Design of Dual Band MIMOAntenna for WLAN &WI-MAX

Mr. B. Rama Mohan
Electronics and Communication Engineering
Lendi Institute of Engineering and Technology
Affiliated to JNTUK, Jonnada, Vizianagaram

B. Likhitha
Electronics and Communication Engineering
Lendi Institute of Engineering and Technology
Affiliated to JNTUK, Jonnada, Vizianagaram

B.Bhanu Prasad
Electronics and Communication Engineering
Lendi Institute of Engineering and Technology
Affiliated to JNTUK, Jonnada, Vizianagaram

A.Asha Latha
Electronics and Communication Engineering
Lendi Institute of Engineering and Technology
Affiliated to JNTUK, Jonnada, Vizianagaram

Abstract: The main aim of this paper is to design a dual band MIMO antenna for WLAN & WI-MAX applications. The antenna consists of four square patches and the dimensions of the antenna are 55 mm x 30 mm. This antenna is designed using a low cost Fr-4 lossy as a substrate with thickness of 2 mm whose relative permittivity is 2.65 and loss tangent is 0.02. The design and simulation of the antenna is performed in CST studio. Simulated resultsshowed that the antenna operates at frequencies such as 2.6 GHz, 3.6 GHz. The radiation energy is relatively concentrated and gain reach 3.5dBi and 3.4dBi at center of operating frequencies. And also an Envelope Correlation Coefficient value of less than 0.01 is obtained. The value of diversity gain obtained is greater than 9.9. The antenna will have applications in S-band.

Keywords: Dual-band, MIMO, Loss tangent, ECC, Diversity gain

Introduction:

Wide development of wireless communication has high demands. Around the world interoperability Microwave, farther broadband communication benchmarks based o Inaccessible adjacent locate organize (WLAN) based or commonly called Wi-Fi, is broadly utilized in organize Inside the fifth time (5G) flexible communication system inside the band 2.400GHz-2.9 GHz (2.4 G band) and Wi- 3.5-3.7GHz.

The low frequency band has small transmission debilitating and long transmission distance. Which satisfies the requirements of signal hail scope and capacity and stable organize speed. get The high frequency band has wide bandwidth. The hail capacity to point is concentrated. Radio wires utilized to transmit and get electromagnetic waves for inaccessible adapt are an important part to Wi-Fi system.

Antenna design :

The schematic representation of the proposed MIMO antenna is shown in fig-1.The proposed antenna hastotal dimensions of 90x52 mm^2 and is designed on low cost 2mm thick substrate (FR4) having ε_r (relative permittivity) of 2.65 and tan δ of 0.02.

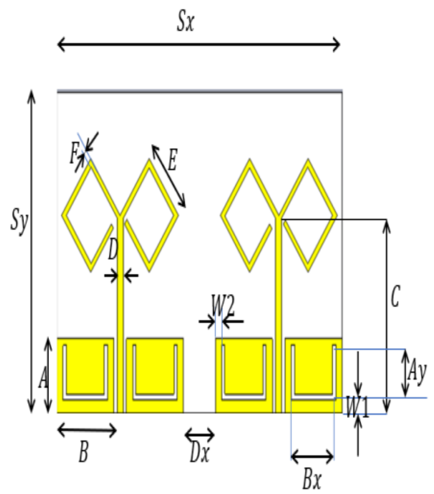

Fig.1 Proposed antenna structure

parameter	Value (mm)	parameter	Value (mm)
Sx	90	*F*	1
Sy	52	*Bx*	14
A	12	*Ay*	9
B	18	*W1*	2
C	32	*Dx*	10
D	2	*W2*	2
E	13		

Table 1 Parameters of the proposed antenna

Results and discussion:

Scattering parameters

Fig. 2 illustrates the simulated S11 (dB) results. The antenna exhibits two working frequencies in this case those are 2.6 GHz and 3.6 GHz. In this case dual band response is achieved.

