Raytheon Company (Missiles & Defense – M)
Special Temporary Authority Application
Call Sign:
File Number: 1376-EX-ST-2026

Explanation of Experiment

Raytheon Company develops a number of missile systems for the US government. Those systems incorporate a number of highly developed systems including radio technology that improves the function, performance, and precision of Raytheon's technologies.

This application is for the use of Marshal Orion incorporated into Raytheon systems. This application seeks authorization for operations at three (3) locations. Operation in the vicinity of Raytheon Facilities (Tucson, AZ), with a radius of 4 km. Operation in the vicinity of Skydive Arizona (Eloy, AZ), with a 30 km radius. Operation in the vicinity of Yuma Proving Grounds (Yuma, AZ), with a 50km radius. Operation in the vicinity of Florence Military Reservation (Florence, AZ), with a 10km radius. The testing is conducted to comply with the provisions of DOD Contract Number W9124P-19-9-0001.

Testing is not constant. The program conducts only occasional testing in the area of operations and is willing to continue to adhere to all coordination requirements deemed necessary by regional frequency management offices and the FCC.

This application modification request authorization to continue the testing and demonstrations required by Raytheon's DOD customers.

Description of Operations:

This application seeks authorization to test with a radio that is installed on a series of readily deployable UASs. Those UASs are small, without the ability to carry heavy radios. The goal of the new system is to allow the UASs to operate in a variety of configurations, with radio links between the UASs as well as links to a command-and-control center.

These radios are designed with low gain antennas, which are being tested to determine how well they control the group of UASs in flight and how effectively they deliver information back to a centralized control point. This assists in the data throughput, which in turn aids in the management of the UASs operating together.

Technical Synopsis:
Wave Relay

- Spectrum Needed: 1.350 – 1.39 GHz
- Operations: Fixed operations in limited areas
- Power level: 5 W
- Radios are listen-before-transmit

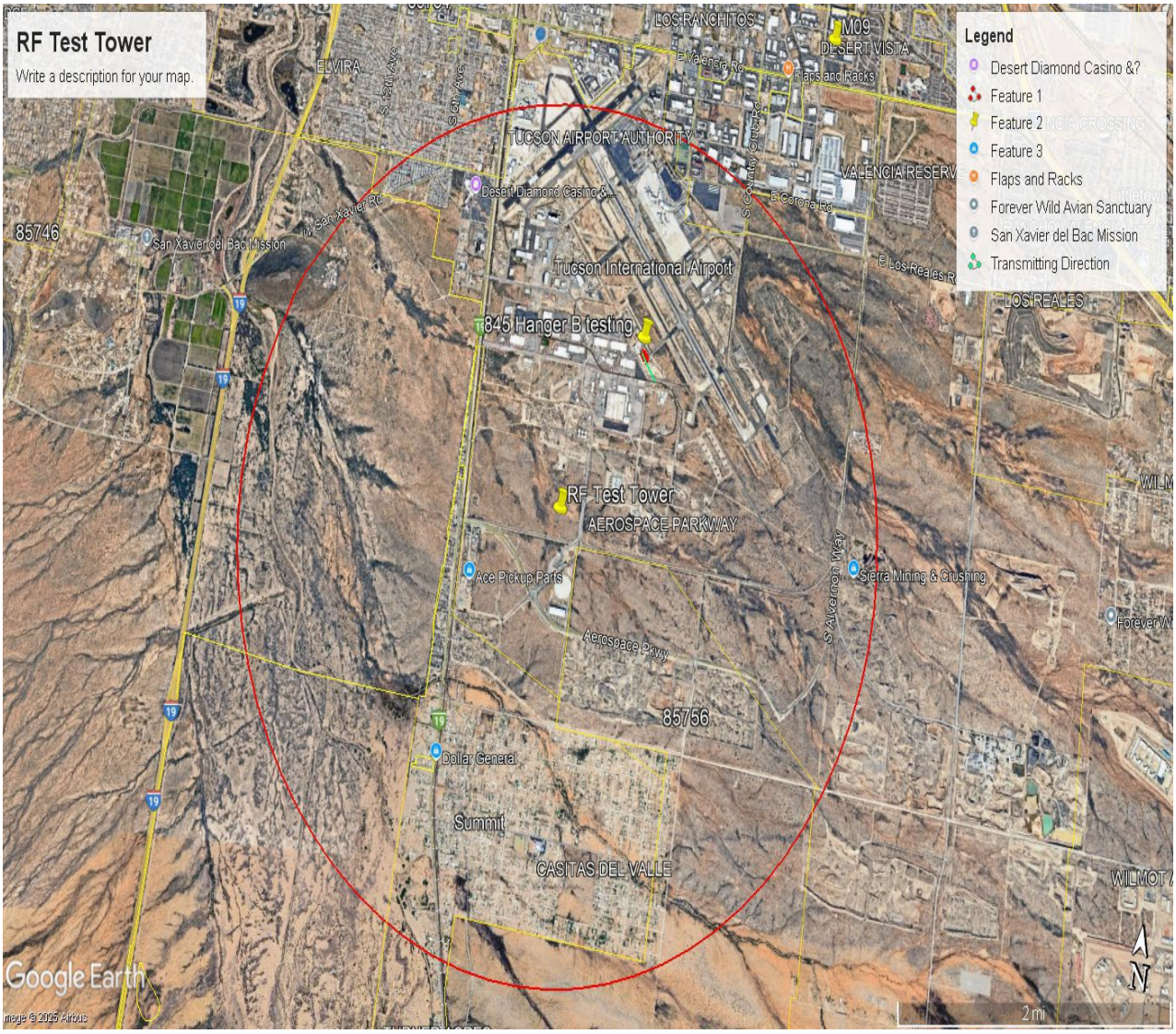
Area of Operations:

