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Big Brother Will Soon Be Watching—Or Will He? Constitutional, Regulatory, and Operational Issues Surrounding the Use of Unmanned Aerial Vehicles in Law Enforcement

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BIG BROTHER WILL SOON BE WATCHING—OR WILL HE? CONSTITUTIONAL, REGULATORY, AND OPERATIONAL ISSUES SURROUNDING THE USE OF UNMANNED AERIAL VEHICLES IN LAW ENFORCEMENT

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I. INTRODUCTION

The widespread use of Unmanned Aerial Vehicles (UAVs) and Unmanned Aerial Systems (UASs) in domestic law enforcement is imminent. Every police department, chief, and beat officer in the United States dreams of the ability to have eyes everywhere—a constant panoramic view of every angle in every precinct with the ability to instantly zoom in on suspicious behavior. That ability is available now. And it is on sale, cheap. The problem is regulatory uncertainty surrounding operations of UAVs in American airspace, and no one wants to be the guinea pig. The Federal Aviation Administration (FAA), tasked with ensuring the safe and orderly operation of aircraft, is regulating UAV operations of the kind that domestic law enforcement wants. The FAA has effectively stopped domestic law enforcement agencies from operating small UAVs in their operations without running afoul of FAA regulations for now. Nonetheless, the law enforcement industry is clamoring for the new tools. Finally, use of small UAVs raises potentially thorny Fourth Amendment issues and will not go unnoticed by lawyers and civil liberty groups. The privacy issues raised by the potential ubiquity of UAVs go beyond the current Fourth Amendment jurisprudence.

This article will begin first with a discussion of the problem background, canvass the operational abilities of current UAVs, and explore the regulatory and constitutional limitations affecting their use. Second, the article will illustrate the burdensome process a local law enforcement agency must endure to utilize UAVs in operations and avoid administrative enforcement action. Third, the article will assess recent regulatory developments in regard to the domestic operation of small UAVs. The article will conclude by exploring where Fourth Amendment jurisprudence might go when society is faced with continuous, ubiquitous airborne surveillance.

II. PROBLEM BACKGROUND

Every technological step forward in remote sensing raises potential Fourth Amendment issues, and the implications of law enforcement and executive use of ever cheaper and more numerous surveillance tools are not fleshed out until the highest courts profess their opinions, sometimes years later. And in the interim, even newer technologies have rendered the original technologies and questions obsolete. Even legislative oversight is ineffective—a deliberative organ's skills at playing technological "whack-a-mole" are futile when compared to the rate of industry advancement.

The societal questions raised by today's law enforcement use of cutting-edge surveillance technology in day-to-day operations will need to be answered at the same level they are raised—on the ground. There is no precedent that squarely addresses privacy implications of governmental use of a technology that allows essentially permanent, multi-dimensional, multi-sensory surveillance of citizens twenty-four hours per day. A hypothetical example approaching that kind of surveillance ability would be a police officer's access to a Google Earth[1]-like display, with a point of view that could be moved or zoomed anywhere in three dimensions, coupled with real-time visual, audio, thermal, or other sensing. God-like sensory omniscience, in other words. Individual law enforcement officers' abilities could be multiplied with a flock of small UAVs, exponentially increasing the state's power to continually monitor its citizenry.

Our Constitutional jurisprudence, demographics, and technological ability to remotely sense almost anyone, anywhere, at anytime, seem to be the ingredients necessary for a police state. But interestingly, law enforcement has not taken full advantage of the potential tools available to them—perhaps for regulatory impediments, for budgetary constraints, or to avoid running afoul of the Constitution. At any rate, permanent, ubiquitous surveillance is not the stuff of fiction anymore. So what could usher us into the brave new world of a big brother-like security state? Off-the-shelf technology, an updated regulatory scheme, and outdated Fourth Amendment cases could.

A. OVERVIEW OF AVAILABLE UAVS AND SYSTEMS

Although Unmanned Aerial Vehicles and Unmanned Aerial Systems are not new,[2] their use in domestic law enforcement is new and imminent. The UAS industry, regulators, and researchers are moving closer to adopting rules and regulations that would allow the use of UAVs in civil airspace, but the present state of affairs resembles an aeronautical Wild West.

Production of civilian UAVs has exploded in recent years, and is forecast to continue to grow exponentially.[3] Once almost the exclusive purview

1. *See* Google Earth, www.earth.google.com (last visited Mar. 8, 2010) (illustrating potential surveillance capabilities).

2. For example, the Ryan Aeronautical Company developed the Firebee in 1951, which was a jet-powered target drone. It was one of the most widely-used target drones ever built.

3. *Teal Group Predicts Worldwide UAV Market Will Total Over $80 Billion in its Just Released 2010 UAV Market Profile and Forecast*, PRNEWSWIRE.COM, Feb. 1, 2010, http://www.prnewswire.com/news-releases/teal-group-predicts-worldwide-uav-market-will-total-over-80-billion-in-its-just-released-2010-uav-market-profile-and-forecast-83233947 html ("Teal Group's 2010 market study estimates that UAV spending will more than double over the next

of military operations, UAVs designed for civilian use, such as atmospheric research, agricultural operations, spying, and information relay are available for purchase now. A representative example is the MLB Company's BAT-4, an off-the-shelf ready to fly UAS:

> Bat 4 is a complete man-portable UAV system that operates autonomously and delivers high quality video imagery. A ready-to-fly aircraft with standard sensor payload and complete ground station is available starting at US $35,000. The Bat 4 UAV has a wingspan of 13 feet, weighs only 55 to 100 pounds, and can fly for up to 8 hours (12 with optional wing tanks).[4]

