Raytheon Request for FCC Experimental Permanent License

FCC Form 442 File Number 0132-EX-PL-2014
Date Submitted: February 11 2014

RENEWAL OF WG9XWP, STA File Number 0780-EX-ST-2013

Purpose of Operation:
Frequency authorization is being requested for the period of March 4, 2014 – March 4 2017 for frequency 9410 MHz in order to demonstrate the operation of a Low Power X-Band Radar used to detect wind shear, wind turbine mitigation, and precipitation studies.

STA Explanation:
Low Power X-Band Radar is planned to be operated at the Raytheon facility located at Portsmouth, RI during the period of March 4, 2014 to March 4, 2017. The purpose of this request for Experimental Permanent License is to perform ongoing demonstrations of the feasibility of a low infrastructure, low cost system.

Test Summary:
An experimental license is required to demonstrate the operation of a Low Power X-Band Radar system to our customers. Transmit measurements will be made at the operating frequency 9410 MHz. These measurements will include reflectivity off clouds.

RF Hazard Calculations and Site Safety Measures:
Initial calculations show that power density will fall below general public exposure limits at 20 meters distance and occupational exposure limits at 9 meters, using formula (7) from FCC OET Bulletin 65 "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields", dated August 1997. These calculations take into account the highest duty factor of 16%.

Raytheon's RF safety group is involved in all testing that requires free space radiation to ensure that no personnel are subjected to RF power density levels exceeding the Maximum Permissible Exposure (MPE) limits of the Part 1.1310 of the FCC Rules and the guidelines in FCC's OET Bulletin Number 65. Raytheon has a Company Policy and an Environmental, Health and Safety Standard which address electromagnetic energy exposure control. It is Raytheon's policy to ensure that our personnel, the general public and our customers are not exposed to RF levels which exceed applicable standards. To that end, we will have an RF Safety Control Plan in place for the testing. The Plan will define the procedures and controls required to prevent personnel exposure to levels which exceed the MPE. To verify the safety of personnel, an RF survey was performed at the initial turn-on of the system and at annual intervals after that. All measured levels, where personnel have access, must be below the MPE limits before testing can proceed.

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Period of Use:
Start date: March 4 2014
End date: March 4 2017

Equipment Information: Transmitter info:
Manufacturer: First RF Corporation
Model: FRF-166
Number of units: 1
Experimental (Y/N): Y

For each frequency band:
RF output at the Antenna:
316000 Watts EIRP
(This is the maximum RF output and accounts for losses between the output of the power amplifier and the radiating elements. This does not include front-end losses.)

List each type of emission separately for each frequency
3M00Q3N - 10μsec Linear FM-Pulsed, 9410 MHz
3M00Q3N - 20μsec Linear FM-Pulsed, 9410 MHz
3M00Q3N - 30μsec Linear FM-Pulsed, 9410 MHz

The transmit waveform pulse sequence is programmable. The FM-pulses are modulated with a programmable 3 MHz chirp and programmable pulse width from 4 to 40μsec. The waveform types operate at 9.41 GHz. Both horizontal and vertical polarization switching is utilized

List as appropriate for the type of modulation:
Maximum speed of keying in bauds: Not Applicable, not a communication device
Maximum audio modulating frequency**:** Not Applicable
Frequency deviation of carrier: Less than .001
Pulse duration and rep rate: 40 μsec maximum pulse width
For complex emissions, describe in detail: CW or Pulsed Linear Frequency Modulated (Chirp)

Necessary bandwidth. Explain how determined.
Using a predefined selectable factory setting that determines bandwidth.

Location:
The Raytheon facility in Portsmouth, RI, is located at North 41°34'30.77",
West 071°16'54.56"and ground elevation of 144 feet above sea level. The street address is 1847

West Main Road Portsmouth, RI 02871. The Radar will be placed atop the Nimitz Building 15 meters above ground elevation.

Is a directional antenna (other than radar used)?
No.

