24-September-19

SRI International S-band High Altitude Balloon Radar Experiment

This document describes SRI International's S-band land based and airborne radar experiment which is the subject of this FCC Special Temporary Authority application.

Experiment Description

SRI has been testing an experimental S-band radar system under FCC License 0166-EX-CM-2018, Call Sign WJ2XNG. The radar system is designed to generate synthetic aperture radar (SAR) and interferometric synthetic aperture radar (InSAR) imagery for the purpose of measuring land deformation. The radar system is built by SRI International and consists of a custom transmitter and receiver unit and utilizes an antenna with up to 21 dB gain. SRI would like to expand operational vehicles to include high altitude balloons. Radiative testing of the system will be infrequent: less than one week of outdoor and flight testing per month at 4 hr intervals or less.

SRI is seeking to modify the region of operation and max altitude of operation. SRI would like to increase the area of operation to a box bounded by 36°N, 122.2°W in the southwestern corner and 38.6°N, 117.4°W in the northwestern corner, as depicted in Figure 1. SRI would also like to increase the max altitude of operation to 60,000 ft AGL.

Radar Description

SRI is using the same radar system and auxiliary equipment granted under Call sign WJ2XNG. The pertinent details of which are summarized in Table 1, below. Additionally, a block diagram of the system is included for reference Figure 2, below.

Balloon Flight Path

The balloon will launch from Gilroy, CA and fly toward Stockton, CA. The balloon system complies with CFR14.101 regulations for Unmanned Free Balloons. The balloon provider will be using an establish procedure to begin coordinating with the FAA 72 hours in advance of the launch time, as specified in CFR14.101. SRI is requesting the STA license to operate the radar and comm link at any location within the anticipated area of approximately between 36°N to 38.6°N latitude, and 117.4°W to 122.2°W longitude at balloon altitudes up to 60,000 ft. SRI also plans to operate the balloon radar and comm link while the balloon ascends from Gilroy, CA at altitudes between 5,000 and 60,000 ft. The ascending area of operation is encompassed by a 20 -mile radius circle centered at 7665 Crews Rd, Gilroy, CA 95020, ~37.03°N latitude, 121.51°W. The ascent area is marked by a blue circle in Figure 1, below. longitude. During the experiment, SRI operators will be able to disable the radar and/or radio transmitter at any time. Transmission of the radar and/or radio can be stopped by contacting either of the following SRI personnel:

- Lauren Wye: 650-678-9184
- Simon Lee: 805-801-9223

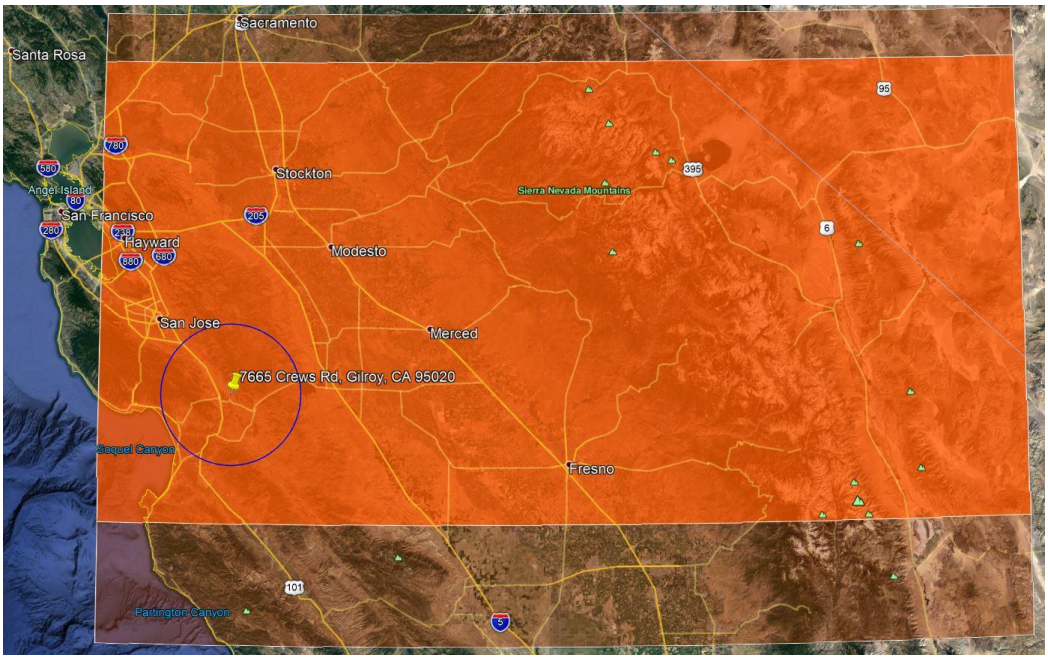

Figure 1. Desired area of operation. Dark orange area indicates operation area already granted under license 0166-EX-CM-2018. Light orange rectangular sections above and below dark orange region is additional area of operation that SRI is requesting. Blue circle encompasses the 20 mile radius of ascent zone.

