

Raytheon Technologies Request for FCC Experimental License

- File No: 1665-EX-CN-2023
- Confirmation No: EL378751

Applicant Name (Company): Raytheon
1001 Boston Post RD
Marlborough, MA 01752
Date: 10/23/2023

Purpose of Operation: Raytheon Company is requesting for a 2-year FCC license in the following frequency ranges (below) to assess the performance of the drone-to-antenna communication link.

Requested Frequencies

4.400-4.940 GHz
5.850-5.925 GHz
21.2-21.4 GHz
21.4-22 GHz
22.5-22.55 GHz
23.55-23.6 GHz

Raytheon Technical Point of Contact:

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Stop Buzzer: David Insana; 603-540-9935

Raytheon Spectrum Manager filing application

Azuka Anuniru
Spectrum Management Manager
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FRN: 0003628344

Period of Use:

Start Date: 11/06/2023.
Stop Date: 11/05/2025.

Test Description & Objective:

The objective of this test setup is to evaluate a system receiving the transmission from a drone positioned at a height equal the receive antenna. Results obtained from this setup will provide valuable insights into the performance of such a scenario.

The test is conducted outdoor, and it involves the use of tripods or mounting equipment to ensure both the receiver antenna and the drone are positioned at an equivalent height. This arrangement ensures stability and proper alignment. The receiver antenna is then linked to a Spectrum analyzer via appropriate cables, connectors, and adapters. Meanwhile, the drone is equipped with a transmitter to transmit a signal to the receiver. Subsequently, data from the receiver is meticulously recorded for subsequent analysis.

Equipment Information:

Transmitter Info:

Manufacturer: Raytheon Company

Number of units: 1

Experimental: No

Antenna Information:

Manufacturer: Proxicast - Vandal Resistant Low Profile 4G/5G Antenna - 3-5 dBi Gain - Fixed Mount - 10 ft coax lead

Antenna Type: Omni Directional

No of Units: 1

Experimental: N

Dimensions: 3.2 inches / 82 mm (Height) x 1.9 inches / 48 mm at base (Diameter)

Manufacturer: MI-Wave K-Band, WR-42, Omnidirectional Antenna

Antenna Type: Dipole-Omni Directional

No of Units: 1

Experimental: N

Dimensions: 4.371 inches (Height) X 3.965 Inches (Diameter)

Emission Designators

56M0W7D

56K0F1D

56M0Q3N

56M0N0N

Pulse Information

Max pulsewidth = 187 msec

List as appropriate for the type of modulation:

Effective radiated power from the antenna (If pulsed emission, specify peak power): The maximum ERP out of the antennas (max instantaneous power) is 0.032 Watts.

Frequency Tolerance: 0.001ppm

Necessary Bandwidth: Explain how it is determined:

The Necessary bandwidth was calculated, and emission designator is below. It represents the -20 dB bandwidth for each waveform type. 56 MHz

Location:

1) The Raytheon facility in Tewksbury, Massachusetts is located at 42°38'19.79"N, 71°14'36.59"W. The street address is 50 Apple Hill Drive, Tewksbury, 01876. The antenna testing will take place within 2 km meters of these cited coordinates at a maximum ground elevation of **121** meters.

Is a directional Antenna (Other than the radar used): **No, it is omnidirectional in azimuth.**

Width of beam in degrees at the half-power point: **360 deg Azimuth, 70 deg Elevation**

Orientation in horizontal plane (degrees from True North): **+/- 180 deg**

Orientation in vertical plane (degrees from horizontal): **+/-20 deg relative to horizon**

Will the antenna extend more than 6 meters above the ground, or if mounted on an existing building, will it extend more than 6 meters above the building, or will the proposed antenna be mounted on an existing structure other than a building: **No**

- a. Overall height above ground to tip of antenna in meters: **121**
- b. Elevation of ground at antenna site above mean sea level in meters: **68**
- c. Distance to nearest aircraft landing area in kilometers: **12.91**

Lawrence Municipal Airport	12.91km
Laurence G Hanscom Field	20.77km
Nashua Airport – Nashua, NH (OQU)	27.47km

(d) List any natural formations of existing man-made structures (hills, trees, water tanks, towers, etc.) which, in the opinion of the applicant, would tend to shield the antenna from aircraft: **None**