



# **A Method to Enhance Manned Aircraft Pilot Awareness of sUAS in UTM-Enabled Airspace**

**Michael S. Baum, JD, MBA, ATP**

Aviators Code Initiative | Sept. 14, 2018

Drone Enable/2 | ICAO | Chengdu





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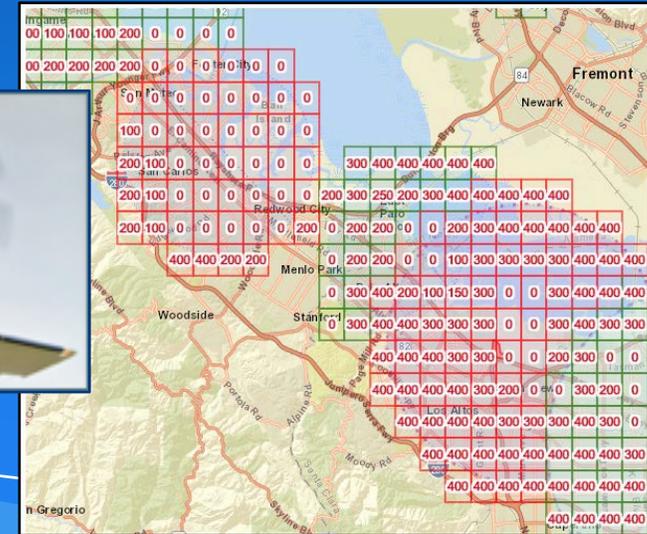
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# Challenge

The Low Altitude Authorization and Notification Capability (LAANC) falls short of providing effective notice to those with the greatest and most immediate need—*manned aircraft pilots*



# Manned Aircraft Pilot Awareness Need

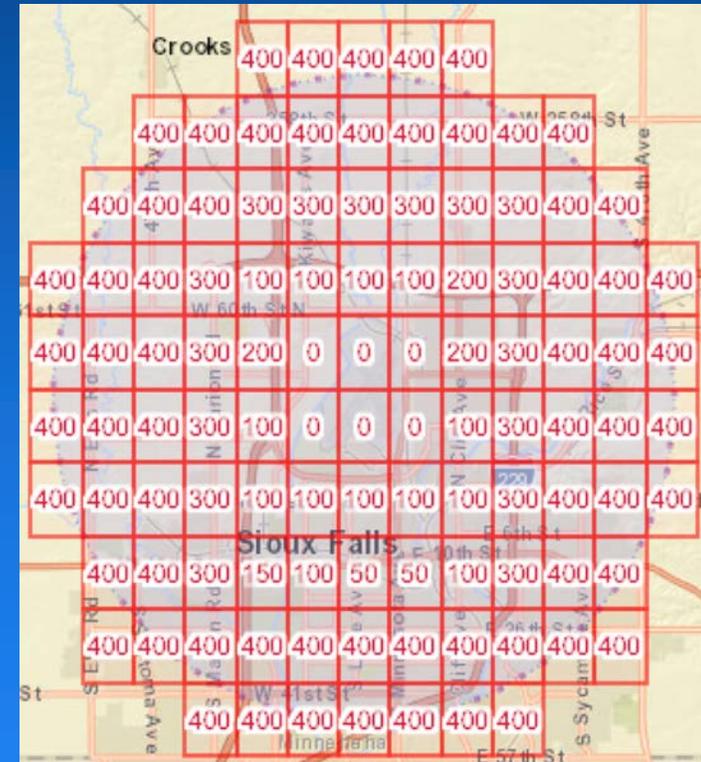
- LAANC may place sUAS in close proximity to manned aircraft
- Most sUAS cannot be seen, detected or avoided
- No transponder required on sUAS
- Lack of protected spectrum, altimetric requirements
- sUAS pilots may lack aviation safety culture & training
- LAANC UAS Facility Map risks



