

ABSTRACT

VSAT (Very Small Aperture Terminal) technology is a ground terminal technology used in satellite communication devices. It emits focused beams through a directional Radiation pattern in VSAT, which enhances antenna performance by minimizing observed interference through radiation pattern, gain, and also side lobes. The utilized antenna type for VSAT is the offset antenna, which features a directional radiation pattern with focused emission for high gain. The technology employs the Ku-Band frequency range, spanning from 12.5 GHz to 12.7 GHz, with relatively small antenna sizes ranging from 0.8 meters to 1.4 meters. Optimization of the radiation pattern of the offset VSAT antenna is achieved through the use of different feed types, including circular feed horns and pyramidal feed horns, as well as increasing the antenna diameter. Antenna diameters are simulated at 0.8 meters, 0.9 meters, 1 meter, 1.2 meters, and 1.4 meters. The application of circular feed significantly improves the radiation pattern and gain in the offset antenna using pyramidal feed. The results show that the gain of the offset antenna with pyramidal feed for diameters of 0.8m, 0.9m, 1m, 1.2m, and 1.4m are 27.9 dB, 28 dB, 27.9 dB, 27.9 dB, and 28.3 dB, respectively. After optimization using circular feed horn, the gains become 30.6 dB, 30.7 dB, 30.8 dB, 31.2 dB, and 31.2 dB for the corresponding diameters. Furthermore, the side lobe levels, initially measured at -32.40 dB, -32.60 dB, -31.60 dB, -31.60 dB, and -31.60 dB, are reduced through the use of circular feed to -40.20 dB, -39.90 dB, -40.30 dB, -40 dB, and -41 dB. Thus, the influence of radiation pattern on gain for each offset antenna can be optimized from pyramidal feed to circular feed, where lower side lobe levels lead to increased gain.

Keywords: VSAT, offset antenna, gain, side lobe level