Raytheon is requesting authorization for operations in three locations. This application is for the use of Wave Relay(s) incorporated into Raytheon systems. This application seeks authorization for operations at three (3) locations. Operation in the vicinity of Raytheon Facilities (Tucson, AZ), with a

radius of 4 km. Operation in the vicinity of the Arizona National Guard Florence Military Reservation (Florence, AZ), with a 15 km radius. Operation in the vicinity of White Sands Missile Range (NM), with a 15 km radius. The testing is conducted to comply with the provisions of DOD Contract Number W9124P-19-9-0001.

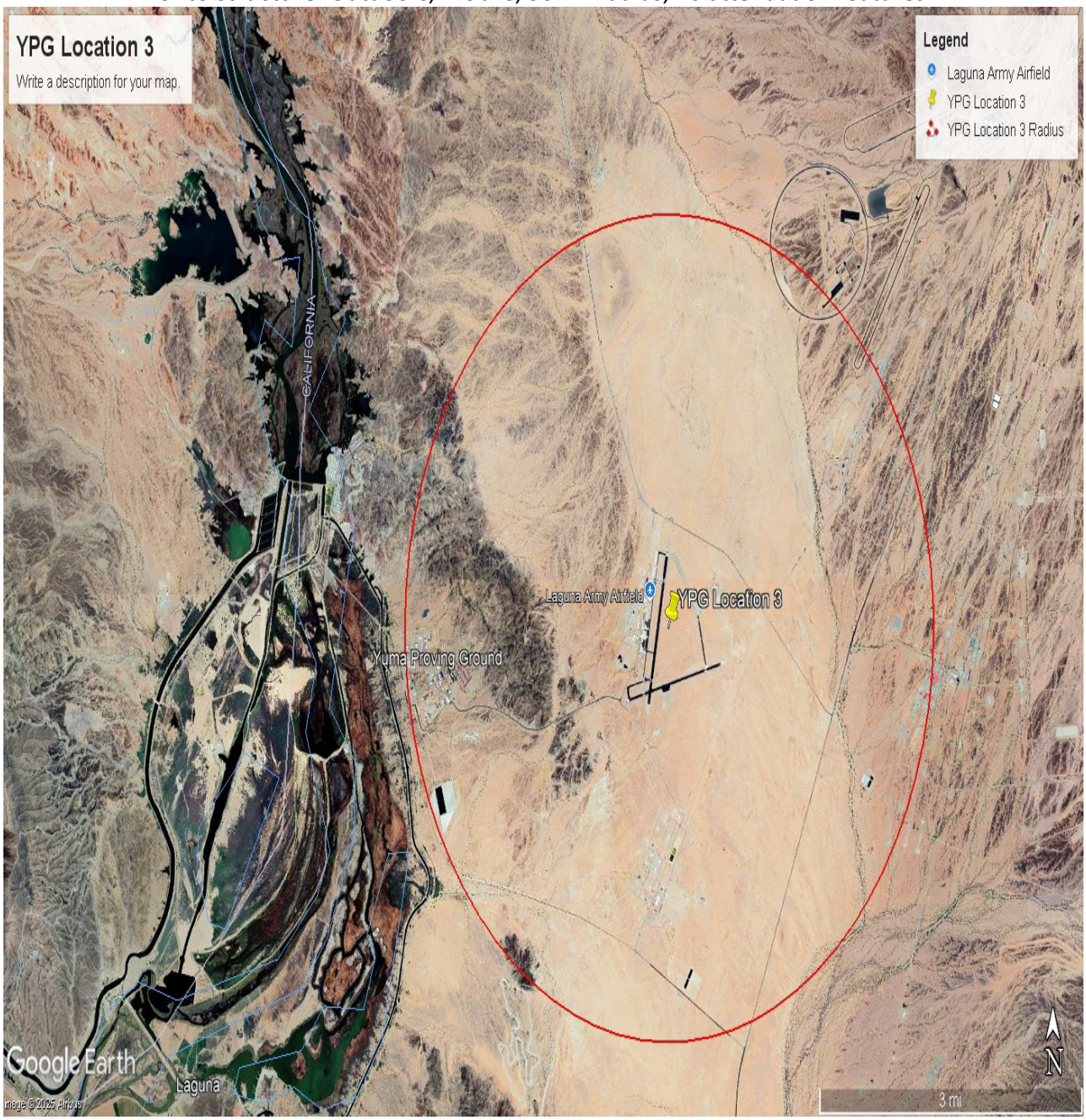
Location #1 (L1)

