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Unmanned Aircraft System Policy and Regulatory Environment Bart Elias Specialist in Aviation Policy

Transportation Research Board, 92nd Annual Meeting Workshop 146 It's a Bird! It's a Plane! It's an Unmanned Aircraft System: Meeting the Challenge of Accommodating Unmanned Aircraft Systems in Civil Airspace Sunday, January 13, 2013

Agenda

Current Policy and Regulatory Environment

Provisions of the FAA Modernization and Reform Act of 2012 (P.L. 112-95)

Domestic Airspace Integration Issues and Challenges





Current Policy and Regulatory Environment

FAA Policy

- Unmanned Aircraft Operations in the NAS (13 Feb 2007)
 - "no person may operate a UAS in the National Airspace System without specific authority."
- Model Aircraft
 - Advisory Circular (AC) 91-57
 - Below 400 feet AGL
 - Line of Sight
 - Recreational Use Only (hobbyists, modelers)
 - NOT to be used as the basis for commercial flight operations
 - Analysis to determine whether small, slow commercial drones can operate without airworthiness certification (pending)



UAS Certification

Public UAS

- Law enforcement, homeland security (CBP), first responders, environmental agencies, federal research (NASA, NOAA), state universities (research)
- Certificates of Authorization (COAs)
 - 2009 146
 - 2010 298
 - 2011 313
 - Currently active (as of Nov 2012) 345



Civil UAS

- Special Airworthiness
 Certificate in the Experimental Category
 - Manufacturers RDT&E, demonstrations
 - Others TBD

Provisions of the FAA Modernization and Reform Act of 2012 (P.L. 112-95)

2012 FAA Reauthorization Provisions (P.L. 112-95, Enacted 14 Feb 2012)

Integration Plan

- Develop by November 2012
- Submit to Congress by February 2013
- Publish a "Roadmap" by February 2013 and update annually
- Publish a proposed rule by June 2013 and a final rule 16 months thereafter
- Implement before October 2015
- Six Test Ranges
 - Identify by August 2012

2012 FAA Reauthorization Provisions

- Expedited Approval Process for Public Safety and Other Public Uses
 - Simplify COA process by August 2012 allowing for expedited review (60 days or less) and appeal processes
 - One-time approval for similar operations for a fixed duration
 - Allow public safety agencies to operate drones weighing 4.4 pounds or less within line-of-sight below 400 ft. AGL in daylight conditions in uncontrolled airspace at least 5 miles away from airports, heliports, and other locations with aviation activities
 - Issue guidance regarding: an expedited COA process; a collaborative process for incremental expansion of NAS access; facilitating the development and use of test ranges; and responsibilities when operating drones without civil airworthiness certification, by November 2012
 - Issue standards for operations and certification requirements for public UAS operations in the NAS before January 2016

2012 FAA Reauthorization Provisions

- Determinations Regarding Safe Operation of Certain Drones Prior to Integration Plan Implementation
 - DOT Determination by August 2012
 - Publish a Final Rule by June 2013 for other small UAS that don't meet initial determination criteria
- Arctic Regions
 - Develop a plan by August 2012 to designate areas for 24/7 operations of small unmanned aircraft
 - Processes to facilitate beyond line-of-sight operations and enable over-water flights from the surface to 2,000 ft. AGL
 - Research and commercial purposes
- Exemption for Recreational and Hobby Drones Weighing 55 Pounds or Less
 - Community-based safety guidelines (Academy of Model Aeronautics or similar organization)



Domestic Airspace Integration Issues and Challenges

Issues and Challenges

- Market Demand
 - FAA Forecast (2012-2032): 10,000 active commercial UASs in five years based on the expected regulatory environment
- Small vs. Large UAS
- FAA Oversight and Enforcement Capabilities
- Safety Concerns
- Potential Security Risks
- Availability and Protection of Radiofrequency Spectrum
- Concerns Over Airspace Restrictions
- Concerns Over Sensor Payloads and Flight Operations
 - Privacy Concerns
 - Pervasiveness, Nuisance, and Intrusiveness

Addressing Safety Concerns

- Aircraft Certification, Operator Certification, Operational Requirements
 - RTCA, Inc. consensus standards
- Compatible with Current System, NowGen, and NextGen
- Sense and Avoid Capability
 - Line-of-sight vs. beyond line-of-sight
 - Traffic Collision Avoidance Systems
 - Automatic Dependent Surveillance –Broadcast (ADS-B)

