DESIGN OF DUAL-PORT U-SLOT RECTANGULAR MICROSTRIP PATCH ANTENNA FOR WLAN APPLICATIONS

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Abstract

An efficient U-shaped slot dual port rectangular micro strip patch antenna is presented for supporting two different WLAN bands at (2.3-2.5)GHz and (2.7-2.9)GHz due to its dual-port structure. In order to reduce the transmission coefficient between the two ports of antenna a coupling sleeve-arm and an inverted T-shaped slot are used. In existing system they have designed U-shaped slotted antenna for WLAN applications at the frequency range 2.45GHz.In the proposed system Dual-Port U-Shaped Slot[6] Rectangular Micro strip Patch Antenna designed for 2.4GHz WLAN[1] applications. This antenna is capable of supporting two different WLAN bands at (2.3-2.5) GHz and (2.7-2.9) GHz due to its dual-port structure. In dual port antenna, port 1 supports the frequency band of (2.3-2.5) GHz while port 2 covers the frequency band of (2.7-2.9) GHz [2]. Also, it is depicted. The transmission between the two ports of the antenna is satisfactorily low, especially at the operating frequency bands. The U-shaped slot along with the finite ground plane is used to achieve an excellent impedance matching to increase the bandwidth. At the same time, This U-slot is reduce loss and measured the VSWR and Radiation pattern in the simulation result. The simulated return loss, isolation, radiation pattern, gain and directivity are obtained using a soft Simulation Software High Frequency Structure Simulator [HFSS]

Keywords- Voltage Standing Wave Ratio(VSWR);Isolation;Wireless local Area Network(WLAN); An soft Simulation Software High Frequency Structure Simulator [HFSS].

1. INTRODUCTION

Nowadays, Wireless Communication systems are becoming increasingly popular. There have been ever growing demands for Micro strip antenna designs that possess the following highly desirable attributes: small size, low cost and ease of fabrication. The basic structure of the proposed antenna consists of 3 layers. The lower layer, which constitutes the ground plane, covers the partial rectangular shaped substrate with a side of (29.47X38.04) mm. The middle substrate, which is made of FR4 epoxy resin, has a relative dielectric constant 4.4, height 1.5 mm and loss tangent 0.02.The patch is called as upper layer and it covers rectangular top surface. The rectangular patch has sides (29.47X38.04) mm that covers the middle portion of the substrate.

But in the proposed system due to the fact that two ports of the dual port antenna connected directly to the same patch isolation between these two ports is very poor. So to avoid this isolation problem sleeve-arm and an inverted T-shaped slot are used. The sleeve-arm is coupled fewer than one of the feed-line and the inverted T-shaped slot is cut on the ground plane beneath the other feed-line. The proposed antenna structure proper isolation between two ports at both operating frequency bands is achieved.

Slot antennas were used in the frequency range from 300MHz to 24GHz. They are widely used because of two reasons one is it can be mounted on any type of surface and its radiation pattern is mostly omnidirectional.The microstrip line feed is easy to fabricate, simple to match by controlling the inset position and rather simple to model. Also if the substrate thickness increases surface waves and spurious increases which limit the bandwidth of the antenna.Generally the thickness depends on the type of the substrate used. For FR-4 substrate, thickness used is 0.8 or 1.5mm in common.

The U-shaped slot along with the finite ground plane is used to achieve an excellent impedance matching to increase the bandwidth. Being such advantages, a slot of U-shaped on the rectangular shaped patch antenna is considered for our design. The U-slot introduces a capacitive component to counteract the large input inductance when thick substrate is used. Because of these characteristics they are mostly used in aerospace, mobile and satellite communication.

2. PROPOSED ANTENNA CONFIGURATION

Here the center frequency f_o is taken as 2.4 GHz with lower bound frequency f_{low} as 2.2 GHz and upper bound frequency f_{high} as 2.90 GHz. The antenna was designed for the application of wireless LAN that uses operating frequency 2.4GHz.Dielectric material FR-4 substrate with dielectric constant 4.4 and loss tangent 0.02 was used. Substrate height was taken 1.5 mm to minimize inductive impedance and surface waves.