

GigaBeam Corporation
Application for Special Temporary Authority

Narrative Statement

By this application, GigaBeam Corporation (“GigaBeam”) seeks Commission consent for special temporary authority to test and experiment with a fixed, point-to-point data communications system, using the upper millimeter wave bands, *i.e.*, spectrum above 70 GHz. In this experiment, Applicant seeks to test transmissions in the 71-76 GHz and 81-86 GHz bands.

The proposed experiment is in the public interest because, in accordance with Section 5.63 of the Commission’s Rules, it will contribute to the development, extension or expansion, or utilization of the radio art. Advances in technology have led to the development of equipment that offers the possibility of providing high-speed, high throughput communications in bands of spectrum that were previously thought to be unusable or marginally useable. Significant development and testing has already occurred with respect to Applicant’s technology and Applicant is confident that its real-world testing will advance the utilization of these bands.

This experimentation is necessary so that GigaBeam can determine the granular effects of rain on various modulation formats. The effects of rain in terms of attenuation are well-characterized and understood. The previous work serves as the basis for the Crane Model and the ITU rain model, which are widely used. However, the previous work only takes into account the attenuation effects of rain. The area where there is insufficient data and understanding is the effects of rain on modulation formats; specifically, the effects of rain on amplitude, phase, time delay and or pulse spreading. Each interaction of an electromagnetic wave with a rain droplet is a “micro scattering” event. To the best of GigaBeam’s knowledge, the amount of forward scattering with respect to the amount of off angle scattering and the integrated effect of all these events has not been researched and reported.

Details of Experimental Program:

In order to develop data on antenna spacing and interference levels:

- The orientation of the directional antenna in horizontal plane will be between 120 degrees and 150 degrees
- The orientation of the directional antenna in the vertical plane will be between 0 degrees and 35 degrees

GigaBeam believes that as 10 Gigabit per second rates are approached, there is a distinct possibility that the 100 picosecond intersymbol timeframe may be problematic in terms of rain interaction. These effects need to be measured in greater detail in order to be able to predict the kinds of link margins necessary to ensure highly reliable, carrier grade communications links.

- Transmit modulation formats: AM, FM, PSK, FSK, QPSK, QAM, with data rates from 1 Gigabit to 10 Gigabits
- Observe received signal at ranges of ¼ mile, ½ mile, and 1 mile

- On observing equipment, note received signal in the form of an eye diagram (if QAM, as a phase amplitude constellation)
- Introduce rain into the propagation path and note effects
- Correlate observed data with continuously monitored Bit Error Rate