

## **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 planning to operate 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 October 1, 2017 to September 30, 2019. 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 in the vicinity of Ann Arbor MI, Grayling MI, and various sites around northern CA with the aircraft operating at altitudes up to 25,000 ft. Ground scenes will cover a range of types, including both urban and rural areas. Each test flight will be 4 to 6 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 over the two-year period. Thus, SRI expects the radar to be operational only 40 to 60 hr over the 2 year duration.

### *Airborne Radar System Description*

The airborne radar is a custom X-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 9,200 to 10,050 MHz, resulting in 850 MHz of signal bandwidth. The waveform will have a pulse width of at most 80  $\mu$ s and a maximum duty cycle of 5%.

### *Transmitter*

The custom radar transmitter will amplify the waveform to a peak RF output power of at most 1,250 W. The transmitter is limited to a maximum duty cycle of 5%, resulting in a maximum average power of at most 62.5 W. Including the antenna gain, the effective radiated power is 40 kW peak and 2 kW average.

### *Antenna*

The antenna used to transmit the radar waveform is a directional horn antenna. The antenna has a gain of 15 dBi and an azimuth half-power beamwidth of 40 deg and an elevation half-power beamwidth of 28 deg. The transmit antenna will be mounted in a housing underneath the aircraft cabin with the antenna pointed at a fixed depression angle between 20 and 50 deg.