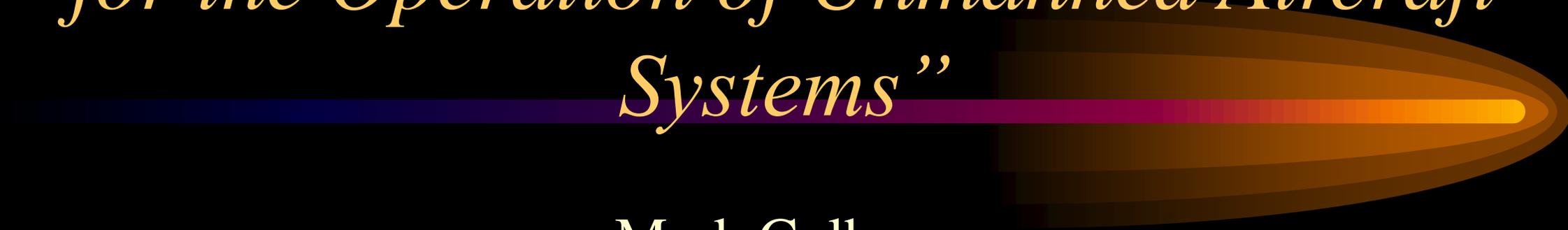


*FCC NPRM:  
“Spectrum Rules & Policy  
for the Operation of Unmanned Aircraft  
Systems”*



Mark Colborn

Retired Reserve Sr.Cpl./Remote Pilot

Dallas Police Dept. Aviation Unit – UAS Squad

# *History behind this Notice of Proposed Rulemaking*

- The World Radio Conferences of 2007 (“L-band” 960-1164 MHz) and 2012 (“C-band” 5030-5091MHz) recommended the allocation of these bands for Aeronautical Mobile Route Service and control links for UAS. \*Little progress was made until Congress got involved.
- The FAA Reauthorization Act of 2018 – Section 374 – required the FAA, FCC, and National Telecommunications and Information Administration (NTIA) to collaborate and decide if UAS should be allowed to operate on the bands recommended by the WRC.  
\*Congress wanted report w/in 270-days!
- DAC was tasked to work on this for the FAA in Task Group #6 (late 2019, early 2020). Recommended...Positive Outcome is this NPRM!

# *Notice of Proposed Rulemaking*

- 47 CFR Parts 1, 87, and 88 [**WT Docket No. 22–323**; FCC 22–101; FR ID 122915] – FCC outlines three reasons for this NPRM:
- The document seeks comment on service rules for the 5030–5091 MHz band “C-Band” that will provide UAS operators with access to licensed spectrum with the reliability necessary to support safety-critical UAS command-and-control communications (C2C) links. \*Not limiting all C2C to this band, just exclusive use.
- Are the Commission’s current rules adequate to ensure coexistence of terrestrial mobile operations and UAS use...or are changes to these rules necessary.
- To further promote the safe integration of unmanned aircraft operations in controlled airspace and facilitate flight coordination, this document proposes a process for UAS operators to obtain a license in the aeronautical very high frequency (VHF) band to communicate with air traffic control and other aircraft.

## *Handheld VHF Radios*

- FCC proposing to create a new category of license: “Unmanned Aircraft Operator VHF Ground Station.”
- Currently no mechanism in place for a UAS operator to obtain a ground-based station license. \*RRTOP not enough!
- Also, currently not legal to put a VHF radio in a UAS to act as a relay station.
- This proposal starts at Section 131 in the NPRM.



# *Licensing UAS Operators for VHF Communications*

- Proposal would allow licensees to transmit on all VHF air-band frequencies to include ATC, FSS, Multicom, Unicom, air-to-air, etc. Will increase safety and help prevent collision
- Propose modifying Section 87.18(b)'s language to include UAS as well as crewed aircraft (already covered by “**licensed-by-rule**” - or no license required).
- Applications made with current FCC Form 605.

## *Questionable Provisions*

- FCC understandably is worried that untrained or inexperienced UAS operators will come up on ATC radio freqs and cause trouble. Concerns outlined in Section #132.
- Therefore, FCC proposing applicants obtain an “endorsement” or “COA” from the FAA.
- This adds an unnecessary, un-funded, and time-consuming mandate or burden on FAA.

