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Review of Microstrip Patch Antenna For WiMAX and WLAN Application

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Abstract :- Microstrip Antenna has many advantages and can easily installed in system. Dual band or Multiband antenna has the main role for Wireless communication system. Wireless Local Area Network (WLAN) and Worldwide Interoperability for Microwave Access (WiMAX) have been used for mobile devices and smart phones. Both are cost effective , reliable ,flexible and high speed data connectivity. This paper present literature survey of different types of radiating patches, feeding techniques and substrates. Also we discuss the basic antenna parameters of antenna,different feed techniques, basics of microstrip antenna and advantages and disadvantages of radiating patch antenna.
Keywords :- Mcrostrip, WiMAX, WLAN, Feed

I. INTRODUCTION

Antenna is an Electrical device which convert electrical power into electromagnetic waves and vice versa. It is usually used with a radio transmitter or radio receiver. In transmission, a radio transmitter supplies an oscillating radio frequency electric current to the antenna's terminals, and the antenna radiates the energy from the current as electromagnetic waves.In reception, an antenna intercepts some of the power of an electromagnetic wave in order to produce a tiny voltage at its terminals, that is applied to a receiver to be amplified. Antennas are essential components of all equipment that uses radio.

The study on microstrip patch antennas has made a great progress in the recent years. Compared with the conventional antennas, microstrip patch antennas have more advantages.A Microstrip patch antenna consists of a radiating patch on one side of a dielectric substrate which has a ground plane on the other side and overview of MSA shown in fig 1. The patch is generally made of conducting material such as copper or gold and can take any possible shape such a rectangular, circular, square, hexagonal, triangular etc. The radiating patch and the feed lines are usually photo etched on the dielectric substrate. Low dielectric constant substrates are generally preferred for maximum radiation.

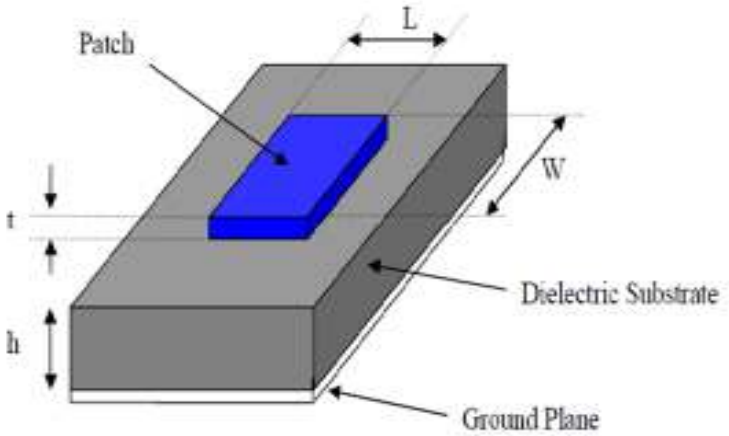

Fig.1.Structure of Microstrip patch Antenna

The dielectric substrates used are Bakelite, FR4 Glass Epoxy, RO4003, Taconic TLC and RT Duroid. The height of the substrates is constant i.e., 1.6 mm. Some properties of different substrate are explained in Table1.

Parameter	Bakelite	FR4	RO4003	Taconic	RT Duroid
Dielectric Constant	4.78	4.36	3.4	3.2	2.2
Loss Tangent	0.03045	0.013	0.002	0.002	0.0004
Water Absorption	0.5-1.3%	<0.25%	<0.06%	0.02%	0.02%
Tensile Strength	60MPa	<310MPa	141MPa	-	450MPa
Breakdown Voltage	20-28kv	55kv	-	-	<60kv

II. LITERATURE SURVEY

A double L-slot microstrip patch antenna [1] array with CPW feed technology has been proposed for microwave access and wireless local area network applications. This paper results in compact antenna with good omnidirectional radiation characteristics for proposed operating frequencies. It can be observed that the peak gain can be higher than 3dBi at 3.5 GHz.

A Broadband patch antenna [2] for WiMAX and WLAN is developed. In this proposed antenna exhibits wideband characteristics that depend on various parameters such as U-slot dimensions, circular probe –fed patch. This antenna shows 36.2% impedance bandwidth with more than 90% antenna efficiency and is suitable for 2.3/2.5GHz WiMAX and 2.4 GHz WLAN application.