Its advertised uses include "[u]rban monitoring" and "[a]erial mapping."[5] Although it looks rather ungainly, its ability to loiter for up to 12 hours over urban areas, peering down with a three-dimensional gimbaled camera capable of magnification by 25 times in any weather conditions or at night, thanks to its infrared camera, gives it advantages far beyond those of human piloted aircraft. By way of comparison, a police department wishing to purchase a standard Bell model 206 helicopter for aerial surveillance can expect to pay $875,000 up front for a basic machine capable of a maximum of 4.5 hours of flight time, requiring two or more crewmembers, and costing approximately $500 per hour to operate.[6] For the same price as the Bell 206 helicopter, that department could instead purchase around 40 Bat-4 UAVs plus launcher and associated equipment that require zero trained crewmembers to operate and costs less than $5 per hour to operate, per aircraft.[7]

That was but one example of how relatively inexpensive UASs are compared to manned aircraft. Many manufacturers of UAS offer similar products, and law enforcement agencies around the country have calculated that it would be entirely feasible to equip each patrol officer's car with a UAS in the trunk. The potential uses of a UAS in tandem with a patrol officer are many. The UAV could fly along several hundred feet above the patrol car, giving the officer a real-time bird's eye view of the situations developing around his or her patrol beat. The need for risky high-speed pursuit of fleeing suspects would be eliminated, since the UAV could

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decade from current worldwide UAV expenditures of $4.9 billion annually to $11.5 billion, totaling just over $80 billion in the next ten years.").

4. The MLB Company, http://spyplanes.com/pages_new/products htm (follow "Bat 4" hyperlink to find downloadable PDF file) (last visited Mar. 8, 2010).

5. *Id*.

6. *See* Bell Helicopter, http://www.bellhelicopter.com/en/aircraft/commercial/bell206B-3.cfm (last visited Mar. 8, 2010).

7. *See* The MLB Company, http://spyplanes.com/pages_new/products htm (last visited Mar. 8, 2010).

simply track the suspect from above. Or several UAVs could be posted to orbit and monitor suspected drug distribution locations, freeing officers for other duties until enough evidence is gathered with the UAV sensors to obtain a search warrant.

Those examples are relatively simple in keeping with the simplicity and ease of use of a small UAV. Most small UAVs are flown via "point and click" on a laptop computer, with the vehicle itself controlled by its own internal autopilot, receiving guidance instructions via a radio or satellite link.[8] Some larger UAVs can be hand flown by qualified pilots, but it is not necessary to be a trained pilot to operate a small, autonomous UAV. Operators merely select the operation they wish the UAV to perform, whether that is orbiting over a single location, tracking a moving target, or patrolling a set area. The newest technologies allow the UAV to monitor an area for certain interesting activity and then track that activity when it begins, wherever it goes, using artificial intelligence programs in its flight computers. Those are more expensive, experimental technologies, but they are quickly becoming commercially available.[9]

The currently available UAS technologies have given law enforcement officers tools never available before now. The ability to continuously monitor suspected criminals from above in all weather and visibility conditions multiplies law enforcement's executive power and abilities. Legislative oversight, however, is lagging behind the commercial development and marketing of these new tools. The current regulatory scheme is inadequate to deal with the novel issues raised by use of UAVs in law enforcement.

B. CURRENT U.S. REGULATORY SCHEME

The current regulatory scheme in place in the domestic U.S. airspace is a mixture of constitutional jurisprudence and administrative regulation. Although it was not long ago that the Supreme Court rejected the idea of *cujus est solum ejus est usque ad coelum*, where a landowner owned everything above his or her property out to the edge of the universe,[10] the courts are in general agreement that landowners own as much airspace above their property as they can reasonably use,[11] and everything else is akin to a "public highway."[12] The seminal "ownership" cases are factually limited to airport expansion or construction nearby, with the result that aircraft end up

8. *E.g.*, Insitu Co., http://www.insitu.com/scaneagle (last visited Mar. 8, 2010).

9. *See* P.W. SINGER., WIRED FOR WAR: THE ROBOTICS REVOLUTION AND CONFLICT IN THE 21ST CENTURY 355-356 (Penguin Press 2009).

10. U.S. v. Causby, 328 U.S. 256, 260-61 (1946).

11. *Id.* at 264.

12. *Id.* at 261.

flying unreasonably low over a house, or the airport's presence results in restrictive zoning regulations.[13] The constitutional limits on ownership of airspace generally limit the remedy of an aggrieved property owner to an action in inverse condemnation[14] or to a challenge of the zoning restrictions under the Fifth Amendment takings clause.[15] Therefore, contemporary constitutional takings claims for flight over a person's property are unlikely to survive outside close proximity to an airport, and even then, federal law and airspace regulations favor public use of airspace.[16]

The Air Commerce Act[17] allows the flying public the use of all public airspace above the minimum safe altitudes and use of lower altitudes for takeoff and landing.[18] Minimum safe altitudes are generally defined as no lower than 500 feet above the surface generally, or no closer than 500 feet horizontally and vertically from any person, structure, vessel, or vehicle, and no lower than 1,000 feet above congested areas[19] for fixed wing aircraft, and "less than the minimums [for airplanes] if the operation is conducted without hazard to persons or property on the surface" for rotor wing aircraft (helicopters).[20]

Those, and myriad other operating regulations, are promulgated by the FAA and apply to all aircraft in the United States.[21] The FAA defines "aircraft" as "a device that is used or intended to be used for flight in the air."[22] This broad definition could strictly encompass paper airplanes folded by restless students, but the FAA has made a practical policy decision to essentially ignore small model aircraft and other similar things. Although no definition currently exists for what a "model aircraft" is, if model aircraft operators fly below 400 feet above the surface and stay away from airports, they generally can safely ignore all the regulations that apply to full-scale aircraft operators.[23]

In response to the production surge of small UAVs, the FAA has promulgated a series of orders, which will be discussed in later sections, regarding the operation of UAVs as a temporary stopgap, since many

13. *See Causby,* 328 U.S. at 256; Griggs v. Allegheny, 369 U.S. 84, 84 (1962); Sneed v. Riverside, 32 Cal. Rptr. 318, 319 (Cal. Dist. Ct. App. 1963).

