DESIGN AND FABRICATION OF DOUBLE C DUAL BAND SLOTTED MICROSTRIP ANTENNA FOR 5G TECHNOLOGIES

Balaji K G[1], Anguraj N[1], Chellaprabu A[1], Kingston Sachin A[1], Manikandan M[2]

[1] Bachelor of Engineering student, [2] Assistant Professor

Department of Electronics and Communication Engineering,

SSM Institute of Engineering and Technology, Tamilnadu, India.

Abstract: The fifth generation (5G) promises more advantages and benefits to the world. It will create an essential difference over 4G. The design of 5G antenna providing broad bandwidth is very important to ensure the performance of 5G networks. In this research, design of double c dual band slotted microstrip antenna for 5G technologies is designed and simulated. The patch has a compact structure of 6mm x 8mm x 1.6mm. The proposed antenna resonates at 28.9GHz with a return loss of -21dB, Bandwidth of 900MHz, gain of 7.47dB and 38GHz with a return loss of -28dB, Bandwidth of 1.47GHz, gain of 7.89dB. An inset feed transmission line technique is used for matching the radiating patch and 50 ohm microstrip feed line. In the design, a FR4 (lossy) substrate was used. The geometry was displayed and analyzed using Computer simulation Technology (CST) Microwave studio.

Keywords: CST software; mm wave; dual band microstrip patch antenna; 5G.

1. INTRODUCTION

The technology related to antennas in the modern wireless system has been continuously improved with the corresponding increase in the number of requirements for 5G communications. This leads to new challenging network requirements as well as in the antenna design for 5G communication systems in order to meet the expected data rate and capacity.

The frequency greater than 6GHz is called as mm wave spectrum, carriers are likely to use the 28, 38GHz bands that will become available for future technologies. Based on the requirements for 5G, antennas with light weight, low profile (compact size), low cost mass production, ease of installation, conformable to planar surface and also non-planar surface, mechanically robust when mounted on rigid surface and compatible with monolithic microwave integrated circuit are quite important. We proposed a slotted microstrip patch antenna which will satisfy the above requirement.

In this design, the microstrip feed line feeding technique is used. In the proposed antenna, the Double C and H slots are loaded on the patch. The 50 ohms microstrip line feeding is used and the results are simulated in the CST software. The proposed antenna is designed to resonate at 28/38GHz.

After the simulation, the antenna is fabricated using photo-lithography technique.

2. Antenna Design

A dual band microstrip patch antenna of shape as depicted in fig.(1) is designed with the dimensions of 6mm x 8mm at 28/38 GHz for millimeter wave 5G applications. The slots are loaded on the patch with different dimensions. The patch is delivered by the 50 ohm microstrip line feed and the antenna is simulated on a FR4 lossy dielectric substrate having relative permittivity of 2.2, loss tangent of 0.0009, and height of 1.6 mm.

CST software is used for simulation purpose. The copper sheet with dimensions of 6mm x 8mm is used as the ground plane. The Double C and H slot cuts which are used to increase the impedance bandwidth, are made on the patch. The length of the patch is 3 mm and width is 3.5 mm. The length and width of the H slot is 2.5 mm and 2 mm. The C slots have an inner radius and outer radius of 0.9 mm and 0.55 mm. The microstrip feed lines have a length and width of 0.5 mm and 3.25 mm. The dual band antenna has been designed at the work 28/38 GHz millimeter wave frequency.