Raytheon Airport Site (South)
9000 S Raytheon Pkwy, Tucson, AZ 85756
NL 32-05-30; WL 110-56-47 (within 4 km)
Height of transmitter is 60'/18m AGL; Positioned on top of a RF Test Tower; Overall Height of the tower is 60'/18 m AGL Outdoors, Mobile, 4 km radius, no attenuation features



Location #2 (L2)
Skydive Arizona
4900 N Taylor St, Eloy, AZ 85131
NL 32-48-23; WL 111-35-10 (within 30 km)
Height of transmitter is 0-25,000' AGL , placed/installed onto commercial aircraft, N/A (not installed onto structure) Outdoors, mobile, 30 km radius, no attenuation

Location #3 (L3)
U.S. Army Yuma Proving Grounds (YPG)
301 C St, Yuma, AZ 85365
NL 32-52-03; WL 114-23-33 (within 50 km)
Height of transmitter is 0-25,000’ AGL, placed/installed onto commercial aircraft, N/A (not installed onto structure. Outdoors, Mobile, 50 km radius, no attenuation features

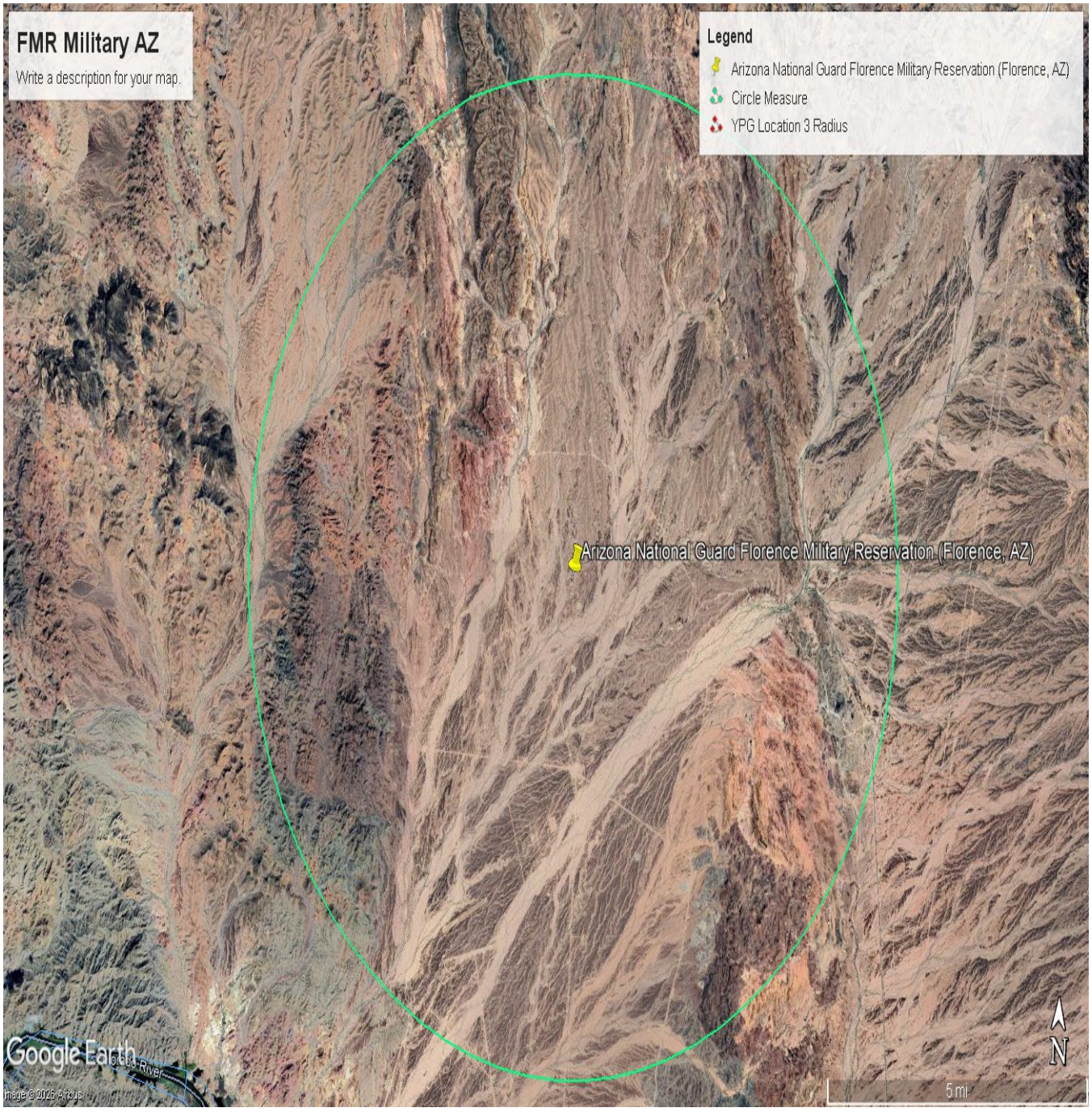


Location #4 (L4)

Arizona National Guard Florence Military Reservation

20252 AZ-79 Bldg 5020l, Florence, AZ 85132

NL 33-07-04; WL 111-21-15 (within 10 km) Height of transmitter is 0-5,000' AGL, placed/installed onto commercial aircraft, N/A (not installed onto structure) Outdoors, Mobile, 10 km radius, no attenuation features



Limited Time of Use:

Testing will be conducted only occasionally in the areas of operation. Test activities will take place over multiple periods of 1-7 days, with 2-3 hours of transmission per day.

Testing is not constant. The program conducts only occasional testing in the area of operations and is willing to continue to adhere to all coordination requirements deemed necessary by regional frequency management offices and the FCC.

No likelihood of interference with other operations:

The radios are designed to be listen-before-transmit, which minimizes any potential for interference to other radio operations.

