



A White Paper on the Need for Immediate Deployment of Low Altitude Airspace Response and Enforcement Capabilities

The Low Altitude Airspace Enforcement Challenge

It is widely understood that unmanned aircraft systems (UAS) operations in American airspace presents both significant benefits and significant challenges. Those benefits and challenges are widely documented and both governmental agencies and the private UAS industry are proposing a myriad of rule-making and technological solutions to address “careless, clueless, and criminal” UAS operations. This white paper is intended to address currently available first-step technologies and practices on which the long-term law enforcement strategies and public awareness solutions can be built. Meanwhile, millions of UASs are operating in America’s airspace and recent FAA studies show consistent violations of airport airspace and other unlawful operations. Unlawful UAS flights are not the only growing hazard in low altitude airspace. In a single year, the FAA received around 10,000 reports of laser illuminations of aircraft cockpits, blinding pilots at critical stages of flight. The following should not be limited to UAS-related incidents, but inclusive of all low altitude airspace incidents who require joint response of federal and state, local, tribal, and territorial (SLTT) law enforcement agencies.

One can argue that unregulated “hobby drones” became a front-burner issue for the FAA and other agencies in 2015. At that point, Dronelife published estimated sales of over 500,000 DJI Phantoms since their introduction in 2013. At an estimated 70% of market share, the total number of consumer drones in 2015, including Parrot and 3D Robotics, would be in the range of 700,000, earning the status of a true consumer product. According to the then Secretary of Transportation, by January of 2018 the number of registered drones topped one million, not counting the units sold prior to the registration mandate, and during the ensuing court challenges. Although actual numbers vary widely, it is safe to say the number of drones is likely now in the millions.

From an enforcement perspective, the number of UAS units owned, and potentially operated in the NAS, is not as significant as the progression of federal (and some cases states and localities) rule making and regulations. In those first years we had simple rules as to restricted areas and flight levels, as well as the application of hazardous operation violations.

Using airports as the best example, the so-called “5-mile rule” has been replaced with complex systems such as the Low Altitude Authorization and Notification Capability (LAANC) and the

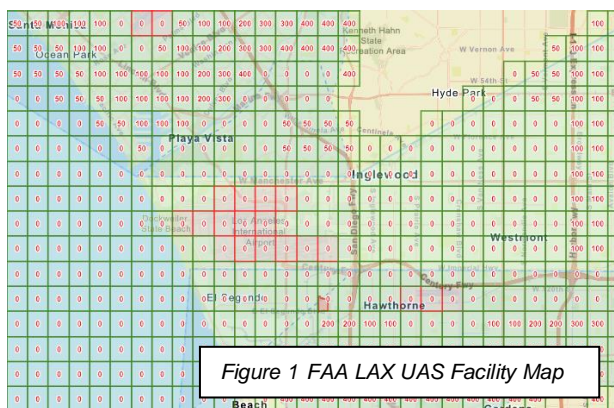


Figure 1 FAA LAX UAS Facility Map

FAA’s UAS Facility Maps. An example of the challenge for SLTT law enforcement response is a portion of the FAA UAS Facility Map for Los Angeles International Airport (Figure 1 below). This snapshot example shows a grid structure that has no relation to jurisdictional boundaries and incorporates several primary 911 PSAPs, at least five municipal police agencies (including multiple LAPD divisions), and two Los Angeles County Sheriffs Department stations. The actual LAX Facility Map covers over twice those agencies in the example.

Compounding the difficulty for a responder to differentiate allowable altitudes is the elimination of LAANC-authorized flights within the airport-controlled airspace from agency response. Adding in a plethora of federal rules and statutes, state laws, and municipal and county ordinances, effective SLTT response and enforcement is next to impossible without comprehensive software support.

