STATEMENT ACCOMPANYING REQUEST FOR EXPERIMENTAL AUTHORIZATION

1. **Introduction**

By this application, AeroVironment, Inc. (AeroVironment), requests that the Commission grant an experimental license to operate facilities within the in the 2025-2110 MHz and 1670-1675 MHz band segments at a site, detailed in the attached Form 442, located at:

- Near Whitethorne Road, Blacksburg, Montgomery County, Virginia, mobile and airborne, 3.3 km radius, 152 m AGL, centered on NL 37 11 48 WL 80 34 42

The testing and experiments are for the US Department of Defense (DoD), Defense Advanced Research Projects Agency (DARPA). AeroVironment has contractual agreements with DoD. AeroVironment is collaborating with the Mid-Atlantic Partnership of Virginia Tech University to perform the experiments.

The following summarizes the testing proposed, the reasons underlying this effort and the technical parameters of the intended operations.

2. **Purpose and Technology**

AeroVironment designs and manufactures small unmanned aircraft systems (SUAS) in support of US and allied Armed Forces. These systems are used by US military and allied forces to help establish intelligence, surveillance and reconnaissance superiority.

AeroVironment's SUAS DDL™ is a lightweight, low power, bi-directional, digital wireless video link. Compliant with the Small Unmanned Airborne Systems Digital Data Link (SUAS DDL) waveform, it enables enhanced command and control of small UAS. DDL is IP-based to enable flexibility and interoperability between small airborne and ground systems with limited power availability and bandwidth to maximize the systems operating within an area. The primary frequency band supporting US DoD has been the 1780-1850 MHz segment.

The purpose of the experiments is to determine and examine interference between transmissions in the 2025-2100 MHz and 1670-1675 MHz band segments and an RF payload being tested on the aircraft. Radio performance and functional flight tests will be pursued. The experiments will replicate scenario-based environments to discern operational effectiveness and the degree refinements are needed to transceivers, antenna, emission designators, power source and the overall system. The testing will evaluate the technology's effectiveness in context of the RF payload.

3. ***Deference to Licensed Users***

AeroVironment commits to operations respecting other users of the band and those in adjacent segments. The limited power levels are part of this commitment. The channels provide aircraft control and video and telemetry transmission from the aircraft to the ground. Time slots are dedicated for uplink data and a downlink.

The concurrence of the leaseholder of 1670-1675 MHz (WPYQ 831), One Dot Six LLC (Ligado) is attached. AeroVironment commits to coordinate with Ligado and to respect its operations. AeroVironment also commits to coordinate with the Society of Broadcast Engineers' regional frequency advisor as to the 2025-2110 MHz band and to respect broadcast auxiliary operations.

*4. N****ature of Operations***

Surface Based and Airborne Transmission

The DDL communications module will use band segments that are 4.68 MHz wide in the 2025 to 2101 MHz band for purposes of sending ground based command and control (C2) data to and from the SUAS and to transmit video and telemetry to the ground control station. The technology requires 4.68 MHz for a control channel. The channel will be divided in time between uplink (ground to air) C2 and downlink (air to ground) full motion video and associated metadata at 15 frames per second. Emission Designators are 4M68G7W and 1M56G7W, respectively, with a transmit power at 10W. Transmission control will be from the surface control station to the SUAS via a laptop, console, or tablet. AeroVironment's DDL system has been adopted by the US Army as the standard communications architecture for all small unmanned systems, including ground robots.

5. **Stop Buzzer**

Andy Thurling, Chief Test Pilot, Director, Product Safety and Mission Assurance, is available by telephone at 805.581.2198, extension 1892, Mobile Phone 805.368.6351 and will act as a "stop buzzer" if any matters involving interference arise during the testing.

6. **Transmitting Equipment**

The transmitting equipment is AeroVironment Transreceiver Model 75869, with up to 5 units sharing the channel in a Time Division Multiple Access (TDMA) manner at the location proposed. It is not experimental.

7. **Antenna**

The Antenna details are as follows:

Antenna	**Gain** (Nominal)	**Polarization**	Orientation in Vertical Plane	Oriental in Horizontal Plane
GCU Antenna ASY AeroVironment Stack Patch	9dbi*	Vertical	30	85
Tailboom ASSY AeroVironment Dipole	2.9dbi	Vertical	78	360

*Major Side Lobe

- E-Plane
    - Gain: +9 or +2 dbi
    - 120 deg
- H- Plane
    - Gain: +9 or +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, discontinuing operations.

9. **Waiver of Station Identification Requirements**

AeroVironment ask that its waiver of the station identification requirements stated in Section 5.115 of the Commission's rules remain in place.

10. **Diagram**

A diagram of the operations is provided in the Attachment as is the location of the proposed experiments.

Conclusion

AeroVironment appreciates very much the Commission's, NTIA's, DoD and other agency consideration of this application.

Please call upon us if we can respond to any questions.

