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Cone Shaped Multiband Antenna for Wireless Applications

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Abstract— In this paper multi-band microstrip-fed monopole antenna is proposed to apply Satellite communication, GSM 860 & GSM 1800. A cone-shaped defected patch antenna with the reduced ground plane is proposed to build a multi-band antenna. Because of the defective patch, the antenna resonating in triple bands 860MHz, 1.8GHz &2. 1GHz.The size of the antenna is 72*1.6*100 mm3. The antenna simulation is done on CST software using FR-4 substrate.
Keywords— Defected Ground Structure (DGS), multi-band applications.

I. INTRODUCTION

Wireless communication is now an essential part of contemporary life. The antennas, also known as the "eyes" or "ears" of communication systems, are essential components of the wireless communication device. One of the more popular commercial antennas, a printed antenna, is usually used for military or civilian use like radar, satellite, transportation systems & communication since it offers advantages like low manufacturing costs, compact design & lightweight. The printed antenna design for Ultra-Wide Band communication technology is defined in this thesis. Over recent decades the communication on Ultra-Wide Band has been thoroughly investigated because the FCC has launched the free license spectral mask of Ultra-Wide Band Radio with a bandwidth of between 3.1 and 10.6 GHz (UWB frequency ranges) over 7.5 GHz, a promising, short-range high-rate data transfer technology [1]. The communication system for UWB, on the other hand, needs extremely low radiation power to prevent interference with other systems. Three strategies are presented to address this challenge, based on antenna aspects.

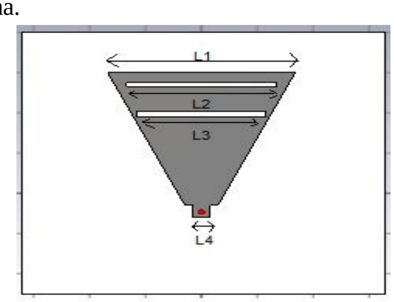
Different wideband-operated antennas for radar & communications systems have been studied for many years [2]. The wide-band antenna design for a handheld terminal is particularly difficult as simplicity, size, and cost must compromise. The design of a compact antenna and the wide-band characteristic of the entire operating band are key problems in UWB communications systems. Based on its attractive wide bandwidth characteristics, simple structures. Several broadband monopoly configurations, including a circle, square, elliptical, hexagonal [4]–[6], were proposed for ultra-wideband applications. However, omni directional radiation patterns and ease of installation are not ideal for integration by printed circuit boards because they lack planar structure. Due to their appealing characteristics, like lightweight, low cost, and low profile, the microstrip-powered monopole antenna is ideal for the integration by the handheld terminal.

This paper proposes the new compact microstrip-fed antenna with a printed monopole. DGS is implemented on the partial ground to obtain the multi-band characteristic, and some defects have been made on the patch. To show the efficiency of the suggested antenna, simulated results are described.

II. METHODOLOGY

The projected wide-band antenna configuration is exhibited in fig 1, which contains a circular patch with a microstrip feedline and two perpendicular cut widths.

The figure exhibits the top view of the antenna.



(A)

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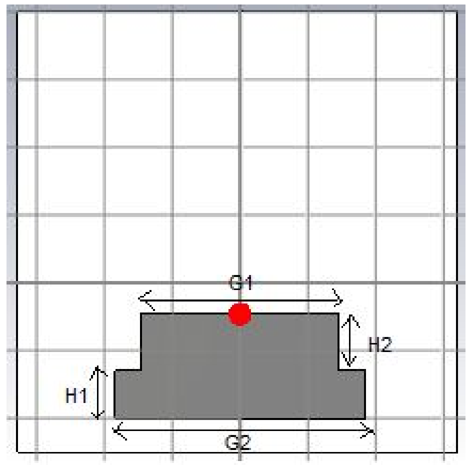

(B)

Figure l. Front and Back sides of the suggested antenna. (A) The front side of the circular patch with microstrip feed, (B) Partial ground with DGS.

The proposed antenna values L1=72, L3=46, L2=54 L4=6 mm, G4=54, H1=16mm, H2=20, and G=62 mm. The radiation efficiency of the antenna is increased by using partial ground.

