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Review of PIFA

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Abstract-The current growth in mobile communication based gadgets those function at a couple of frequencies has lead to the development of patch antennas that helps multiband and wideband operations. There is an increasing demand for miniaturized and cost tremendous antenna for each commercial and personal applications. Planar Inverted F Antenna (PIFA) designs assist these requirements. The Planar Inverted-F Antenna (PIFA) can be considered as evolved from a quarter-wavelength monopole antenna and is now extensively used in mobile and portable radio purposes due to its many eye-catching attributes such as simple design, lightweight, low-cost, low-profile, conformal nature, constructed -in structure and dependable performance. In this assessment paper a number of designs of PIFA have been presented which are of low profile, excessive acquire and supports a couple of frequencies.

Keywords---Multiband operations; PIFA, Wireless Communication.

I. INTRODUCTION

In 1886, Henry Hertz verified the presence of electromagnetic waves and developed a wi-fi conversation system. In the latest years wireless verbal exchange has stepped forward very shortly and researchers center of attention on making a low profile antenna. To meet these necessities the dimensions are reduced accordingly. An antenna that helps multiband operations and is small in measurement is the want of these days to help a number of wi-fi purposes [1].

Planar Inverted F Antenna (PIFA) can be notion to be advanced from patch antenna via introducing a shorting pin from the patch to the ground at a variety of locations. The shorting pin gives parallel inductance to antenna impedance. Planar Inverted F Antenna resonates at quarter wavelength and consequently it requires less area than different antennas. The form of the antenna appears like an inverted F, and therefore named Planar Inverted F Antenna (PIFA). Planar Inverted F Antenna has an omni-directional pattern and provides high achieve in vertical and horizontal route Planar Inverted F Antenna is a type of Inverted F Antenna (IFA) in which a wire radiator is substituted with the aid of a plate to extend the bandwidth. The Inverted F Antenna consists of a rectangular planar aspect that is positioned over a ground aircraft and a shorting plate. Planar Inverted F Antenna has reduced height and continues a resonant hint length. Bandwidth plays an necessary function in designing of PIFA and is exceptionally affected through the size of floor plane. The efficiency is decreased via the losses suffered via PIFA from its surroundings [3].

In wireless verbal exchange a low profile antenna that supports multiband and wideband operations is required. In sequence to meet these requirements Planar Inverted F Antenna designs are needed. These antennas are compact and aid multiband and wideband operations. Therefore such antennas are appropriate for the units the place house is a essential issue. PIFA has low backward radiation and subsequently it minimizes electromagnetic wave absorption. It has a self resonating structure [4]. Height of radiator and variation of distance, region and size influences the overall performance of the antenna. Therefore Planar Inverted F Antennas (PIFA) can be used for range of functions such as in

mobile and radio verbal exchange due to the fact of its compact size, decreased length and convenient integration.

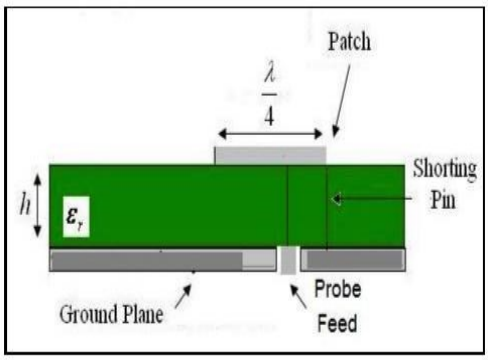

Fig1. Planar Inverted F antenna [1]

II. REVIEW OF PIFA DESIGNS

A massive number of Planar Inverted F Antenna designs have been proposed for many radio applications. This paper represents mind-blowing boom of PIFA in the fields of wi-fi communication. The obvious purpose is integration of a variety of applied sciences in moveable wireless devices. Various designs of PIFA are mentioned below.

A.Slotted Patch PIFA Design

This is a multi-band Planar Inverted F antenna and is intended for WiMAX application. In this paper four slots are introduced on the radiating patch to gain three bands i.e., 2.6GHz, 3.6GHz, 5.6GHz. It is considered that through including slots bandwidth response adjustments because the contemporary has to travel extra except slots [10]. Moreover the frequency response of the antenna can be multiplied or lowered to lower or to a greater band. There is a notable enchancment in the resonant frequency by inserting slot1 and slot 2 on the patch. A decrease resonant frequency is obtained by means of inserting slot three The width of slot three was higher than different two slots. The fourth slot is delivered to reap a good bandwidth. By including four slots to the radiating patch the required bands for the WiMAX are obtained. The diagram of the antenna is shown in Figure2[5].