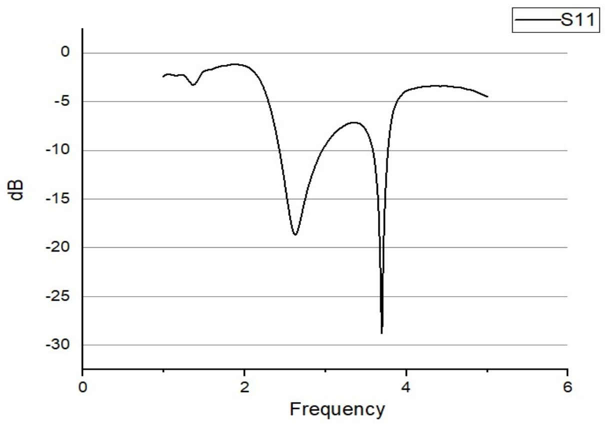

Fig.2 S11

Far filed analysis

TO demonstrate far field performance of the proposed antenna, far field radiation pattern was evaluated using simulator. Fig.3a shows the radiation pattern at 2.6GHz frequency and Fig.3b shows the radiation pattern at 3.6GHz frequency.

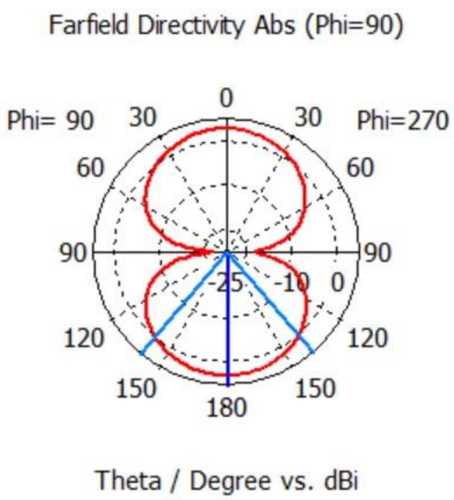

Fig.3 (a) Far field at 2.6 GHz

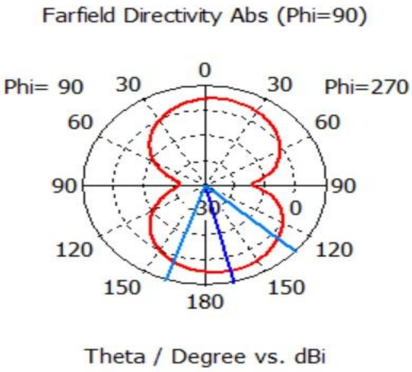

Fig.3(b) Far filed at 3.6 GHz

Envelope correlation coefficient

The ECC can measure field coupling between the MIMO antenna elements and is considered an essential performance standard for evaluating MIMO antennas. It tells us how independent two radiation patterns are. It is desirable to have ECC value between 0.3-0.4.

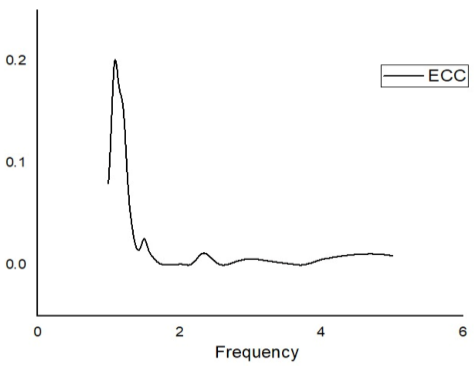

Fig.4 ECC

From the above graph we can observe that the value of ECC at the operating frequency is below 0.01.

Diversity gain

The value of diversity gain for any acceptable MIMO antenna is around 10. Fig.5 shows the

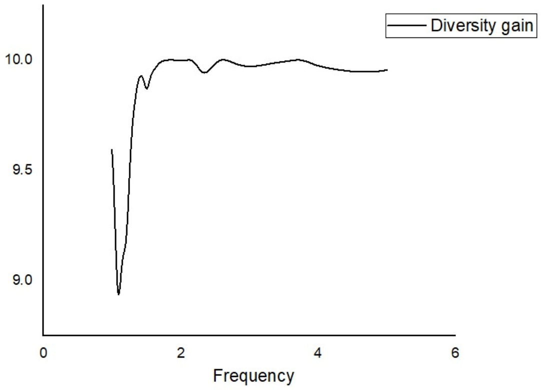

Fig.5 Diversity gain

From the graph we can observe that the value of diversity gain is greater than 9.9 at both the operating frequencies.

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