

Conventional Experimental License File 0211-EX-CM-2021 Technical Exhibit*Purpose Note*

SRI is submitting this conventional experimental license request to continue support testing of an experimental transmitter. This is a follow-on application from Experimental License File number 0994-EX-CN-2020, call sign WL2XKD. Antenna, transmitter, and receiver parameters are unchanged from Experimental License grant. Testing will continue over a two year period at the following locations: Menlo Park, California (37.45° N, 122.18° W); Boulder, Colorado (40.02° N, 105.27° W); Ann Arbor, Michigan (42.28° N, 83.74° W); St. Petersburg, Florida (27.76° N, 82.63° W); & Fort Story, VA (36.92° N, 76.02° W) operations will take place within 50km of the center of these locations. We would like to add a location Gulfport, MS (30.35° N, 89.09° W) with an operational radius of 80 km. These areas of operations are shown below for reference in Figure 1 through Figure 7, the new requested region is circled in green in the Figure 1 and 7 below. We request the window of operations to continue until February 1, 2023. Expected usage during this period is 2-6 hours a day approximately 3 days a week. SRI International is a non-profit scientific research institute, more information about SRI may be found at <https://www.sri.com/about-us/>.

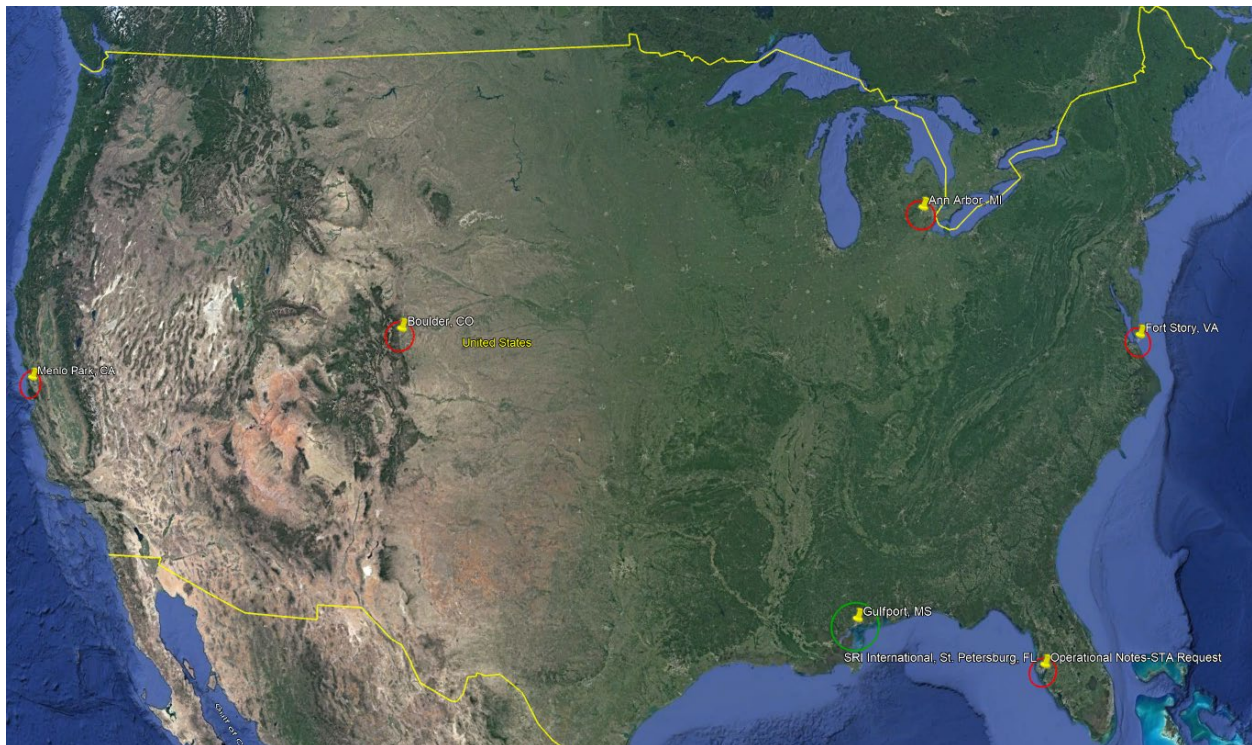


Figure 1

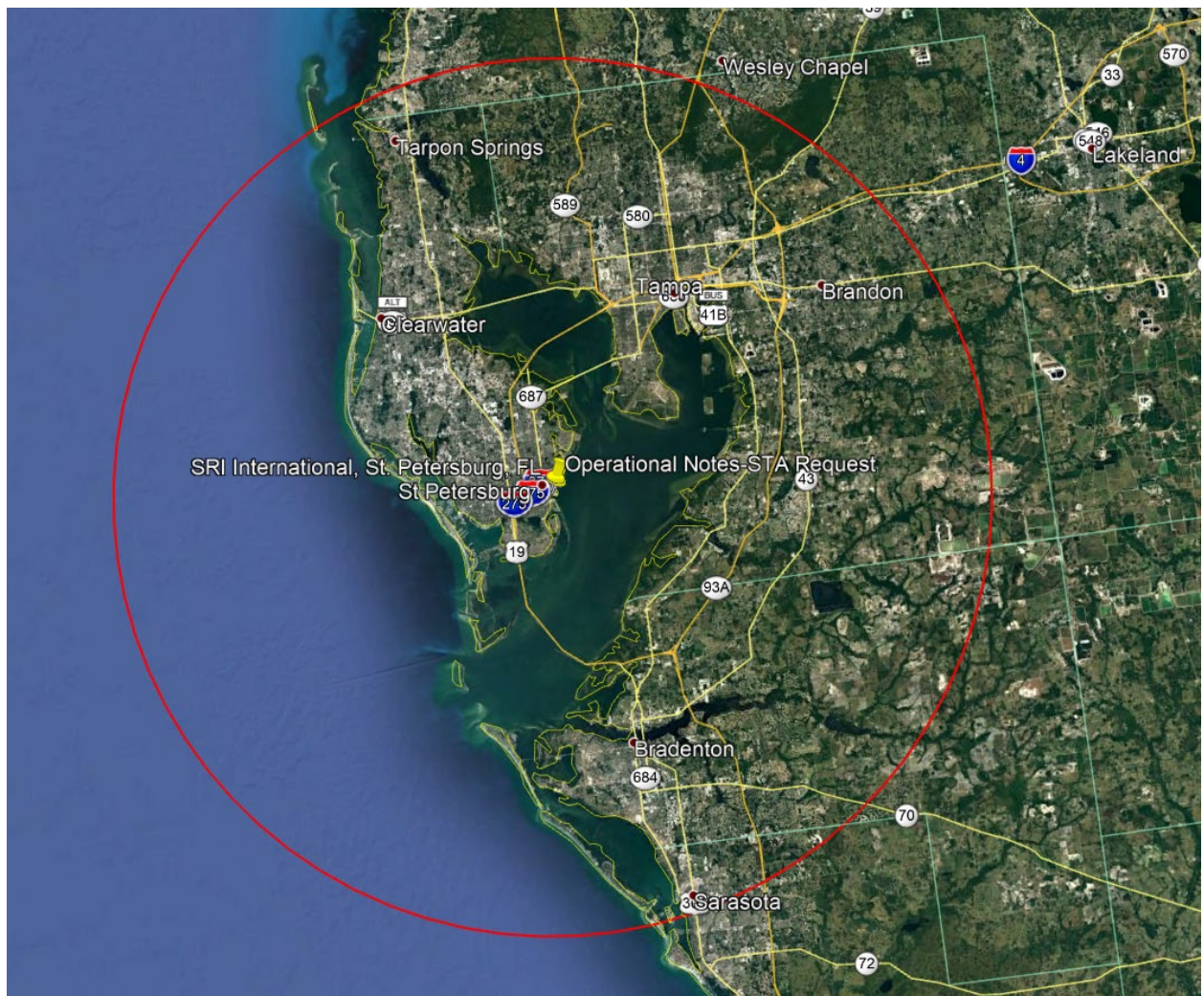


Figure 2

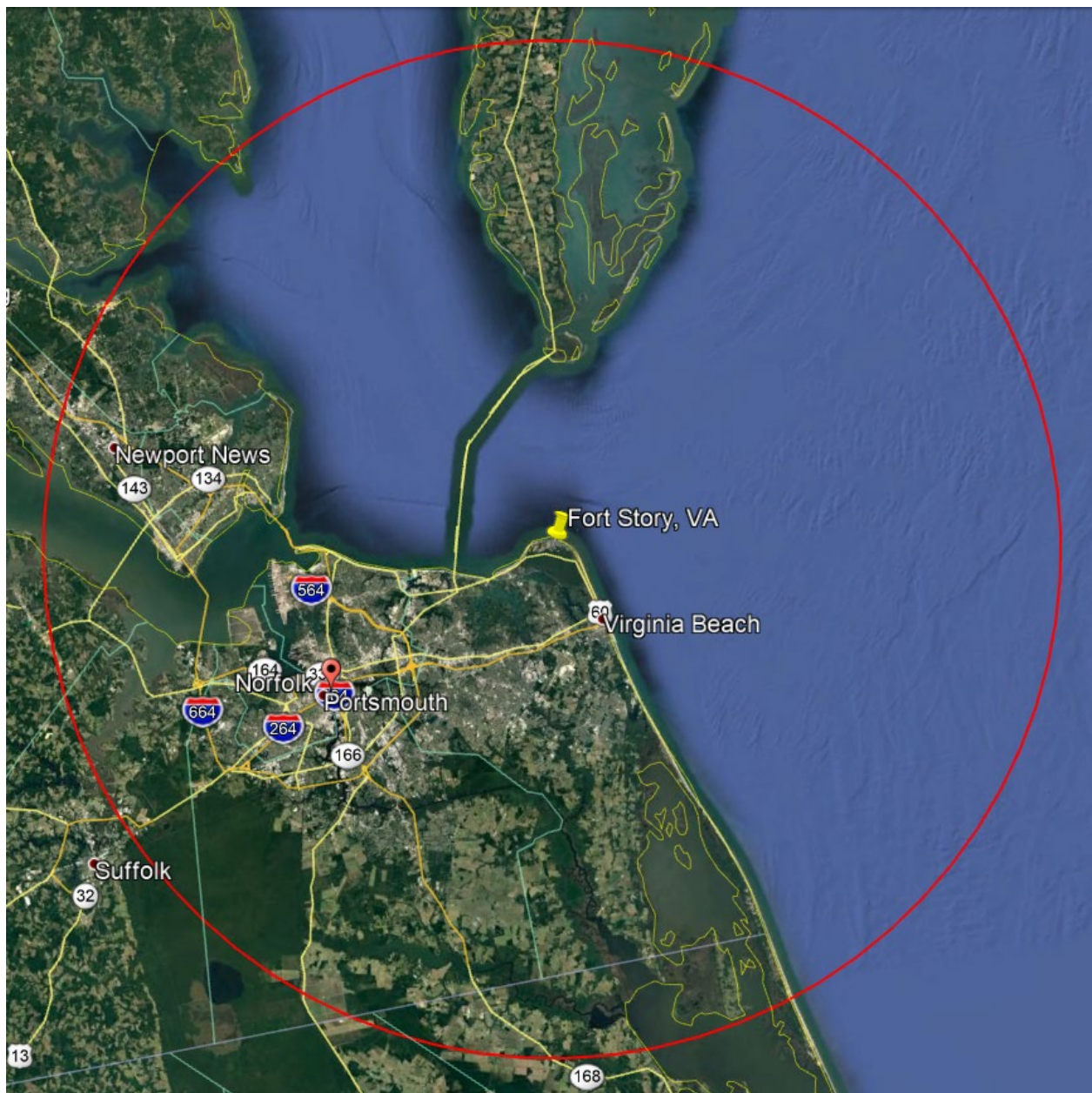


Figure 3

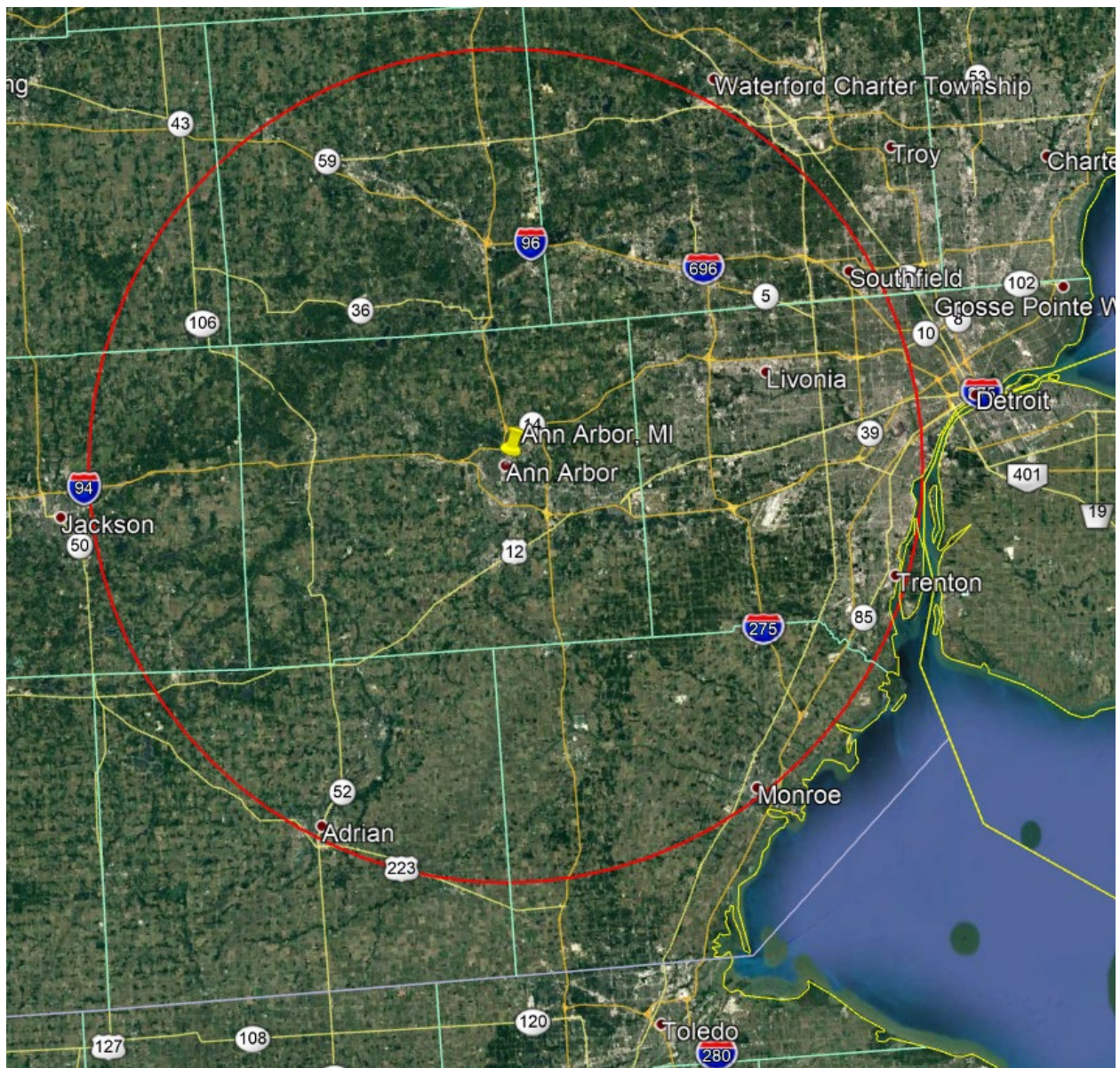
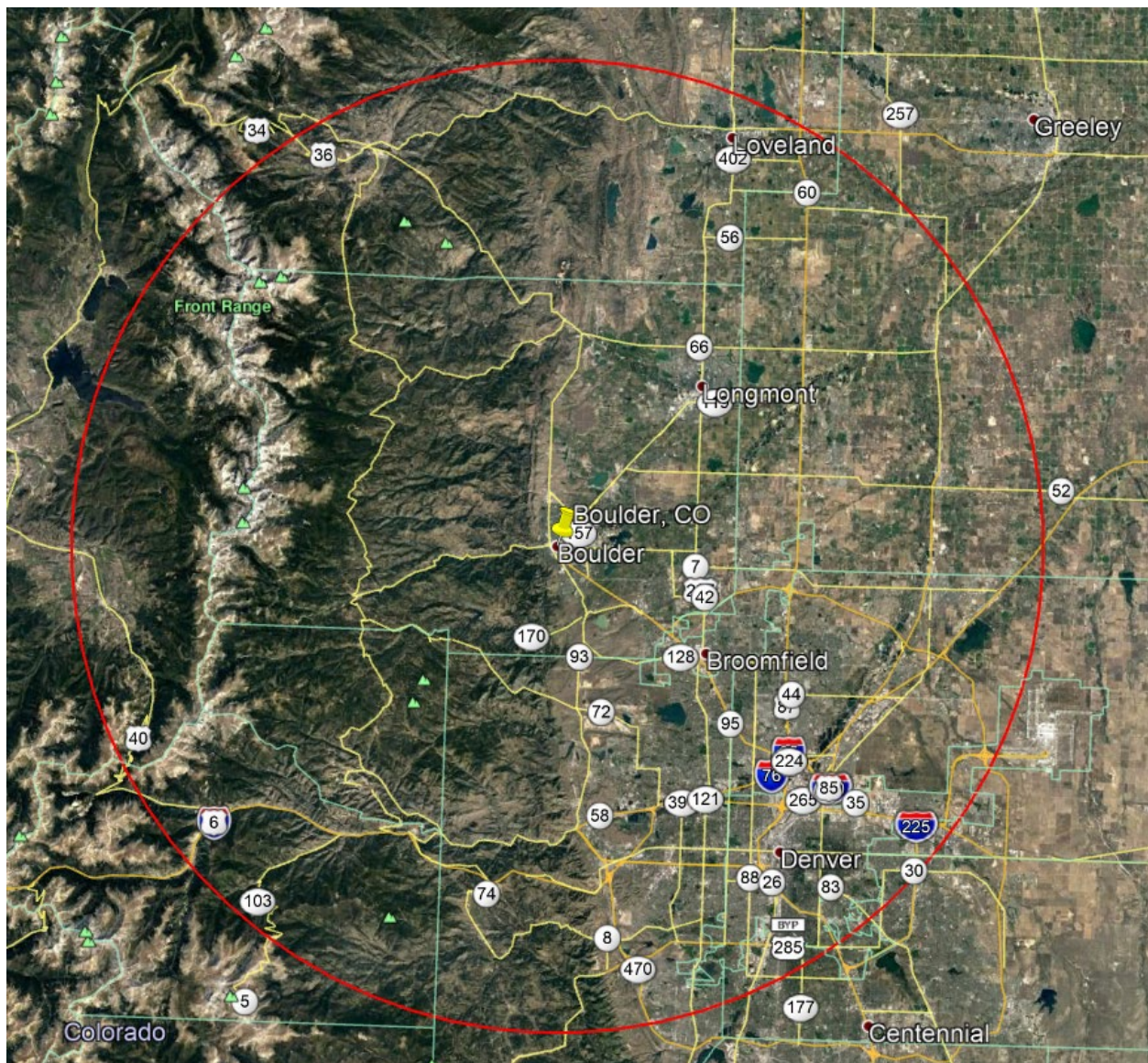


