Narrative Statement for the Requested License:

The experimental license is requested to develop, test and demonstrate a state-of-the-art multiple input multiple (MIMO) wireless communication system for emerging applications at centimeter-wave and millimeter-wave (10-100GHz) frequencies. The system will consist of one access point (AP) transmitter/receiver equipped with a lens antenna array and an RF beam selector architecture to enable multi-beam steering and data multiplexing. The AP will be able to support 4 channels/data streams, each equipped with its own RF chain consisting of an I/Q mixier, bandpass filter, power amplifier or low-noise amplifier and a digital to analog convertor (DAC) or analog to digital convertor (ADC). The lens antenna array will be able to excite 16 beams in the coverage area. The RF beam selector will consist of RF switches to map a particular data stream to one feed antenna out of the 16 possible (for exciting different beams). The AP will communicate with two separate single antenna transceivers – the mobile stations (MSs) - each capable of supporting a single data stream. The two MSs will be able to communicate with the AP simultaneously at rates on the order of 500Mbps-1Gbps. The sampling rates of the ADCs/DACs will be a at least 350MS/s over a bandwidth of at most 1GHz. The backend digital signal processing will be done by the Altera Arria 10 FPGAs.

The objective of this project is to develop a prototype for proof-of-concept demonstration of the electronic multi-beam steering and data multiplexing capability of the proposed system at 28GHz. The prototype system will also provide a state-of-the-art instrument for doing multi-beam wideband channel measurements at 28GHz. Finally, the prototype development will also facilitate technology transfer and commercialization for emerging Gigabit 5G applications at centimeter-wave and millimeter-wave frequencies, including backhaul, last-mile connectivity, and mobile access.