The Continuum of Governmental Response

Federal government response to UAS threats began in earnest in 2015 with FAA appointing a retired Air Force General as Senior Advisor on UAS Integration and publishing a concept of operations (ConOps) paving the way for today's strategic direct and UAS development, policies, and issues management. Since 2016 the FAA has published guidelines for response to UAS incidents by local law enforcement agencies. In 2018, Congress passed the *FAA Reauthorization Act* which included federal actions including testing and reporting mandates. Reflecting the sense of urgency felt by the private sector was the 2019 aviation industry *Blue Ribbon Task Force on UAS Mitigation at Airports*. In 2021 the FAA sponsored the National Safe Skies Alliance publication *Airport Reponse to Unmanned Aircraft System (UAS) Threats* and issued *FAA National Part 139 Cert Alert No.21-04*, requiring all Part 139 airports to include UAS response in their required airport emergency plans (AEPs). All these actions culminated in the April 2022 with the *White House Domestic Counter-UAS National Action Plan*, and the accompanying Senate Bill 4687 "*Safeguarding the Homeland from the Threats Posed by Unmanned Aircraft Systems Act of 2022*."

Since the FAA's enforcement guidelines in 2016 there has been a growing expectation of SLTT agencies providing response, triage, validation, initial investigation, forensics, and uniform reporting of drone incidents and violations. With the FAA's current staffing of less than 20 law enforcement Special Agents, SLTT agency response is the only practical solution. The current draft of SB 4687 codifies this expectation, giving the Department of Homeland Security the authority to designate non-federal agencies to provide direct enforcement of UAS-related offenses. Logical in concept, the challenge is in the detail. Since the 1930's, local law enforcement has maintained joint jurisdiction on bank robberies, kidnapping, interstate fraud, and major drug offenses. These crimes are typically initiated by specialized investigative units and follow established protocols. Joint jurisdiction does not mean joint authorities.

The proposed National Air Space (NAS) enforcement infrastructure is not only complicated by the immense geographic scope of 16,000 SLTT jurisdictions, but by the progressive severity of "drone offenses" or other low altitude airspace incidents. These offenses can range from minor infractions, such as registration and pilot certification, to serious incursions into airport, military base, and other highly restricted airspace. UAS are increasingly used in smuggling contraband into correctional facilities, drug smuggling, and other felonious offenses. The most analogous law enforcement function is "traffic enforcement," with a similar offense range of minor infractions to vehicular homicide. Since the first American highway traffic fatality in 1899, it took 40 years to establish and align highway traffic safety engineering, enforcement, and reporting in the 48 States. The UAS- drone safety system needs to be a reality in about a half-decade. In the meantime, 15,000 air traffic controllers, 95,000 911 public safety communicators, and over 500,000 field law enforcement (LEO) responders are without a means to effectively respond to, investigate, gather forensic evidence, and provide prosecution-ready offense reporting on UAS incidents and violations.

Further complicating the law enforcement responsibilities of UAS response are the dozens of private-sector detection, tracking, and countermeasure (C-UAS) solutions on the market. Pursuant to the 2018 FAA Reauthorization Act, the FAA is currently testing at least ten of these solutions at five test airports. Upon the completion of these tests in early 2023, it is anticipated

the approved solutions will be marketed to 3,000 correctional facilities, dozens of sports and entertainment venues, and score of critical infrastructure sites, in addition to the Nation's 550 Part 139 airports. The challenge is how those alerts are introduced in the largely analog 911 response infrastructure, initiating the expected SLTT response and reporting. The only logical approach to these challenges is to enact universal protocols and provide a common entry-point to America's 6,100 primary public safety answering points (PSAPs).

Establishing a Baseline for the Future of UAS Enforcement and Reporting

During the 2019 United States Air Force-Techstars Accelerator a team of law enforcement, aviation, and forensics experts prototyped a cloud-based UAS enforcement system that automates comprehensive drone incident response and reporting for civilian and military air traffic control (ATC), 9-1-1 public safety answering points (PSAPs), and field law enforcement/security force responders. Based on four years of focused research, this system was designed to deliver the ability to triage, validate, investigate, and report incidents and violations; fully automating compliance federal reporting mandates. Through a platform-agnostic, multi-tier infrastructure, UAS incident calls from the public, reports by pilots to the ATC, and automated C-UAS detection alerts are routed to the appropriate 911 PSAP managing the correct SLTT first responders for immediate dispatch and response. 911 telecommunicators and first responders are supported with artificial intelligence and machine-learning-enabled software to render a flood of highly complex data into a simple, user-friendly process. Considering the magnitude of over 500,000 federal and SLTT operatives, a prime goal was to enable infinite scaling of user training and certification in an online format, eliminating the need for classroom training.

