15-Feb-18

SRI International S-band Land Based and Airborne Radar Experiment

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

Experiment Description

SRI is planning to test an experimental S-band radar system starting in March 2018. 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. The radar system will be tested and operated in stationary ground configurations, on ground vehicles, and on aircraft. SRI is seeking a license to operate the radar in the vicinity of Ann Arbor MI, Muskegon MI, Menlo Park CA, Crow's Landing CA, Tracy CA, Baltic SD, and Elko NV.

Ground-based outdoor, airborne, and land based testing of the radar system will begin in March 2018 and continue through February 2020. 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.

Radar Description

As discussed above, the radar consists of a custom S-band transmitter and receiver unit designed and built by SRI International. The radar transmits a linear FM chirp signal over 2.9 to 3.1 GHz. The waveform has a 200 MHz bandwidth. The transmitter outputs the waveform with an average power of 60 W. A 21 dBi gain antenna is used with the transmitter, resulting in an EIRP of 7500 W average. The radar will operate with a nominal pulse repetition frequency (PRF) of 2500 Hz, a pulse width of 40 microseconds, and a duty cycle of 10%. The radar antenna has a beamwidth of 10 deg in the azimuth (horizontal) plane and 27 deg in the elevation plane. The directive antenna will be pointed at a depression angle between 20 and 60 deg below the horizon.

During ground-based outdoor testing, the antenna will be placed on the roof of an approved facility or other raised platform and pointed down to the ground. Additional ground based testing would include operation from a truck, car, man-lift, or other ground based moving platform. The antenna could be oriented in any azimuth direction during testing. During airborne testing the antenna may be pointed in any azimuth direction. The aircraft will fly at altitudes of up to 20,000 ft.

Figure 1 below shows a schematic of the SRI S-band radar system.

Communication Link Description

SRI will maintain communication with the radar payload via a 900 MHz ISM-band communication link. Both the ground station and the radar will utilize a Digi XLR Pro commercial transceiver that operates over 910 to 920 MHz. The transceiver utilizes a chirp spread-spectrum waveform to minimize interference with other transceivers. For the ground station, the transceiver unit will output an average power of 1 W and be connected to a 13.5 dBi gain antenna for an average EIRP of 22 W. For the radar side of the link, the transceiver unit will output an average power of 1 W and be connected to a 3 dBi

gain antenna for an average EIRP of 2 W. SRI will utilize a maximum of two mobile ground stations to communicate with the radar at a time.

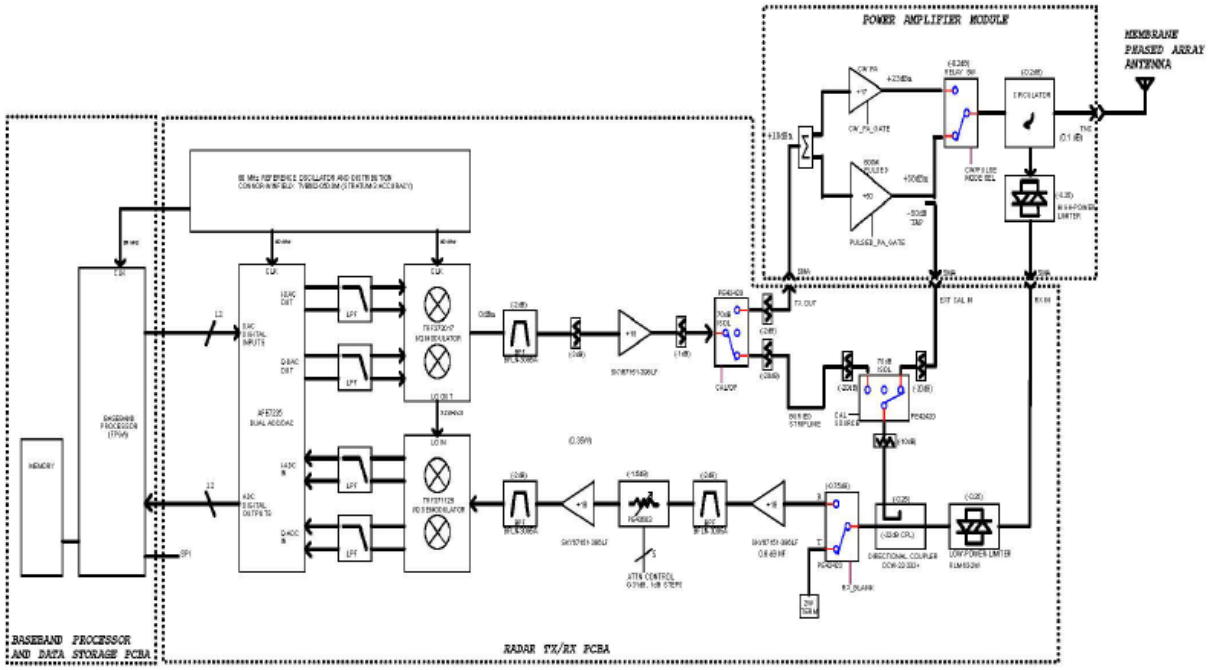

Figure 1. SRI International Experimental S-band Radar System

Table 1. Balloon Radar and Comm Link Transmitter Parameters

	Ground and Airborne S-band Radar Transmitter	**Ground and Airborne Comm Link Transmitter**	**Ground Station Comm Link Transmitter**
Frequency Range	2.9 to 3.1 GHz	910 to 920 MHz	910 to 920 MHz
Bandwidth	200.0 MHz	10 MHz	10 MHz
Emission Designation	200MM3N	10M0F3D	10M0F3D
Waveform Type	Pulsed linear FM chirp	Chirp Spread Spectrum	Chirp Spread Spectrum
Transmit Power, Avg	60 W	1 W	1 W
Transmit Antenna Gain	21 dBi	3 dBi	13.5 dBi
EIRP, Avg	7500 W	2 W	22 W
Transmitter Part Number	SRI custom	Digi XLR Pro	Digi XLR Pro
Antenna Part Number	SRI custom	L-Com HG903RD-SM	KP Performance KPPA-900DP-FP