IMSAR
THE RADAR REVOLUTION

Purpose of Demonstration

The purpose of this demonstration is to demonstrate the capabilities of IMSAR's radar for the United Stated Custom and Boarder Protection Agency (CPB). This is a manned mission with the radar being mounted on a CBP aircraft and flown at or below 10,000 MSL. All radar data collections will be focused/transmitted on or near the U.S. – Mexico border.

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Company and Technology Background

IMSAR LLC has radar 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 10,000 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 continuous wave (LFM-CW), or a "chirp," with the frequency being swept from the minimum to the maximum frequency 1000 times per second. A chirp signal is illustrated in Figure 1. Because the transmission sweeps are very rapid, the average power at any given frequency is extremely low, as is the likelihood of detection by (i.e., interference to) ground based systems operating in the same frequency range.

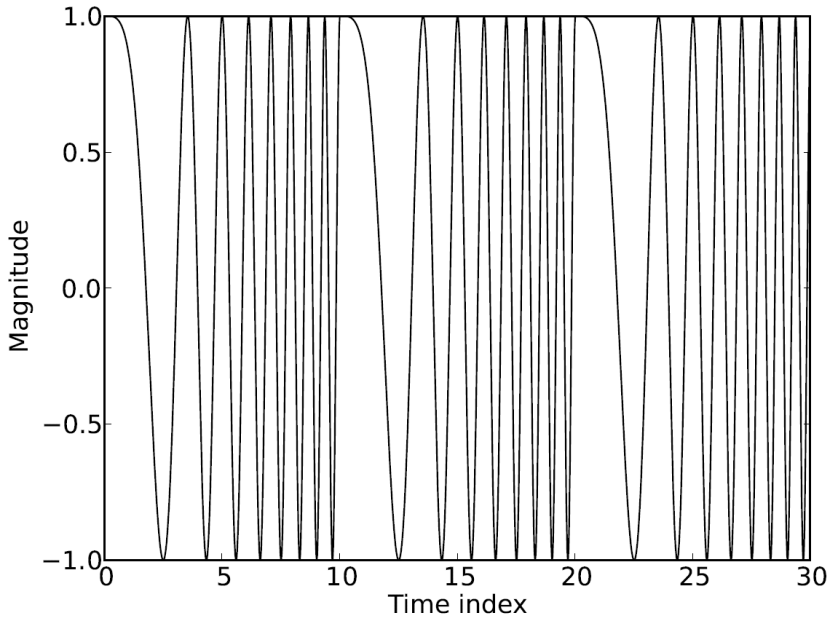

Figure 1. Example LFM chirp signal, increasing in frequency from left to right, then repeating.

The transmit signal is directed perpendicular to the direction of travel and towards the ground using a directional antenna. The antenna radiation pattern is approximately 120° in elevation and 70° in azimuth. The back lobes of the antenna are attenuated significantly. The peak of the antenna pattern has a 45° incident angle to the ground. The return signal is received by the same antenna. An example of the geometry of a SAR is shown in Figure 2.

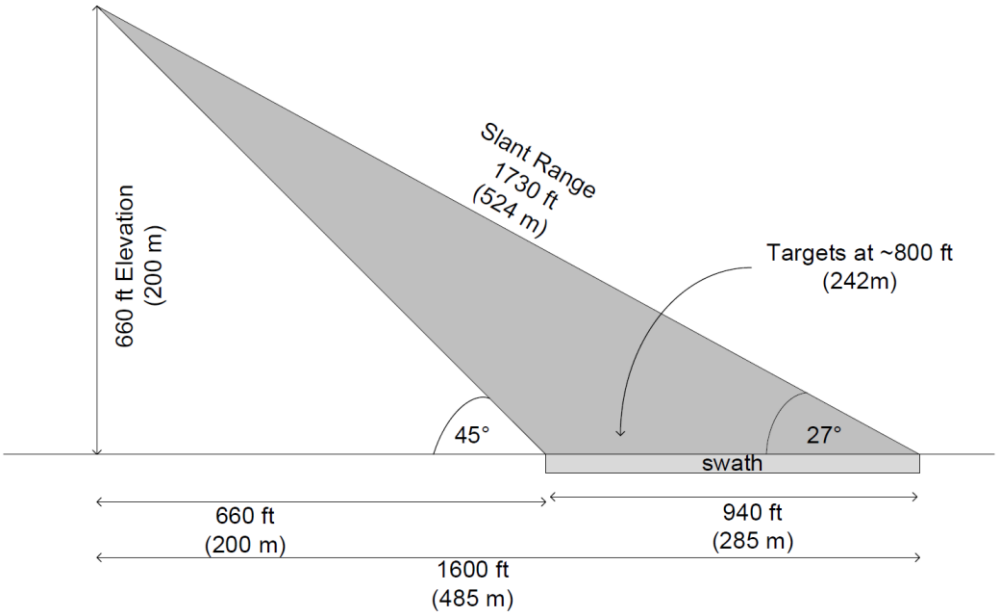

Figure 2. Example SAR geometry, from an airborne platform.

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