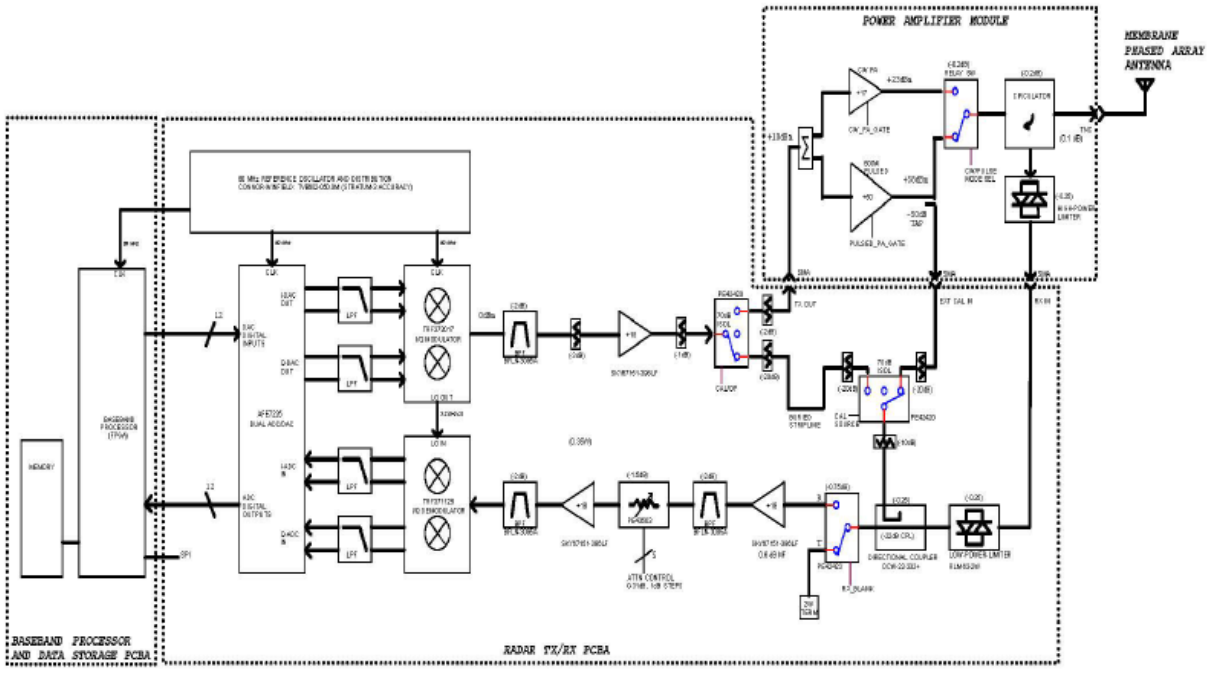

Figure 2. SRI International Experimental S-band Radar System

Table 1. Radar and Comm Link Transmitter Parameters

	Radar Payload Transmitter	**UHF Radar Payload Comm Link Transmitter**	**UHF Ground Station Comm Link Transmitter**	**Radar Payload Satellite Link Transmitter**
Frequency Range	2.93625 to 3.35 GHz	910 to 920 MHz	910 to 920 MHz	1616 to 1626.5 MHz
Bandwidth	200.0 MHz	10 MHz	10 MHz	10.5MHz
Emission Designation	200MM3N	10M0F3D	10M0F3D	10M5M7D
Waveform Type	Pulsed linear FM chirp	Chirp Spread Spectrum	Chirp Spread Spectrum	Differentially Encoded QPSK
Transmit Power, Avg	60 W	1 W	1 W	7 W
Transmit Antenna Gain	21 dBi	3 dBi	13.5 dBi	3 dBi
EIRP, Avg	7500 W	2 W	22 W	14 W
Transmitter Part Number	SRI custom	Digi XLR Pro	Digi XLR Pro	9522B DataMODEM RST600B and RockBlock MK2
Antenna Part Number	SRI custom	L-Com HG903RD-SM	KP Performance KPPA-900DP-FP	Iridium Aero Antenna

Key Changes from FCC Experimental License already Granted

- Area of operation: Around Menlo Park, CA increased ~20 mi north, and ~40 mi south
- Altitude of operation: Up to 60,000 ft AGL