Raytheon Company (Missiles & Defense – M)
Experimental License Renewal Application
Call Sign: WI2XZW
File Number: 0656-EX-CR-2021

Explanation of Experiment

Raytheon Company (Missiles & Defense – M) (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 product development and testing to incorporate some refinements into the system.

This application seeks renewed authorization for testing inside and adjacent to the Raytheon development laboratory in Tucson, AZ. This testing allows Raytheon to advance the development of the product much more rapidly.

Technical Synopsis

- Spectrum Requested: 351 and 362.25 MHz
- Area of Operation: .2 km radius, inside and area adjacent to test lab, see Figure 1.
- 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.

This experimentation is independent research and development. Use of the frequencies was coordinated with the MAG and DOD-AFC for Arizona prior to the initial filing. Raytheon would be glad to coordinate with them again. There is no contract for this testing.

Spectrum Availability

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

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 – if there is testing at all during the 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 system may be used indoors, very occasionally, in a much more limited area. Outdoors, the system will be used on a limited basis, weather permitting.

Area of Operation

The operations take place over the vacant lot adjacent to the test lab. This gives the program flexibility to operate within line of site of the ground control station. An image of the area of operations is shown in Figure 1, below.

Stop Buzzer Point of Contact

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Conclusion

Raytheon continues to work on the development of its UAS systems. This 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.

Figure 1. Image of Test Area