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ISSN:2348-2079

Volume-5 Issue-1

International Journal of Intellectual Advancements and Research in Engineering Computations

Design of yagi microstrip slot antenna

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Abstract—In this paper we use a novel model of quasi yagi microstrip antenna with high gain and directivity. Slot is placed within the patch which helps to increase the front to back ratio and increase the gain of the antenna. Surface currents are more in the slot area that we have designed. The prototype of the antenna covers frequency range of 2-6 GHz with VSWR less than 1.2. The antenna has high gain between 5-7dBi and has high directional pattern. It is useful for Wi-MAX and other WLAN applications.

Keywords—Antenna; Yagi; Microstrip; Slot; Wi-MAX

I. INTRODUCTION

Wireless communication systems progressed too fast in the last decade in notebooks and cellular phone because of low cast device and mobility. A WLAN links two or more devices which provides a high speed connection through an access point to the wider internet. This gives users the mobility to move fast around within a local coverage area and still be connected flexibly to the network. They are used in communication system, medical imaging, radio communication and biomedical like breast cancer detection and treatment system.

Yagi-Uda is a most famous antenna for UWB and high gain application. A new high gain Microstrip Yagi array antenna with a high front-to-back (F/B) ratio for WLAN and other applications.

We design array quasi Yagi to achieve high gain antenna. On the other hand slot antenna has a simple structure for fabrication and when it is feed by microstrip it has a low profile and high gain is accessible.

To reduce this drawback of Yagi antenna we present a new model of antenna. Here presents a novel quasi Yagi microstrip antenna with a special ground shape like a slot antenna and as said before , it help to increase the gain of the antenna. A ground plane was placed under the microstrip and it reduces the F/B ratio of the antenna. The prototype antenna has narrow bandwidth and cover 2GHz-6GHz with VSWR less than 2. The antenna has high gain between 5-7dBi and support wireless applications

II. ANTENNA DESIGN PARAMETERS

A. INTRODUCTION

An antenna is a transducer between a guided wave and a radiated wave, or vice versa. The structure that "guides" the energy to the antenna is most evident as a coaxial cable attached to the antenna. The radiated energy is characterized by the antenna's radiation pattern.

It is a specialized transducer that converts radio-frequency (RF) fields into alternating current (AC) or vice-versa. There are two basic types: The receiving antenna, which intercepts RF energy and delivers AC to electronic equipment, and the transmitting antenna, which is fed with AC from electronic equipment and generates an RF field.

B. FEATURES

- Flexible and portable
- High directivity
- Miniaturization
- Less weight
- Low input signal noise

III. ANTENNA DESIGN RESULTS

In this quasi yagi microstrip slot antenna, we designed and simulated the following results which includes antenna parameter like Return Loss, Voltage Standing Wave Ratio , Input impedance and Radiation pattern.

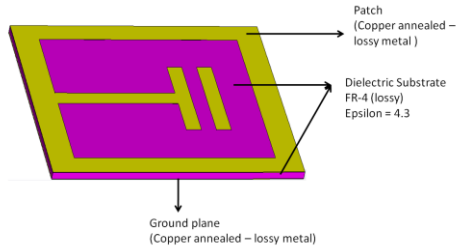
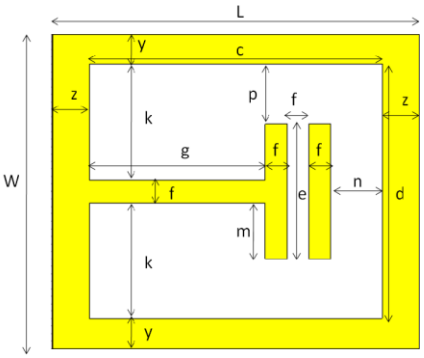
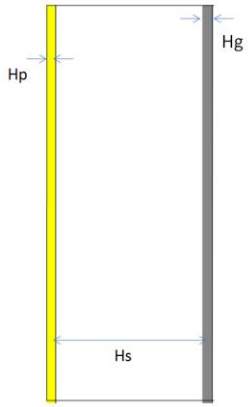


