

Raytheon Missile Systems  
Experimental License Application  
File Number: 0128-EX-CN-2017

### **Explanation of Experiment**

Raytheon Missile Systems (Raytheon) builds a variety of innovative technologies for the US government, including the Department of Defense and the various military services. Raytheon has been working on development of an advanced RF technology that uses one of its proprietary UAS platforms to search for, detect, and deliver reports that are needed by the customer. Initial testing and customer demonstrations have shown the promise of this technology. At this point, Raytheon needs to expand its field testing to incorporate some refinements into the system.

This application seeks authorization for testing in an area of Arizona that is primarily open desert. This testing will allow Raytheon to advance the development of the product much more rapidly. The application seeks to continue testing that was initiated under WK9WHB. The original experiments were only expected to last for five months. The radio testing has proven fruitful, and additional development is needed to expand the utility of the radio system on the UASs.

### **Technical Synopsis**

- Spectrum Requested: 351 and 362.25 MHz
- Area of Operation: 9.6 km radius around center location, primarily over open desert
- Test Time: approximately 2 hours per day
- Low power use: Transmitter operates at 1 W, the ERP for the mobile unit is only 2 W.

### **Description of Experiment**

Raytheon is testing the operation of its UAS system incorporating data links that allow for the transmission of tracking information back to a command station. The goal is to test the performance of the UAS and radios using more than one channel to optimize data capture and transfer.

The radio selected is ideal for this use because it is a size and weight, less than an ounce, that can easily be accommodated by the UASs in use for this testing. The UASs are small, light, and quickly deployable, which makes them of great interest to the government customers. A larger, heavier radio would exceed the capabilities of the UAS to transport the radio.

The radios can carry data at a rate up to 1.2 Mbps. This provides incredible performance in a small package.

### Spectrum Availability

Raytheon has worked with the Area Frequency Coordinator for Arizona (DOD AFC – AZ) to prior coordinate the use of the frequencies.

### Power Levels and Antenna Gain

Raytheon has limited the power level of its proposed operations to only 2 Watts ERP for the mobile unit, and 12.162 Watts ERP for the directionalized command and control ground station. The command and control station has a higher gain antenna, with far less beamwidth, to ensure that it can capture the data transmissions from the UAS. The UAS has an omni-directional antenna, since that will be required in the field. It needs to have maneuverability, which means that the antenna has to transmit in all directions at any time. The command and control ground station can be oriented to follow the path of the UAS, and therefore can use the higher gain antenna, with less scatter of RF energy.

### Limited Time of Use

The UASs will only be in use for two hours per day, which limits the amount of time that the spectrum will be in use. The radios will be in use full time during the flight testing.

The program is prepared to schedule its testing to accommodate the requirements of the DOD for use of these frequencies in Arizona.

### Area of Operation

The proposed operations are expected to take place over the unoccupied areas within the radius of operations. This will give the program flexibility to operate within line of site of the ground control station.

### Stop Buzzer Point of Contact

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### Conclusion

Raytheon continues to work on the development of its UAS systems. This proposed testing will continue to explore the use of a Microhard radio to deliver high speed data in real time. Raytheon has designed its experimentation to minimize the spectrum and power needed for these operations.

Should there be any questions about this application, please contact Tom Fagan or Anne Cortez at [alc@conspecinternational.com](mailto:alc@conspecinternational.com) or 520-344-8525.

Figure 1. Image of Test Area

