Raytheon Company (Missiles and Defense – M)
Experimental License Application
File Number: 0800-EX-CN-2021

Explanation of Experiment

Overview:

Raytheon Company (Missile and Defense – M) (Raytheon) is the primary missile manufacturer in the US, supplying ordinance ready to operate to the US military. Raytheon's experience with missiles has led its customers to seek UAV technology based on some of its existing platforms and knowledge. This has led Raytheon into the development of advanced UAV technology as well. This application seeks authorization for the use of a radio that is used in the development and testing of its advanced UAVs. The radios incorporated into the UAVs support the mission of the UAV testing.

Need for a License:

Raytheon has a contract with DARPA, HR001120C0008, to deliver advanced UAV systems. The contract requires rapid development and testing, with radio demonstrations. To achieve the contractual goals, Raytheon needs to work on radio development at its plant site as soon as possible.

Technical Synopsis:

- Spectrum Needed: 1370-1390 MHz, emission is 5 MHz wide, 5M00F1D
- Limited Time of Use: only occasional testing at this location
- Limited time of use: 4-6 hours per day of radio use
- Limited area of operations: maximum 3000 feet elevation
- Power levels are low for airborne operations: L band 5.5 W, only 5 W ERP
- Ground control maximum ERP: 16 W

Description of Operations:

Raytheon needs to demonstrate performance characteristics of its Coyote UAV system in future test and demonstration events. The ongoing testing at the Tucson plant site is intended to allow the program to work on its UAS platform before demonstrations at DoD locations.

This UAV platform has been designed to perform a range of tasks. They include surveillance and monitoring. Those tasks require the UAV to carry a range of radio links to ensure its proper performance. Each link is described in more detail below.

This testing proposes to put the "UAV" radio on a tower on the Raytheon plant site, in a fixed installation on the tower at 65 feet. The ground stations used to track the UAVs will be driven around the area south and west of the Raytheon plant. This testing is designed to optimize the interaction among the radios, taking motion into account.

Limited Time of Use:

Advances in the UAV technology allow these operations to take place for 4-6 hours per day. The program only works in one location at a time, so operations are intermittent at any given location.

Locations of Testing:

The testing will be conducted at the Tucson plant site, fixed location on a tower at the center of Figure 1, below, and from mobile ground stations driving within a 10 km radius south west of the fixed location on the plant site. The tower on the Raytheon plant will function as if it were the UAV, rather than actually having any UAVs in flight in Tucson for this testing and development. The ground station(s) will be mounted on vehicles and driven around the area primarily south and west from the tower. See shaded area below for where the trucks will run on which ground stations will be operating.

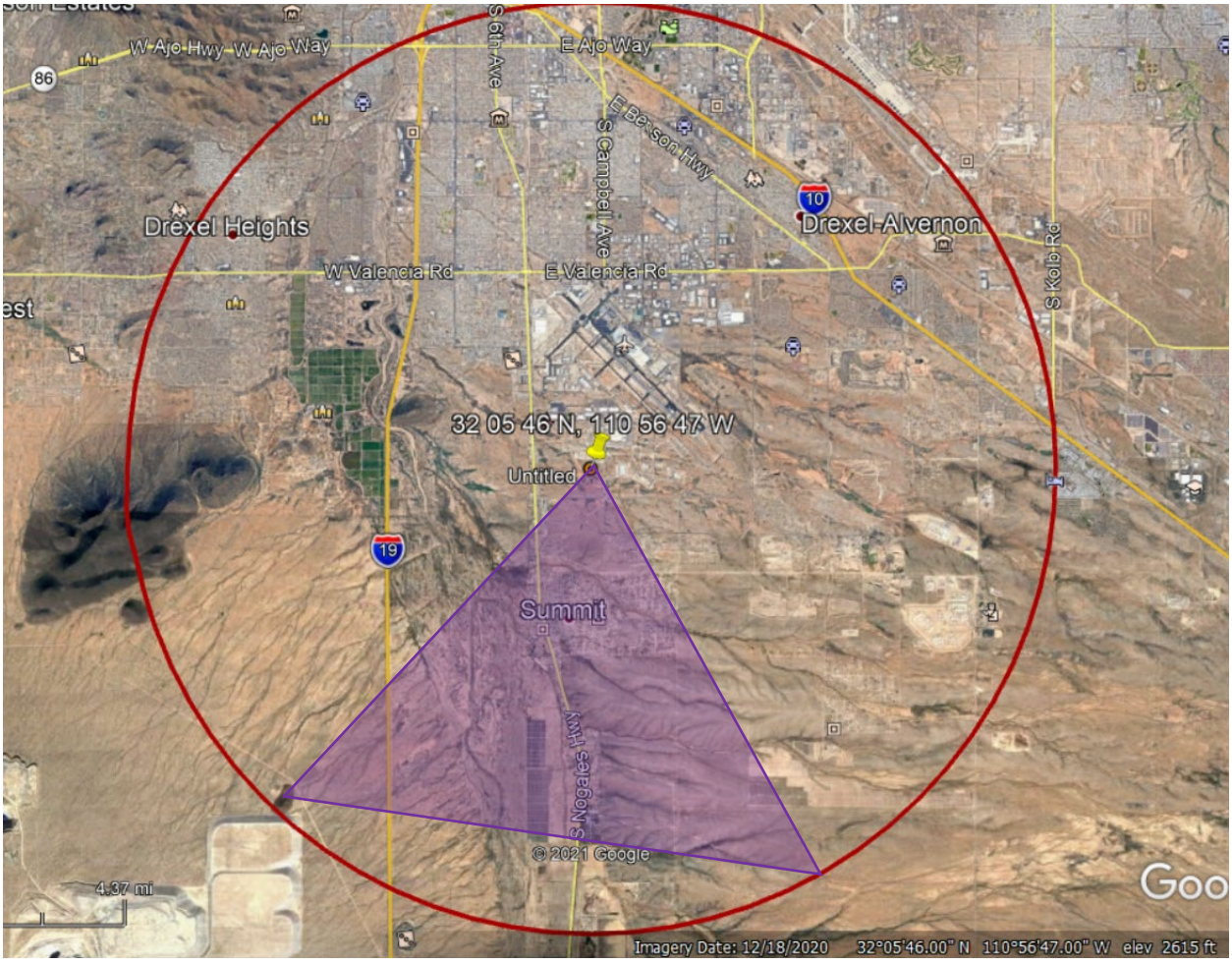

Figure 1. Area of Operation, purple shaded area, with push-pin marking the tower on the Raytheon Plant

Spectrum Use:

L band frequencies: The radios have been designed to operate at 5 MHz intervals from 1370-1390 MHz. The radios are frequency hopping, and require six channels for the hopping sequence to work. There are six channels from 1370-1390 MHz.

The airborne radio operates at 5.5 W, with 5 W ERP, as there is loss in the system. The ground control radio operates from a low power of 7.1 W ERP to a higher power of 16 W ERP – which is only in use as a back up if there is a loss of communication with the UAV.

Local deconfliction: the program will work with local spectrum managers prior to any operations to deconflict radio operations that are local to the area. Raytheon agrees to continue coordination with the VLBA point of contact as previously required.

Stop Buzzer Point of Contact:

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Conclusion:

Raytheon is seeking an experimental conventional license for continued test and development operations. The proposed testing will be limited in nature. The radio use will be limited.