# *Alternatives to COA or “Endorsement” by FAA*

- Training requirement listed in Section #142 of the NPRM can be handled by the private and commercial aviation industry.
- Either by receiving comms training by a Certified Flight Instructor...
- Or from an approved aviation school comms program like King Schools, GLEIM, or Sporty’s (among others).
- Certificated crewed pilots w/Remote Pilot Certificate: including copy of pilot certificate w/application should be proof they can talk coherently on the radio!

# *My Recommendations for Training to Satisfy license requirements --- Cont.*

- FAA Remote Pilot certificate holders – include copy of Remote Pilot certificate and proof of comms training from a recognized program – or a letter or a copy of log-book endorsement from a CFI that they received one-hour of aviation related comms training.
- Recreational Operators (TRUST) holders – copy of TRUST certificate and a letter from CFI or a comms training certificate submitted with application to the FCC.

## *Band Plans for the C-band*

- Original use of the “C-band” designated for MLS.
- FCC proposes partitioning the band into 2 separate segments:
- NNA – Non Networked Access, or what the RTCA calls “Point-to-Point.”
- NSS – Network Supported Services, or what the RTCA calls “Command-and-Control Communication Service Suppliers.”

## *Partitioning the Band*

- Aerospace Industries Association (AIA): designate 10Mhz to NNA for now. Then phase in 5MHz blocks as needed.
- FCC proposing 5MHz at each end of the band for NNA or 10MHz in the middle, giving the rest to NSS's.
- Qualcomm wants 20MHz for direct UA to UA comms to facilitate DAA & Broadcast RID. Remaining 41MHz be licenced in 20MHz blocks for NSS providers.
- RTCA suggests building the partitions around band pass filter designs or put each service partition together.

## *Interference Issues*

- FCC wants UAS users to employ interference-protected “Control and Non-payload Communications” (CNPC) links.
- A great deal of discussion occurs in the document regarding ways to reduce interference challenges. (The word “interference” appears 115 times generally preceded by the word “harmful.” Also, “mitigation” appears often.
- The FCC appears to really want advise from the industry on this issue.

## *Other Proposals*

- Create a Dynamic Frequency Management System (DFMS) that will automatically handle frequency assignments. \*This is used now in the Citizens Broadband Radio Service in the 3.55 to 3.7GHz range (and quite successfully).
- “Reasonable fees” of course will apply for these services.
- FCC does not intend to mandate that all C2C non-payload comms (CNPC) occur exclusively in the 5030 to 5091MHz band.

- 
- AURA Network Systems & A2G Communications have petitioned the FCC to permit the transmission of data in the Air-Ground Radio Telephone Automated Service Channels between 454/459.675 & 454/459.975MHz.

- 
- FCC is asking a lot of great questions in the NPRM.
  - This proposal is a huge gift to the UAS community.  
\*In 2021 wireless 5G comm bidders spent a total of \$80.9 billion on microwave spectrum licenses.
  - Be sure to send in COMMENTS to the FCC electronic file system website:
  - <https://www.fcc.gov/ecfs/filings/standard>

