Oct 5, 2008
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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,

As additional note to the other attachment, ImSAR would like to explore similar low power systems at different frequencies and bandwidths. At low frequencies, such as L band, the radar has foliage and ground penetration capabilities that are of potential military and commercial interest. At higher frequencies, such as 16 and 35 GHz, wider bandwidths are possible giving near optical quality of the images. The usage of different electromagnetic bands yields different properties of the scene being imaged and thereby give additional information to the user. A description of the system at X-band follows. The other experimental hardware is very similar in architecture, transmit power, and transmit waveforms, just at different center frequencies and bandwidths.

Sincerely,
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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 product testing 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 resolutions as small as 0.3 m, a transmit bandwidth of 500 MHz is desired. Transmission is linear frequency modulated continuous wave with the frequency being swept from the minimum to the maximum frequency 1000 times per second. Because the transmission power is under 1W and the frequency sweeps very rapid, the average power at a given frequency is extremely low.

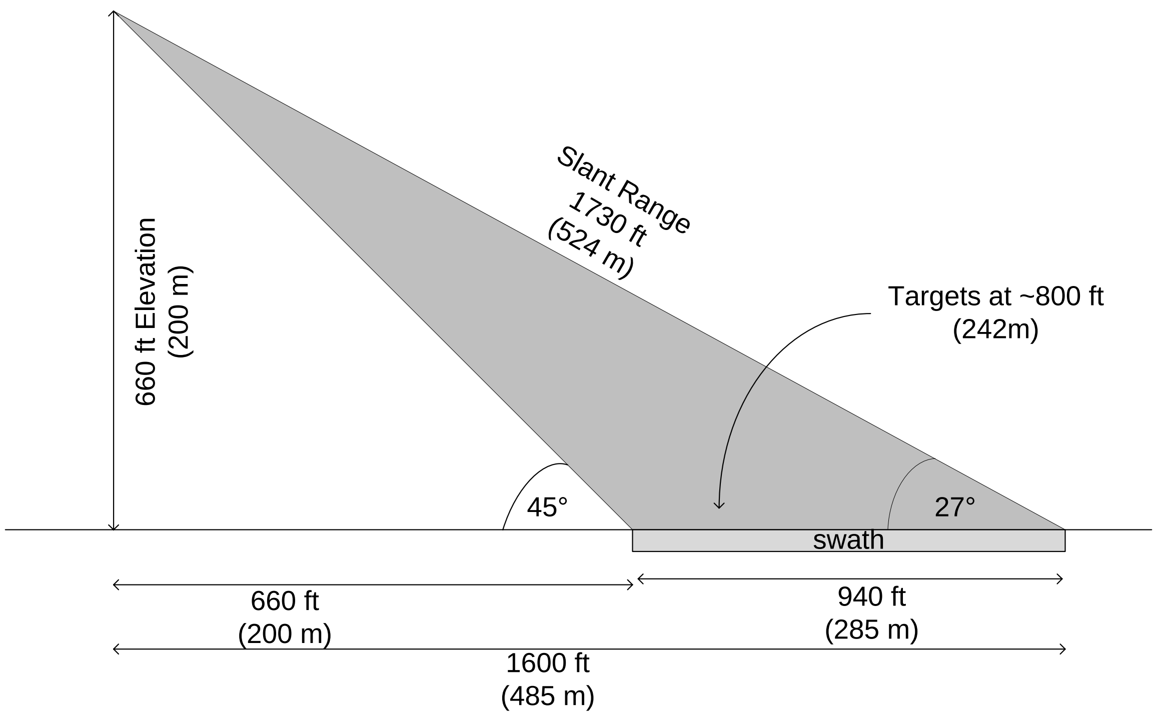
Transmissions will be generally performed in remote areas over very limited time intervals of roughly an hour at a time, a few times per month.

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 simple patch antenna array with a beam width approximately 45°in elevation and 10° along the track of the aircraft. 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 10 to 10.5 GHz. Most transmissions will be further constrained to a small bandwidth of 150 MHz centered at 10.25 Hz. The signal is continuous and modulated only by frequency. The frequency is ramped from the bottom of the bandwidth to the top of the bandwidth at a 1kHz rate. The received signal is mixed with the transmitted signal in a homodyne fashion. Frequency is controlled with a highly stable PLL and 25 MHz crystal with 25 ppm stability. The frequency ramp 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 -49 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 NanoSAR. 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 month, with each test typically lasting under 1 hour.

A Record of non-interference

ImSAR;s NanoSAR has logged nearly 20 hours of unmanned flight and easily more than twice that 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.