14. *See Allegheny*, 369 U.S. at 84-90.

15. *See* U.S. CONST. amend. V.

16. *See*, *e.g.*, *Causby*, 328 U.S. at 264.

17. Ch. 6, 44 Stat. 2119 (codified at 49 U.S.C. §§ 171-84 (repealed 1983)).

18. *See id.* ch. 6, § 180, 44 Stat. at 2122 (codified at 49 U.S.C. § 180 (repealed 1983)).

19. 14 C.F.R. § 91.119(b)-(c) (2009).

20. 14 C.F.R. § 91.119(d).

21. 14 C.F.R. § 91.1(a).

22. 14 C.F.R. § 1.1.

23. *See* U.S. Dep't of Transp., Federal Aviation Admin., Advisory Circular 91-57, *Model Aircraft Operating Standards*, 1981, *available at* http://rgl.faa.gov/.

operators have made the easy logical deduction that a device such as the BAT-4 would qualify as a model aircraft and hence could be flown with impunity under the Model Aircraft Operating Standards. Of course, UAVs come in a wide range of sizes, but this paper will focus on small sized UAVs to stay with the hypothetical example of a police patrol car equipped with a UAV in the trunk.

C. CONSTITUTIONAL LIMITATIONS ON AERIAL SURVEILLANCE

Before examining the legal issues surrounding operation of a UAV in domestic American airspace, an examination of Fourth Amendment jurisprudence[24] will assist in fleshing out the limits of what surveillance techniques might be employed by police using UAVs and withstand constitutional muster. In the landmark case *Katz v. U.S.*,[25] the defendant was convicted using evidence obtained by police placing an electronic listening device on the outside of a public phone booth the defendant used.[26] The Court rejected the government's argument that there had been no Fourth Amendment violation because no physical intrusion into the phone booth occurred.[27] In doing so, the Court changed track in its Fourth Amendment jurisprudence, moving away from the notion that a trespass was a necessary ingredient in a Fourth Amendment violation[28] because the "Fourth Amendment protects people—and not simply 'areas'—against unreasonable searches and seizures."[29] Even though the phone booth was in a public place, the defendant still retained some reasonable expectation of privacy—"[W]hat [a person] seeks to preserve as private, even in an area accessible to the public, may be constitutionally protected."[30] However, the Court noted in the same breath that "[w]hat a person knowingly exposes to the public, even in his own home or office, is not a subject of Fourth Amendment protection."[31] Justice Harlan highlighted that subjective reasoning in his concurrence, where he articulated the following two part rule: "first that

24. Several commentators have argued for private tort actions (such as intrusion, trespass, nuisance, etc.) for unwanted remote sensing of property. *See, e.g.* Craig, Brian, *Online Satellite and Aerial Images: Issues and Analysis*, 83 N.D. L. REV. 547, 557-58 (2007). But no private tort action yet will lie for remotely sensing a private property owners land, either by another private actor or a government actor. Therefore, this article's scope will remain focused on constitutional claims and government actors.

25. 389 U.S. 347 (1967).

26. *Katz*, 389 U.S. at 348.

27. *Id.* at 351.

28. *See* Goldman v. U.S., 316 U.S. 129, 134 (1942); Olmstad v. U.S., 277 U.S. 438, 466 (1928) (both overruled by *Katz*).

29. *Katz,* 389 U.S. at 353.

30. *Id.* at 351-52 (alteration in original).

31. *Id.* at 351.

a person have exhibited an actual (subjective) expectation of privacy, and second, that the expectation be one that society is prepared to recognize as 'reasonable.'"[32] The Court has seized upon that logic, holding that a "search" under the Fourth Amendment generally occurs "when an expectation of privacy that society is prepared to consider reasonable is infringed."[33]

Surveillance by UAV combines surveillance by remote sensing and aerial observation, both areas having been previously explored in context of the Fourth Amendment. *Katz* was essentially the first remote sensing case, since the evidence was obtained by police placing an electronic listening device on the outside of a public phone booth.[34] Remote sensing, or gathering data from a distance, encompasses a broad range of tactics from simple visual observation to audio enhancement as in *Katz* to highly technical methods such as forward looking infrared systems (FLIR).

Remote sensing, regardless of the methodology used, falls into two categories for Fourth Amendment purposes: "open fields" and "curtilage." Open fields include public areas and private property that "do not provide the setting for those intimate activities that the [Fourth] Amendment is intended to shelter from government interference or surveillance."[35] Surveillance of open fields, or activities in open fields, simply will never implicate the Fourth Amendment. Surveillance of curtilage, on the other hand, may implicate the Fourth Amendment. Curtilage is a legal "penumbra" surrounding a home, where surveillance may implicate the protections of the Fourth Amendment.[36] But the fact that "the area is within the curtilage does not itself bar all police observation. The Fourth Amendment protection of the home has never been extended to require law enforcement officers to shield their eyes when passing by a home on public thorough-fares."[37] Essentially, surveillance of an area by remote sensing does not implicate the Fourth Amendment if it is done from a public vantage point where law enforcement officers can make open observations.

32. *Id.* at 361.

33. U.S. v. Jacobsen, 466 U.S. 109, 113 (1984).

34. *Katz*, 389 U.S. at 348.

35. Oliver v. U.S., 466 U.S. 170, 179 (1984).

36. U.S. v. Dunn, 480 U.S. 294, 300 (1987). Four factors determine whether an area is "curtilage:" "[T]he proximity of the area claimed to be curtilage to the home, whether the area is included within an enclosure surrounding the home, the nature of the uses to which the area is put, and the steps taken by the resident to protect the area from observation by people passing by." *Id*. at 301.

