

## **STATEMENT ACCOMPANYING REQUEST FOR EXPERIMENTAL AUTHORIZATION BY AEROVIRONMENT, INC.**

### **1. Introduction**

By this application, AeroVironment, Inc. (AeroVironment), requests that the Commission grant a two-year experimental license to operate facilities within the 406-420 MHz and the 1670-1675 MHz band segments at the locations proposed in Form 442. In this statement, we explain the purpose and nature of the proposed operations and why this application is within the Commission's experimental authorization rules.

### **2. Purpose**

The purpose of the experiments is providing analysis and information to further the availability of small unmanned aircraft system (SUAS) technologies to federal homeland security responsibilities. There is no existing contract associated with this application. The purpose of the experimental authorization is demonstrating that the technology can make a meaningful contribution to domestic security and emergency response responsibilities at significant cost efficiencies. The experimental work will make possible further presentation of the technology to agencies in an expeditious manner.

### **3. Technology Use**

AeroVironment's SUAS technology is directed to assisting public safety agencies in fulfilling their responsibilities. The experiments embrace a model using spectrum that federal agencies are authorized to operate within or in technology compatible adjacent segments. The requested band segments align with the technology and equipment currently available. AeroVironment commits to operations respecting other users of the band and those in adjacent segments. The limited power levels proposed are part of this commitment. AeroVironment believes the compelling purpose of bringing advanced services to these federal responsibilities serves the public interest.

AeroVironment SUAS technology provides real-time direct situational awareness. The system's communications platform features air vehicles (AVs), a ground control unit and support equipment. The AV can be controlled manually or can autonomously navigate a preplanned route. AVs typically have on-board a color electro-optical camera and an infrared camera for night operations. AeroVironment systems have a deep history with all US military services. The experiments will build on this credible experience to serve civilian agencies.

Transmission will originate from a ground control station to the AV, a mobile unit. A single frequency duplex architecture is proposed. Two separate segments are proposed.

The 1670-1675 MHz segment will be for purposes of AV control, and video and telemetry transmission from the AV to the ground. Slots will be dedicated for uplink data and a

downlink encompassing both video and telemetry. Use of the 1670-1675 MHz segment is proposed at each of the geographic locations.

The UHF segment, 406-420 MHz, will be for purposes of control or back up control. No video will be transmitted over the UHF segment. The back-up capability is a critical element of the AV and any testing. Use of the 406-420 MHz segment is proposed for each of the geographic locations proposed.

Five geographic locations are proposed. The AV's proposed range will depend on the location's environment. At the Simi Valley proposed location (AeroVironment's testing facility), the AV will operate within FAA Certificates of Authorization (COA) areas. Operation will be within a 5 Km radius of the center point and not exceed 500' (152 meters) Above Ground Level (AGL). Other locations will be within Department of Defense Restricted Air Space. Operations at Camp Roberts in California will be within a 10 Km radius of the center point and not exceed 5000' (1524 meters) AGL. Operations at Edwards Air Force Base, California and Dugway Proving Ground, Utah will be within 30 Km of the center point and not exceed 5000' (1524 meters) AGL. At Point Mugu Naval Air Station (NAS), California, operations will be a 5 Km radius around the center point and not exceed 5000' (1524 meters) AGL.

#### 4. Purpose and Nature of Operation

##### *Ground Based and Airborne Transmission*

As noted, ground based and airborne operations will use the 406-420 MHz UHF segment to support command and control of the AV and serve as control back up for communications using the 1670-1675 MHz spectrum segment. The radio technology requires 280 KHz of contiguous spectrum in the 400-450 UHF spectrum band. Operations, restricted to parameters of the designated facility, can be used in a fixed frequency mode or a frequency hopping mode within 400 to 450 MHz. FM Modulation with an Emission Designator 280kF1D is proposed with adjustable transmit power between 100mW-1W. Transmissions will normally originate from the ground control station to the AV via a laptop or consul.

AeroVironment's communications module, Digital Data Link (DDL), will use the 1670-1675 MHz band segment for purposes of sending ground based command and control data to and from the AV and to transmit video and telemetry to the ground control station. The technology, capable of operating within 1625-2390 MHz, requires 4 MHz for full motion video and a 1 MHz channel for video at 15 frames per second. Emission Designators are 4M68G7W and 1M56G7W, respectively with a transmit power at 10W. Transmission control will be from the ground control station to the AV via a laptop or consul.

AeroVironment's DDL system has been adopted by the US Army as the standard communications architecture for all small unmanned systems, including ground robots. In addition to AV command and control and video and telemetry, DDL can be used to create a communications network. An air vehicle flying over an area can use its DDL transceiver to permit voice communications between DDL-equipped mobile radios on the ground. Voice, data

and video can also be sent from one DDL ground module to another through the air vehicle, allowing non-line-of-sight communications between several ground units.

The experiments' purpose will assist in the continued development of SUAS technologies for federal homeland security agencies. The testing will replicate environments where real time surveillance and monitoring activity can provide information improving planning and response.

5. Stop Buzzer, Andy Thurling, Chief Test Pilot, will be available by telephone at 805.581.2198, extension 1892, and will act as a "stop buzzer" if any matters involving interference arise during the testing.

6. Transmitting Equipment

Manufacturer	Model	Quantity	Experimental
Microhard Systems	MHx425	2 at each location	No
AeroVironment	50280 Transreceiver	2 at each location	No

7. Antenna

The following details Antenna information:

Antenna Frequency Segment	Gain (Nominal)	Polarization	Orientation in Vertical Plane	Orientation in Horizontal Plane
406-420 MHz ZDA Communications ZDADJ400- 7YG Yagi	7dbi	Vertical or Horizontal	72	52
1670-1675 MHz GCU Antenna ASY AeroVironment Stack Patch	9dbi*	Vertical	30	85
1670-1675 MHz Tailboom ASSY AeroVironment Dipole	2dbi	Vertical	78	360

\*Major Side Lobe

- E-Plane
  - Gain: -2 dbi
  - 120 deg
- H-Plane
  - Gain: -2 dbi
  - 179 deg

8. Restrictions on Operations and Interference Protection

AeroVironment understands that experimental operations must not cause harmful interference to authorized facilities. Should any interference occur, AeroVironment will take immediate steps to resolve the interference, including if necessary arranging for the discontinuance of operations.

9. Waiver of Station Identification Requirements

AeroVironment requests a waiver of the station identification requirements stated in Section 5.115 of the Commission’s rules.

## 10. Diagram

A diagram of the proposed operations follows.

## Conclusion

AeroVironment appreciates very much the Commission's consideration of its application for an Experimental Authorization to assist federal homeland security purposes. Please call upon us if we can respond to any questions.

# Diagram of Proposed Use



*Small Unmanned Aircraft-*

- Simi Valley- 152 meters AGL/ 5Km radius*
- Camp Roberts- 1524 meters AGL/10Km radius*
- Edwards AFB- 1524 meters AGL/30km radius*
- Point Mugu NAS- 1524 AGL/5km radius*
- Dugway Proving Ground 1524 AGL/30 Km radius*

*Video and Telemetry*

1670-1675 MHz

*Aircraft Command and Control*  
*Main and Backup*

1670-1675 MHz

406-420 MHz

**Mobile Ground Control Equipment**



Mobile Ground Control

