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**MICRO STRIP PATCH ANTENNA ITS TYPES, MERITS DEMERITS AND ITS  
APPLICATIONS**

**Ankur Kaushal\*, Sachin Tyagi**

M.Tech Scholar , Dept. of Electronics and Communication Engineering,  
Roorkee College of Engineering, Roorkee, UK, India  
Assistant Professor, Dept. of Electronics and Communication Engineering,  
Roorkee College of Engineering, Roorkee, UK, India

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**ABSTRACT**

In recent years lots of study had been done over Micro Strip Antennas. Micro strip patch antennas have more advantages and better prospects if we compare them with conventional antennas. They provide dual and circular polarizations, dual-frequency operation, frequency agility, broad band-width, feedline flexibility, beam scanning omnidirectional patterning and are lighter in weight, low volume, low cost, low profile, smaller in dimension and are easy to fabricate. Moreover, the microstrip patch antennas can . In this paper we discuss the microstrip antenna, types of microstrip antenna, feeding techniques and application of microstrip patch antenna with their advantage and disadvantages over conventional microwave antennas

**KEYWORDS:** Microstrip Antenna (MSA), Microstrip patch antenna (MPA), Feeding techniques.

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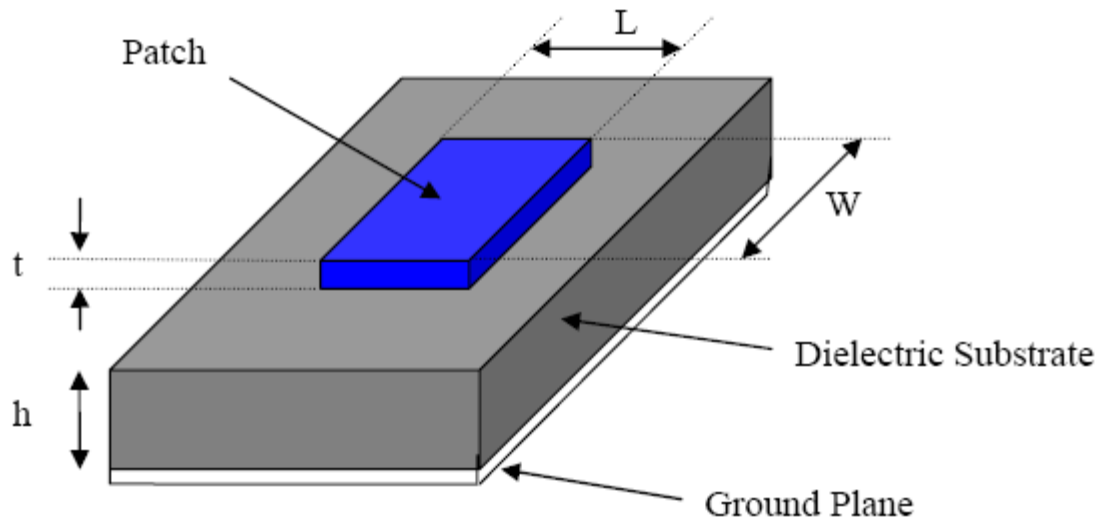
**INTRODUCTION**

Satellite communication and Wireless communication has been developed rapidly in the past decades and it has already a dramatic impact on human life. In the last few years, the development of wireless local area networks (WLAN) represented one of the principal interests in the information and communication field With a simple geometry, patch antennas offer many advantages not commonly exhibited in other antenna configurations. For example, they are extremely low profile, lightweight, simple and inexpensive to fabricate using modern day printed circuit board technology, compatible with microwave and millimeter-wave integrated circuits (MMIC) and have the ability to conform to planar and non planar surfaces. In addition, once the shape and operating mode of the patch are selected, designs become very versatile in terms of operating frequency, polarization, pattern, and impedance. The variety in design that is possible with Micro strip antenna probably exceeds that of any other type of antenna element.

**Microstrip Patch Antenna**

Micro Strip patch antenna is a thin square patch on one side of a dielectric substrate and the other side having a plane to the ground. The simplest Micro strip patch antenna configuration would be the rectangular patch antenna The patch in the antenna is made of a conducting material Cu (Copper) or Au(Gold) and this can be in any shape . A good performance from the patch antenna can be expected with a thick dielectric substrate with a low dielectric constant as this gives better efficiency, larger bandwidth and a better radiation.

**FIGURE.1 STRUCTURE OF MICRO STRIP PATCH ANTENNA**

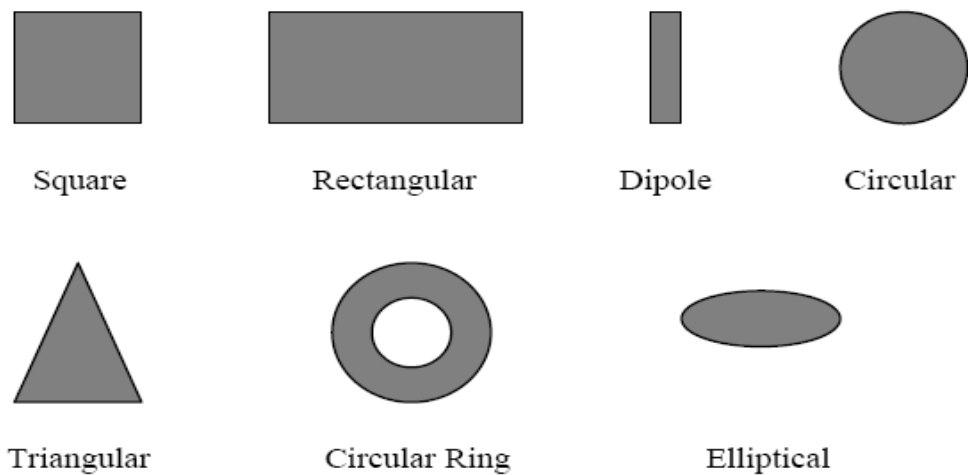


**TYPES OF MICRO STRIP ANTENNA**

There are different types of Micro strip antennas which are classified based on their physical parameters. There different types of antennas have many different shapes and dimensions. The basic categories of these Micro strip antennas can be classified into four which are:

1. Micro strip patch antennas
2. Micro strip dipoles
3. Printed slot antennas
4. Micro strip travelling wave antennas

**FIGURE.2 DIFFERENT SHAPE AND SIZE OF PATCH**



**APPLICATIONS**

The Microstrip patch antennas are well known for their performance and their robust design, fabrication and their extent usage. The advantages of this Microstrip patch antenna are to overcome their de-merits such as easy to design, light weight etc., the applications are in the various fields such as in the medical applications, satellites and of course even in the military systems just like in the rockets, aircrafts missiles etc. the usage of the Microstrip antennas are spreading widely in all the fields and areas and now they are booming in the commercial

aspects due to their low cost of the substrate material and the fabrication. It is also expected that due to the increasing usage of the patch antennas in the wide range this could take over the usage of the conventional antennas for the maximum applications. Microstrip patch antenna has several applications. Some of these applications are discussed below:

**Mobile and satellite communication application:** Mobile communication requires small, low-cost, low profile antennas. Microstrip patch antenna meets all requirements and various types of microstrip antennas have been designed for use in mobile communication systems. In case of satellite communication circularly polarized radiation patterns are required and can be realized using either square or circular patch with one or two feed points.

**Global Positioning System applications:** Nowadays microstrip patch antennas with substrate having high permittivity sintered material are used for GPS. These antennas are circularly polarized, very compact and quite expensive due to its positioning. It is expected that millions of GPS receivers will be used by the general population for land vehicles, aircrafts to find their position accurately.

**Radio Frequency Identification (RFID):** RFID uses in different areas like mobile communication, logistics, manufacturing, transportation and health care [2]. RFID system generally uses frequencies between 30 Hz and 5.8 GHz depending on its applications. Basically RFID system is a tag or transponder and a transceiver or reader.

**Worldwide Interoperability for Microwave Access (WiMax):** The IEEE 802.16 standard is known as WiMax. It can reach up to 30 mile radius theoretically and data rate 70 Mbps. MPA generates three resonant modes at 2.7, 3.3 and 5.3 GHz and can, therefore, be used in WiMax compliant communication equipment.

**Radar Application:** Radar can be used for detecting moving targets such as people and vehicles. It demands a low profile, light weight antenna subsystem, the microstrip antennas are an ideal choice. The fabrication technology based on photolithography enables the bulk production of microstrip antenna with repeatable performance at a lower cost in a lesser time frame as compared to the conventional antennas.

**Rectenna Application:** Rectenna is a rectifying antenna, a special type of antenna that is used to directly convert microwave energy into DC power. Rectenna is a combination of four subsystems i.e. Antenna, one rectification filter, rectifier, post rectification filter. In rectenna application, it is necessary to design antennas with very high directive characteristics to meet the demands of long-distance links. Since the aim is to use the rectenna to transfer DC power through wireless links for a long distance, this can only be accomplished by increasing the electrical size of the antenna.

**Telemedicine Application:** In telemedicine application antenna is operating at 2.45 GHz. Wearable microstrip antenna is suitable for Wireless Body Area Network (WBAN). The proposed antenna achieved a higher gain and front to back ratio compared to the other antennas, in addition to the semi directional radiation pattern which is preferred over the omni-directional pattern to overcome unnecessary radiation to the user's body and satisfies the requirement for on-body and off-body applications. A antenna having gain of 6.7 dB and a F/B ratio of 11.7 dB and resonates at 2.45GHz is suitable for telemedicine applications.

**Medicinal applications of patch:** It is found that in the treatment of malignant tumors the microwave energy is said to be the most effective way of inducing hyperthermia. The design of the particular radiator which is to be used for this purpose should possess light weight, easy in handling and to be rugged. Only the patch radiator fulfills these requirements. The initial designs for the Microstrip radiator for inducing hyperthermia was based on the printed dipoles and annular rings which were designed on S-band. And later on the design was based on the circular microstrip disk at L-band. There is a simple operation that goes on with the instrument; two coupled Microstrip lines are separated with a flexible separation which is used to measure the temperature inside the human body. A flexible patch applicator can be seen in the figure below which operates at 430 MHz.

### 5. Advantage and Disadvantage

Microstrip patch antenna has several advantages over conventional microwave antenna with one similarity of frequency range from 100 MHz to 100 GHz same in both type. The various advantage and disadvantage are given in table 1

*Table 1. Advantage and Disadvantage of Micro Strip Patch Antenna*

Sr. No.	Advantage	Disadvantage
1.	Low weight	Low efficiency
	Low profile	Low gain
3.	Thin profile	Large ohmic loss in the feed structure of arrays
4.	Required no cavity backing	Low power handling capacity
5.	Linear and circulation polarization	Excitation of surface waves
6.	Capable of dual and triple frequency operation	Polarization purity is difficult to achieve
7.	Feed lines and matching network can be fabricated simultaneously	Complex feed structures require high performance arrays

### CONCLUSION

A theoretical survey on microstrip patch antenna is presented in this paper. Some effect of disadvantages can be minimized. With the help of an array configuration we can overcome low power handling capacity and low gain. Some factors are involved in the selection of feeding technique. Particular microstrip patch antenna can be designed for each application and different merits are compared with conventional microwave antenna

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