The Air Traffic Control Tier

The base system creates a dedicated cloud-based communications infrastructure that creates a first-ever network linking air traffic control towers, traffic management centers, and TRACON's to their local law enforcement infrastructure. UAS incursions into controlled airspace, laser illuminations, and other aviation emergencies are reported through an interactive mapping tool. The ATC Tier also provides a simple API for C-UAS countermeasure providers to convey their alerts to the appropriate 911 PSAP.

The 911 Public Safety Answering Point (PSAP) Tier

Either through a data transfer from ATC/ airport law enforcement, automated UAS countermeasure (C-UAS) systems, or what will be the most prolific source, **public calls to their local 911 PSAP**, the public safety 911 telecommunicator will receive the incident information and utilize AI/ML-based software to determine the responding agency and make the binary decision to dispatch or not to dispatch. The first critical step in the public safety response continuum is triage. Upon establishing that the incoming report is a qualifying UAS, laser illumination, or other aviation emergency, the telecommunicator launches the UAS law enforcement application on their existing dispatch workstation. Through a novel MMS API, the field responder is connected to the cloud-based application and database, downloading map and tabular data from the cloud.

The Law Enforcement Officer (LEO)/ Military Security Force Response Tier

Either by dispatch, or by on-view observation, field LEO's utilize the cloud application on their smart device (smart phone, tablet, or mobile computer) to locate the incident on the interactive map, record video and forensic evidence of flight, collect victim, witness, and offender statements, record observations, and determine appropriate actions.

Using *smart data capture* technologies, the known facts and officer's observations use AI/ML algorithms to inform the responder of possible matching violations of federal civil/criminal regulations and/or state statutes, and city or county ordinances. All these steps are aggregated

to create a comprehensive, prosecution ready, incident report. Based upon the facts and circumstances, the officer can take actions ranging from a recorded warning notice to civil and criminal referrals directly to the appropriate authority.

Supporting Infrastructure

A key feature of a progressive web application architecture (WebApp) is the use of existing infrastructure and user devices, and the ability to run on virtually any platform, including Android, iOS, and Windows. Utilizing preempted broadband, such as the federal First Responder Network Authority (FirstNet) or Verizon's Mobile Broadband Priority Service (MBP), the system runs independent of the agency's legacy mobile data network and can be a data-communications backup. In the case of regional or national disaster responses, the system can serve as a universal interface for multi-agency operations.

Essential third-party systems must be integrated into any comprehensive solution. Much like DMV for vehicular enforcement, emerging solutions aggregate UAS registration and other critical data need to be accessible from the UAS enforcement solution, both programmatically and manually. Federal, state, and local criminal justice system (CJIS) interfaces are essential to the investigative process. Once an offending device is in custody, specialized forensic technology is key to extracting navigational, video, and other vital evidence within existing 4th Amendment rules and restrictions.

Conclusion

Millions of drones, mainly hobby-drones flown by unlicensed operators, are being flown without a fully-completed regulatory infrastructure and virtually no effective enforcement process. A burgeoning industry of detecting drones through countermeasures has grown to over 200 solutions, with **no means of effectively communicating their alerts through the legacy 911 infrastructure to those who are expected to respond**. Effective technology must serve to fill these critical gaps in the UAS Traffic Management System (UTM).

For law enforcement officers to provide reasonable UAS enforcement today, it is proposed that parallel tracks of enforcement and emerging technology be established. Creating a Congressionally directed network of DHS-certified SLTT agencies cannot be effective without supporting protocols and technology. Modeled after the Air Force Accelerator solution which was cleared by FAA Office of Airport Safety and Standards in July 2019, there needs to be a baseline enforcement system that can immediately be deployed throughout the nation, becoming a standardized platform for the many innovations and enhancements the future may hold.

The Author

John D. Abbey is a retired Chief of Police from California's Silicon Valley, and a nationally recognized thought leader in law enforcement and public safety. With a quarter century of experience in law enforcement John is the founder of SafeFlight Corporation, providing research and technology for air traffic control, 9-1-1 centers, and field responders to address low altitude airspace incidents and violations. For the past seven years John Abbey has worked with the FAA, law enforcement principals, and private industry to create the first universal protocols for response and reporting. John is a graduate of the 136th FBI National Academy and the California Executive Command College. John has a Presidential MBA from Pepperdine University. You can contact John at jabbey@safeflight.io. Comments and complementary ideas and technologies are appreciated.