

Cross-Dipole Right-Hand Circularly Polarized UHF/VHF Yagi-Uda Antenna for Satellite Applications

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Abstract : Satellite communication plays a pivotal role in modern global communication networks, serving as a vital link between terrestrial infrastructure and remote regions. The demand for reliable satellite reception systems, especially in UHF (Ultra High Frequency) and VHF (Very High Frequency) bands, has grown significantly over the years. This research paper presents the design and optimization of a high-gain, dual-band crossed Yagi-Uda antenna in CST Studio Suite, specifically tailored for satellite reception. The proposed antenna system incorporates a circularly polarized (Right-Hand Circular Polarization - RHCP) design to reduce Faraday loss. Our aim was to use fewer elements and achieve gain, so the antenna is constructed using 6x2 elements arranged in cross dipole and supported with a boom. We have achieved 10.67dBi at 146MHz and 9.28dBi at 437.5MHz. The process includes parameter optimization and fine-tuning of the Yagi-Uda array's elements, such as the length and spacing of directors and reflectors, to achieve high gain and desirable radiation patterns. Furthermore, the optimization process considers the requirements for UHF and VHF frequency bands, ensuring broad frequency coverage for satellite reception. The results of this research are anticipated to significantly contribute to the advancement of satellite reception systems, enhancing their capabilities to reliably connect remote and underserved areas to the global communication network. Through innovative antenna design and simulation techniques, this study seeks to provide a foundation for the development of next-generation satellite communication infrastructure.

Keywords : Yagi-Uda antenna, RHCP, gain, UHF antenna, VHF antenna, CST, radiation pattern.

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