17-November-2020

Conventional Experimental License File 0994-EX-CN-2020 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 STA File number 0568-EX-ST-2020 & 0819-EX-ST-2020, call signs WM9XZH & WQ9XOS. Antenna, transmitter, and receiver parameters are unchanged from STA grants. 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. These areas of operations are shown below for reference in Figure 1 through Figure 6. We request the window of operations to be January 1st 2021 – December 31st 2022. 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/.

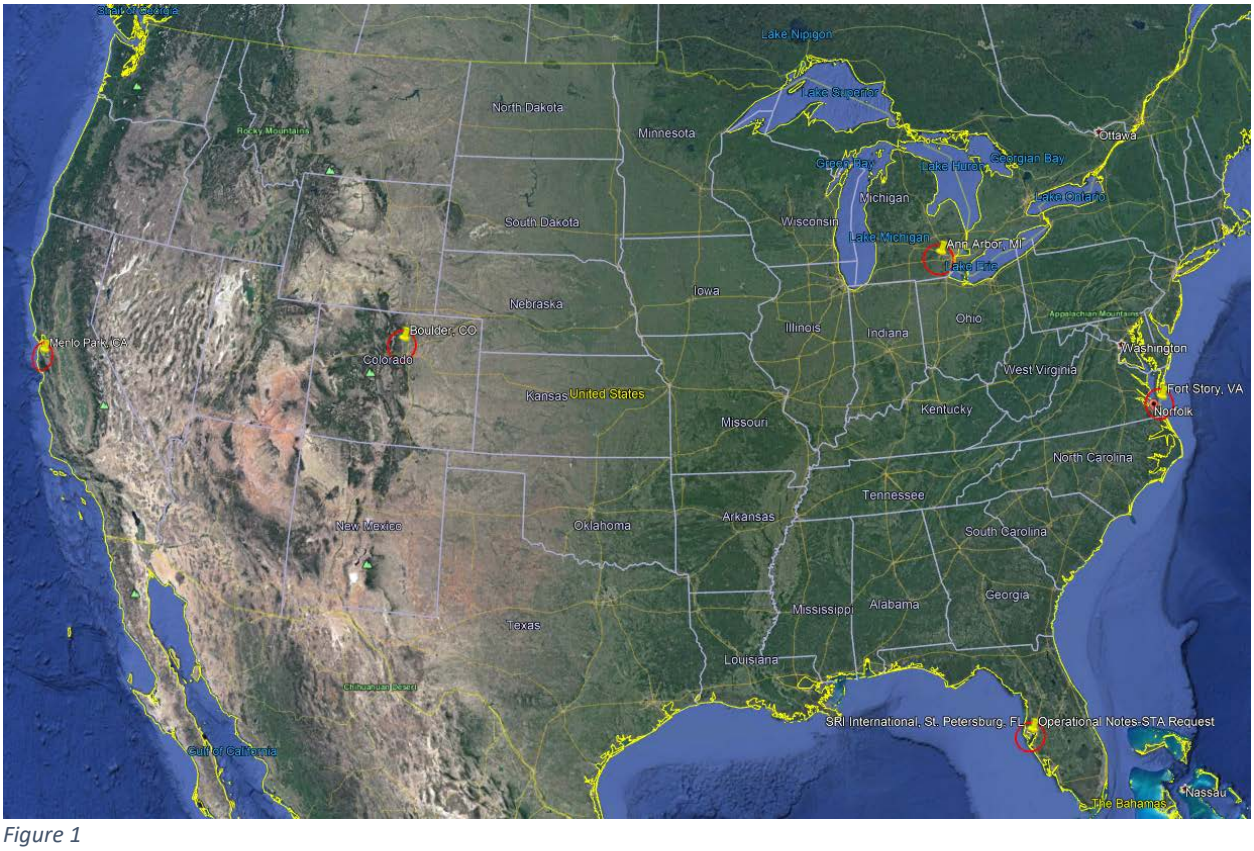


Figure 1

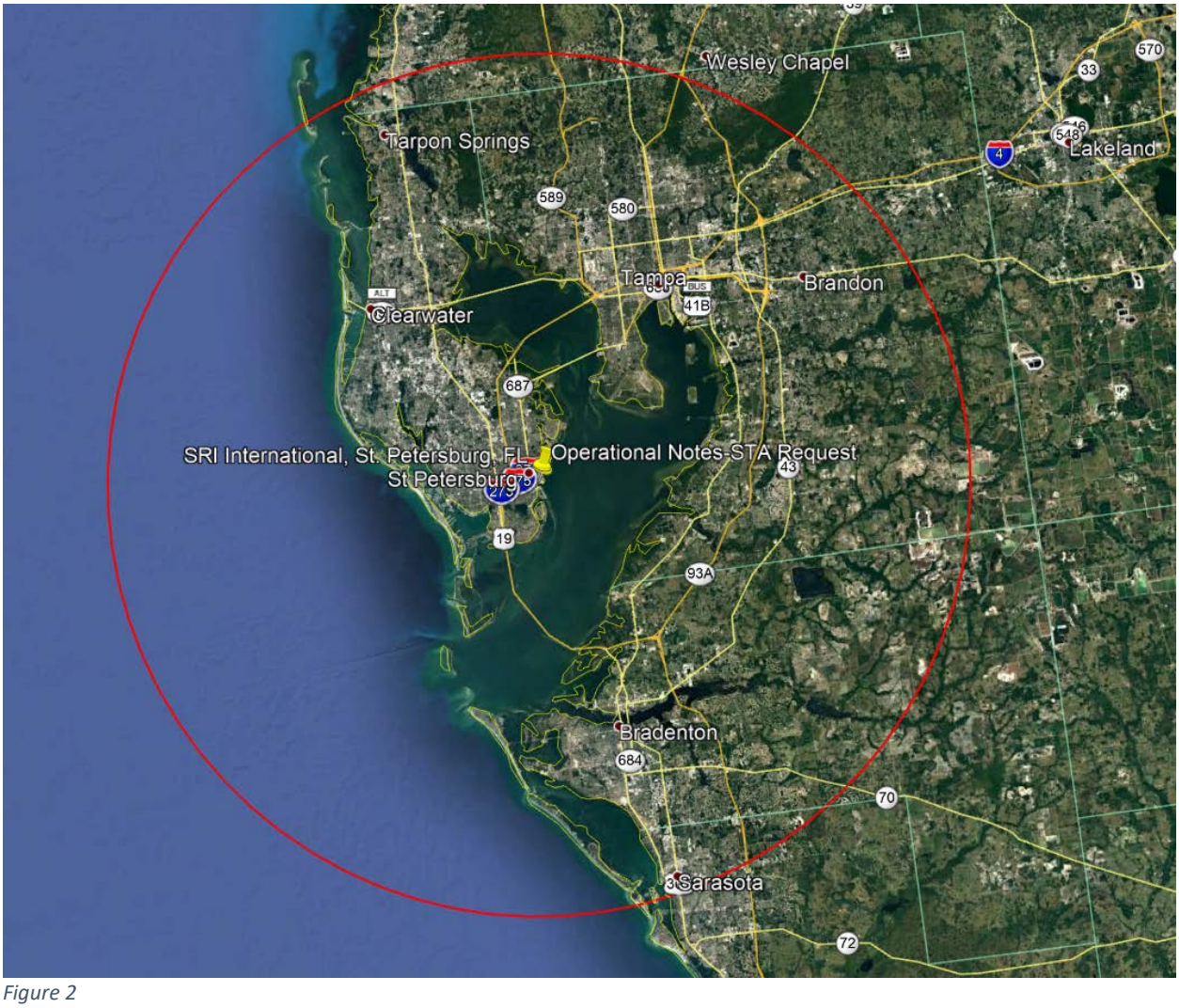
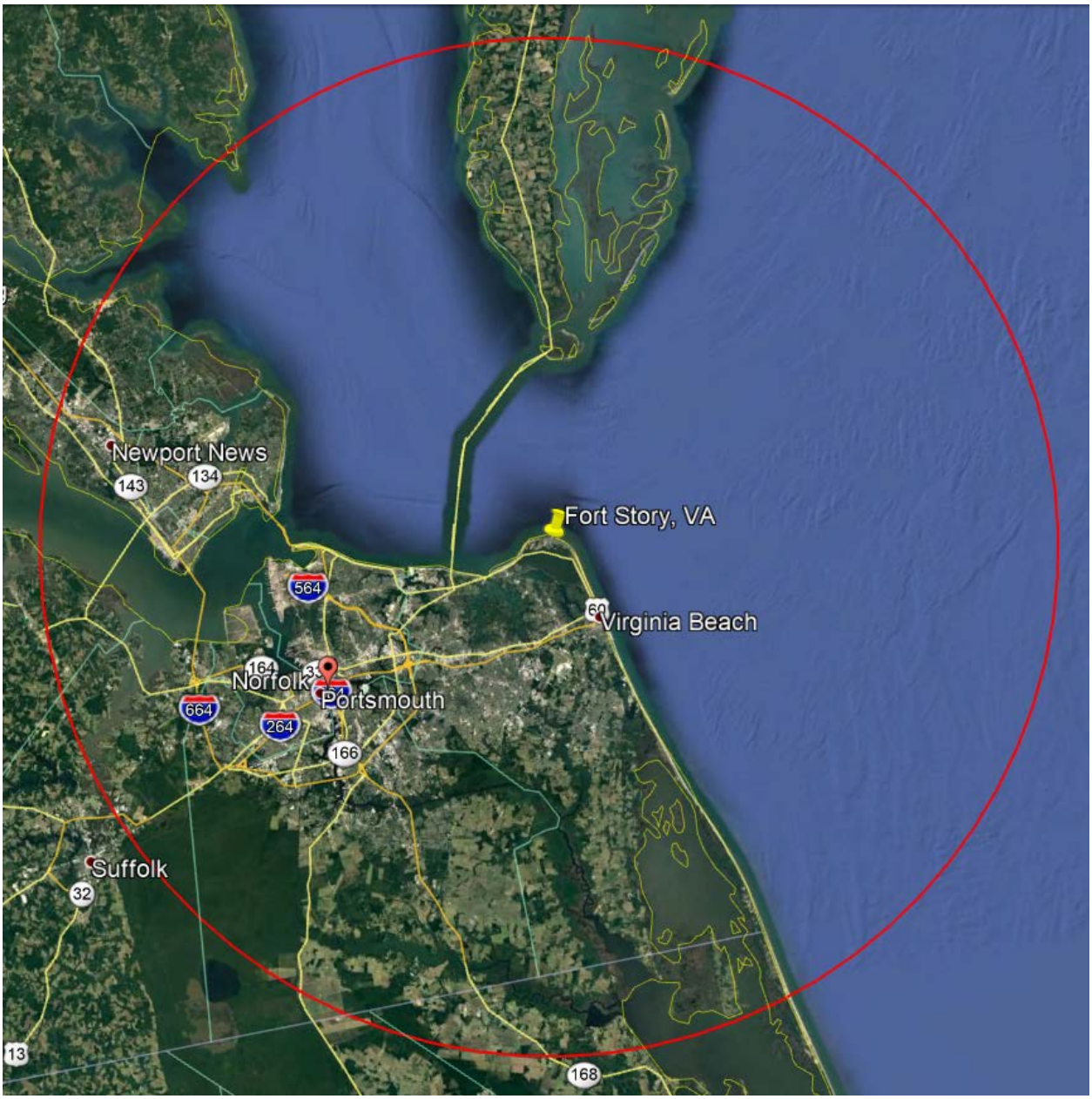

