

Design of dual band slot antenna for LAN Application

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Abstract - Slot antennas are used typically at frequencies between 300 MHz and 24 GHz. The slot antenna is popular because they can be cut out of whatever surface they are to be mounted on, and have radiation patterns that are roughly omnidirectional (similar to a linear wire antenna, as we'll see). The polarization of the slot antenna is linear. The slot size, shape and what is behind it (the cavity) offer design variables that can be used to tune performance. A simple and compact dual-band H-shaped slot antenna for wireless local area network applications is proposed. The proposed antenna is composed of an H-shaped slot on the ground plane with size of 23mm by 32mm. The substrate material is foam. The antenna is fed by micro strip at its top. The impedance bandwidth, radiation pattern and gain of the antenna were simulated. The results show that the antenna just covers the WLAN bands (2.4-2.485, 5.15-5.35, 5.725-5.825 GHz) with the gain remains steadily. The measurement of impedance bandwidth was carried out with a network analyzer. A good agreement between measurement and simulation can be observed.

Keywords - H-shaped slot antenna, WLAN, micro strip, ADS software, and Optimization design

I. INTRODUCTION

Antennas play a very important role in the field of wireless communications. Some of them are Parabolic Reflectors, Patch Antennas, Slot Antennas, and Folded Dipole Antennas. Each type of antenna is good in their own properties and usage. We can say antennas are the backbone and almost everything in the wireless communication without which the world could have not reached at this age of technology. Slot antennas play a very significant role in today's world of wireless communication systems. A slot antenna is very simple in the construction using a conventional Micro strip feed line technique. These slot antennas are used as simple and for the widest and most demanding applications. A simple arrangement of a micro strip feeding method has become very famous in WLAN systems. In this article the antenna design with slots has been used to achieve the required WLAN bands. Various slots are shaped in the radiating patch to manage the current flow on the antenna surface. Slot dimensions are varied to improve the various parameters like gain, return loss.

II. PARAMETERS

Frequency Range (Hz): This is application specific for the using antenna.

Input Impedance: Generally, input impedance is important to determine maximum power transfer between transmission line and the antenna. This transfer only happen when input impedance of antenna and input impedance of the transmission line matches. If they do not match, reflected wave will be generated at the antenna terminal and travel back towards the energy source. This reflection of energy results causes a reduction in the overall system efficiency.

Gain: The gain of an antenna is essentially a measure of the antenna's overall efficiency. If an antenna is 100% efficient, it would have a gain equal to its directivity. There are many factors that affect and reduce at the overall efficiency of an antenna. Some of the most significant factors that impact antenna gain include impedance matching, network losses, material losses and random losses. By considering all factors, it would appear that the antenna must overcome a lot of adversity in order to achieve acceptable gain performance.

Return loss (dB): Return loss is the negative of the magnitude of the reflection coefficient in dB since power is proportional to the square of the voltage; return loss is given by,

$$R_l = -20 \log|\Gamma| \text{ dB}$$

III. ANTENNA DESIGN

Geometry parameter of antenna

- Frequency: 2.4/5 GHz
- Dielectric properties: $\epsilon_r = 1.0$
- Height = 1.6 mm
- Loss Tangent = 0.0023

