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Compact High Gain Microstrip Patch Multi-Band Antenna for Future Generation Portable Devices Communication

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Telecommunication services have been developing at a continuously accelerating pace, and it is forecasted that it will accelerate even more, that is particularly so for the wireless communication system with the introduction of 4G and 5G and the integration of the Internet of Things (IoT). Microstrip patch antennas present undeniable advantages when compared to other antennas such as low cost, compact, planar surface, flexibility in performance parameters and easy fabrication. Such advantages have made these antennas so popular. The main objective of this research is to design an antenna operating at multiple frequencies with high performance. This paper discusses design of compact multiband antenna with microstrip-line-feed designed for future wireless devices applications. The introduced antenna is simulated using Rogers RT-5880 substrate of having dimensions $21 \times 16 \times 0.507 \text{ mm}^3$ with dielectric value 2.2 and 0.0009 tangent loss. Planned patch antenna operates initially at 10GHz with return loss -11.19dB and VSWR 1.76. I shaped slots on patch and defective ground structure technique is employed for multiband operation and improvement in performance parameters. Multiband antenna resonates frequencies 10, 21, 30 and 34 GHz with return loss -19 dB, -12dB, -12dB, -11 dB and VSWR 1.2, 1.5, 1.6, 1.82. International Telecommunication Union (ITU) specified these frequencies for radio astronomy, wireless LAN, satellite communications, DBS applications. Designed antenna provides gain 7.785dB, 3.508 dB, 7.510 dB, 7.7746 dB at 10,21,30,34GHz respectively.

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☰ Contents

I. Introduction

In recent years rapid growth in wireless industry initiated demand for large scale growth of efficient mobile device and good performance communication network, thus require high efficiency in the antenna design as it is basic part of every wireless system. Expected is designed antenna should be compact. For multi functionalities we need to design multiband antenna to fulfil various wireless devices need. Thus, there is a need to design a multiband antenna to work at multiple frequencies. Microstrip patch antennas are one of the basic elements of today wireless communication. Future generation portable devices conversation is waiting to meet potential never attained earlier [2]. It's demanded stipulations are including huge bit rate, better utilization of frequency spectrum and lower latency [3]. Upcoming mobile radio intelligence chain (5G) [4], [5], [6] are predicted to build a footprint along supporting multiple functionalities and advantages compared to particulars what 4G offered. Leading communication system would connect entire world and stow the support for a world-wide web.

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