Wesley Chapel
Tarpon Springs
Lakeland
Tampa
Brandon
Clearwater
SRI International, St. Petersburg, FL
Operational Notes-STA Request
St Petersburg
Bradenton
Sarasota
570
33
548
4
589
580
687
19
93A
684
70
72
43
41B

Figure 2


Newport News
143
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Fort Story, VA
564
60
Virginia Beach
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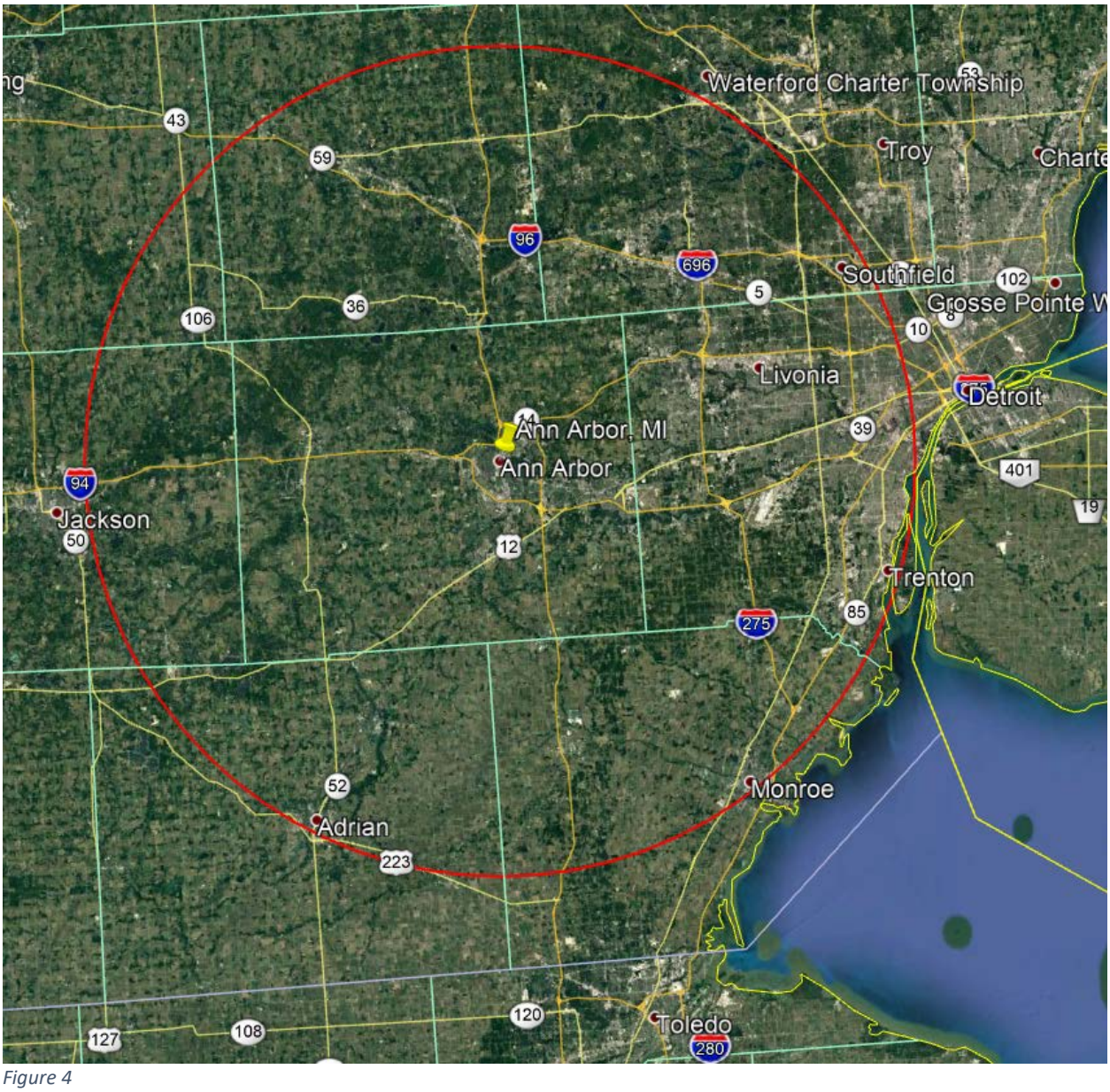
