

### **Explanation of Experiment**

Raytheon Missile Systems builds, tests, and demonstrates UAS systems for the U.S. Department of Defense and other approved customers. Raytheon has been working on the advanced development of a UAS platform using a range of configurations to illustrate various types of services that the UASs can deliver to the customer.

This application seeks authorization for UAS operations for testing and demonstration of this platform to Raytheon's customers. The location was chosen by the customer, and it is at White Sands Missile Range.

In July 2019, Raytheon's spectrum management office learned that there is a demonstration and subsequent testing needed at WSMR in August. That testing started and has been continuing this month. Although the testing was conducted in advance of a customer demonstration, the success of the demonstration has led Raytheon to need to conduct additional testing. Therefore, Raytheon is filing this application to extend operations that were originally authorized under WP9XAF.

### **Technical Synopsis:**

- Spectrum requested: 4435-4990 MHz, the same as WP9XAF
- Low power operations: ERP is only 20.013 W
- Radios are listen-before-transmit
- Area of operations: remote area at White Sands Missile Range
- Limited time of use: only 4 hours per day, select weeks during the proposed license term.

### **Description of Operations:**

Raytheon will be flying its Coyote UAS system at WSMR. The purpose of the testing and demonstration is to explore the performance of newly installed data link radios that operate across the 4435-4990 MHz band. The customer has an ever-increasing need for more data throughput from all of the assets it has. The new radios offer a range of configurations that can be used to optimize data throughput during UAS exercises. The radios will be demonstrated, reconfigured, tested, and re-demonstrated to achieve the level of performance desired by the DoD customers.