Fig1.(a).Structure Of The Antenna



Symbol	Size(mm)
W	42
L	50
c	40
d	34
e	18
f	3
g	24
k	15.5
m	7.5
n	7
p	8
y	4
z	5

Fig1.(b).Top View Of The Antenna

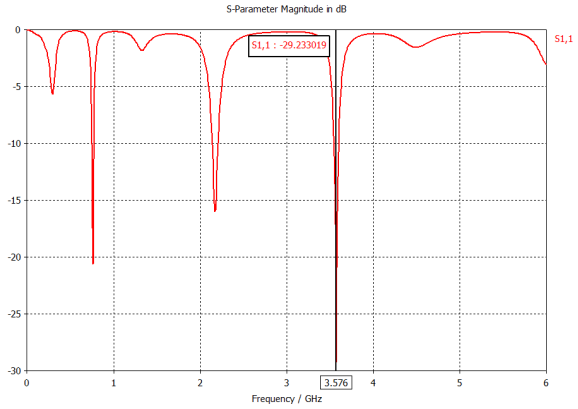


Name	Size(mm)
Height of the Ground plane (Hg)	0.1
Height of the Dielectric substrate (Hs)	1.6
Height of the Patch (Hp)	0.1

Fig1.(c).Side View Of The Antenna

A. Return Loss :

Return loss is defined as the loss of power in the signal reflected due to a discontinuity between the transmission line and the antenna. The achieved result is -29.23dB which is good parameter.



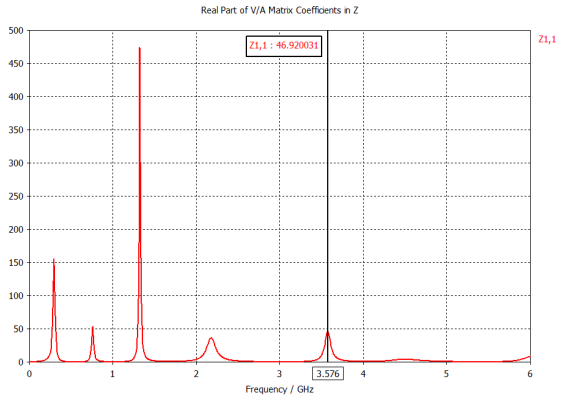
B. Input Impedance :

Input impedance is an important parameter in determining the maximum power transfer between the antenna and the transmission line.

Input impedance is a combination of real and complex parts and its general form is:

$$Z_{in}=R_{in}+jX_{in}$$

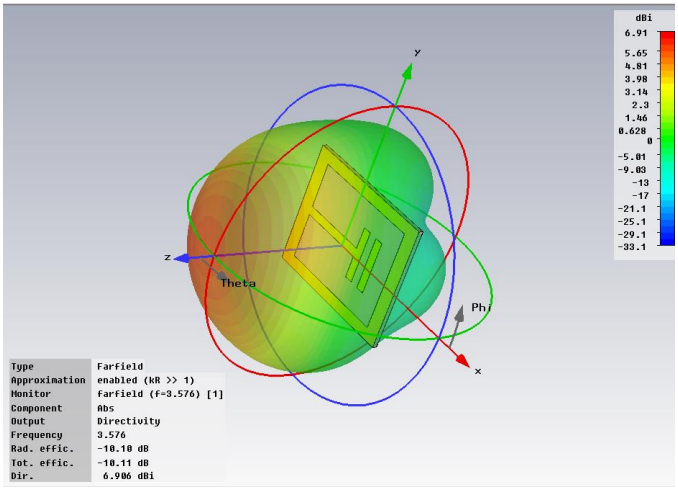
The achieved result is 46.92ohms.



C. Directivity :

The directive gain of an antenna is a measure of the concentration of the radiated power in a particular direction. It may be regarded as the ability of the antenna to direct radiated power in a given direction. It is usually a ratio of radiation intensity in a given direction to

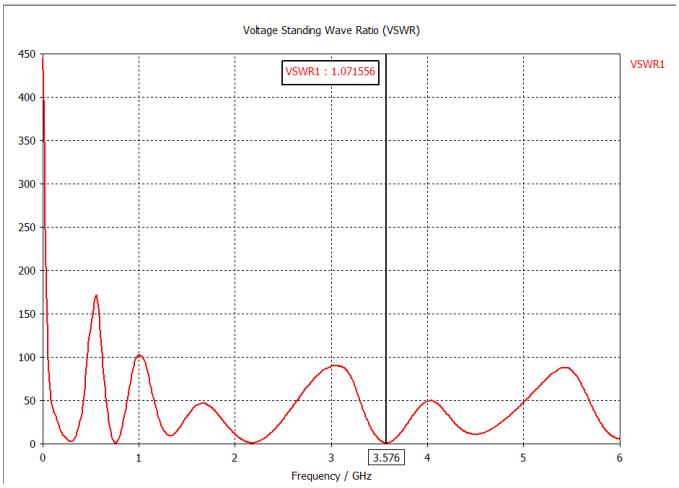
the average radiation intensity. The achieved result is 6.906dBi which is a high directive parameter.



