March 11, 2010
Form 422 File Number: 0414-EX-PL-2008, modification request

Federal Communications Commission
Office of Engineering and Technology
Experimental Licensing Branch
445 12th St., S.W.
Room 7-A322
Washington, DC 20554

To Whom it May Concern,

On behalf of ImSAR LLC I would like to apply for a modification of Experimental License Call Sign WE2XVR to further the development of a low power radar system. I would like to increase the band centered at 435 MHz to 200MHz and add a 200MHz band centered at 650 MHz. The request for the 200 MHz bands is to develop detection capabilities for features that are critical to the protection of military and civilian personnel in Afghanistan and other areas of terrorist activity.

The radar will be operated on an occasional basis of a few times per week for roughly an hour each time it is used. The end user of these experimental systems will be predominantly the US Department of Defense.

I hope the attached document has sufficient information to enable a favorable approval of an experimental license.

Sincerely,
Adam Robertson
NanoSAR Program Manager
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Purpose of radio operation:

ImSARs LLC has technology that is able to track moving targets, image the surface of the earth, create digital elevation maps, assist in search and rescue operations, and detect small changes in a scene, such as the movement of a vehicle. The US Navy, Army and Air Force have expressed interest in this technology. The size, weight, power, and cost of this Nano sized Synthetic Aperture Radar system (NanoSAR) is an order of magnitude less than similar systems. The radical change is weight and power consumptions enables tactical use of the radar, which in turn gives surveillance capabilities to small sets of soldiers that were previously unavailable. With the new surveillance capabilities, dangerous and life threatening situations can be further reduced.

Similar radar systems, such as Linx SAR weighs 85 lbs and transmit 300W of power. ImSAR's radar system weighs 2 lbs and transmits less than 1W of power. ImSAR requests a license in order to complete development and begin customer demonstrations.

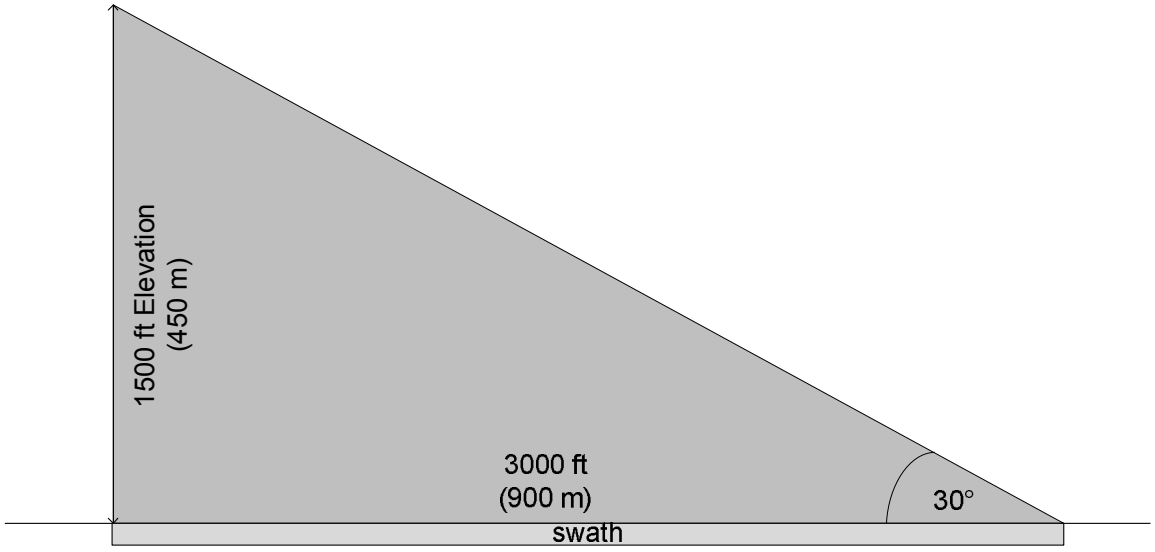
ImSAR will use this experimental license to performed tests from a small aircraft flying under 2km in elevation. The transmit and receive antennas are nominally pointed toward the earth. Reflected signals are collected and processed to create images of the ground. The resolution of the imagery is directly proportional to the bandwidth of the signal transmitted. In order to obtain the targeted resolution, a transmit bandwidth of 200 MHz is desired. Transmission is a succession of linear frequency modulated pulses of less than 20 uS with the frequency being swept from the minimum to the maximum frequency over an interval of 1 to 4 ms. Because the transmission power is under 1W, the pulses are short, and the frequency sweeps very rapid, the average power at a given frequency is extremely low. Transmitter blanking

Transmissions will be generally performed in remote areas over very limited time intervals of roughly an hour at a time, a few times per month.

Operation Location and Height:

NanoSAR will be operated from a small aircraft at a height between 0m and 5000m. The transmit signal is directed perpendicular to the line of site and towards the ground using a fractal antenna array with a beam width of approximately 90° in elevation and azimuth. The peak of the antenna pattern has a 45° incident angle to the ground. The return signal is received by an identical receive antenna co-located with the transmit antenna.

Data collections will occur primarily over rural areas of northern Utah to test the functionality and demonstrate the utility of the NanoSAR as a tool for both commercial and military applications. Sites of interest to be imaged will be terrains of interest to potential customers, including urban and rural scenes. Site at Boardman OR, Arlington OR, China Lake CA, Yuma AZ, and Whidbey Island WA are also areas for testing or potential testing of NanoSAR.



Description of the Transmit Signal:
The transmit signal is from 335 to 535 MHz or from 550 to 750 MHz. The signal is swept frequency pulses of less than 25 uS with blanking of 10 to 50 uS between pulses. Each pulse will begin where the previous pulse left off until the 200 MHz spectrum is covered. The process will repeat every 1 to 4 ms. The baseband frequency is controlled with a highly stable PLL and 25 MHz crystal with 25 ppm stability. The frequency ramp of the mixing signal is controlled with a direct digital synthesizer capable of over 60 dB ACPR. The final power amplifier is a linear MMIC based amplifier with excellent linearity. The highest power spectral density we anticipate is -40 dBW/Hz (75 MHz bandwidth).

We have equipment in house to measure out of band spurious signals and we regularly measure our transmission signals to minimize harmonics and spurious signals.

Time Period of Operation
We have submitted form 1494 for the Merlin UHF radar which is a specific version of NanoSAR adapted for UHF operation. We anticipate the 1494 to take several months for approval. Until that is complete, we would like to continue development. We anticipate doing tests a few times per week, with each test typically lasting under 1 hour.

A Record of non-interference
ImSAR's NanoSAR has logged nearly 50 hours of unmanned flight and more than 200 hours in manned flight operating this system so far. To date we have observed no detectable interference with other systems including communication equipment, active military radar systems, commercial aircraft, or unmanned aircraft systems. NanoSAR has been found to be tolerant of interference from these systems, up to and including interference from large directional antennas and high power military radars.