*HOPEFULLY, THIS BRIEFING HAS BEEN  
ILLUMINATING!*

<https://www.fcc.gov/ecfs/filings/standard>



# **Advanced Air Mobility and Autonomous Vehicles at an Airport**

Research team of AAM and AV technology at an Airport

G. Brint Ryan College of Business, UNT

Dr. Hong, Mr. Joiner, Dr. Purtell and Dr. Savoie

*Presented by Dr. Clinton Purtell*

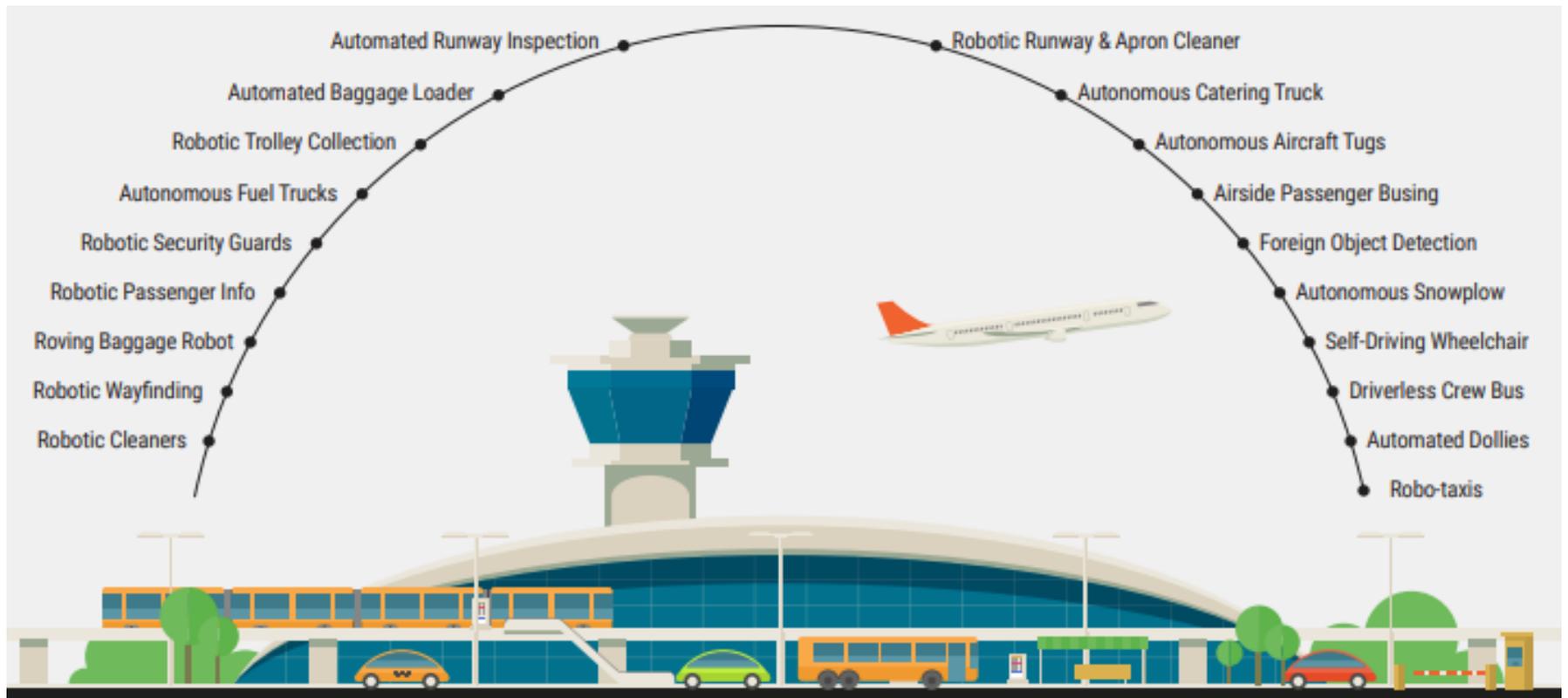
## **The purpose of this presentation:**

- 1) Describe our research and its relevance to this group
- 2) Provide some interesting examples of other types of autonomous technology growing alongside drones and eVTOL
- 3) Most important:
  - Request your participation in an initial data collection survey
  - Request you help us by sharing this survey with airport personnel you know who may be able to provide appropriate perspective and feedback

**This research project focuses on the new technologies at the airport, and it is also intended to understand how airports plan for, perceive and manage the critical factors.**

- Robotics at airports/passenger terminals
- Vehicles carrying luggage between the terminal & aircraft
- Autonomous mobility within the airport
- Autonomous electric tugs
- Autonomous snow removal equipment
- Air Taxi: Airport to the city (eVTOL)
- Vertiport
- Futureproof: Leap

# AVs in Airports



Source, Stantec (2022)

# The rise of autonomous vehicles at the airport

- Changing demographics, rapid urbanization, climate change, and the digital revolution contribute to autonomous machines becoming more accessible and important than ever.
- AVs and systems are attracting attention at airports
  - Robotics
  - Self-driving vehicles
  - Airport parking services
  - Airside operations
  - Drones/Air Taxis

- Airports such as Haneda, Incheon, Auckland and Changi are exploring the use of robots to provide on-the-spot assistance to passengers, or as part of terminal cleaning functions.