# Systemic Limitations of LAANC

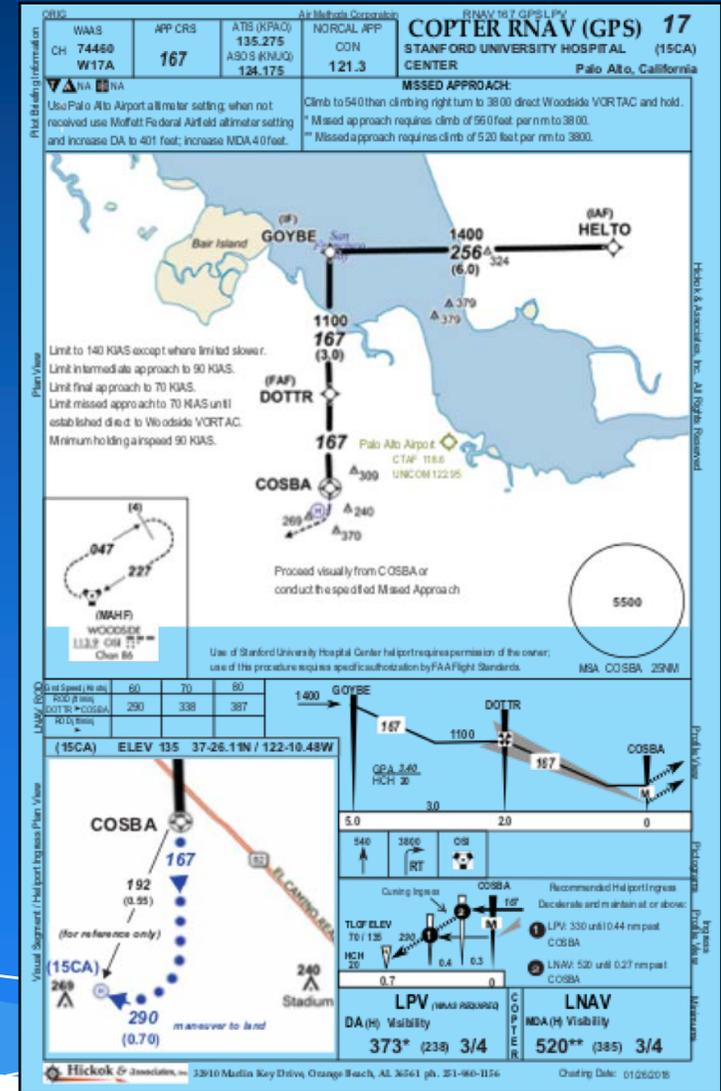
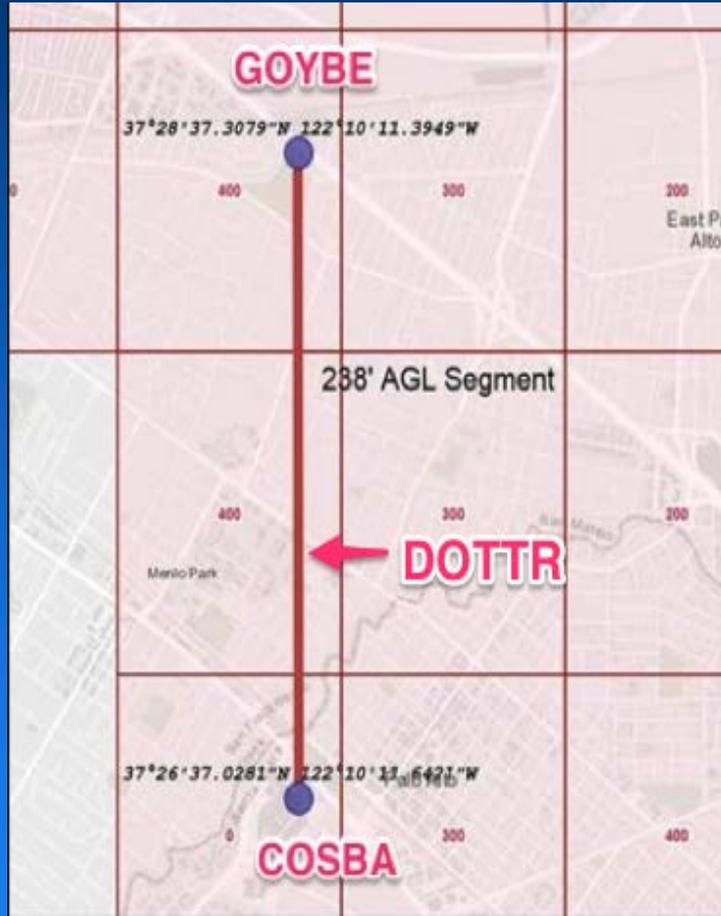
**Material risks to manned aircraft**  
derived from lack of effective:

- Stakeholder awareness & collaboration
- Adjacent ATC facility coordination
- Class E surface area coordination
- Heliports aerodrome coordination
- Manned aircraft pilot awareness



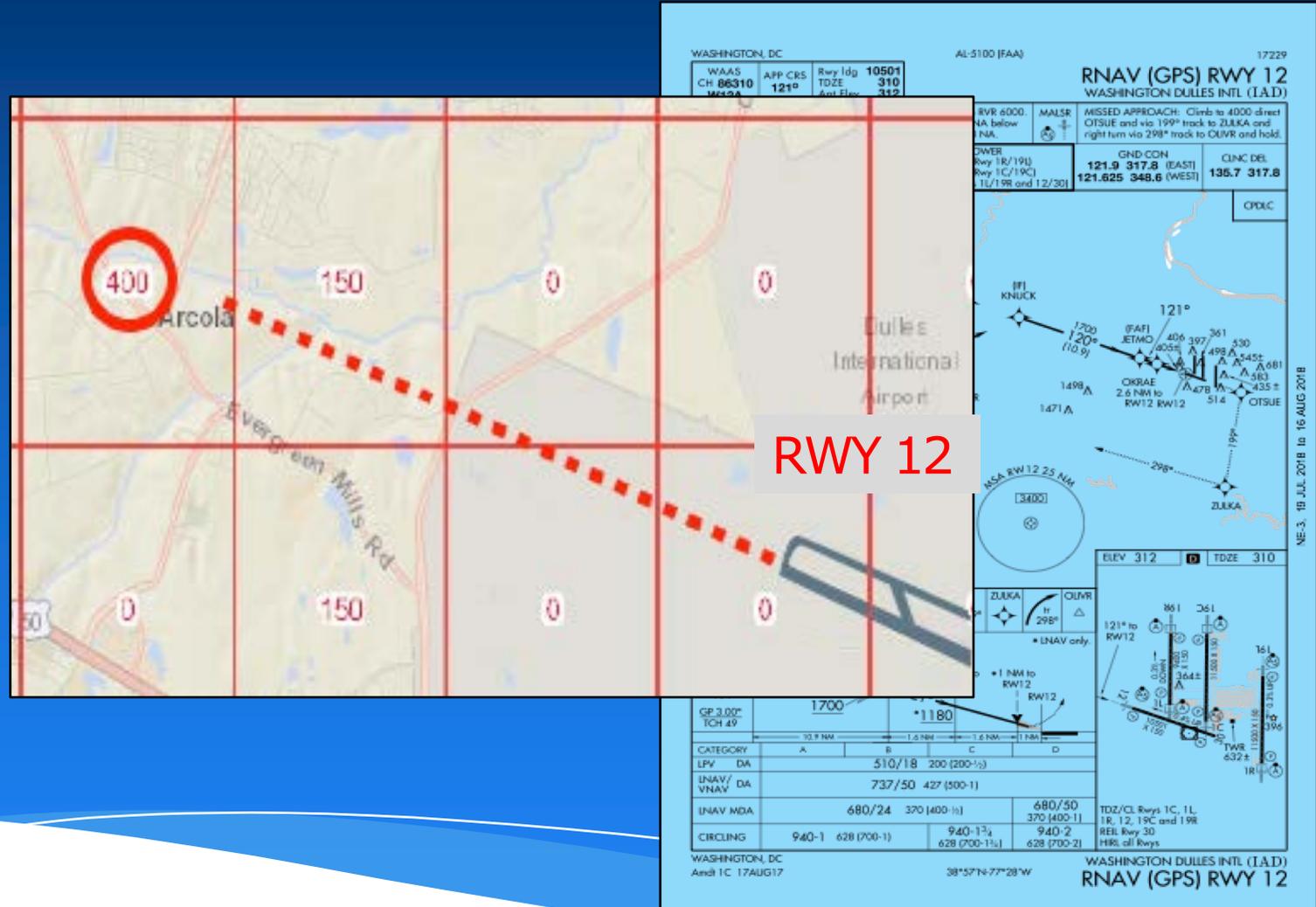
## Example 1

# UASFM Segment Risks



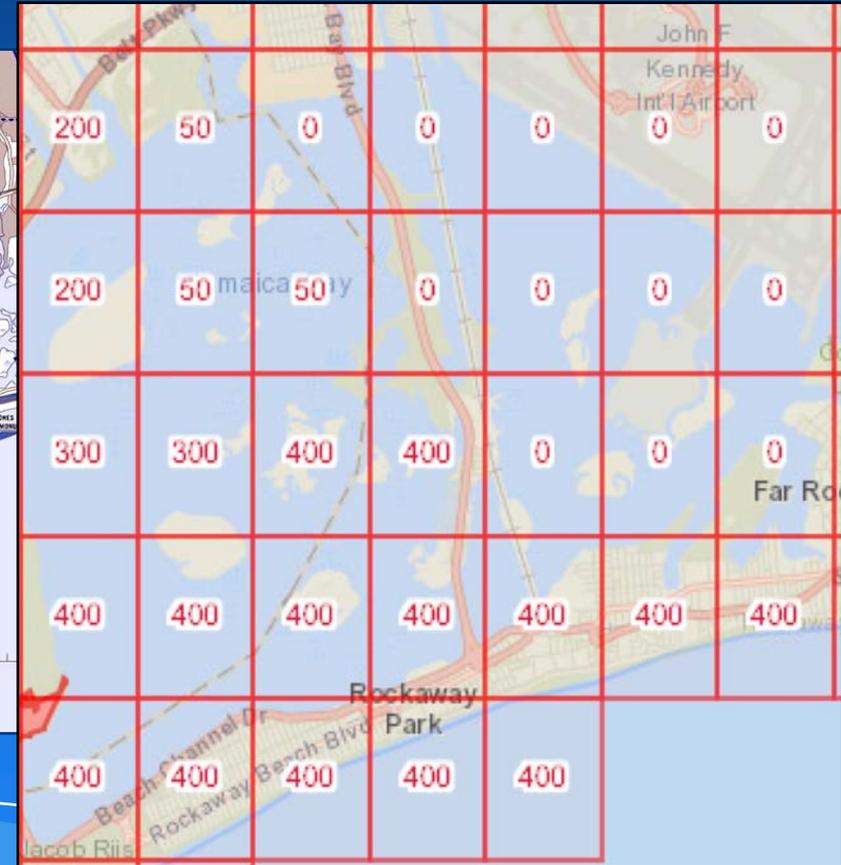
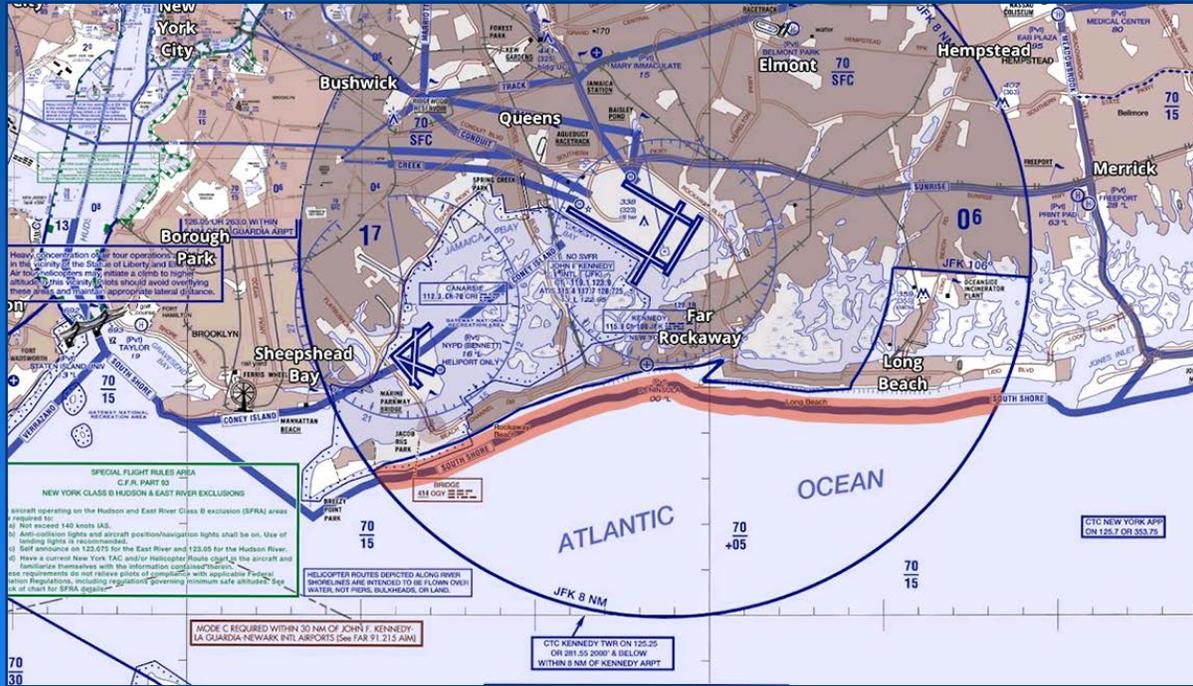
## Example 2

