airspace Classes	Communications	Entry Requirements	Separation	Special VFR in Surface Area
A	Required	ATC clearance	All	N/A
B	Required	ATC clearance	All	Yes
C	Required	Two-way communications prior to entry	VFR/IFR	Yes

Airspace Classes	Communications	Entry Requirements	Separation	Special VFR in Surface Area
D	Required	Two-way communication prior to entry	Runway operations	Yes
E	Not required for VFR	None for VFR	None for VFR	Yes
G	Not required	None	None	N/A

Sectional Chart – Typical VFR Navigational Map

-  Class B Airspace
-  Class C Airspace (Mode C - see FAR 91.215/AIM.)
-  Class D Airspace
-  Ceiling of Class D Airspace in hundreds of feet (A minus ceiling value indicates surface up to but not including that value.)
-  Class E (sfc) Airspace
-  Class E Airspace with floor 700 ft. above surface that laterally abuts Class G Airspace.
- CLASS G**
-  Class E Airspace with floor 700 ft. above surface that laterally abuts 1200 ft. or higher Class E Airspace
-  Class E Airspace with floor 1200 ft. or greater above surface that laterally abuts Class G Airspace
-  2400 MSL Differentiates floors of Class E Airspace greater than 700 ft. above surface.
-  4500 MSL
- Class E Airspace exists at 1200' AGL unless otherwise designated as shown above.
- Class E Airspace low altitude Federal Airways are indicated by center line.



Part 107 Rules

- Released by the FAA in June 2016
- Unmanned aircraft must weigh less than 55 lbs (25 kg)
- Visual line-of-sight (VLOS) only; the unmanned aircraft must remain within VLOS of the remote pilot in command and the person manipulating the flight controls of the small UAS. Alternatively, the unmanned aircraft must remain within VLOS of the visual observer.
- Daylight-only operations, or civil twilight (30 minutes before official sunrise to 30 minutes after official sunset, local time) with appropriate anti-collision lighting.
- Maximum altitude of 400 feet above ground level (AGL) or, if higher than 400 feet AGL, remain within 400 feet of a structure (tower or building).
- Must yield right of way to other aircraft.

Part 107 Rules

- Operations in Class B, C, D and E airspace are allowed with ATC permission. Operations in Class G airspace allowed without ATC permission.
- Minimum weather visibility of 3 miles from control station.
- May use visual observer (VO) but not required.
- First-person view camera cannot satisfy “see-and-avoid” requirement but can be used as long as requirement is satisfied in other ways.
- No person may act as a remote pilot in command or VO for
- more than one unmanned aircraft operation at one time.
- No operations from a moving aircraft; no operations from a moving vehicle unless the operation is over a sparsely populated area.
- No careless or reckless operations.
- No carriage of hazardous materials.

Remote Pilot-in-Command Requirements

- A person operating a small UAS must either hold a remote pilot airman certificate with a small UAS rating or be under the direct supervision of a person who does hold a remote pilot certificate (remote pilot in command).
- To qualify for a remote pilot certificate, a person must:
 - Demonstrate aeronautical knowledge by either:
 - (1) Passing an initial aeronautical knowledge test at an FAA-approved knowledge testing center; or
 - (2) Hold a part 61 pilot certificate other than student pilot, complete a flight review within the previous 24 months, and complete a small UAS online training course provided by the FAA.
 - Be vetted by the Transportation Security Administration.
 - Be at least 16 years old.

Resources

- <https://www.faa.gov/uas/>
- <http://knowbeforeyoufly.org>
- Pilot training from a certified flight center