D. VSWR :

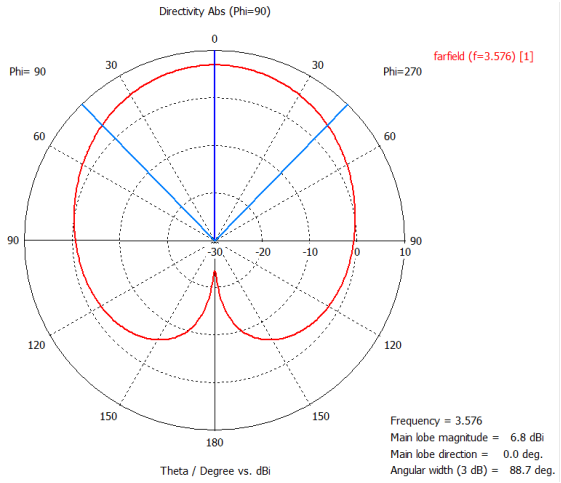
Voltage standing wave ratio(VSWR) is the ratio between the maximum voltage and the minimum voltage of the transmission line. Usually the VSWR of an ideal antenna lies in the range of 1≤ VSWR ≤2.

Here the achieved VSWR is 1.07 which is suitable for Wi-MAX applicatios .



E. Polar Chart :

Polar Chart describes the angular width of 88.7deg and main lobe magnitude of 6.8dBi at a frequency range of 3.576 Ghz.



IV.CONCLUSION

Thus from the simulated result of quasi yagi microstrip slot antenna we obtained radiation pattern having high directivity , low VSWR, high Input Impedance, high gain at a frequency range of 3.576 GHz.

They are used in applications like Wi-Fi hot spot, backhaul networks for cellular base station, broadband internet access

a.

References

[1] C. Wang, Z.-H.Yan, P. Xu, J.-B. Jiang and B. Li "Tridentshaped dual-band CPW-fed monopole antenna for PCS/WLAN applications" ELECTRONICS LETTERS 17th February Vol. 47 No. 4 2011

[2] W. T. Li, X. W. Shi, . Y. Q. Hei "Novel Planar UWB Monopole Antenna with Triple Band-Notched Characteristics" IEEE ANTENNAS AND WIRELESS PROPAGATION LETTERS, VOL. 8, 2009

[3] S. Baek and Y. Jee "Compact integrated monopole antenna with CPW-fed meander resonators" ELECTRONICS LETTERS 20th January Vol. 47 No. 2 2011

[4] H.H. Li, X.Q. Mou, Z. Ji , H. Yu, Y. Li and L. Jiang ," Miniature RFID tri-band CPW-fed antenna optimised using ISPO algorithm" ELECTRONICS LETTERS 3rd February 2011

[5] H.-Y. Xu, H. Zhang, and J. Wang, "Study ON AN UWB PLANAR TAPERED SLOT ANTENNA WITH GRATINGS" Progress In Electromagnetics Research C, Vol. 1, 87–93, 2008

[6] H.-Y. Xu, H. Zhang, K. Lu, and X.-F. Zeng ," A HOLLYLEAF-SHAPED MONOPOLE ANTENNA WITH LOW RCS FOR UWB APPLICATION "Progress In Electromagnetics Research, Vol. 117, 35-50, 2011

[7] M. Ojaroudi, Sh. Yazdanifard, N. Ojaroudi, and R. A. Sadeghzadeh," Band-Notched Small Square-Ring Antenna With a Pair of T-Shaped Strips Protruded Inside the Square Ring for UWB Applications " IEEE ANTENNAS AND WIRELESS PROPAGATION LETTERS, VOL. 10, 2011

[8] D. Ghosh , A. De, M.C. Taylor, T.K. Sarkar, M.C Wicks, E.L. Mokole , "Transmission and Reception by UltraWideband (UWB) Antennas "IEEE Antennas and Propagation Magazine, Vol. 48, No. 5, October 2006