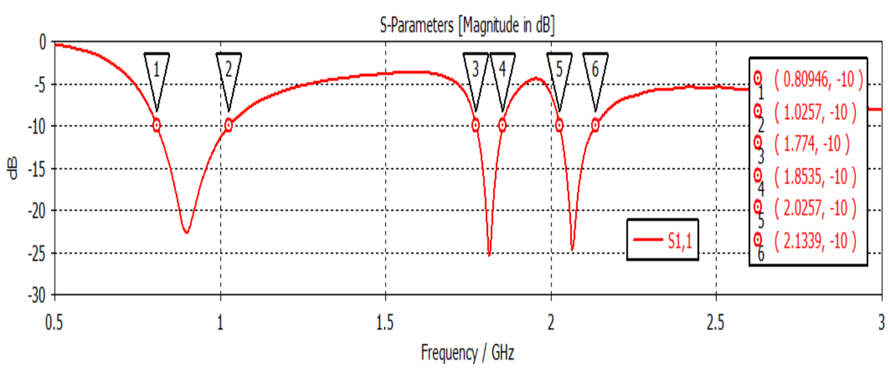

Figure 2.Return loss vs. Frequency

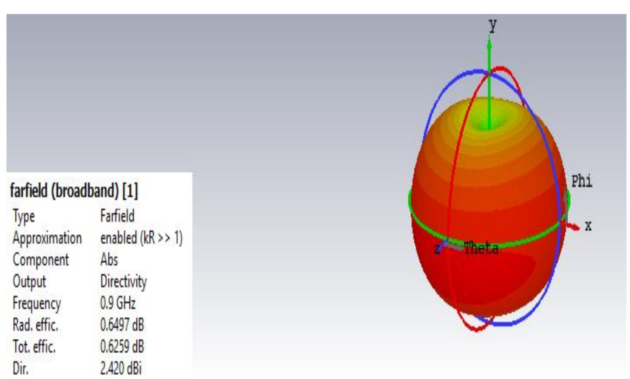

Figure 3. The radiation pattern of the simulated patch antenna at 0.9GHz operating frequency.

These outcomes indicates that the antenna has a return loss value of less than -10dB at three instances, which means that the antenna operates at three different frequencies, making this antenna a multi-band antenna. Bandwidth of these 3 bands are 216MHz, 79MHz and 108MHzwhereas return losses are -22dB, -25dB and -25dB respectively for 0.86GHz, 1.8GHz and 2.16GHz. Observing these figures can be analysed by raising the operating frequency. The coverage area of the radiation by the antenna can also be varied. Approximately omni-directional results are obtained, especially at the upper operating frequency.

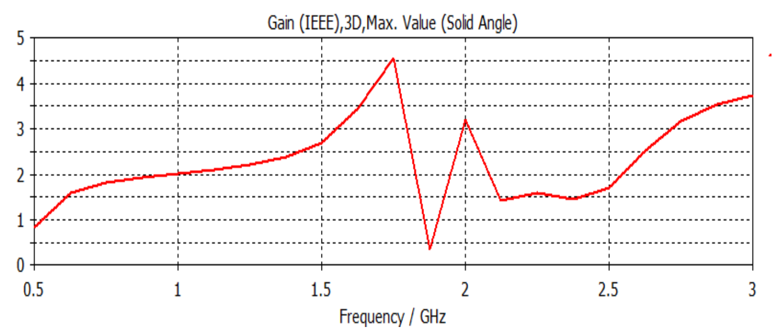

Figure 4.Gain of the proposed antenna

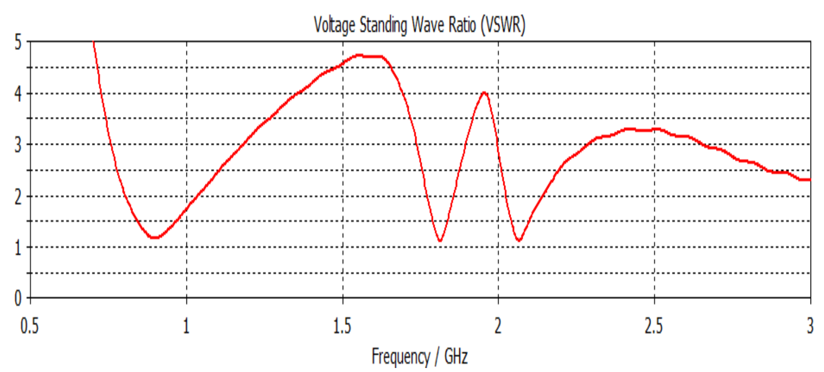

Figure 5. VSWR

Figure 4 and 5 are indicating the variation in antenna gain and VSWR in the frequency band of 0.5 to 3GHz; it can be observed from figure 4 that the maximum gain achieved from this antenna is 2.5dBi at 2.1 GHz and VSWR is less than two at all the operating frequency bands

III. CONCLUSIONS

The designed antenna is a compact monopole antenna for multi-band application. The designed antenna is ***resonating in triple bands 860MHz, 1.8GHz & 2.1GHz. The antenna is suitable for GSM and Satellite applications. The antenna gain is 2.5 dBi & VSWR less than 2 for all operating bands.*** The antenna is very easy to manufacture and has a very simple configuration.

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