37. California v. Ciraolo, 476 U.S. 207, 213 (1986).

Regarding aerial observation from navigable airspace,[38] the Court has specifically held that surveillance of a home's backyard by aircraft[39] or helicopter[40] is not a search under the Fourth Amendment, nor is photographing a private industrial complex from public airspace.[41] The Court's holdings form an "aerial surveillance trilogy"[42] and the basis for aerial surveillance Fourth Amendment law. In the first aerial surveillance case, *California v. Ciraolo*,[43] police flew a fixed-wing aircraft over the defendant's backyard at 1,000 feet, the minimum safe altitude required by Federal Aviation Regulations, and observed marijuana plants with naked eye observation.[44] Police used aerial surveillance because the backyard was not visible from the ground due to an extensive fencing system.[45] The aerial surveillance formed the basis for a search warrant, and police later found marijuana plants upon a physical search.[46] Although the defendant had fenced his yard, creating an expectation of privacy, the Court concluded that a ground fence does not extend any expectation of privacy to be free from aerial surveillance because routine flights exposed the backyard to public view.[47]

The Court extended *Ciraolo's* reach in *Florida v. Riley*.[48] Similar to *Ciraolo*, the defendant enclosed his greenhouse to prevent ground-level observation.[49] Officers used a helicopter, flying at 400 feet overhead, to peer through openings in the greenhouse; they determined marijuana was growing inside.[50] The Court followed *Ciraolo* in holding that the defendant

38. "'Navigable airspace' means airspace above the minimum altitudes of flight prescribed by regulations . . . including airspace needed to ensure safety in the takeoff and landing of aircraft." 49 U.S.C. § 40102(a)(32) (2009).

39. *Ciraolo*, 476 U.S. at 213-214. In this case, the observation by aircraft took place within public navigable airspace. *Id.* at 213.

40. Florida v. Riley, 488 U.S. 445, 449 (1989). In this case, the helicopter was flying within navigable airspace. *Id.* at 451.

41. Dow Chem. Co. v. U.S., 476 U.S. 227, 239 (1986). In this case, the aircraft which the photographs were taken was at all times within lawfully navigable airspace. *Id.* at 229.

42. *See generally* California v. Ciraolo, 476 U.S. 207 (1986); Florida v. Reilly, 488 U.S. 445 (1989); Dow Chem v. U.S., 476 U.S. 227 (1986). The "aerial surveillance trilogy" refers to *California v. Ciraolo, Florida v. Reilly, and Dow Chem. Co. v. U.S.* read together as a whole.

43. 476 U.S. 207 (1986).

44. *See Ciraolo*, 476 U.S. at 209.

45. *Id*.

46. *Id*. at 209-10.

47. *Id*. at 215.

48. 488 U.S. 445 (1989).

49. *Riley*, 488 U.S. at 450.

50. *Id*. at 448.

had no reasonable expectation of privacy because a helicopter flying in navigable airspace was a routine, expected occurrence.[51]

Finally, in *Dow Chemical Company v. U.S.*,[52] the Court extended further the authority of law enforcement officers to fly over private commercial areas that would otherwise be constitutionally protected from physical surveillance.[53] Dow had also extensively enclosed its property to prevent ground-level observation and even went so far as to investigate any low-flying aircraft, even though it had no authority to do so.[54] The Environmental Protection Agency (EPA), suspecting regulatory violations, hired a commercial pilot to fly over Dow's property to take aerial photos.[55] The EPA did not procure a search warrant prior to the flight.[56] Although the Court noted that "[a]ny actual physical entry by EPA into any enclosed area would raise significantly different questions, because 'the businessman, like the occupant of a residence, has a constitutional right to go about his business free from unreasonable official entries upon his private commercial property,'"[57] the Court held that "such an industrial complex is more comparable to an open field and as such it is open to the view and observation of persons in aircraft lawfully in the public airspace."[58]

Under the "aerial surveillance trilogy" canvassed above, it seems that aerial surveillance, regardless of the method, of private or commercial property from aircraft lawfully in navigable airspace is not a search under the Fourth Amendment, because there is no reasonable expectation of privacy in any area in open view from above—regardless of whether it is located in an open field or within the curtilage. Each Court opinion in the trilogy focused on an area visible from above. But recall that the "Fourth Amendment protects people—and not simply 'areas'—against unreasonable searches and seizures."[59] The Court seems to have recently returned to that idea in *Kyllo v. U.S.*[60] In *Kyllo*, police used a thermal imaging device

51. *Id.* at 450-51. While operating a helicopter at 400 feet over a residential dwelling may be technically allowed by regulation, it is neither prudent nor safe. The noise and disruption produced would likely result in complaints and lawsuits, and the pilot's options for safe landing in the event of an emergency are severely limited at that low altitude. Low-level operations are not as routine or expected as the Ciraolo Court thinks, but the Court blessed such operations as such.

52. 476 U.S. 227 (1986).

53. *Dow Chem Co.*, 476 U.S. at 234.

54. *Id*. at 229.

55. *Id.*

56. *Id*.

57. *Id.* at 237 (quoting See v. City of Seattle, 387 U.S. 541, 543 (1967)).

58. *Id*. at 239.

