

Raytheon Missile Systems
Experimental License Application
Renewing **WB2XGB**
File Number: 0117-EX-RR-2012

Explanation of Experimentation

Overview:

The license being renewed is for the experimental use of the frequencies from 80-86 GHz, 92-100 GHz, and 102-105 GHz to develop new radar technologies that operate in these millimeter wave frequencies.

Technological experimentation and development have been in progress on these frequencies for nearly 10 years. The work continues. Additional experimentation is required to help develop the antennas, receivers, and other components until the technology catches up with the theoretical possibilities of using this spectrum for radar applications.

Synopsis:

- Frequencies Requested: 80-86 GHz, 92-100 GHz, and 102-105 GHz
- Operations have been ongoing; no interference has resulted from ongoing operations;
- Use of these millimeter wave frequencies requires extensive research, and the program is requesting a five (5) year license to continue its work;
- The pulse width of the transmission is narrow, and the average power is much lower than the peak power (ERP) listed on the application;

Project Description:

The experimentation requires use of a fixed transmitter where testing is conducted on the ground, using a transmitter attached to the roof of a Raytheon Missile Systems' building. That testing is done outdoors to track the motion of "targets". Then, the experiment takes the technology under development and loads it onto an aircraft that is flown up to altitudes of 10,000 ft AGL within a 75 mile radius around Raytheon's Tucson facility. As the testing continues, the technology is refined to help Raytheon achieve specific technological objectives. Each iteration brings the technology closer to the goals, but the testing and experimentation process needs to continue to advance the development of the various system components until complete, reliable, effective operations are achieved.

Technical Parameters:

The radios are operated using the frequencies in the 80-86 GHz band, 92-100 GHz band, and 102-105 GHz band. Any or all of the frequencies may be selected in a pre-determined sequence.

- **Transmitter power:** The peak power level at the transmitter is 5 kW;
- **Duty Cycle:** The duty cycle ranges from a low of 1% to a high of 10%;
- **Average Power:** The average power is only 500 W;
- **Antenna Gain:** 41 dB;
- **Total Peak ERP:** 50 MW (77 dBW). The average ERP is only 5 MW.
- **Pulse Width:** .001 to 1.0 microseconds
- **Pulse Repetition Frequency:** 1 to 1000 kHz
- **Necessary Bandwidth:** 2.0 GHz
- **Emission Designator:** 2G0D1N

Only two prototype radios have been built for use in this testbed. The testing continues because there is a great deal of refining necessary to make the technology function as required. It is anticipated that **there will need to be a minimum of 5 additional years of testing** before there are results.

Potential for Interference:

There are few radio operations in this spectrum. The primary uses are for radio-astronomy and radiolocation. The use of the spectrum for development of radar falls within the category of radiolocation use of the spectrum. The proposed use is just a continuation of operations that have been ongoing for a decade. There have been no complaints of any type of interference in the past 10 years, and it is not anticipated that there will be any in the next five years. To the extent that there are some federal users who utilize the 92-100 GHz spectrum for cloud profiling radar, it is important to note that the area around Tucson has very little cloud cover, and so it is not likely to be the site of the NASA and Air Force testing of their systems, thus minimizing any potential for the creation of harmful interference.

Therefore, based on the lack of interference from past operations and the localized nature of the ongoing experimentation, it is unlikely that renewing this authorization will result in the chance of any harmful interference.

Stop Buzzer Point of Contact:

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Conclusion

Raytheon Missile Systems requests that the Commission renew its experimental license WB2XGB for an additional five years to allow for the continued testing and development of radar systems in this spectrum.

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