Figure 4



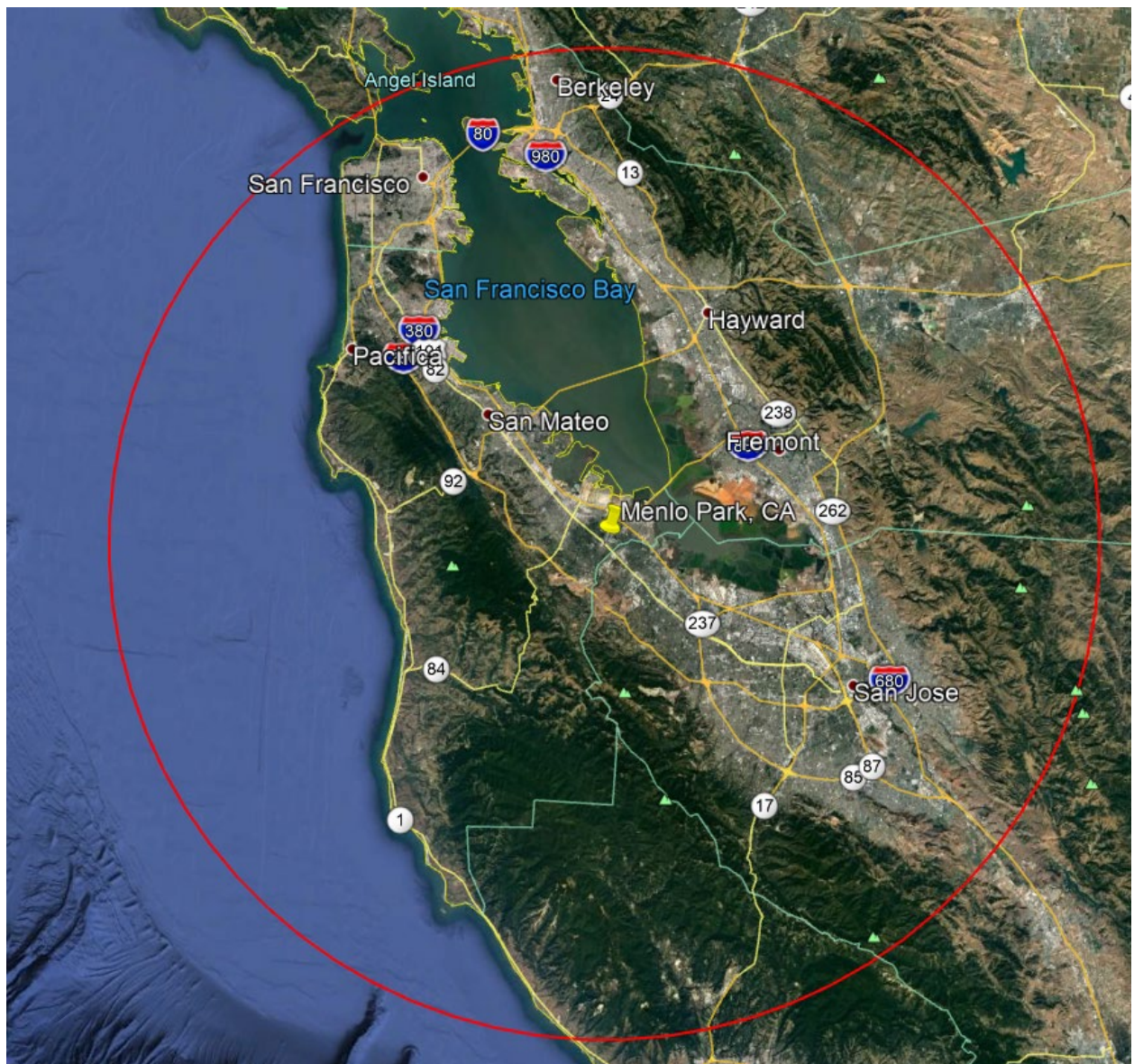


Figure 6

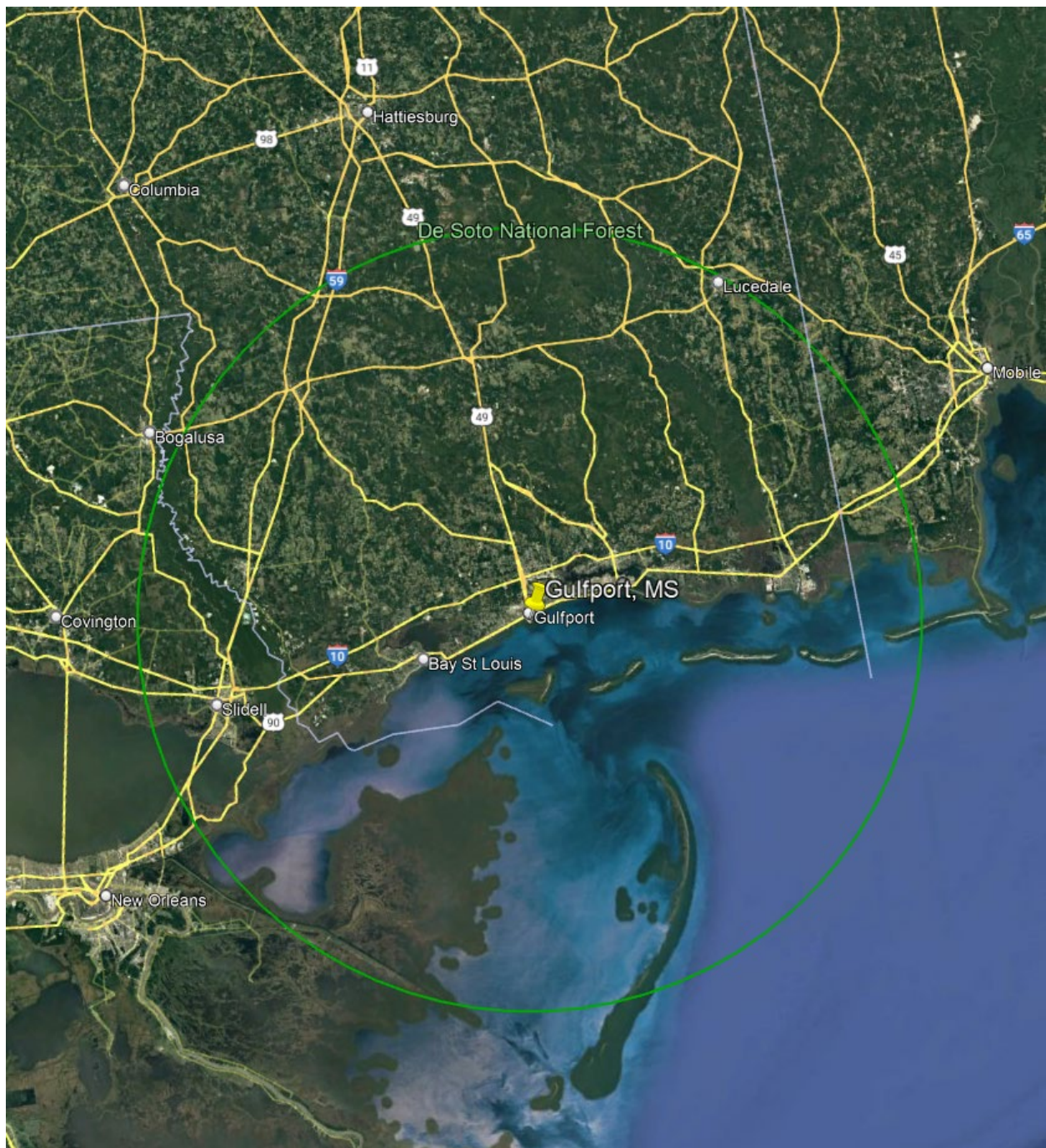


Figure 7

SRI engineers will be directly operating the transmitter, on site, and will have the ability to immediately turn off the transmitter.