59. Katz v. U.S., 389 U.S. 347, 353 (1967).

60. 533 U.S. 27 (2001).

to detect unusual amounts of heat radiating from the defendant's home.[61] Although the Court framed its holding around the principle that such penetrating searches are unconstitutional absent a search warrant as a limit on technological encroachment of privacy, the Court added the caveat "at least where (as here) the technology in question is not in general public use."[62] Presumably, once a certain technology is in general public use, a search like that in *Kyllo* would not be a search under the Fourth Amendment. Therefore, the test seems to turn on whether Wal-Mart sells it or not.[63] Notwithstanding this caveat, the *Kyllo* Court insisted that the technological tools employed by the government were irrelevant and focused instead on whether the defendant (and society) had a reasonable expectation of privacy in the activities observed or information gathered.[64]

But society's reasonable expectations of privacy and tolerance for invasion of privacy affect the limits of the Fourth Amendment, as the *Kyllo* Court implicitly acknowledged with the same caveat: "We think that obtaining by sense-enhancing technology any information regarding the interior of the home that could not otherwise have been obtained without physical 'intrusion into a constitutionally protected area' constitutes a search—at least where (as here) *the technology in question is not in general public use*."[65] "The touchstone of Fourth Amendment analysis is whether a person has a 'constitutionally protected reasonable expectation of privacy.' *Katz* posits a two-part inquiry: first, has the individual manifested a subjecttive expectation of privacy in the object of the challenged search? Second, is society willing to recognize that expectation as reasonable?"[66] The cases of the aerial surveillance trilogy were premised upon the question of whether flight over the subject property was common at a given altitude. And the Court did not hesitate in proclaiming low altitude flight a common occurrence and that society should reasonably expect as much. Constitutionally, it seems that aerial surveillance by any method of any area in open view from any legal altitude does not implicate the Fourth

61. *Kyllo*, 533 U.S. at 29.

62. *Id*. at 34.

63. *See* Ric Simmons, *From* Katz *to* Kyllo*: A Blueprint for Adapting the Fourth Amendment to Twenty-First Century Technologies*, 53 HASTINGS L.J. 1303, 1331-35 (2002) (explaining that well established technologies can change reasonable expectations of privacy).

64. *See Kyllo*, 533 U.S. at 34 (explaining the need for a rule governing searches and seizures that applies despite advancing technology).

65. *Id.* (emphasis added) (internal citations omitted).

66. California v. Ciraolo, 476 U.S. 207, 211 (1986) (quoting Katz v. U.S., 389 U.S. 347, 360 (1967) (Harlan, J., concurring)).

Amendment, as long as the technology used to obtain the surveillance technology is in general public use and does not penetrate into the home.[67]

III. LAW ENFORCEMENT: HOW TO LEGALLY USE UAVS IN SURVEILLANCE (IT'S NOT GOING TO BE EASY)

Because aerial surveillance of an area in open view from a legal altitude using technology in general public use that does not penetrate into a home does not implicate the Fourth Amendment, it would seem to be a simple matter for law enforcement agencies to purchase and use small, autonomous UAVs like the BAT-4 or its equivalent described earlier. But the FAA has taken the position that "no person may operate a UAS in the National Airspace System without specific authority."[68] The FAA defines that specific authority on whether the operation is amateur, public, or civil.[69] For amateur model aircraft the authority is FAA publication AC 91-57.[70] For UAS operations as a public aircraft the specific authority comes by way of a Certificate of Authorization (COA).[71] For UAS operations as civil aircraft—general public use of aircraft and airspace—the authority is granted via a special airworthiness certificate.[72]

A. AMATEUR MODEL AIRCRAFT

As a preliminary matter, no law enforcement agency will succeed in arguing that its UAV is essentially an amateur model aircraft, albeit with a very sophisticated camera attached, and therefore can be operated with impunity under FAA Advisory Circular (AC) 91-57.[73] The FAA intended this advisory circular, a single-page non-regulatory opinion, to exclude model aircraft operators from federal regulations governing aviation.[74] The FAA recognized that modelers did not pose a substantial hazard to high-flying commercial aircraft, and thus directed them to operate below 400 feet and to stay away from airports.[75] This exception existed because the FAA did not want to expend scarce resources on policing such a small, harmless niche, as it was.

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67. *Kyllo*, 533 U.S. at 44.

68. Unmanned Aircraft Operations in the National Airspace System, 72 Fed. Reg. 6689, 6690 (Feb. 13, 2007) (to be codified at 14 C.F.R. § 91).

69. *Id.*

70. *See* Advisory Circular 91-57, *supra* note 23.

71. Unmanned Aircraft Operations in the National Airspace System, 72 Fed. Reg. at 6690.

72. *Id.*

73. Advisory Circular 91-57, *supra* note 23.

74. *See id.*

75. *Id.*

No law enforcement agency will succeed in operating a UAV under AC 91-57 because the FAA specifically prohibits it.[76] The document and its rationale are currently being updated by the FAA because new UAVs are much more capable than the model aircraft of yesteryear, raising safety concerns. The FAA has the authority to regulate aircraft operations[77] unless it elects not to, as with amateur model aircraft.[78] An "aircraft" is defined by the Code of Federal Regulations as follows: "*Aircraft* means a device that is used or intended to be used for flight in the air."[79] An amateur model aircraft falls under the definition of "aircraft" because it is a device used for flight in the air and therefore would ostensibly be regulated by the rules provided in Title 14, Section 91 of the Code of Federal Regulations. Civil aircraft operations in the domestic U.S. airspace are regulated by this section, which states: "Except as [otherwise] provided this part prescribes rules governing the operation of aircraft (other than moored balloons, kites, unmanned rockets, and unmanned free balloons and ultralight vehicles . . .) within the United States, including the waters within 3 nautical miles of the U.S. coast."[80]

Nonetheless, the FAA will likely continue to ignore model aircraft operations that fall below certain weight and speed parameters. Model aircraft exceeding the performance capabilities of traditional "amateur" model aircraft may soon be regulated by civil aviation regulations in some fashion.