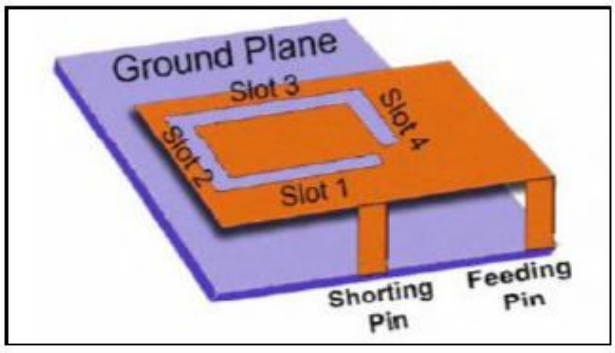

Fig2. Configuration of PIFA with four slots on top patch [5]

B. Tapered T-PIFA design

This is a tapered T-PIFA designed antenna and it is used for handset terminals. It has a linearly tapered radiating patch, feed wire, shorting plate and a ground plane. In this a classical PIFA with a tapered pinnacle plate is designed for WLAN band. The antenna is designed the use of Zeland Software. In this the resonant frequency is rather lower than the primary PIFA due to the reality that the resonant frequency is inversely proportional to the dimensions of the pinnacle patch. Specific Absorption Rate is decrease in tapered T-PIFA as compared to primary rectangular PIFA. Tapered Planar Inverted F Antenna indicates high performance and wideband characteristics. The bandwidth got by means of T-PIFA is greater expandable than that of a rect

angular PIFA having comparable volume. It is considered that tapered T-PIFA is an efficient radiator and can deal with each 1.8 and 5.2 GHz ISM bands. A compact tapered PIFA is additionally used to obtain PCS band purposes [11].. The plan of PIFA is proven in figure three [6].

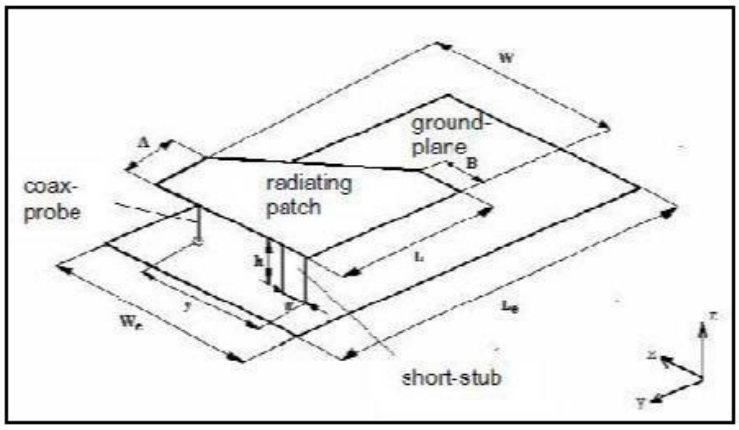

Fig3. T-PIFA Geometry [6]

C. Reconfigurable PIFA Design

It is a reconfigurable PIFA that is for hand held applications. The antenna is designed the use of switchable PIN-diode and a varactor. The antenna is designed to function at USPCS (1.85 - 1.99GHz), WCDMA (1.92-2.18 GHz) and WLAN (5.15-5.825 GHz) frequencies. Although Planar Inverted F Antenna (PIFA) affords multiband operations and small size but has a narrow bandwidth. In order to overcome this problem, a reconfigurable antenna used to be designed. The antenna not only gives small size however additionally provides wider bandwidth for that a reconfigurable antenna using varactor and a PIN diode is utilised. Fine tuning frequency can be without difficulty completed by means of various the capacitance of the varactor barring increasing the measurement of antenna. Also the antenna can pick out different frequency bands based on the on and off reputation of PIN diode. We have determined that when the PIN diode is off, antenna operates in USPCS and WLAN bands. Alternatively, when the PIN diode is on, the antenna operates at m-WiMAX and USPCS bands. Despite reconfigurable antenna has many advantages however the designing of this antenna is quiet complex [12]. The antenna can be beneficial for future cellular handsets. The layout of the antenna is presented in discern 4 [7].

