

Introduction

Hidden Level (HL) is seeking a Conventional Experimental License for experimental transmissions in Syracuse, NY. This activity is in support of work with the United States Army on the Family of Counter Unmanned Aircraft Systems (FOCUS) program. The FOCUS program began in 2019 with the concept to combine various Counter Unmanned Aircraft System (C-UAS) sensor modalities to create a layered detection and defeat system. Hidden Level is tasked with developing a low-size, weight, and power (SWAP) Multi-Static Radar (MSR) receiver to integrate into the FOCUS system.

Under this effort, Hidden Level desires to conduct testing near its headquarters in Syracuse, NY. This area does not contain a transmitter compatible with our passive multi-static receiver with the proper characteristics needed for our experiments. Particularly, at this point in development the following is critical:

- A single transmission source.
- The right waveform
 - 4G/Long-Term Evolution (LTE) Frequency-Division Duplexing downlink.
 - 5, 10, or 20 MHz bandwidth (wider preferred)
- Low co-channel interference from other sources.

In the geographic area of interest, these signals are present, but there is much frequency re-use amongst transmitters which for our purposes presents a co-channel interference problem. This problem is an active area of research but not one to be addressed on this phase of testing.

As such, a need for a temporary operation of our own moderate power transmitter in an unoccupied area of spectrum has arisen. We are seeking up to 20 MHz of spectrum in which to operate, somewhere in 1800-2700 MHz. This source would only be operated occasionally (approximately 1 day out of every 2-3 weeks) and only for a maximum of 6 hours at a time. The transmitter would be emplaced and displaced before and after each test event to prevent any accidental operation.

Primary points of operation would be:

- Hidden Level headquarters, 1014 N. Geddes St., Syracuse, NY 13204
- Onondaga Lake Park South shoreline (43°4'1.89"N, 76°11'51.05"W), a location from which we have appropriate approvals to conduct flight testing of small multi-copters over Onondaga Lake.
- Tuscarora Dairy Farm, Chittenango, NY 13037, a farm that allows us to conduct flight operations over their land.

Experimental transmitter equipment

The experimental transmitter Hidden Level is applying to operate consists of an Ettus E310/E313 SDR, an amplifier, and an antenna. Hidden Level has been operating this equipment under Special Temporary Authority, Call Sign WV9XQB, since July 2023.

The Ettus E310/313 SDR is used to load and “play” I/Q data created using the MATLAB LTE toolbox.

The amplifier is Mini-circuits ZHL-100W-272+, a 100W amplifier that operates from 700 MHz to 2700 MHz. The amplifier will be used linearly, with the LTE PEP at 50 dBm and average output power of 37 dBm.

The antenna is L-com HG72714P-090, a vertically polarized 90 degree Azimuth sector antenna with up to 14 dBi gain and 13 degree vertical beamwidth. The antenna, along with the SDR, power amplifier, and power supply will be pole mounted on a tripod.

Azimuth siting of the antenna will vary with each test/experiment. Nominal Elevation tiltback will be 6-7 degrees.

A conceptual diagram for the experimental transmitter is shown below.