Amateur modelers may currently operate "under the radar," but are subject to enforcement if their models are used for commercial purposes or compromise the safety of other aircraft or the public. "The FAA recognizes that people and companies other than modelers might be flying UAS with the mistaken understanding that they are legally operating under the authority of AC 91-57. AC 91-57 only applies to modelers, and thus specifically excludes its use by persons or companies for business purposes."[81] For the time being, the FAA has decided to limit operation of UAVs to public or civil authority.

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76. Aviation Safety Unmanned Aircraft Program Office AIR-160, Interim Operational Approval Guidance 08-01, 5 (Mar. 13, 2008), *available at* http://www.faa.gov/aircraft/aircert/designapprovals/uas/reg/media/uas_guidance08-01.pdf.

77. 14 C.F.R. § 91.1(a) (2009).

78. *See* Advisory Circular 91-57, *supra* note 23 (encouraging model aircraft operators to comply with safety standards).

79. 14 C.F.R. § 1.1 (2009).

80. 14 C.F.R. § 91.1(a).

81. Unmanned Aircraft Operations in the National Airspace System, 72 Fed. Reg. 6689, 6690 (Feb. 13, 2007) (to be codified at 14 C.F.R. pt. 91).

B. PUBLIC AIRCRAFT AND THE CERTIFICATE OF AUTHORIZATION (COA)

Since the FAA has prohibited the use of UAVs under AC 91-57 when used for business purposes, a law enforcement agency wishing to use UAVs in its operations must either operate the aircraft as a public aircraft and apply for a COA, or apply for a special Experimental Aircraft certification. Of the two, operation as a public aircraft under a COA is currently the only viable option, and even it remains overly burdensome. A COA is essentially a waiver by the FAA allowing operation that would otherwise be a violation of the Federal Aviation Regulations (FAR) if the operations can be "conducted at an acceptable level of safety."[82] An example of a regulation that may be waived is FAR 91.113(b), which requires operators of aircraft to "see and avoid" other aircraft.[83] But many UAV operators are unable to comply with this regulation by definition—they are not inside the aircraft and therefore cannot see or avoid other aircraft. Therefore, a waiver allowing operation might require a ground or airborne observer to be present at all times while the UAV is in flight to ensure an acceptable level of safety is met.

The waiver application requires applicants to establish the UASs "airworthiness either from FAA certification, a Department of Defense airworthiness statement, or by other approved means. Applicants also have to demonstrate that a collision with another aircraft or other airspace user is extremely improbable as well as complying with appropriate cloud and terrain clearances as required."[84] Additionally, the applicant must describe the procedures the pilot and observer must follow. "The [pilot] is simply the person in control of, and responsible for, the UAS. The role of the observer is to observe the activity of the unmanned aircraft and surrounding airspace, either through line-of-sight on the ground or in the air by means of a chase aircraft."[85] Currently, UAV pilots do not necessarily need to hold FAA licensure, depending on the operation, but must be medically qualified to act as commercial pilots, as must the observer.[86]

The application requires a detailed discussion of launch and recovery procedures, contingency plans in the event of loss of control or communication with the aircraft, fuel requirements, bad weather alternatives, accident

82. *Id.*
83. 14 C.F.R. § 91.113(b).
84. *Id*.
85. *Id.*
86. Aviation Safety Unmanned Aircraft Program Office, AIR-160, Interim Operational Approval Guidance 09-01, 16 (Mar. 13, 2008), *available at* http://www faa.gov/aircraft/aircert/designapprovals/uas/reg/media/uasguidance08-01.pdf.

and incident reporting procedures, and other details.[87] Finally, the applicant must include graphical representations of much of the above.[88] The application is then reviewed operationally and technically by the FAA to ensure compliance at the acceptable level of safety. Limitations or other provisions may be imposed as part of the approval process. According to the FAA's website, "[i]n most cases, FAA will provide a formal response within 60 days from the time a completed application is submitted."[89]

Last year, the FAA received 164 COA applications and denied only three.[90] The FAA continues to be inundated with applications, having received 65 as of July 2009.[91] The FAA's UAS Office in Washington, D.C., staffed with five people, estimates a processing time of approximately 60 days, consistent with its website.[92]

In the event of emergency, however, a COA can theoretically be granted in as little as one hour.[93] An example of an emergency COA is the U.S. Customs and Border Protection (CPB) operation of their Predator MQ-9 UAV over the Red River valley in eastern North Dakota and northwest Minnesota during the spring flooding of 2009. CBP was granted a special COA to fly over the flooded Red River and its tributaries from March 22 to April 22, 2009.[94] The images obtained from the UAV sensors were used by the National Weather Center for flood crest prediction and monitoring, and by the Department of Homeland Security for emergency response preparedness.[95] That example proved to be a valuable political tool for CBP and domestic law enforcement proponents of UAVs, but the backlog of COA applicants seems to indicate that only emergencies with widespread potential harm will be processed quickly. An ordinary missing person search, for example, probably would not merit such expeditious processing under the present regulatory scheme.

87. *Id*.

88. *Id.*

89. Federal Aviation Administration Certificate of Authorization or Waiver (COA) (Dec. 9, 2008), *available at* http://www faa.gov/about/officeorg/headquartersoffices/ato/serviceunits/systemops/aaim/organizations/uas/coa/.

90. Interview with John Page, Federal Aviation Administration Office of Unmanned Aircraft (July 21, 2009).

91. *Id.*

92. *Id.*

93. *Id.*

94. Certificate of Authorization, Doc.009-EMER-4, *available at* North Dakota Law Review office.

95. *See Predator Drone is on Patrol, Taking Aerial Surveys of Area*, STAR TRIBUNE, Mar. 25, 2009, *available at* http://www.startribune.com/local/41869107 html?elr=KArks:DCiUH c3E7VnDaycUiD3aPc:Yyc:aUU.

