

Experimental Airborne Radar Description

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

Experiment Description

SRI is building a prototype radar system for use on an aircraft. A Temporary Experimental License from the FCC is requested for test flights of the radar sensor from Jun 1, 2013 to May 31, 2015. The radar is designed to map the ground as the aircraft with the radar system flies in the vicinity of the collection scene. Test flights will be conducted at various sites around northern CA and MI with the aircraft operating at altitudes between 14,000 and 16,000 ft. Ground scenes will cover a range of types, including both urban and rural areas. Each test flight will be up to 4 hours in duration, with the radar operating approximately 25% of the total time the aircraft is airborne. SRI International will coordinate the flight path of the aircraft with the FAA prior to and during each test flight. SRI expects up to 10 test flights per month from June until July 2013, then infrequent test flights (1 to 3 per month) after that through May 2015.

Airborne Radar System Description

The airborne radar is a custom VHF/UHF-band radar designed and built by SRI International. The radar is intended to demonstrate radar processing algorithms. The radar consists of a low-power electronics unit, a custom-built transmitter, and directional antennas.

Waveform

The waveform is a pulsed linear FM (chirp) over 220 to 430 MHz, resulting in 210 MHz of signal bandwidth. The waveform will have a pulse width of 10 μ s and a duty cycle of 0.4% and a pulse repetition rate of 400 Hz. SRI has the ability to notch out sections of spectrum over the waveform bandwidth to avoid interference with other signals.

Transmitter

The custom radar transmitter will amplify the waveform to a peak RF output power of at most 1 kW, including RF losses before the antenna. At 0.4% duty cycle this corresponds to an average power at the antenna of 4 W. Including the antenna gain, the effective radiated power is 1.25 kW peak and 50 W average.

Antenna

The antenna used to transmit the radar waveform is a directional dipole array antenna. The antenna has a peak gain of 11 dBi and an azimuth half-power beamwidth of 40 deg and an elevation half-power beamwidth of 25 deg. The antenna is mounted underneath the aircraft with the antenna pointed at a fixed depression angle of 40 deg below the horizon.