Norfolk
Portsmouth
664
264
166
Suffolk
32
13
168
Figure 3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Troy
Southfield
Grosse Pointe
Livonia
Detroit
Ann Arbor, MI
Ann Arbor
Jackson
Trenton
Monroe
Adrian
Toledo
43
59
96
696
5
102
106
36
10
39
401
94
50
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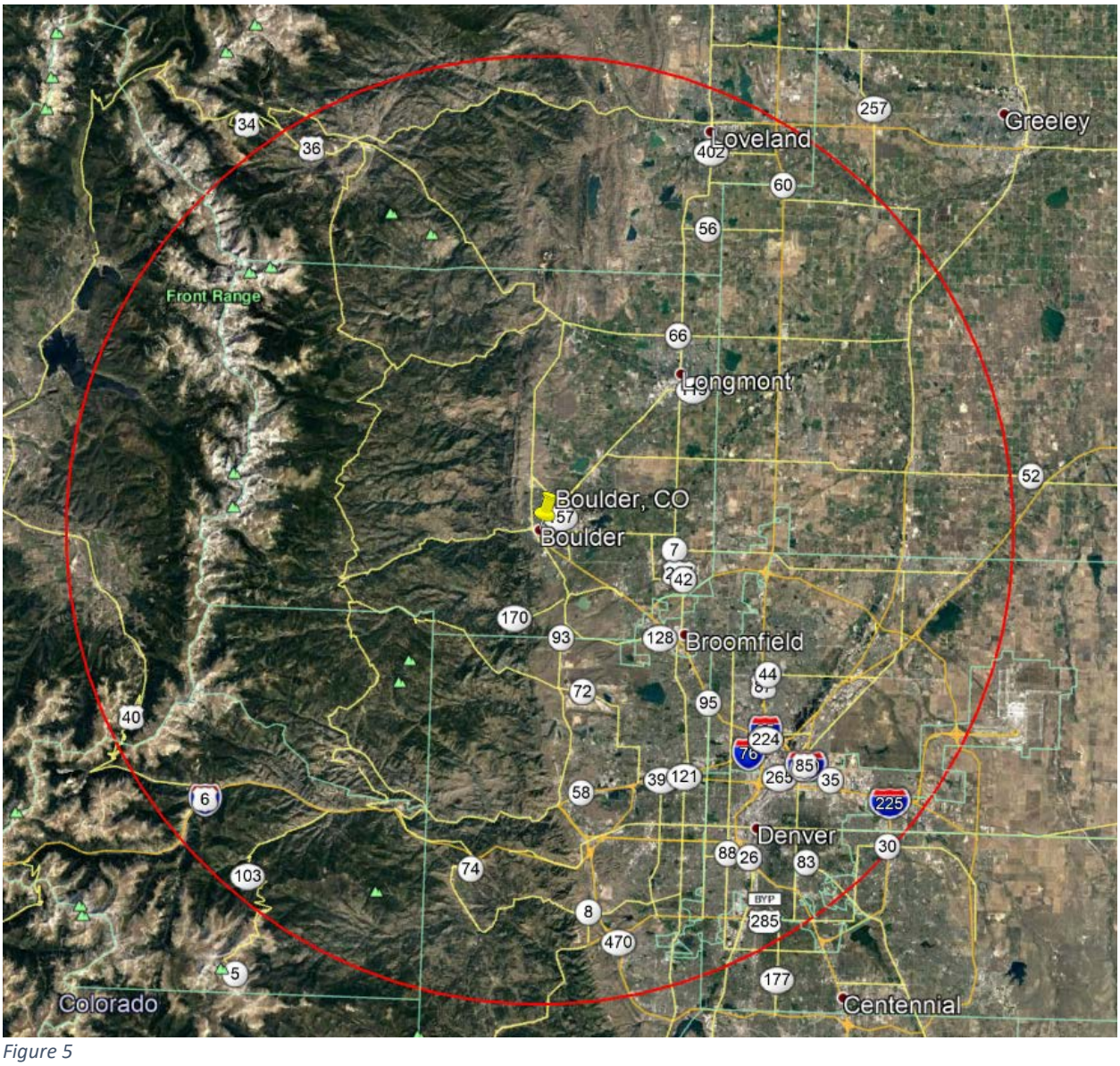
275
85
52
223
120
127
108
280
Figure 4