# UASFM Segment Risks



### Example 3

# UASFM Segment Risks



“Ideally, all NAS airspace users should have access to situational awareness information about UAS flights relevant to them [as] UAS present additional safety concerns . . . that vary significantly from manned aircraft.”

— *LAANC CONOPS*

“At minimum, manned aircraft Operations should access UTM shared intent data to gain awareness of UAS operations planned along their route of flight.”

— *UAS UTM CONOPS*



# Proposed Method

To improve manned aircraft pilot awareness of sUAS in LAANC-enabled airspace:

- Display nearby active UASFM segments in the cockpit
- Data transmitted for graphical presentation via existing Universal Access Transceiver (UAT) ADS-B datalink, enabled by Flight Information Service–Broadcast (FIS-B) message sets, satcom, and other protocols



*Prototype  
Active  
UASFM  
Segments*



# Advantages

- Modest extension to FIS-B and other protocols & services
- Uses existing infrastructure, data-sharing, & graphical products
- Requires no additional equipment
- Requires neither sUAS pilot action or sUAS beacon/transponder
- Supports all sUAS using LAANC
- Requires only small, manageable data transfers
- Presents no personally identifiable information
- May offer safety mitigation supporting sUAS waiver applications



# Product Attributes

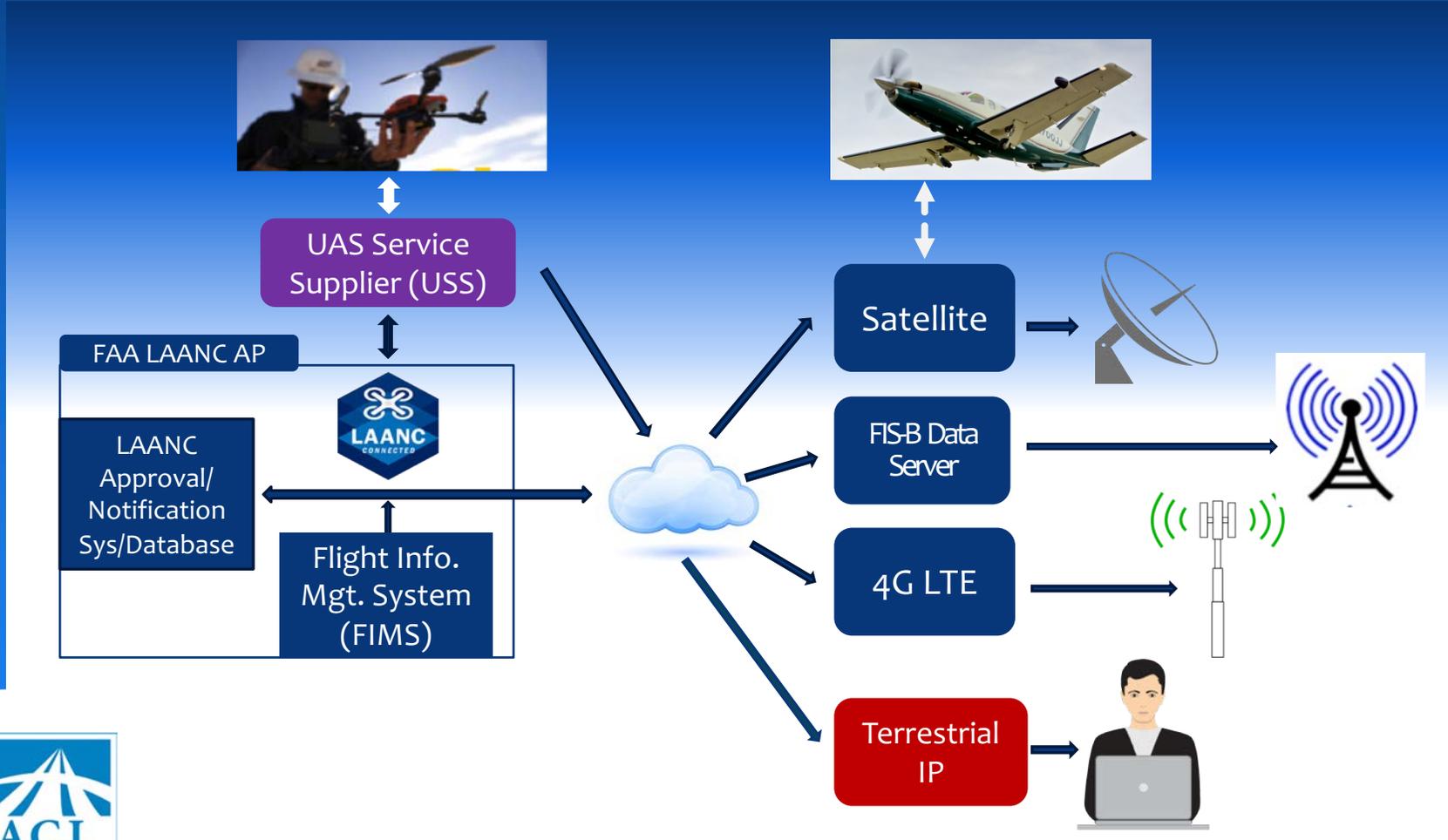
- Focus on the NOTAM
- Text with Graphical Overlay (TWGO)
- Aligned, extensible?
- New Product Number/standard?
- Data size is not an issue

Text/Graphic Products			
Prod. ID 8 NOTAM	Prod. ID 11 AIRMET	Prod. ID 12 SIGMET/ Convective SIGMET	Prod. ID 13 SUA
Segmented Messages			

