IMSAR
THE RADAR REVOLUTION

Company and Technology Background

IMSAR 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. Various branches of the US military, including the Navy, Army, and Air Force, as well as some commercial businesses, have expressed interest in this technology. The size, weight, power, and cost of IMSAR's Synthetic Aperture Radar (SAR) system, known as NanoSAR, are an order of magnitude less than similar systems.

IMSAR performs SAR tests from a small aircraft typically flying between 2,000 and 6,000 feet in altitude (above ground level). Directional transmit and receive antennas are nominally pointed toward the earth. Reflected signals are collected and processed to create images of the ground. Transmission is a linear frequency modulated (LFM) signal with the frequency being swept from the minimum to the maximum frequency 1000 times per second. Because the transmission power is relatively low and the frequency sweeps very rapid, the average power at a given frequency is extremely low (low duty cycle). The transmit signal is directed perpendicular to the direction of travel and towards the ground using a directional antenna.

The Ku-band system typically operates with a contiguous bandwidth of 1500 MHz, and can be programmed to operate anywhere between 15.4 and 17.7 GHz. The system is not currently capable of notching in the middle of the 1500 MHz band. Therefore, if a potential conflict is present, the transmission frequencies must be moved to a different portion of the 15.4-17.7 GHz band, or the bandwidth reduced. The system can operate with a reduced bandwidth (< 1500 MHz), but the imaging capabilities are reduced proportionately.

UHF frequencies are employed to enable ground penetration and observation of specific targets where UHF reduces the clutter of the background. The UHF system is capable of operating over any size bandwidth between 300-1600 MHz, and has the ability to notch any specified portion of the band. However, like the Ku system, there is a reduction in performance as the total bandwidth is reduced, and also as portions of the band are notched.

L and S-band radios are used to communicate between the ground-based control station, and the airborne radar systems. Each radio only uses a small amount of bandwidth, at a single center frequency, but is capable of operating anywhere within the band requested in the application. Since we do not know where potential conflicts might exist at a given location, we have requested authorization over the full band, with the expectation that we will be notified of any limitations, and can identify an appropriate portion that is clear for operation.

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