

Hexagonal Multiband Patch Antenna for 4G Technology

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Abstract : A new high gain, multiband hexagonal-shape slot loaded microstrip patch antenna is presented in this paper. The antenna is printed on a dielectric substrate, backed by a metal board, and directly fed from a 50 Ω coaxial cable. Using IE3D software package of Zeland, according to the set size, the antenna is simulated. The introduction of rectangular slot in hexagonal antenna offers a low profile, multiband, high gain and compact antenna. The computer simulation results show that the antenna can realize multiband characters at resonant frequencies of 7.4 GHz, 8.51 GHz and 9.8 GHz as in 4G technology.

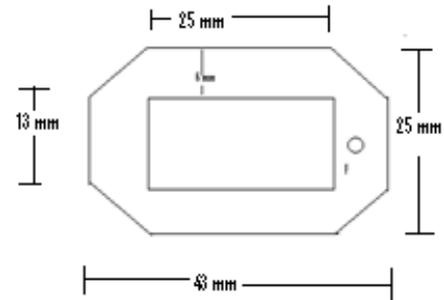


Fig.1 Geometry of the proposed hexagonal microstrip antenna

I. INTRODUCTION

In this paper a printed multiband antenna fed by a coaxial probe is presented. The antenna is simulated using IE3D, 14.10 version of Zealand. The results show the impedance bandwidth has achieved a good match. Besides to make sure that the antenna designed in this paper can be applied into practice for 4 G technology like virtual navigation, tele-medicine and multimedia transmission. The technology is commercially available from 2010 and already in use. An antenna with multiband nature can cater to different applications via a single antenna with low cost.

II. ANTENNA DESIGN

The geometry of the proposed hexagonal shaped slot antenna is shown in Figure 1. The antenna is built on a glass epoxy substrate with dielectric constant 4.4 and height h of 1.578 mm. A substrate of low dielectric constant is selected to obtain a compact radiating structure. The geometry of the top view of the proposed antenna is shown in Figure 1. The dimensions of the slotted patch are shown. Reducing the size of the antenna and multiband characteristic are one of the key factors for communication devices. Coaxial probe feed is used for multiband characteristic.

TABLE I. Dimensions of the hexagonal microstrip patch antenna

Dimension	Value
Length of rectangular patch	43 mm
Width of rectangular patch	25 mm
Feed point	(18,0)
Permittivity of dielectric	4.4
Loss tangent	0.02
Height of dielectric	1.578 mm
Effective dielectric constant	2.098

III. RESULT

The performance of this antenna was simulated and optimized by IE3D 14.10 version of Zealand. This was used to calculate the return loss and radiation pattern. The simulated return loss of the proposed antenna is shown in the Figure 2. The simulated result shows that the resonant frequency locates at about 7.4 GHz, 8.51 GHz and 9.8 GHz in the 4 G frequency spectrum. The simulated return loss graph and the 2-D radiation plot of the proposed antenna are shown in Figure 3.

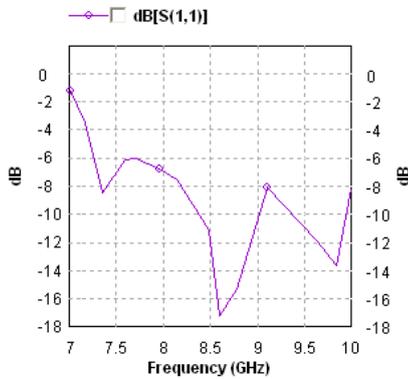


Fig.2 Simulated return loss for the hexagonal microstrip patch antenna

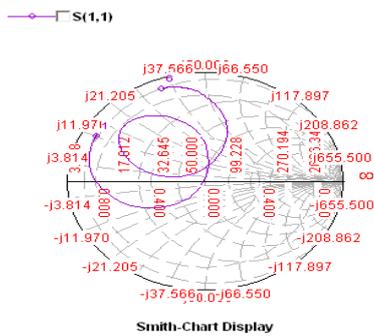


Fig.3 Simulated 2-D radiation plot

IV. CONCLUSIONS

A novel compact, slot loaded hexagonal microstrip antenna for multiband application for 4G has been designed, simulated and analyzed theoretically. Simulation results of a multiband microstrip patch with resonant frequencies at 7.4 GHz, 8.51 GHz and 9.8 GHz. have been present. Antenna performance can be enhanced by adjusting the probe position and the dimensions of the patch. It can be concluded that the proposed antenna has satisfactory multiband performance in the 4G spectrum.

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