Attachment

Operations Diagram

Small Unmanned Aircraft-

Video and Telemetry

2030-*2101* MHz

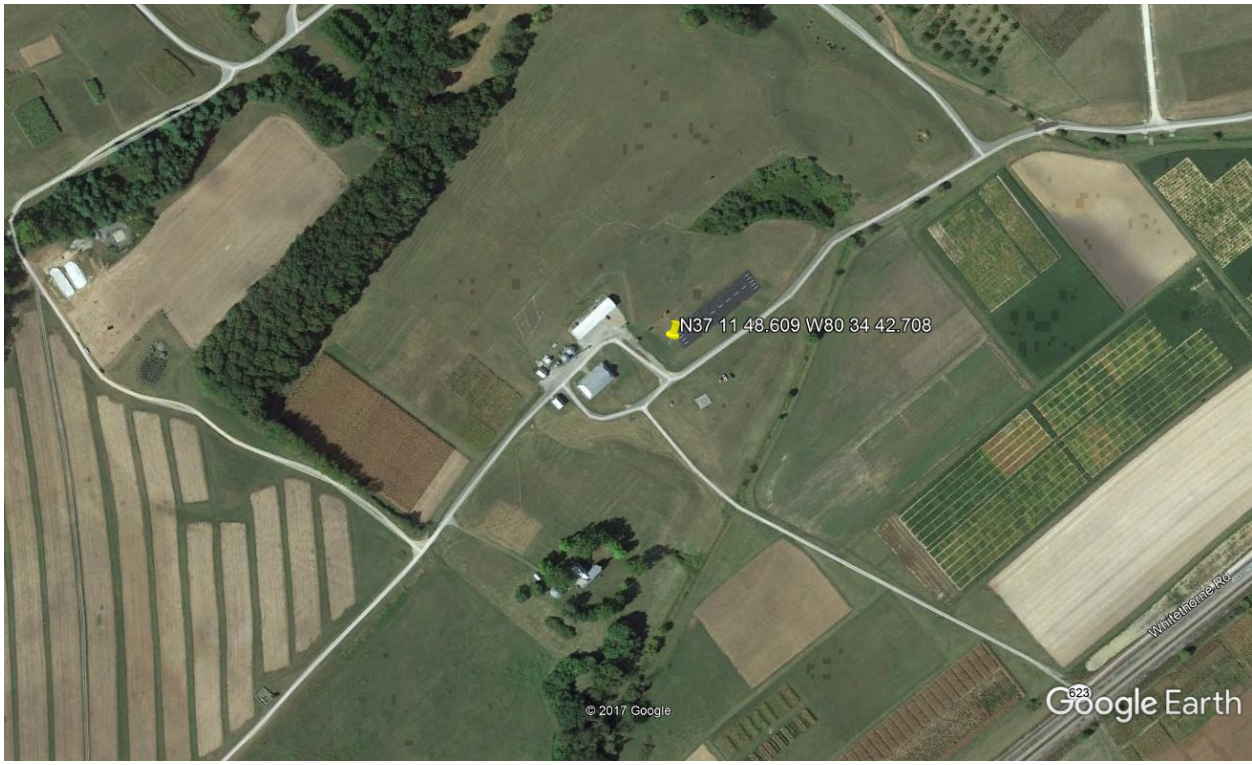
Aircraft Command and Control Main and Backup

2030-*2101 MHz*

Figure 1 Simplified view of planned operations

Location

Near Whitethorne Road, Blacksburg, Montgomery County, Virginia, mobile and airborne, 3.3 km radius, 152 m AGL, centered on NL 37 11 48 WL 80 34 42



Ligado Concurrence

On 10/17/17, 5:46 AM, "Mike Gagne" <xxx@ligado.com> wrote:

Earl,

I have not got any feedback form our regulatory team but can tell you people as still getting STAs on our license for UAS operations without us stopping them.

I am not worried about conflict of services. We know all STAs are granted with the possibility they can be revoked if interference with the license holder exists.

Mike

From: *Earl Cox [mailto:xxx@avinc.com]*
Sent: *Thursday, October 12, 2017 5:53 PM*
To: *Mike Gagne <xxx@ligado.com*
Cc: *Andrew Thurling <xxxt@avinc.com>*
Subject: *Re: STA for Ligado frequencies near Blacksburg, VA next year*

Mike,

Here is a more detailed sneak peak on what we're looking to do.

The STA will be for a fairly long period of time since we aren't exactly sure when we'll be doing our experiment but the actual time will be short. Our target is mid-May 2018 but that may slip. The experiment will go for about a week with flying a Puma for about 2 or 3 days. The goal will be to determine the affects of a payload that will be on the Puma in the 1625 – 1725 Mhz band. We'd, of course, like to test throughout the whole band but only have time and availability of one channel within this band. Note that we are also looking to get allocations for other frequencies that we also need to test. The STA will probably contain at least 2 different frequency requests, the other being between 2030 and 2106 Mhz.

The signal description will be very similar to the past flights that have used your spectrum under STAs since we'll be using a similar radio.

I was hoping to get a verbal 'ok' from you prior to filing the STA. Do you want to see the STA filing information prior to submission to the FCC?

Best Regards,

Earl

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Earl Cox

AeroVironment, Inc