		Graphical Overlay Record							
		MSB							LSB
BYTE#		Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8
1	GRAPHICAL OVERLAY RECORD								
2	REPORT NUMBER								
3	REPORT YEAR								
4	SPARE								
5	OVERLAY RECORD IDENTIFIER								
6	LABEL FLAG								
7	OBJECT LABEL (2-9 BYTES)								
8	OBJECT ELEMENT								
9	OBJECT TYPE								
10	OBJECT STATUS								
11	OBJECT QUALIFIER (OPTIONAL) (2-9 BYTES)								
12	OBJECT PARAMETER TYPE (OPTIONAL)								
13	OBJECT PARAMETER VALUE (OPTIONAL)								
14	REC. APPLIC. OPTS.								
15	DATE/TIME FORMAT								
16	OVERLAY GEOMETRY OPTIONS								
17	OVERLAY OPERATOR								
18	OVERLAY VERTICES COUNT (OPTIONAL)								
19	RECORD APPLICABILITY START (OPTIONAL) (1-4 BYTES)								
20	RECORD APPLICABILITY END (OPTIONAL) (1-4 BYTES)								
21	OVERLAY VERTICES LIST (1...64 RECORDS) (OPTIONAL) (3-896 BYTES)								

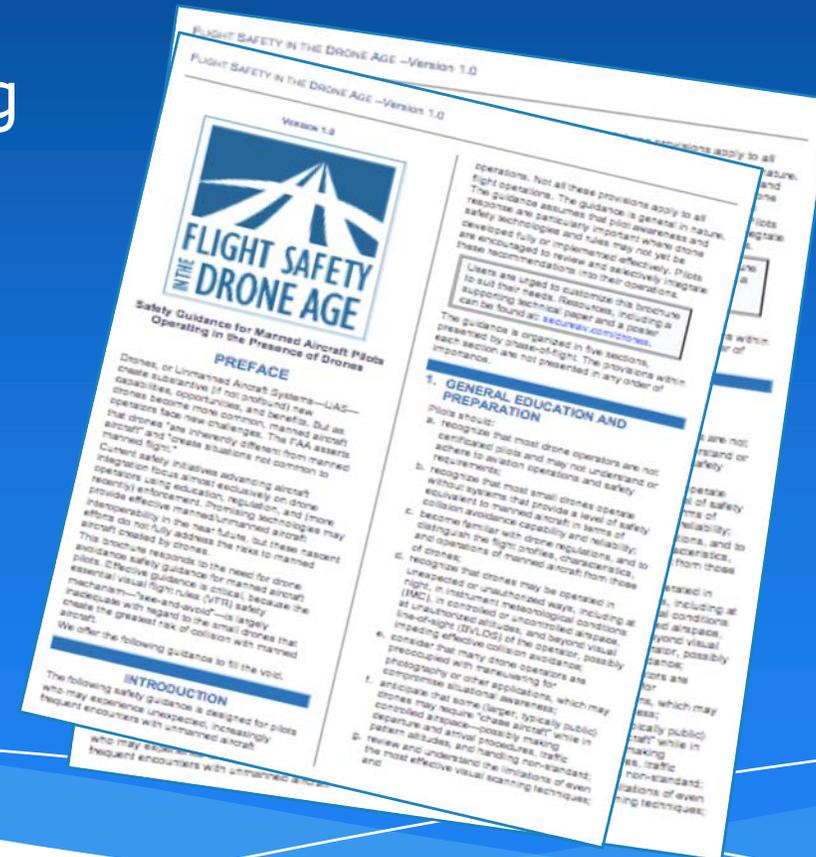


# Notional Architecture



# Additional Mitigation: Raising Manned Pilot Awareness of UTM

- Chart Supplement (AF/D) listing
- Sectional charts
- Graphics / notes in approach, SID, & STAR plates
- AIM & Advisory Circulars
- Educational materials





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**Permanent Editorial Board**

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