These radios offer advanced development of swarming UAS technology at a low cost. Further development may lead to the development of different radios that are similarly small, lightweight, and require little power, intended to offer broadband transmission of information, with the ability to send information back and forth to the command-and-control center and to exchange information among the swarm of UASs. The power levels are limited to just enough power to permit the required communications.

Stop Buzzer Point of Contact:

Raytheon's Stop Buzzer point of contact are:

Joshua Salmon, Spectrum Manager
Raytheon Missile Systems
520-473-6784 (cell)
joshua.2.salmon@rtx.com

Conclusion:

Raytheon is seeking an experimental license to continue testing its UASs. This test will advance the development of the communications links needed for command and control of the UASs operating as a group as well as ensure that the telemetry data needed from the UASs can be effectively transmitted back to the control station. The time of use is limited.

Emission: G1D, Modulating Signal: , Necessary Bandwidth: 3.03000000 MHz

Emission: D1D, Modulating Signal: , Necessary Bandwidth: 4.06000000 MHz

Emission: G1D, Modulating Signal: , Necessary Bandwidth: 6.10000000 MHz

Emission: D1D, Modulating Signal: , Necessary Bandwidth: 8.13000000 MHz

Emission: G1D, Modulating Signal: , Necessary Bandwidth: 12.10000000 MHz

Emission: D1D, Modulating Signal: , Necessary Bandwidth: 16.30000000 MHz

Emission: G1D, Modulating Signal: , Necessary Bandwidth: 3.85000000 MHz

Emission: G1D, Modulating Signal: , Necessary Bandwidth: 7.70000000 MHz

Emission: G1D, Modulating Signal: , Necessary Bandwidth: 15.40000000 MHz

Emission: F1D, Modulating Signal: , Necessary Bandwidth: 25.00000000 kHz1370