

Experimental Ground-Based Radar Description

This document describes the experimental ground-based radar system that is the subject of SRI International's request for a Temporary Experimental License from the FCC.

Experiment Description

SRI is in the process of testing a prototype tower-based radar system. A Temporary Experimental License from the FCC is requested for ground testing of the radar sensor from November 15, 2015 to November 14, 2017. The radar is designed to locate the position of targets on the ground in the vicinity of the collection scene. The purpose of the radar system is demonstrate radar phenomenology and advanced radar data processing concepts.

Ground testing is under consideration in the vicinity of SRI's Ann Arbor, MI office. Each test will be at most 8 hr in duration. SRI expects up to 25 test dates per year. The scene illuminated by the radar, approximately 200 by 200 m in size, will be controlled and restricted by SRI personnel during the experiment.

Radar System Description

The experimental system consists of two tower based radars made up of standard off-the-shelf components. An arbitrary waveform generator is used to generate two X-band waveforms which are then fed to separate transmit amplifiers mounted on mobile lifts (cherry pickers). During the experiment, the lifts are stationary and unmanned. Directional horn antennas are used to illuminate the ground scene, while reducing the emitted energy away from the ground. The radar antennas will be located approximately 85 ft above the ground.

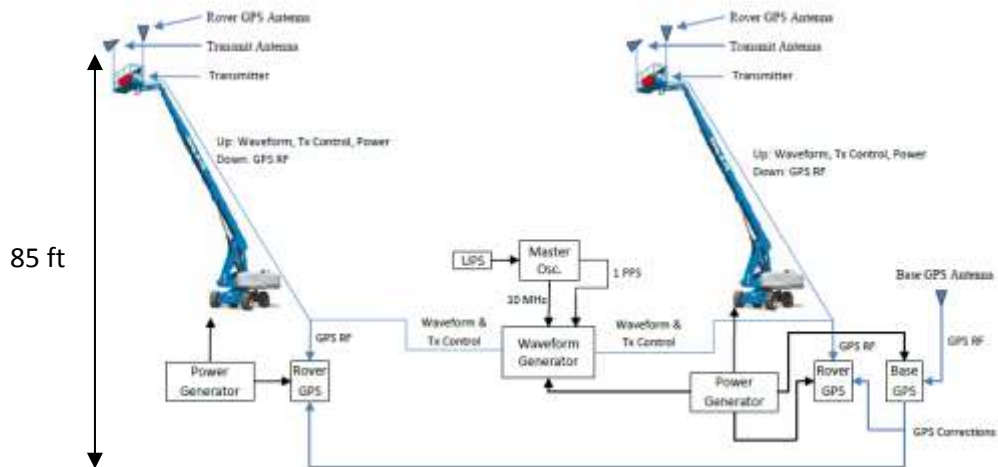


Figure 1. Ground-Based Radar System Setup Utilizing Two Tower Lifts to Elevate Antennas above the Ground

Waveform

The waveform is a pulsed phase modulated waveform with spectral energy spanning 9,200 to 10,050 MHz, resulting in 850 MHz of signal bandwidth. The waveform will have a pulse width of at most 40 μ s and a maximum duty cycle of 5%.

Transmitter

The radar transmitter will amplify the waveform to a peak RF output power of at most 1,000 W. The transmitter is limited to a maximum duty cycle of 5%, resulting in a maximum average power of at most 50 W. Including the antenna gain (10 dBi), the effective radiated power is 10 kW peak and 500 W average.

Antenna

The antenna used to transmit the radar waveform is a directional horn antenna. The antenna has a gain of 10 dBi and an azimuth and elevation half-power beamwidth of 60 deg. The transmit antenna will be mounted in a housing rigidly attached to the tower lift at a fixed depression angle between 5 and 20 deg below the horizon.