A microstrip slot antenna [3] fed by a microstrip line has been proposed in this paper. In this bandwidth of antenna has been improved. This antenna was presented for WLAN and satellite application. A microstrip patch antenna [4] for dual band WLAN application is proposed. In this paper a dual band L-shaped Microstrip patch antenna is printed on a FR-4 substrate for WLAN systems, and achieves a frequency range from 5.0GHz to 6.0 GHz with maximum gain of 8.4 and 7.1 dB in lower and higher frequency bands respectively.

A compact rectangular patch antenna [5] has been presented for Wi-MAX and WLAN application. This antenna has compact, cost effective, simple structure and suitable for all frequency bands of Wi-MAX and WLAN applications.This paper [6] has been proposed for describing various feeding techniques. In this a circular polarized patch antenna of shape similar to alphabet I on FR4 substrate for BLUETOOTH applications has been investigated. This paper describes a good impedance matching condition between the line and the patch without any additional matching elements.

III. FEEDING TECHNIQUE

A feed is used to excite to radiate by direct or indirect contact. The feed of microstrip antenna can have many configurations.In this we have discussed some of the feeding techniques.

Characteristics	Microstrip Line Feed	Co axial Cable Feed	Aperture Coupled Feed	Proximity Coupled Feed
Spurious Feed Radiation	More	More	Less	Minimum
Reliability	Better	Poor	Good	Good
Fabrication	Easy	Soldering and Drilling	Alignment Required	Alignment Required
Impedence Matching	Easy	Easy	Easy	Easy

III. BASIC ANTENNA PARAMETER

Radiation Pattern
A radiation pattern defines the variation of the power radiated by an antenna as a function of the direction away from the antenna.
Directivity
It is a measure of how directional an antenna's radiation pattern is. The directivity of an antenna increases as its Beamwidth is made smaller.
Antenna Efficiency
An antenna's efficiency is a measure of how much power is radiated by the antenna relative to the antenna input power.
Antenna Gain Antenna Gain describes how much power is transmitted in the direction of peak radiation to that of an isotropic source.
Effective Aperture
Effective aperture is a basic antenna concept that is a measure of the power captured by an antenna from a plane wave.

IV. ADVANTAGES AND DISADVANTAGES

Microstrip patch antenna has several advantages over conventional microwave antenna. The various advantages and disadvantages are given in table:

Sr.No.	Advantages	Disadvantages
1	Low Weight	Low Efficiency
2	Low Profile	Low Gain
3	Thin Profile	Large Ohmic Loss
4	Linear and Circular Polarization	Low power handling capacity
5	Capable of multi frequency operation	Complex Feed Structure

V. CONCLUSION

A theoretical survey on microstrip patch antenna is presented in this paper. After study of various research papers it concluded that Lower gain and low power handling capacity can be overcome through slotted patch. Different feeding techniques and basic parameter of antenna have been studied in this paper.

REFERENCES

[1] R. Jothi Chitra,V. Nagarajan ,2013. "Double L-slot microstrip patch antenna array for WiMAX and WLAN applications", *IEEE Transactions on Antennas and Propagation*, Vol. 39, pp 1026-1041.

[2] M A Matin, M.P Saha, H. M. Hasan, 2010 " Design of broadband patch antenna for WiMAX and WLAN", IEEE.

[3] Xu-bao Sun ,Mao-Young Cao, 2012. "A rectangular slot with *Transactions* improved bandwidth", *Elsevier Science Direct*, Vol. 66, pp 465-466.

[4] Bharath Kelothu, K.R. Subhashini, *IEEE* Transactions 2012."A compact high-gain microstrip patch antenna for dual band WLAN application".

[5] Lin Dang, Zhenya Lei, 2010. "A compact microstrip slot Triple-band Antennna for WLAN / WiMAX applications", *IEEE Antennas and Wireless Propagation Letters*, Vol.9, pp 1178-1181.

[6] Govardhani Immadi, M.S.R.S Tejaswi, 2011. "Design of coaxial fed microstrip patch antenna for 2.4 GHz Bluetooth Applications", *Journal of emerging trends in computing and information sciences*, Vol.2, pp 686-690