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A SURVEY ON 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 presents literature survey on different type of radiating patches, feeding techniques and substrates. Also we discuss the parameters of antenna, different feed techniques, basics of microstrip antenna and advantages and disadvantages of radiating patch antenna.
KEYWORDS: Microstrip, WiMAX, WLAN, Feeding techniques.

INTRODUCTION-

Antenna is an Electrical device which convert electrical power into electromagnetic waves and vice versa. It is used with a radio transmitter or radio receiver. In transmission section, a transmitter supplies an electric current to the antenna's terminals, and the antenna radiates the energy electromagnetic waves. In receiver section, an antenna intercepts some of the power of an electromagnetic wave in order to produce a tiny voltage at its terminals, which is applied to a receiver section to be amplified. Wireless communication systems are attracted toward multifunctionality. Also it provides users with options of connecting to different kinds of wireless services for different purposes at different times. It is very important to develop single radiating element which is having a capabilities of performing different functions and multi-band operation in order to minimize the antenna's weight and area.
The study of microstrip patch antennas has made a great importance in the recent years. Microstrip patch antennas have more advantages, as compared with the conventional antennas. A Microstrip patch antenna consists of a radiating patch on one side of and ground plane on the other side. An overview of micro-strip antenna shown in fig 1. The patch is made of conducting material 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 preferred for maximum radiation.

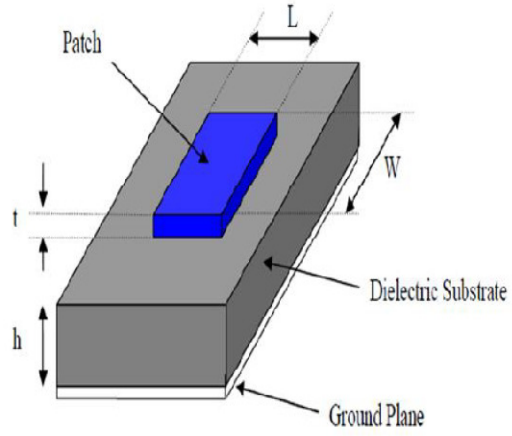

Fig.1.Structure of Microstrip patch Antenna

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.

Table1. Different types of substrate

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

LITERATURE SURVEY

A Compact Dual-Band Micro-strip Antenna for IEEE 802.11a WLAN Application 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 5.2 GHz. [1]

A Dual band antenna with compact radiator for 2.4/5.2/5.8 GHz WLAN applications 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 2.4/5.2 GHz WLAN application. [2]

A Rectangular Microstrip Patch Antenna to Enhance Bandwidth at 2.4 GHz for WLAN Applications has been proposed in this paper. In this bandwidth of antenna has been improved. This antenna was presented for WLAN and satellite application. [3]

A microstrip patch antenna 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.[4]

A compact rectangular patch antenna 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. [5]

This paper 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. [6]

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.

Table 2. Different Feed 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
Impedance Matching	Easy	Easy	Easy	Easy

BASIC ANTENNA PARAMETER-

Radiation Pattern

A radiation pattern of antenna 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 Beam width is made smaller.

Antenna Efficiency

An efficiency of antenna is a measure of how much power is radiated by the antenna relative to the antenna input power.

Antenna Gain

Gain of antenna describes how much power is transmitted in the direction of peak radiation to that of an isotropic source.

Effective Aperture

Effective aperture is a measure of the power captured by an antenna from a plane wave.

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

CONCLUSION

A survey on microstrip patch antenna is presented in this paper. By referring various research papers it is 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.

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