Source, Airport review (2019)

Changi airport

# Self-driving vehicles

- Christchurch, Heathrow, Gatwick and Cincinnati/Northern Kentucky are all examples of airports that are trailing self-driving vehicles, either outside the terminal building or airside; transporting staff and passengers with reduced mobility.



Source, Airport review (2019)

Cincinnati/Northern Kentucky

# Vehicles carrying luggage between the terminal and aircraft-CVG

- Self-driving technology could take over the job of driving luggage movement vehicles at airports.
- Cincinnati/Northern Kentucky International Airport (CVG) is experimenting with autonomous technology in the vehicles carrying luggage between the terminal and aircraft.
  - One of the airport's luggage-transporting vehicles — known as ground tugs — has been outfitted with technology from ThorDrive, a maker of AV tech, to explore the various applications and use cases.
- [ThorDrive - Your Future Ride](#)
- [ThorDrive is Pioneering Autonomous Vehicles at the Cincinnati Airport](#)

# Vehicles carrying luggage between the terminal and aircraft-CVG



International Ground Support Equipment (GSE) expo, Las Vegas, Oct. 2021

# Mobility at the airport – *from Love Field to LHR*

- Dallas Love Field had a hiccup when it came to transporting its passengers through connecting flights.
  - Due to airport size, passengers were not initially be able to make their connecting flights due to the time it took to reach the gate.
- Love Field engineers designed the “Glide Ride (Moving side walkway)” taking a hint of moving stone belt.
  - Essentially this pod can transport a few people extremely quickly to their destination.

# Mobility at the airport-LHR

- London Heathrow decided to use this idea, a high-speed pod, to transport its passengers using 22 PRTs (**Personal Rapid Transport** for four passengers powered by battery) without a driver every 3 seconds for 3.8 km (2.4 mi).
  - Reaching speeds of up to 25mph on the mainly elevated route.
  - [Personal Rapid Transit at Heathrow](#)
  - [A Ride on the Heathrow Pods](#)



# Airside operations

- Among the many examples, airports such as Edmonton, Oslo, Winnipeg and Heathrow are testing or deploying driverless perimeter patrol vehicles, snowplows or foreign object debris (FOD) radars.



Source, Airport review (2019)

Winnipeg International Airport

# Autonomous electric tugs

- British Airways tested autonomous electric tugs to automate taxiing and get approaches/ exits at Heathrow airport.
- The system reduced pushback-related delays by 54 percent and emissions.
  - The new mototok robot, which is able to push back airplanes weighing up to 130 tons.
  - BA owns two additional different-sized mototoks
    - a smaller machine called the SPACER 8600 that can push up to 90 tons
    - a larger version called the SPACER 195 that can move up to 195 tons.
  - 15-minute training session before being allowed to operate the remote-controlled machine.
- The aim is to eventually replace traditional tugs.
- [Video: Airbus 320 with Mototok towbarless tug for British Airways](#)

# Autonomous snow removal equipment

- An autonomous snow removal equipment at Fagernes Airport in Leirin, Norway, cleared 357,500 square meters of snow in an hour, reducing costs, emissions, delays, increasing profitability, and adding value for people.
- Swedish tech manufacturer Semcon revealed an autonomous snowplow at Fagernes Airport.
- The self-driving vehicle's purpose is to reduce air traffic delays during wintery conditions.
- The company's demonstration included two self-driving plows working in tandem at the airbase.

# Autonomous snow removal equipment



# Autonomous tractor

- An autonomous tractor keep runway edge lights clear of snow as part of a airport maintenance technology.
  - The technology has now been tested for the first time at Örnköldsvik Airport, Sweden.
  - The runway gets closed down if 15% of the lights are non-operational, and this causes significant delays and costs.
  - This can present major safety risks.

[Video: Autonomous solutions tested at airport in unique collaboration project](#)



# Airport parking

Autonomous vehicles can help maximize the use of parking space, as demonstrated by Lyon Airport, Paris Charles-de-Gaulle & Dusseldorf Airport.



