

Introduction

Hidden Level (HL) is seeking a Special Temporary Authority for experimental transmission of 4G LTE simulated waveforms. 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) passive Multi-Static Radar (MSR) receiver to integrate into the FOCUS system.

Contact information for the FOCUS program being supported:

- Agency Name: Army C5ISR
- Contract Number: W911NF-17-D-0012
- Government PoC Name: Blake Aycok
- Government PoC Phone: 571-585-8391

As part of this program, Hidden Level will support the Army during a test at Fort Irwin National Training Center in Winter/Spring 2024. It is currently unclear if this location has sufficient “transmitters of opportunity” to support the operation of the passive radar system for the test. As a risk mitigation, Hidden Level is seeking a Special Temporary Authority for this test to operate its own transmitter in the event that other acceptable “transmitter or opportunity” sources are not available during the test.

The passive radar receiver equipment Hidden Level developed for the Army can operating in several bands, including the AWS and PCS downlink bands, the 2300-2400 MHz band, and the 2.4G ISM band. Since the AWS and PCS bands are usually fully occupied by licensed users, we have used the 2300-2400 MHz band for other STA and experimental license applications for this transmitter in the area of our headquarters in Syracuse, NY. We have operated this transmitter equipment in 2390-2400 MHz under STA call sign WV9XQB in Syracuse, NY. We have an experimental license application (File number 1699-EX-CN-2023) in process to extend this beyond the STA for Syracuse, NY area as well.

To support the Army test at Fort Irwin, we are seeking an STA with at least two frequency bands. The first being the same 2390-2400 MHz we have operated in as discussed above. To mitigate risk of finding interference or licensed users in that spectrum at Fort Irwin, we have also included 2325-2340 MHz in this STA application. We understand 2305-2320 MHz and 2345-2360 MHz are licensed to WCS uses. We also understand there are further restrictions to 2305-2320 MHz due to the proximity to the Goldstone facility nearby, so the requested 2325-2340 MHz avoids these with 5 MHz of padding on either side. If other considerations prevent the grant of the full 2325-2340 MHz band, Hidden Level could:

- amend the application to only 10 MHz of that 15 MHz.
- Or further amend the application to as little as 5 MHz of spectrum somewhere in the 2320-2345 MHz range (and amend the waveform for that frequency to 5 MHz instead of 10 MHz accordingly).
- Consider use of 2370-2390 MHz, but understand this introduces additional coordination with AFTRCC so avoided in application.

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 4G LTE toolbox in order to simulate a LTE signal source for our passive radar receiver.

The amplifier is Mini-circuits ZHL-100W-272+, a 100W amplifier that operates from 700 MHz to 2700 MHz. The amplifier is used linearly, with the LTE peak envelope power (PEP) at 50 dBm (100W) 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. Total height to the top of the antenna is 12 feet.

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

A conceptual diagram for the experimental transmitter is shown below.