Width of beam in degrees at the half-power point:
1.8° Azimuth, 2.7° Elevation

Orientation in horizontal plane:
+/- 60° Electronically Scanned
(This is the full capability of the system. Orientation will be limited via software-defined radiation control zones)

Orientation in vertical plane:
0° to 60°, relative to ground horizontal
(This is the full capability of the system. Orientation will be limited via software-defined radiation control zones)

Will the antenna extend more than 6 meters above 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

If Yes,
Overall height above ground to tip of antenna in meters:
2m

Elevation of ground at antenna site above mean sea level in meters:
57m

Distance to nearest aircraft landing area in km:

Newport State Airport (UUU)	4.9km
Quonset State Airport (OQU)	11.2km
TF Green Airport (PVD)	20.1km

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

See the attached figure for a top view of the radar test site. The radar is normally controlled through the use of software-set radiation control zones. The test area is to be cordoned off on Raytheon property and controlled thru the use of interlocking access doors.

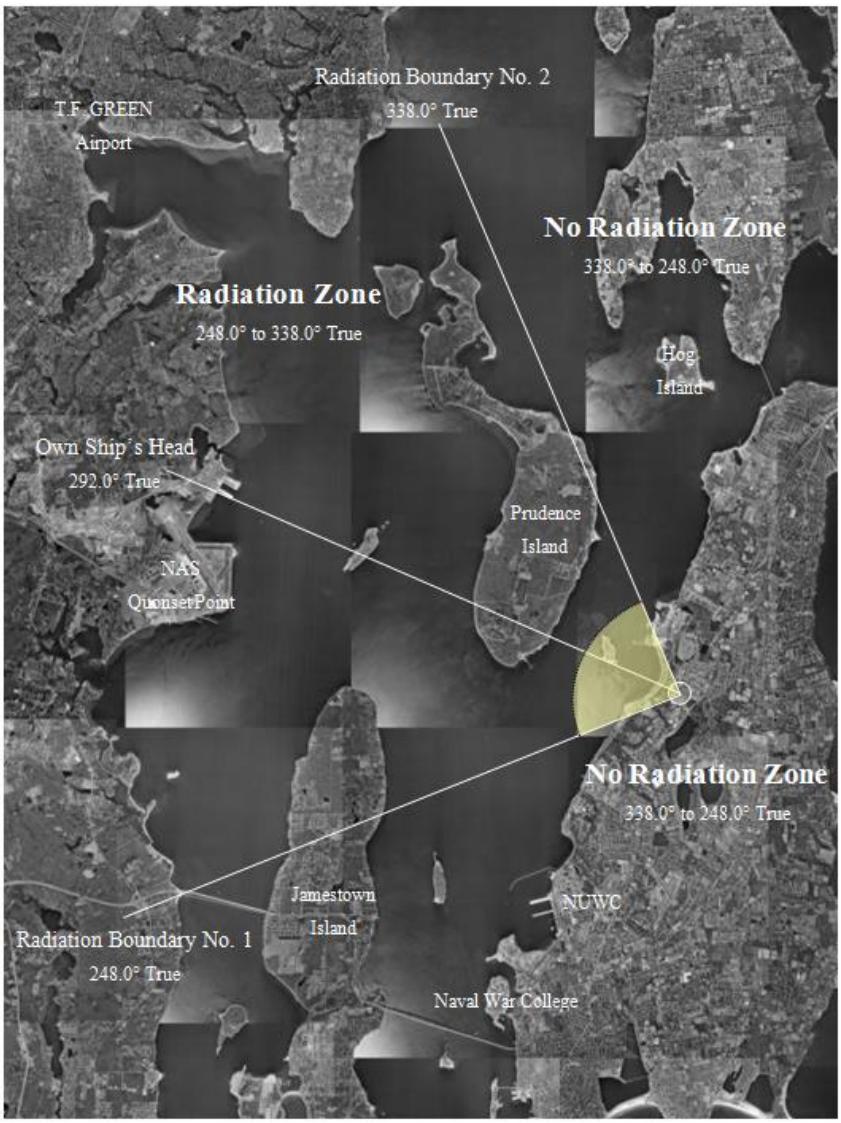

Figure 1: RF Radiation Boundary