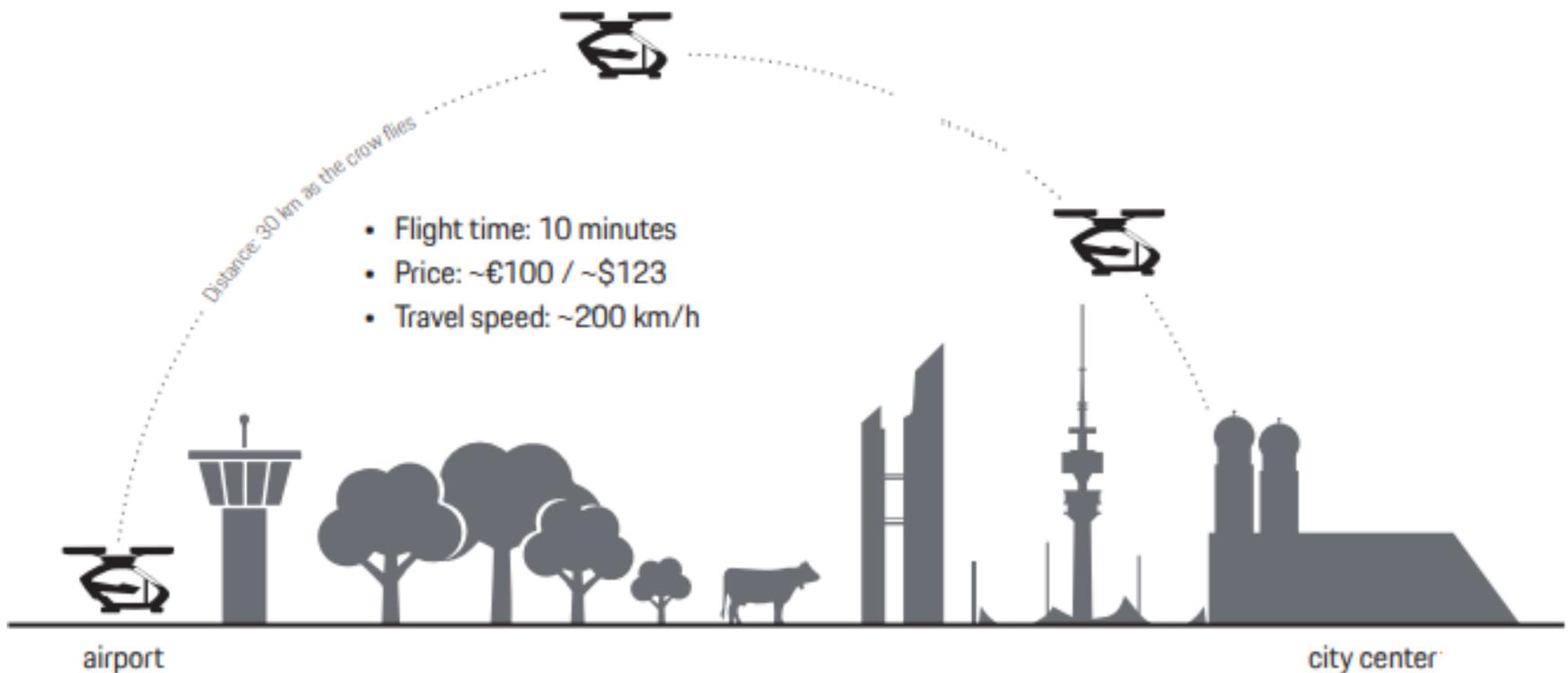
Source, Airport review (2019)

Photo source: Stanley Robotics

- Drones can provide an efficient and effective means of inspecting large areas, or areas which are hard to reach.
- Paris CDG, Atlanta, Luxembourg and Southampton are among the airports looking at using drones for their inspection needs.
- Drones have many more use-cases for airports to consider.

# Air Taxi: Airport to the city

- Air taxis available for fast connections between airports & cities.
- For example, the fastest connection in Munich would be 10 minutes.



Source, Porsche Consulting (2018)

# Air Taxi: Safety Management System

- What are the peculiar hazards, risks, and human factor issues, especially in approaches, departures and ground handling at air facilities?
  - Noise levels
  - Danger areas around the operating craft
- What are the effects of climate, weather, altitude on the craft's performance in these areas where close human interaction will be required?
- What will be the infrastructure?
  - Ramp layout
  - Hangar/maintenance area design?
  - Ground Support Equipment (GSE)?
- Personnel training and PPE?

