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STA File 1147-EX-ST-2018 Technical Exhibit

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Purpose Note

SRI is submitting this STA due to an upcoming window of availability to field test an experimental transmitter at Fort Story, VA. We request the window of operations to be July 23 – October 31, 2018. Approval to operate as soon as possible is very valuable to the future of the program and its application. The actual period of operation will be for a single test cycle of approximately 1-2 weeks duration, for about 6 hours per day during daylight hours. SRI engineers will be directly operating the transmitter, on site, and will have the ability to immediately turn off the transmitter.

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. In azimuth, beam width and direction will be constrained such that the half-ERP point may occur anywhere between 90 (westward) and 120 (eastward) degrees of true north, with the direction of transmission being northward of these limits. This azimuth range will be achieved by a combination of beam width, manually reorienting the AESA, and using the AESA's azimuth steering feature.

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 be at least 20 μs. The stated mean ERP of 3.7kW is based on 30% duty factor operation.

Signal Descriptions

As stated in the STA application, emissions will be confined to the 8900 – 9000 MHz band. Instantaneous bandwidth will not exceed 25 MHz. 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.

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.

25M0Q1N, pulsed linear fm

- The signal within the pulse envelope will be a linear FM sweep, with a bandwidth of up to 25 MHz.

25M0Q1N, pulsed frequency hop

- The signal within the pulse envelope will frequency hop in an unspecified order over the defined bandwidth.

25M0Q1N, 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 25 M chip/sec, and filtered to limit bandwidth to 25 MHz.