Greeley
Loveland
Front Range
Longmont
Boulder, CO
Boulder
Broomfield
Denver
Centennial
Colorado
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34
36
402
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57
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93
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44
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95
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76
85
265
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74
103
8
470
177
40
6
5

Figure 5

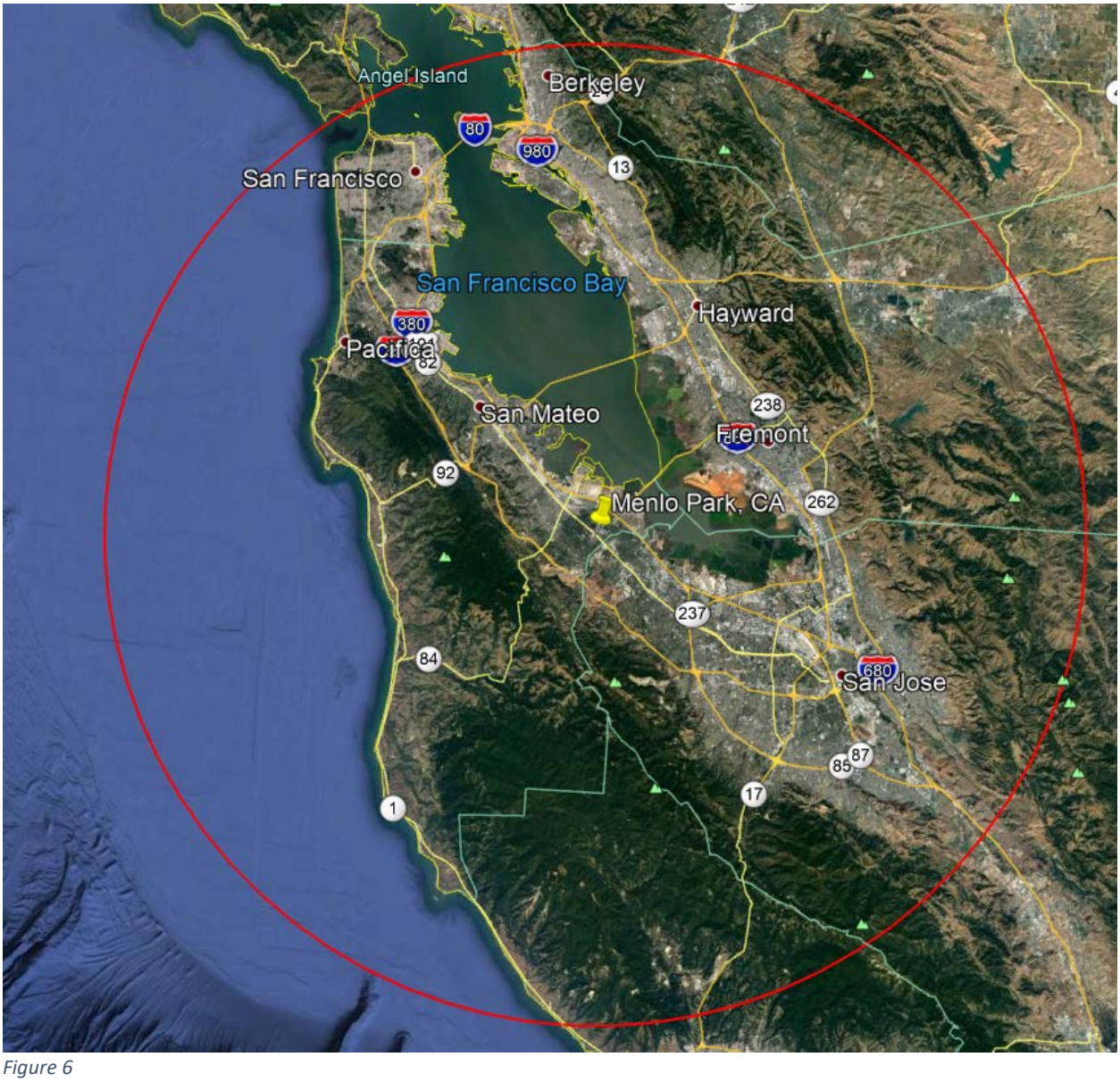

Figure 6

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, un-modulated, 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.