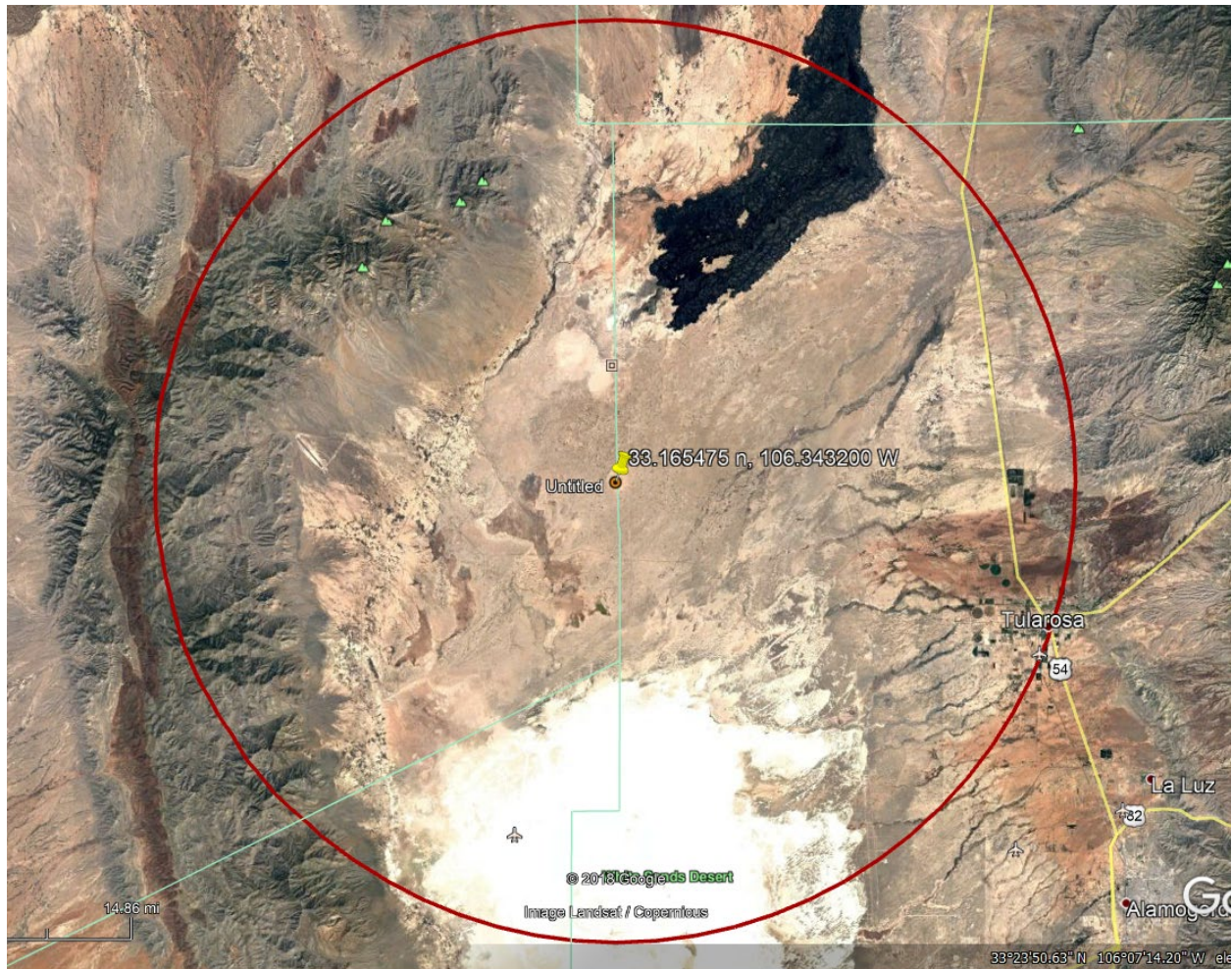
### **Spectrum Requested:**

Raytheon seeks authorization to operate on frequencies in the 4435-4990 MHz range. Raytheon is seeking to use Persistent Systems RF4100 radios for this testing. The radios can be tuned in 5 MHz increments. The radios are listen-before-transmit, which minimizes the chances of any interference to other operators in the area. Various configurations of the system, using different modulation techniques and emissions, will be tested to optimize data throughput. The mean output power of

the radius is 6 W, with an ERP of 20.013 W. At these frequencies, the signals are not expected to propagate very far.

### **Area of Operations:**

Raytheon will be taking its UAS platform to WSMR for this work. The area selected is a 20-mile radius around an area of the range north of the White Sands desert.



*Figure 1. Area of Operations at White Sands Missile Range*

Once this application is on file with the FCC's Office of Engineering and Technology, Raytheon will be working with spectrum management and other officials at WSMR to coordinate the proposed operations.

The UASs will be flown in accordance with all regulatory limitations. They will be confined to the range.

**Time of Use:**

One of the UAS challenges that all operators face is the limit of battery time. Raytheon has worked to allow its UASs to fly up to 2 hours at a time without needing to be recharged. Sometimes, the flight time is more limited, depending on whether the batteries are fully charged and the distance from the controller. The greater the distance, the more the radios have to drain the battery to achieve data throughput. So, 2 hours per flight is the maximum, before the systems will have to be recharged. Flight testing is expected to take about 4 hours per day during testing days. Thus, the spectrum will not be heavily used. Scheduling is possible, if necessary.

**Stop Buzzer Points of Contact:**

Jim Ortega, Spectrum Manager  
520-794-0227  
[James.e.ortega@raytheon.com](mailto:James.e.ortega@raytheon.com)

Chris Troudt  
520-434-6325  
[Christopher.d.troudt@raytheon.com](mailto:Christopher.d.troudt@raytheon.com)

**Conclusion:**

Raytheon is seeking to extend its authorization for the operation of one of its UAS platforms for operations at White Sands Missile Range. This ongoing testing will advance the development of its UAV platforms. The flights are sporadic, so the radio use is limited to when the UAVs are flying. The radios in use are listen-before-transmit, which minimizes the chances of any harmful interference. The power levels are low.

If there are any questions about the proposed operations, please contact Anne E. Cortez, Esq. at 520-360-0925 or [alc@conspecinternational.com](mailto:alc@conspecinternational.com).