

Chapter 7

Design of Bow Tie Antenna for Industrial IoT Application

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ABSTRACT

A printed bow-tie antenna is designed and simulated for IoT application. This antenna is designed and fabricated using FR4 dielectric material constant around 0.002. Thickness of the substrate is about 1.6mm. Two triangular elements one as a reflected element of another are arranged in such a manner to propose a single element. Antenna parameters are simulated using CST Microwave Studio, which gives a better compromising with measured results. The proposed antenna resonates at 8GHz with a return loss S_{11} of - 23.351dB, VSWR of 1.16, directional gain of 5.89dB, respectively.

DOI: 10.4018/978-1-7998-9315-8.ch007

INTRODUCTION

Internet of Things (IoT) can be defined as a computer network that includes integrated technology to help the device communicate information within its environment and wireless setting. IoT enables these devices to be remotely controlled by providing wireless communication across the network, resulting in some economic benefits and improved efficiency. Microstrip antennas with a wide operation bandwidth have received much attention due to their employment in different applications with easy tuning options. The world of wireless telecommunications evolves rapidly. Wireless networking represents the future of computer and Internet connectivity worldwide. The Bowtie microstrip antennas have been designed for wireless LAN communication. The advantages of bow tie antenna are as follows: they are thin and light weight; they are compatible with mobile terminal equipment; they have equality factors; their bandwidth are narrow; they have enough antenna gain. Nowadays electronics and wireless communications are rapidly developing, we need only one device which can operate at different frequency standards (Saravanakumar, U; Rangarajan, R; Haripriya, R; Nithya, R and Rajasekar. K, 2013). Also, by introducing two loop strips in the bow-tie slots, the gain at low frequencies is increased (A. C. Durgun; C. A. Balanis; C. R. Birtcher and D. R. Allee, 2011). The measured results show that the proposed antenna has a bandwidth of 8GHz. Wireless networks provide all of the features and benefits of traditional local area network technologies such as Ethernet and Token Ring without the limitations of wires and cables. These solve the problem of antenna practicality of the traditional ground-penetrating radar (GPR), which is low because of its excessive size, expensive cost, and insufficient bandwidth. But issues remain, as the antenna gain is not high and the directionality is inaccurate and affects the GPR performance. The bow-tie patch actually is the combination of imaginary image of two triangular patches which are fabricated in a single substrate. A bowtie antenna is a wire approximation in two dimensions of a biconic dipole antenna. The main software used to design and implement the program is CST microwave studio. CST microwave studio is a specialized tool for the 3D EM stimulation high frequency components. The CST microwave studio program is used as a main program to stimulate and design the antennas. It is also called as an Auto sketch software or Drawing Software in which we can draw the inclusive electrical structure of antennas with 1:1 scale in order to print the antenna which we needed on laser paper for fabrication. This program is used to avoid any errors or mistakes during fabricating the antenna structures. Antennas design for wireless communication systems has attracted a great interest during the last years. The printed antenna has advantages such as low cost, light weight which is a suitable criteria to design a wireless communication and ease of integration with microwave circuits (Anita Jones Mary; Bathala V. Sindooja, 2014). The bow-tie patch actually is

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