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DESIGN OF A DETACHABLE ANTENNA SYSTEM FOR NANO SATELLITE GROUND STATION

Abstract

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Satellite systems have evolved considerably in recent years and there is a phenomenal growth in Nano satellite deployment throughout the world. The Nano satellite plays an important role in surveillance applications and in particular it creates a platform for scientific research in academics. A satellite ground station comprises of massive hardware and infrastructure, its operating task execution requires enormous power and maintenance overheads. When communicating with Nano satellites requiring data rate of around few Kbps, there exist a scope for reducing the large infrastructural needs and power requirements. In order to reduce the cost, the concept of internet based ground station is being developed. To design a low cost ground station one needs to develop a low cost antenna system. This paper is an effort to design and deploy a directional antenna for low cost ground station. The developed Quadrifilar Helix directional antenna produces circular polarization with half-power beam width of 26 degree and directivity 47 dB. The Aluminum alloy base composite material is used for antenna fabrication along with copper wires. The antenna system has voltage standing-wave ratio of less than 2:1 covering 2025-2125 MHz and 2200-2300 MHz for up-link and down-link respectively. The simulation results indicate the gain performance in the order of 28 dB and with this gain we are able to demonstrate sufficient link margin during transmission as well as reception. The designed antenna system is easy to fabricate and can be re-tuned for different frequency bands.