C. EXPERIMENTAL AIRCRAFT CERTIFICATION

An alternative method of operating a UAV in the national air space without a COA is under an Experimental Aircraft Certification. All aircraft that operate in the national air space are required to meet certain minimum levels of quality control and redundancy in their manufacturing and production processes.[96] If an aircraft does not comply with those minimums, operations may be restricted. Experimental aircraft are those aircraft traditionally built by non-certified manufacturers or amateur builders themselves. Experimental certification is also sometimes sought by certified manufacturers when testing prototype aircraft. Operations under an experimental certification are restricted to operating over sparsely populated areas and away from congested airways, among other factors.[97] Obviously, this limitation hampers any potential law enforcement use of UAVs for surveillance over populated areas. To date, fifty-four experimental certificates have been issued for UAVs.[98] Several applications have been withdrawn by the applicant, but none have been denied a certificate.[99]

Both the COA process and the Experimental Certification process are burdensome for operators and industry. However, the COA seems to be the method of choice for the main reason that an experimental certificate is specific to one aircraft, whereas a COA is for use of certain designated airspace by any number of aircraft. Either way, when a potential operator wishes to obtain FAA clearance to fly a UAV in the national air space, he or she must comply with either of those limitations or risk enforcement action by the FAA.

IV. RECENT DEVELOPMENTS

The UAS industry is currently facing a bottleneck of regulation. Operating a UAV under the guidelines for amateur model aircraft is not an option, and the COA process and the experimental certification process are burdensome and lengthy absent a public emergency. Industry, academe, and regulators are searching for a new regulatory paradigm to alleviate the bottleneck. Two major recent events bear discussing: the Small Unmanned Aircraft System Aviation Rulemaking Committee's recommendations and the current operations of the MQ-9 Predator by the United States Customs and Border Protection on the Canadian-American border.

96. *E.g.*, 14 C.F.R. pt. 23 (2009) (airworthiness standards).
97. 14 C.F.R. § 91.319(c) (2009).
98. Interview with Bruce Tarbart, FAA Aircraft Certification Service (June 2, 2009).
99. *Id.*

A. SMALL UNMANNED AIRCRAFT SYSTEM AVIATION RULEMAKING COMMITTEE[100]

Twenty stakeholder representatives of industry, academe, and government met at length to develop a comprehensive set of recommendations for small UAS regulatory development in the U.S. The committee focused on balancing risk to the general public and other aircraft with the burden of unduly restricting the development of UAS technology.[101] In sum, the committee recommended that the FAA adopt standards for UAS operations that would allow certain kinds of operations in the national air space without special certification or authorization.[102] The standards include definitions, operating rules, personnel requirements, aircraft and system requirements, and alternative means of complying with the rules.[103] All the recommendations reflect the general consensus of the committee, unless specially annotated where there was less than a general consensus. If that was the case, alternative views were included along with accompanying rationale.[104] The standards would define and regulate model aircraft and divide UASs into multiple categories.[105] Model aircraft would be defined as those aircraft "operated by hobbyists for the sole purpose of sport, recreation, and/or competition."[106] Additionally, model aircraft would be limited to a certain mass and speed capability, the specific values of which were in conflict.[107]

All other UASs would be divided into five groups. Group I would be frangible aircraft weighing less than 2 kg with a maximum speed of 30 knots air speed at full power, operated at less than 400 feet above the surface.[108] Group II includes aircraft weighing less than 2 kg with a maximum speed of 60 knots, operated at less than 400 feet above the surface but with some notification required in busy airspace.[109] Group III includes aircraft weighing up to 9 kg with no speed limit, operated up to 700 feet above the

100. U.S. Dep't of Transp., Federal Aviation Administration, Order 110.150 (Apr. 10, 2008), *available at* http://www faa.gov/documentLibrary/media/Order/1110.150.pdf.

101. Small Unmanned Aircraft System Aviation Rulemaking Committee Comprehensive Set of Recommendations for UAS Regulatory Development (proposed Apr. 1, 2009) at iii, *available at* http://www faa.gov/about/officeorg/headquartersoffices/avs/offices/air/hq/engineering/uapo/rulemaking/media/sUASARCRecs.pdf.

102. *Id.* at iii-iv.

103. *Id.* at vii-x.

104. *Id*. at iv.

105. *Id.*

106. *Id.* at 5.

107. *Id*. at 7-8.

108. *Id*. at 22-23.

109. *Id.* at 25.

surface with notification required.[110] Group IV includes aircraft weighing up to 25 kg with no speed limit, operated up to 1,200 feet above the surface.[111] All Group IV aircraft must be operated in uninhabited and remote areas, and they will need special permission from the FAA to operate, presumably because of their higher mass and velocity and consequent risk to others.[112] Finally, Group V aircraft are lighter-than-air UASs, and no recommendations were made regarding their characteristics and use.[113]

Stakeholders are still reacting to the committee's recommendations, and the reactions are mixed.[114] Some commentators have expressed concern that operators of small UAVs are getting short shrift.[115] Others, notably larger manufacturers, feel the new regulations will allow UAS operations sooner than they would otherwise.[116] Because of the mixed reactions, FAA is reviewing the committee's recommendations in conjunction with a Safety Management System review.[117] "The outcome of those activities is expected to be a Notice of Proposed Rulemaking [NPRM], but a definitive timeline for the publishing of the NPRM has not yet been established."[118]

B. MQ-9 (PREDATOR) OPERATIONS ON THE NORTHERN BORDER

In compliance with an existing COA, Customs and Border Protection is operating an MQ-9 Predator UAS in its mission of guarding the U.S. borders and law enforcement.[119] Concurrently, the University of North Dakota is collaborating with several partners in UAS education and research.[120] Some of the projects include sensing systems to allow UAS operations in unrestricted airspace, improvements in sensor platforms, and payload testing. UAS operators have informally assisted local law enforcement agencies by surveying a moving vehicle suspected to be trafficking

110. *Id*. at 27.