Addressing Safety Concerns

- Crash Risk Mitigation
 - Risk = f(Crash Likelihood, Potential Consequences)
 - Risk Assessments for System Certification and Mission Planning
 - Ground Impact Models and Mitigation Plans to Reduce Risks to Persons and Property on the Ground
 - Structured training and/or certification requirements for pilots, systems operators and other safety critical personnel
- Human Factors Considerations
 - April 25, 2006 Customs and Border Protection (CBP) Predator B (MQ-9) Crash, Nogales, AZ
 - Training and systems design factors
- Operator Training and Qualification
 - Potential implications for operational cost advantages
 - Common training among uncommon systems
 - Rules of the Sky Basic Training
 - Medical Certification



Addressing Potential Security Risks

Potential Drone Weapons

- Homegrown Terror Plot to Attack Pentagon with large model aircraft packed with high explosives followed by automatic weapons attacks of fleeing personnel
- Intentional Hacking and Signal Jamming
 - Navigation/GPS Signal Jamming and Spoofing
 - Spoof Resistance
 - Back-Ups to GPS (e.g., Inertial Guidance)
 - Intentional Signal Jamming or Interference of Command and Control Transmissions
 - Encrypted communications and telemetry signals
- TSA has not specifically addressed the security of drone operations

Availability and Protection of Radiofrequency Spectrum

- Spectrum Sharing vs. Dedicated Spectrum
- Line-of-Sight vs. Beyond Line-of-Sight (BLOS)
- Satellite communications vs. dedicated land-based radio / WiFi
- International Telecommunications Union (ITU) –



Predicted 56 MHz of satellite spectrum and 34 MHz of terrestrial spectrum needed to support anticipated growth of UAS operations in non-segregated (i.e., integrated airspace)

Existing satellite bands examined cannot safely support UAS control links in non-segregated airspace



Airspace Restrictions

- Concerns Among Current Airspace Users
- Aircraft Owners and Pilots Association (AOPA)
 - Unmanned aircraft operations should not have a negative impact on general aviation operations and should not require special airspace designations, such as restricted airspace, for their operation
 - Do no harm to current manned operations
 - "the use of 'temporary' large-scale flight restrictions for yearlong UAV operations is not appropriate and the FAA needs to fully explore the alternatives available to allow CBP (or any other agency for that matter) to secure our borders without impacting the aviation community."

Privacy and Fourth Amendment Issues

- Manned Aerial Surveillance Cases
 - Aerial Surveillance ≠ Search
- Government Tracking
 - Public Surveillance vs. Pervasive Tracking
- Application to Drones Considerations
 - Location of Search (Home vs. In Public View)
 - Surveillance Technology Used
 - Thermal Imaging
 - Automatic License Plate Readers (ALPRs)
 - Facial Recognition
 - Pervasiveness of Drone Surveillance
 - Long dwell times



Privacy-Related Legislative Proposals in the 112th Congress

- Preserving Freedom from Unwarranted Surveillance Act of 2012 (<u>H.R. 5925</u>, <u>S. 3287</u>)
 - Would require a warrant to conduct federal drone surveillance
- Preserving American Privacy Act of 2012 (H.R. 6199)
 - Would only permit use of drones by law enforcement pursuant to a warrant and in the investigation of a felony
- Drone Aircraft Privacy and Transparency Act of 2012 (H.R. 6676)
 - Would require data collection statements and data minimization statements regarding the use of drone data
 - Would require a warrant for drone operations for protective activities or law enforcement purposes

Privacy-Related Legislative Proposals in the 112th Congress

- Farmers Privacy Act of 2012 (H.R. 5961)
 - Would prohibit the EPA from conducting aerial surveillance of agricultural lands unless the EPA has consent from the farmer, has provided public notice, or has obtained a certificate of reasonable suspicion from the United States District Court for the District of Columbia.
- Proposed 2012 Farm Bill Amendments (Senate)
 - Would have prohibited EPA from using aerial surveillance to inspect or record images of farming operations, <u>or</u>
 - Would have permitted the EPA to conduct fly-overs if it was more cost-effective than ground inspections and if state officials were notified of such flights.