

The complete program of research and experimentation proposed including description of equipment and theory of operation.

We are building a transceiver that will operate in either the 71-76 GHz band or 81-86 GHz band. The transmitted signal will be a digital communications signal of modulation type QPSK with a data rate of 6 Gbps. The equipment used include a commercially available E-band antenna (manufacturer: Radio Waves Inc., model no. HPLP2-80RS (71-86 GHz)), with a solid-state E-band power amplifier (manufacturer: HXI LLC, model nos. HLNAE-417 (71-76 GHz) & HLNAE-418 (81-86 GHz)). Our center frequency will be set by stable, phase-locked oscillators, and the data rate will be set by commercial, high speed data pattern generators from Agilent and Anritsu. The maximum power transmitted is set by the power amplifiers at 21 dBm. Since the antenna has 51 dB gain, the effective isotropic radiated power will be 60 dBW maximum.

The specific objectives sought to be accomplished

We will be studying propagation and data impairments under both fair weather and adverse weather conditions, with the goal of finding the parameters (coding, filtering, Signal-to-noise ratio) required for a reliable communications link at a data rates up to 6 Gbps.

How the program of experimentation has a reasonable promise of contribution to the development, extension, expansion, or utilization of the radio art, or is along the line not already accomplished

This work is a feasibility demonstration for US Air Force communications applications. This authorization is to be used in an Aerospace Independent Research and Development (IR&D) contract with the government. Commercially available point-to point radios operate at lower data rates, up to 1.25 Gbps. The Air Force has an interest in utilizing these bands for satellite applications, but they need high fidelity demonstrations before proceeding to systems development. This demonstration will enable the Air Force to do hardware-based trade studies of radio parameters.