111. *Id.* at 28-30.

112. *Id*.

113. *Id.* at 30.

114. Interview with Professor Douglas Marshall, member of the rulemaking committee, in Grand Forks, N.D. (Oct. 2009).

115 *See, e.g.,* DIY Drones Blog, *available at* http://diydrones.com/profiles/blogs/705844: BlogPost:32836 (last visited Feb. 2, 2010).

116. *See* John Croft, *AUVSI Special: Industry raises the UAV ante,* FLIGHTGLOBAL.COM, Feb. 8, 2009, http://www.flightglobal.com/articles/2009/08/04/330418/auvsi-special-industry-raises-the-uav-ante html.

117. Interview with Bruce Tarbart, FAA Certification Service (June 2, 2009).

118. *Id.*

119. CBP Mission Statement and Core Values, http://www.cbp.gov/xp/cgov/about/mission/guardians xml (last visited Mar. 8, 2010).

120. UND Aerospace, http://www.uasresearch.com/home/default.asp?L1=2&a=30 (last visited Mar. 8, 2010).

drugs.[121] In addition to appearing effortless, the tracking of suspects is excellent training for UAS pilots.

Notably, the Predator is unable to peer through windows in houses for two reasons: first, infrared sensing is not able to penetrate glass because the glass is "cold" relative to the inside of the house, and appears opaque to the sensor. Second, visual sensors are unable to see through the window due to light reflection at the angle of sensing used in an airborne sensor. Because of those physical limitations, Predator's current sensor technologies as directly observed by the author do not violate the principles laid down by the aerial surveillance trilogy of cases and *Kyllo*. A sensor platform like Predator, when operated in navigable airspace, has essentially the same capabilities and physical limitations as a human observer in a manned aircraft, and hence warrantless surveillance by such a system does not likely violate the Fourth Amendment. In the probable event that more advanced sensors are developed that can penetrate opaque walls or roofs, use of such an invasive system would require a search warrant under *Kyllo*.

V. CONCLUSION—A BRAVE NEW WORLD WATCHED OVER BY BIG BROTHER?

It is easy to lose oneself in wonder at the dizzying parade of new technologies that allow surveillance of almost any physical area, but it is essential to recall the fundamental constitutional principle from *Katz,* that the "Fourth Amendment protects people—and not simply 'areas'—against unreasonable searches and seizures."[122] Even though the current crop of UAS sensors do not appear to run afoul of the Fourth Amendment, the question of whether new technologies will violate those principles we hold inviolate must be examined.

In this information age where one can view most street corners or houses anywhere in the U.S. at anytime via a "Smartphone" coupled with Google Street View, which allows users to "virtually" explore neighborhoods at street level,[123] our current Constitutional jurisprudence regarding surveillance and privacy may be inadequate because everyone can indeed purchase truly sophisticated surveillance tools at Wal-Mart. Because such technology is in general public use, our reasonable expectations of privacy under *Kyllo* seem to be shrinking quickly. Until now, the sky has been the province of the birds and airliners going to faraway places. Aerial surveillance, while not unconstitutional and not unknown, was nonetheless

121. The author has personally observed this cooperation.

122. Katz v. U.S., 389 U.S. 347, 353 (1967).

123. Google Maps, http://maps.google.com/help/maps/streetview/ (last visited Mar. 8, 2010).

relatively rare. Even though the aerial surveillance trilogy seems to approve the use of UAVs in domestic surveillance, "[t]he touchstone of Fourth Amendment analysis is [still] whether a person has a 'constitutionally protected reasonable expectation of privacy.'"[124] And a person's reasonable expectation of privacy is necessarily subjective. If a person reasonably expects privacy, that person will likely have "exhibited an actual (subjective) expectation of privacy [in the object of the challenged search]."[125] When a large enough group of people start to manifest subjective expectations of privacy, "society [becomes] prepared to recognize [that expectation] as reasonable,"[126] the expectation becomes objective, and courts adopt it. Thus are societal limits on government surveillance created, with notions of what should be public or private fluctuating with the general social mores of the time.

With the current social trend of publicizing private details of life on social networks like Facebook,[127] MySpace,[128] blogs, and Twitter,[129] concurrently with the public fear of terrorism, the subjective expectations of individual citizens and the objective expectations of society may lead the courts to re-define unreasonable searches and seizures. Regarding UAVs specifically, their eventual use in domestic law enforcement is a near certainty. But the extent of that use is unknown. It is happening already on the northern border of the United States and a ripe market exists. The use of UAVs in domestic law enforcement will not, however, be possible everywhere due to safety concerns or congestion. The existing federal regulations are inadequate to respond to the demand, and the proposed regulations are uncertain at best. Until the FAA publishes clear guidance for domestic UAS operators, the current burdensome system of applying for a regulatory waiver will ensure a bottleneck of users for several years at least. That bottleneck will prevent law enforcement from the full use of its new tool and effectively foreclose permanent, multi-dimensional, multi-sensory surveillance of citizens twenty-four hours a day. But when new federal regulations are codified and the bottleneck has passed and every police department does indeed have eyes everywhere, our notions of privacy under the Fourth Amendment and reasonable searches under *Kyllo* will need to be reevaluated. It seems the state will have the power, both constitutionally and technologically, to continually monitor its citizens from above.

124. *Katz*, 389 U.S. at 360 (Harlan, J., concurring).
125. *See* Smith v. Maryland, 442 U.S. 735, 740 (1979).
126. *Id.*
127. Facebook, http://www facebook.com/ (last visited Mar. 8, 2010).
128. MySpace, http://www myspace.com/ (last visited Mar. 8, 2010).
129. Twitter, http://twitter.com/ (last visited Mar. 8, 2010).