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DESIGN OF SLOT ANTENNA WITH DEFECTED GROUND STRUCTURE FOR WIMAX APPLICATION

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Abstract: It is presented a slotted Micro strip patch antenna for WIMAX Wireless application. Embedding slots with Defected Ground Structure (DGS) technique improves overall performance of an antenna at 5.66GHz in this proposed design. The Computer Simulation technology (CST) simulator which can simulate electromagnetic signals is used for the design. The size of this antenna is 72.54×72.54mm^2. The proposed prototype antenna is well suitable for WIMAX application. The antenna parameters like Bandwidth, Radiation Efficiency, Gain and Directivity have been increased.

Keywords— WIMAX, DGS, Square slot, CST Software.

1. INTRODUCTION

Microstrip patch antenna is a kind of radio wave antenna with a low profile which is embedded on a flat surface. It is a conformal and a planar structure, compactness, low profile, directive with high transmission efficiency and ease of integration with microwave circuit and portable communication equipment. A major factor for recent advancement in Microstrip patch antenna is the current evolution in electronic field miniaturization brought about by improvement in large scale integration. For improved antenna performance, a thick dielectric substrate is desirable since this provides improved efficiency, larger bandwidth and better radiation.

With this added advantage we are implementing slots. The slot antenna is simply an opening cut in a sheet of conductor which is energized in some appropriate manner, such as via a coaxial cable or waveguide. The slot antenna makes use of the fact that energy is radiated when a high frequency fields exist across a narrow slot in a conducting plane. The shape, size of the slot and the frequency determines the radiation pattern. Slot antennas are usually used at Ultra High Frequency (UHF) and microwave frequencies. The introduction of slots in our design enhances bandwidth and gain of an antenna. In this proposed work we made DGS for enhancing antenna parameters for WIMAX Wireless application. The geometrical slot embedded on the ground plane of microwave circuit is known as Defected Ground It is integrated into the ground plane with planar transmission line (i.e.) Microstrip line. It is embedded etching off a basic cut in the ground. The use of DGS in our design improves antenna parameters and radiation characteristics and also it reduces mutual coupling between adjacent element and cross polarization.

WIMAX- Worldwide Interoperability for Microwave Access. It is a family of Wireless Broadband Communication Standard based on IEEE 802.16. WIMAX is an advanced technology based on a standard designed to meet the need for very high speed wide area internet access with low cost. The main aim of WIMAX is to provide business and consumer broadband service on the scale of MAN. The speed of WIMAX transmission is 70 mbps. It provides portable mobile broadband connection across cities and countries through various devices. WIMAX provides compatibility and interoperability of devices. Comparing with Wi-Fi, WIMAX supports further transmission distance and high data rate. The use of both Defected Ground Structure (DGS) and slot enhance the antenna parameters such as Bandwidth, Radiation Efficiency, Gain, and Directivity for WIMAX application at 5.66GHz. Nowadays, DGS has been widely used for enhancing Microstrip patch antenna. Bandwidth enhancement rectangular monopole antenna is reported in [1]. Multiband patch antenna is proposed with the partial ground plane for improving bandwidth [2]. U shape patch antenna and impact on the ground plane is discussed in [3]. Several techniques for improving bandwidth in antennas are stated in [4] to [6].

In this paper, combinations of two methods such as slot and DGS has been proposed to increase the parameters of the antenna. Great improvements in antenna parameters are achieved at 5.66 GHz. The enhancement in bandwidth is achieved by 33%, radiation efficiency by 75.82% and antenna gain and directivity by 6.01 and 8.42 respectively. The paper proceeds as Section II discussing the structure of the design. The results are analyzed in Section III, and finally, Section IV will conclude the work.

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