

**MASSACHUSETTS INSTITUTE OF TECHNOLOGY
LINCOLN LABORATORY**

3 October 2019

TO: FCC

FROM: John Meklenburg

SUBJECT: FCC 442 Exhibit Submission

MIT Lincoln Laboratory (MIT LL) is a Federally Funded Research and Development Center (FFRDC) under contract with the United States Air Force to conduct advanced research related to national security missions. MIT LL frequently conducts field experiments like the one outlined in this application both locally and at remote sites.

USG Contract Agency: US Air Force
Contract Number: FA8702-15-D-0001
POC: Pino D'Orazio / 781-225-5206

Purpose of Experiment

MIT Lincoln Laboratory will be conducting a series of outdoor experiments in support of the LOCIT (Laser Optimized Coherence in Transmission) program. The purpose of these experiments is to coordinate optical and RF range measurements to ultimately enable coherent transmissions from disjoint RF emitters.

Experimental Setup / Geometry

Two transmitters will be located on the east end of the runway at Gardner Municipal Airport in Gardner, MA. One receiver will be located at the opposite end of the runway. The two transmitter antennas will be steered towards the receiver at an azimuth heading of approximately 345 degrees and an elevation angle of approximately 0 degrees (horizontal).



FOR LABORATORY USE ONLY

Hardware

The experiment will include the following hardware related to the RF transmissions:

- Ettus x310 radio with UBX-160 RF daughterboards (x2) [transmitters]
- Ettus B210 radio (x1) [receiver]
- Data Alliance A24 2.4 GHz Antenna (x3) [antenna used for both transmitters and receivers]
 - o 24 dBi of gain
 - o 8 degree azimuth beamwidth
 - o 4 degree elevation beamwidth

Emissions

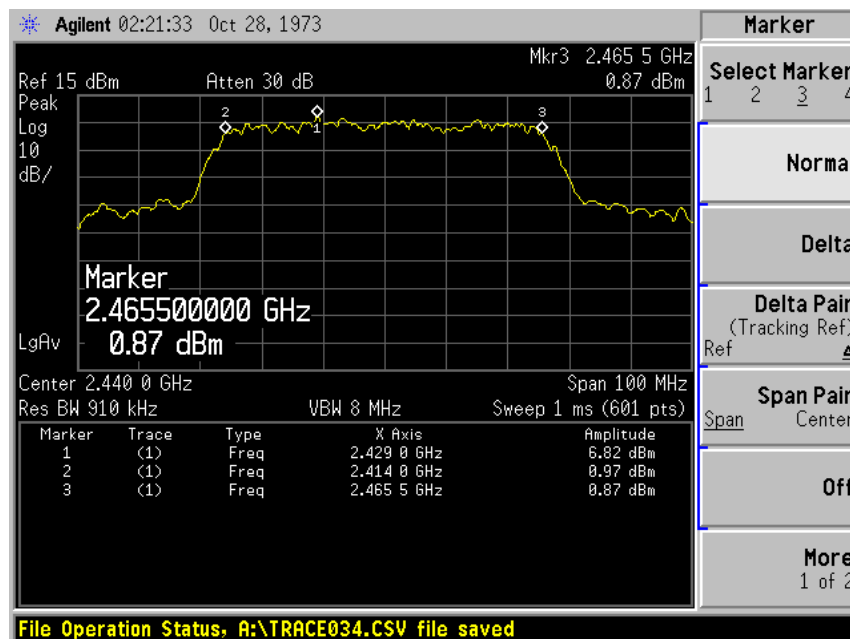
The transmitters utilize a direct sequence spread spectrum waveform and will emit a sequence of QPSK-modulated pulses.

The signal has the following characteristics:

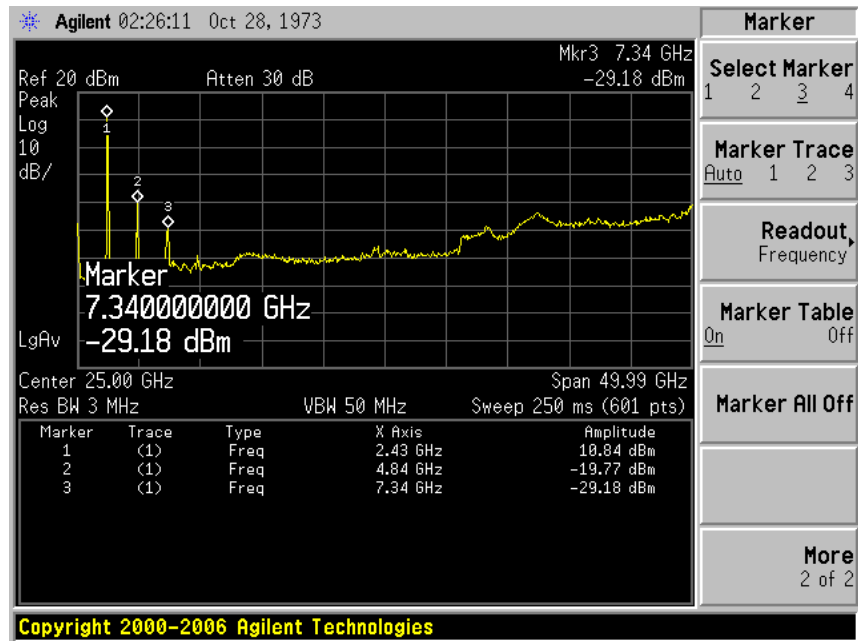
Pulse width:	12 microseconds
Pulse repetition rate:	13.89 kHz
Bandwidth:	50 MHz
Transmit Power:	6 dBm
ERP:	30 dBm (including antenna gain)

Several measurements have been made on this signal and are shown below:

- Center frequency and 6 dB bandwidth



- Harmonics out to 50 GHz (#1 is transmit signal, #2 and 3 are harmonics)



- Transmit power

