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Research Article

Asymmetric Coplanar Strip- (ACS-) Fed Side Edge Panel MIMO Antenna for IoT and 5G Applications

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For future wireless high-speed wireless applications, the antenna design plays an indispensable role. Electrical compactness has been challenging over the years among the research fraternity. Hence, this paper proposes an electrically compact and miniaturized asymmetric coplanar strip- (ACS-) fed MIMO to bridge this research gap. In MIMO antennas, two electrically small antennas are used and are placed on the edges of the smartphone. A ladder-shaped radiator with a C-shaped slit inserted on the ground plane makes up the antenna's monopole radiator. A compact antenna is proposed in this paper with dimensions of $0.076\,\lambda \times 0.409\,\lambda \times 0.005\,\lambda$. This achieves dual band characteristics, which cater to 3.5/5.5 GHz (WiMAX), 5.8 GHz (WLAN), 6.3 GHz (C-band), and sub-6 GHz 5G bands. For the available aperture, reasonable gain is attained by the proposed architecture. Furthermore, fractional bandwidth of 69% and 43% in 2.6 GHz and 5.5 GHz bands, respectively, acting in accordance with the bandwidth stated by Wheeler and Chu's limit, has been attained in this ACS-fed antenna. In both the operating frequency bands, more than 20 dB isolation between the antenna elements has been achieved. High integrity is attained by the radiation pattern, and actual deployment is granted. Moreover, the simulated results presented are in good accordance with the measured results.

1. Introduction

The dramatic increase in global mobile data traffic in recent years because of various advanced applications, including the Internet of Things (IoT), wearable devices, and 5G communication, put a lot of pressure on upgradation of communication systems in terms of capacity and performance. The spectrum in sub-6 GHz bands is covered by a wide range of commercial wireless standards, such as WLAN (wireless local area network), worldwide interoperability for WiMAX (microwave access), and C-band applications [1]. Portable devices with multicarrier hardware ecosystems have been created and tailored to target consumer applications [2], such as wireless sensor network nodes, wireless dongles, and IOT (Internet of Things) sensors [3–5]. The data rates are still limited in sub-6 GHz communication because of the narrow bandwidth. The network at the spectrum level must seamlessly utilize sub-6 GHz bands for the spatial multiplexing and coverage of many devices. In contrast, higher bands must be employed for expelling the peak rates of point-to-point links [6, 7]. The constraints while designing the above-mentioned applicants are critical as very compact radiators are required in low-power devices so that they fit in these devices. The antennas should be compact with the primary module consisting of the substrates of the RF boards and should support pattern diversity to achieve better device throughput. Antennas have specific and preferable resonances over the nonresonant UWB (ultrawideband) antennas [8]. A compact simple structure MIMO UWB antenna is proposed in [9] for portable devices. A connecting metal line and cross-shaped decoupling slots are engraved on the ground plane to attain UWB characteristics and separation/isolation between the elements. Here, we have proposed a composite right left