Parameters	Wg	Lg	S	L	W
Value(mm)	21	32	4	26	16

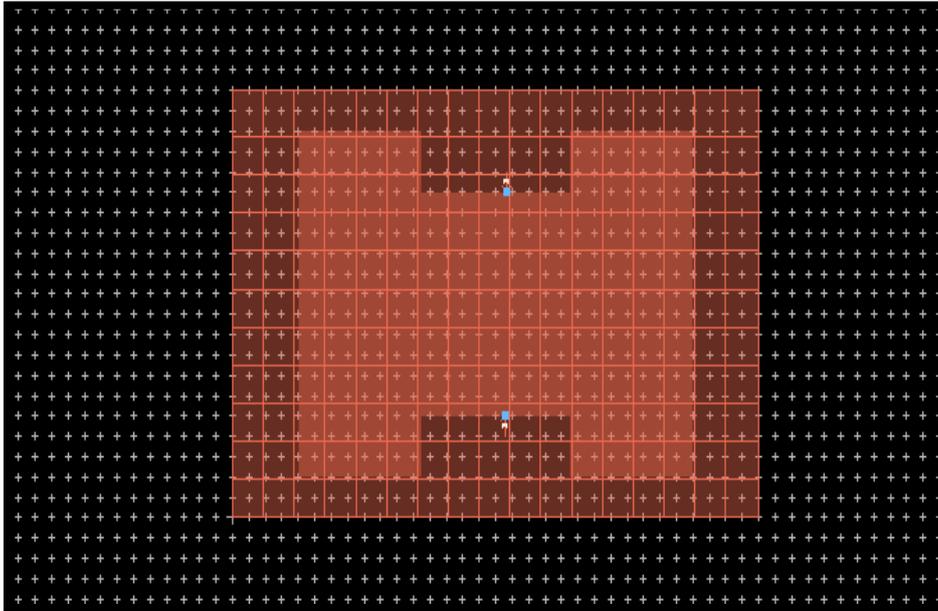
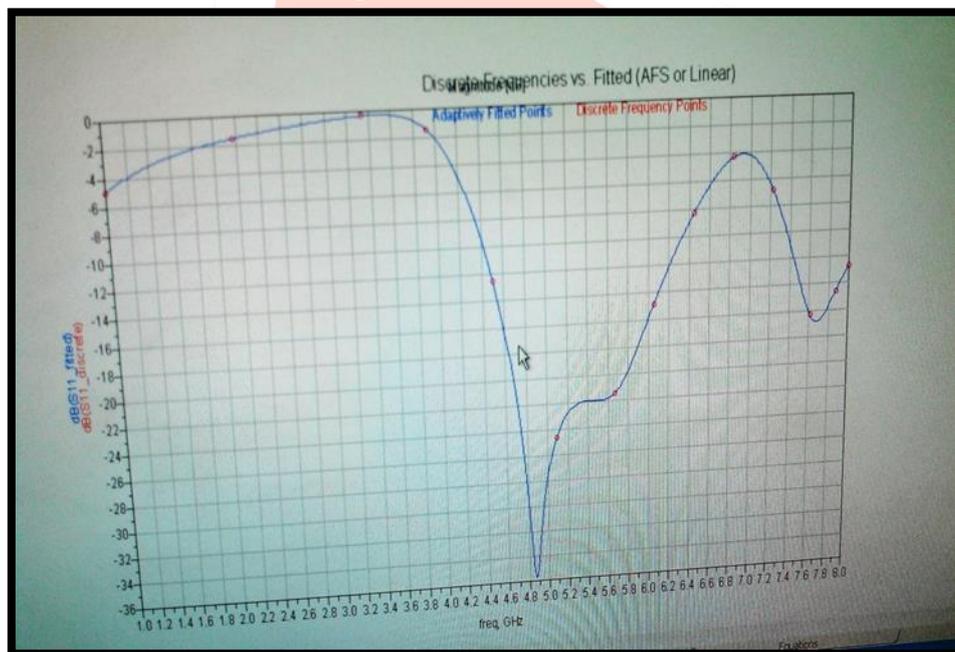


Figure 1 layout design of slot antenna

IV. SIMULATION & RESULTS

By using advance design system (ADS) software design H-shaped slot antenna show in figure. The designed return loss (-36dB) at 4.85 GHz and (-21dB) at 5.6 GHz in the S-parameters.



V. CONCLUSION

In this slot antenna has been designed and simulated and optimize in ads version 2011 software. Slot antenna is designed to cover WLAN band (2.4-2.485, 5.15-5.35, 5.725-5.825 GHz).the dual band slot antenna provides the return loss is -36db at 4.85GHz and -21db at 5.6GHz.so frequency is shifted from 2.4 to 4.85GHz. At 5.6GHz return loss is better as per target specification.

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