- A vertiport is a collective term referring to areas designed specifically for AAM aircraft to take off & land, much like a heliport is a designated area for helicopters (Dr. Johnson, NASA).
  - Vertiports could be built on top of buildings, be a hub like an airport, they could be designed with a “bus stop” concept.
  - Used for air taxis and large cargo payload/commercial drones
- Air traffic will be a mix of piloted, semi-automated, and fully automated aircraft with multiple vertiport configurations depending on the location and type of operation.

# Vertiport

- Vertiport facilities have multiple operational requirements, including layout designs, electrical needs, and safety requirements (Robert Bassegy, FAA).



Source, Dronelife (2021)

# Futureproof

- 100 years ago, air transport was reserved for the elite.
- Air transport is now accessible & global.
- Airports change throughout the years; very different than even 10 years ago.
- Airports will change with time and new regulations, so nothing can be perfect.
- The dream is to run an airport correctly and efficiently.
- The magic of simplicity is easily applying a piece of high-tech architecture.
- This is a city – and it is growing quickly.

# Sustainable and Smart Mobility at an Airport

- Sustainable mobility
- Smart mobility
- Resilient mobility

- Research on Trends to Adopt Autonomous technologies at Airport and Critical Success Factors to Apply.
  - As some airports are experienced with autonomous technologies, we value your opinion.
  - The project focuses on the new technologies at the airport, and it is also intended to understand how airports plan for, perceive and manage the critical factors.
  - [https://unt.az1.qualtrics.com/jfe/form/SV\\_5747ZT4F1vIBo7c](https://unt.az1.qualtrics.com/jfe/form/SV_5747ZT4F1vIBo7c)
  - Responded airports as of today: LAX, SAT, BMI, OKC, CVG, DFW, BOS, KLEX, TVC, ICN, MNL, SFO, DEN, etc.,

Many thanks for your attention !!!

**Please complete the survey ASAP and/or  
share with any airport personnel you know  
– at ANY airport.**

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Co-researcher: Dr. Michael Savoie, [Michael.Savoie@unt.edu](mailto:Michael.Savoie@unt.edu)

# UAS Legislative Update

Nicholas Allen

NCTCOG

2/28/2023

# Federal Update-What has been proposed in the 118<sup>th</sup> Congress?

- **H.R. 84 (Biggs)- Buzz Off Act**

- Prohibits federal law enforcement from using UAVs to intentionally conduct surveillance of a specifically targeted U.S. citizen or the property of such an individual, with certain exceptions.
- Specifically, this prohibition shall not apply if (1) the federal law enforcement agency in question first obtains a search warrant, (2) the Department of Homeland Security certifies that such surveillance is necessary to counter a high risk of a terrorist attack by a specified person or organization, or (3) the citizen gives written consent.

# Federal Update-What has been proposed in the 118<sup>th</sup> Congress?

- **S. 307 (Warner)- A bill to amend title 49, United States Code, to establish certain rules relating to unmanned aircraft systems and operations, and for other purposes.**
  - If passed, FAA must issue rules towards a regulatory pathway for certification or approval of UAS to enable commercial BVLOS six months after this bill is passed.
- **S. 157 (Grassley)- Drone Act of 2023**
  - Defines “Misuse of unmanned aircraft” to include drug trafficking, interfering with airports
  - Prohibits the weaponization of unmanned aircraft
  - Prohibits altering identification numbers

# Texas Update=- What has been proposed in the 88<sup>th</sup> Texas Legislature

- **HB 1302 (Geren)**- Relating to inspections and examinations by the Railroad Commission of Texas of certain sites and facilities conducted using unmanned aircraft.
- **HB 1516 (Wilson)/ SB 423 (Paxton)**- Adds Texas Military Forces to list of entities allowed to capture images using UAS.
- **HB 2159 (Capriglione)**- Removes sections of Gov. Code Chapter 423.
- **HB 2365 (Geren)**- Relating to the operation of an unmanned aircraft over an airport or military installation.
- **HB 2678 (Cook)**- Relating to advanced air mobility technology.