Persons of Contact:

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Transmitter Description

The transmitter is a custom system developed by SRI International. It is comprised of a software defined radio, followed by an Intermediate Frequency (IF) to Radio Frequency (RF) frequency converter, followed by an active, electronically steered phased array (AESA). The AESA is custom hardware manufactured by Ball Aerospace. It will be statically mounted about 2 meters above ground on a tripod. The transmit beam is fixed in elevation and steerable in azimuth. In elevation, the beam will be directed between -2 and +8 degrees of the horizon, with a half-power, full-width of 11 degrees. Thus the half-ERP point may be up to 14 degrees above the horizon. The transmitter may be pointed in any azimuth direction, and the azimuth beamwidth is 4.2°. The transmitter output power envelope will be pulsed with a duty factor not to exceed 30%, and pulse duration will not exceed 30 µs. The interval between pulse-starts will vary between 20 µs and 200 µs. The mean ERP will not exceed 6kW, and the peak ERP will not exceed 20kW.

Signal Descriptions

As stated in the Conventional License application, emissions will be confined to the 8500 – 9000 MHz and 9200 – 9500 MHz bands. While operating at the Fort Story location emissions will be further confined to 8521 – 9000 MHz and 9200 – 9326 MHz. SRI can control where the signal emission falls within these two bands and associated sub-bands. This allows SRI's transmitter system to be used in allowed frequency bands without interfering with nearby transmitters and receivers that may also operate in those bands. Instantaneous bandwidth will not exceed 200 MHz or 126 MHz, depending on area of operation and frequency band of operation. Overall pulse amplitude will be Tukey window shaped with sharpness varying between rectangular and raised-cosine. Within the windowed pulse, unmodulated, frequency modulated, and phase modulated emissions will be generated at different times. Since our system's waveform generator is a software defined radio, we can modify some parameters, including notching frequencies in some modes, if required. Below are further details on each emission defined in the application.

When Operating between 8500-9000 MHz, 8521-9000 MHz, or 9200-9500 MHz:

100KP1N, on/off modulation

- The signal within the pulse envelope will be CW. The bandwidth is stated as 100 kHz due to spreading from the not-to-exceed 50 kHz pulse rate.

200M0Q1N, pulsed linear fm

- The signal within the pulse envelope will be a linear FM sweep, with a bandwidth of up to 200 MHz.

200M0Q1N, pulsed frequency hop

- The signal within the pulse envelope will frequency hop in an unspecified order over a bandwidth of up to 200 MHz

200M0Q1N, pulsed pseudo-random bpsk

- The signal within the pulse envelope will be a BPSK signal, modulated by pseudo-random bits at a chipping rate of up to 200 M chip/sec, and filtered to limit bandwidth to 200 MHz.

When operating between 9200-9326 MHz:

100KP1N, on/off modulation

- The signal within the pulse envelope will be CW. The bandwidth is stated as 100 kHz due to spreading from the not-to-exceed 50 kHz pulse rate.

126M0Q1N, pulsed linear fm

- The signal within the pulse envelope will be a linear FM sweep, with a bandwidth of up to 126 MHz.

126M0Q1N, pulsed frequency hop

- The signal within the pulse envelope will frequency hop in an unspecified order over a bandwidth of up to 126 MHz

126M0Q1N, pulsed pseudo-random bpsk

- The signal within the pulse envelope will be a BPSK signal, modulated by pseudo-random bits at a chipping rate of up to 126 M chip/sec, and filtered to limit bandwidth to 126 MHz.

Request for Detailed Problem Description if Conventional Experimental License cannot be approved

If the FCC cannot approve this Conventional Experimental License, SRI requests a description of the issues involved, so that we can efficiently modify the Conventional Experimental License to make it acceptable. If operating bands, bandwidth, or power is unacceptable, we request feedback on parameters that would make these acceptable. Since SRI's system's waveform generator is a software defined radio, we can modify these parameters, including notching specific narrow frequency bands, if required.