5/25/2011
Form 442 File Number: 0151-EX-ML-2011
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 and testing of a low power radar systems. Our FCC registration number (FRN) is 0017528514. This application adds the following new locations:

1. Avon Park, Florida. Coordinates: N27-38-37, W81-16-25. Radius around given coordinates: 10 miles (16.1 km).
2. Camp Atterbury, Indiana. Coordinates: N39-20-18, W86-01-46. Radius around given coordinates: 10 miles (16.1 km).
3. Fort McCoy, Wisconsin. Coordinates: N44-04-15, W90-38-51. Radius around given coordinates: 10 miles (16.1 km).
4. Fort Drum, New York. Coordinates: N44-08-47, W75-38-41. Radius around given coordinates: 10 miles (16.1 km).
5. Eglin Test Range, Florida. Coordinates: N30-32-48, W86-43-52. Radius around given coordinates: 10 miles (16.1 km).
6. Yuma Proving Ground, Arizona. Coordinates: N33-12-09, W114-02-56. Radius around given coordinates: 30 miles (48.3 km).
7. Utah Test and Training Range (Dugway Proving Ground), Utah. Coordinates: N40-12-01, W112-56-51. Radius around given coordinates: 100 miles (161 km).
8. Camp Roberts, California. Coordinates: N35-43-00, W120-45-53. Radius around given coordinates: 10 miles (16.1 km).

The end user of these experimental systems will be predominantly the US Department of Defense.
We have operated up to this point under experimental license call sign WE2XVR.
I hope the attached document has sufficient information to enable a favorable approval of an experimental license.

Sincerely,
Doug Yarrington
ImSAR LLC, General Counsel
510 W 90 S
Salem UT 84653
801-762-7263
dyarrington@imsar.com

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 ImSAR's Synthetic Aperture Radar system (SAR) are an order of magnitude less than similar systems. The radical change in 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, weigh 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 perform 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.

Very low UHF frequencies are employed to enable ground penetration and observation of specific targets where UHF reduces the clutter of the background.

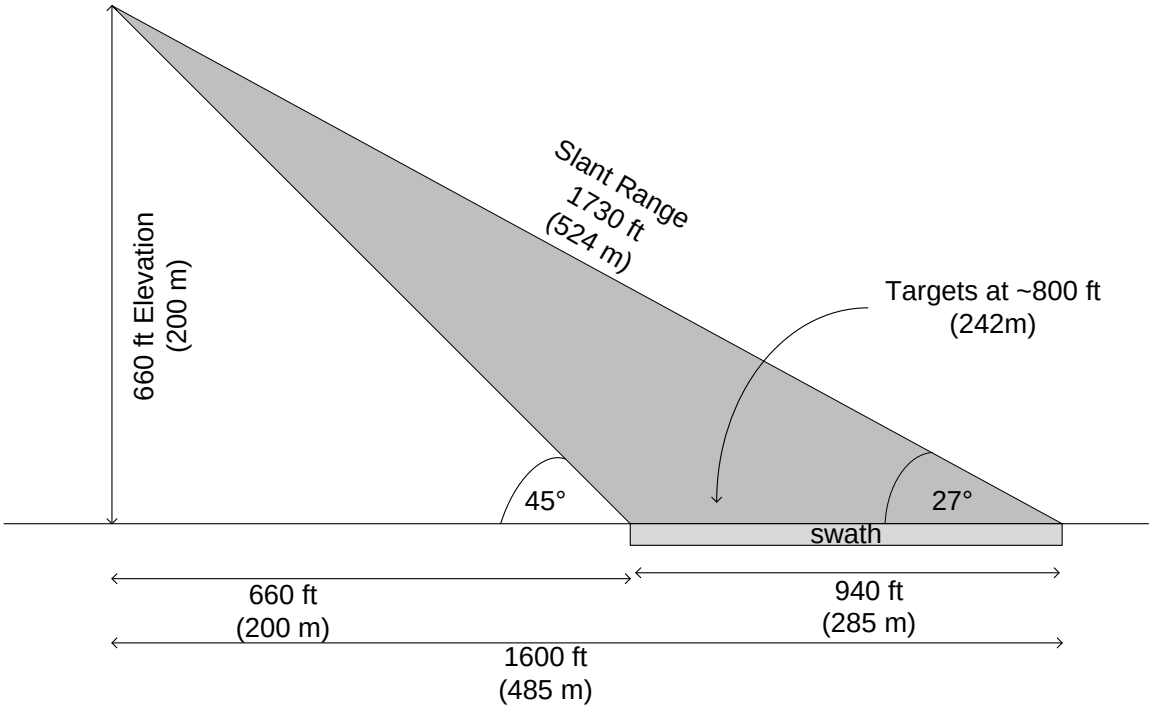
Transmissions will be generally performed in remote areas over very limited time intervals of roughly an hour at a time, a few times per month.

Operation Location and Height:

The radar 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 and remote government owned lands to test the functionality and demonstrate the utility of the radar

as a tool for both commercial and military applications. The sites we are attempting to add to the license (detailed above on the cover letter) are government-owned areas where we anticipate developing and demonstrating the radar systems.



Description of the Transmit Signal:

The transmit signal may be centered at 550 MHz, 10.25 GHz, or 16.35 GHz.

A specific example is illustrative: For X-band, centered at 10.25 GHz and operating from 10 to 10.5 GHz. 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 -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 anticipate developing and demonstrating the SAR systems over the course of the next 5 years.

A Record of non-interference

ImSAR's Radars have logged 100s of 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. The radar systems ImSAR produces 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.