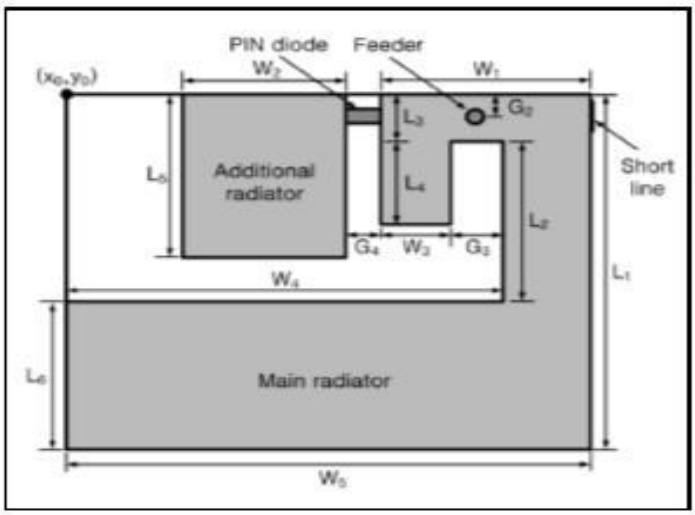

Fig4. Top view of reconfigurable PIFA [7]

D. Defected Ground Plane PIFA Design

In this sketch a quantity of slim slots are integrated to the ground aircraft that supports Planar Inverted F Antenna (PIFA). The ground pattern geometry looks like to a meander-line pattern. A meander-line configuration can be regarded as a slow wave shape in which the pace of mild is higher than the section velocity of the propagation wave. Thus a slotted meandered floor airplane appears longer, even though the bodily measurement is now not changed. It is found that through the usage of this method the peak of the antenna can be decreased to 50% whilst preserving the bandwidth fixed. The aspects will be located only on the metallic portions of the floor aircraft and will be connected via transmission line elements. The casing of the telephone has to be made from plastic as the slots cannot be shielded through any metal screen. The slots will also radiate when the cellphone is preserve in the hand [13]. Thus the antenna can be used in single band and twin band designs for 900 and 1900 MHz applications. The format of the antenna is presented in figure 5 [8].

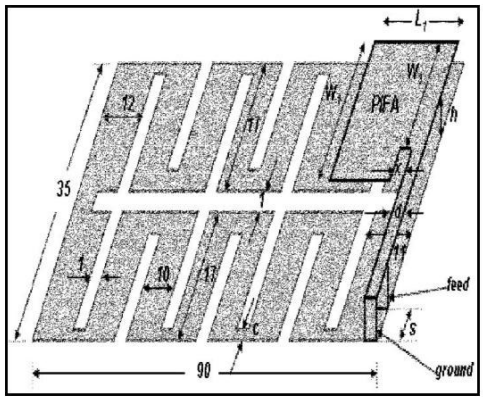

Fig5. PIFA on Defected ground plane [8]

E. Fractal Circular PIFA Design

In this diagram fractal geometry is developed on a round radiating patch of Planar Inverted F Antenna. The fractal geometries on the patch gives enhanced bandwidth and efficiency. A accurate impedance acquire and matching is additionally achieved by the antenna. Currently many handheld units use primary Planar Inverted F Antenna (PIFA) because it resonates at quarter wavelength and therefore less area is occupied in mobile handsets. The predominant disadvantage of PIFA is its narrow bandwidth and it does now not show multiband characteristics. In order to overcome these issues Fractal PIFA is designed. The working of the antenna is similar to rectangular PIFA but it has a fractal format on its radiating patch. Therefore a fractal PIFA provides good efficiency and gain. The achieve and effectivity can be further elevated by the use of slotted patches. In this paper octagonal structure is chosen as it affords a high bandwidth. Fractal PIFA provides giant bandwidth after little iteration. A variety of multiband frequencies such as 2.3GHz, 2.6GHz, 3.7GHz, 4.5GHz and 5.9 GHz can be obtained. The sketch of the antenna is proven in parent 6 [9].

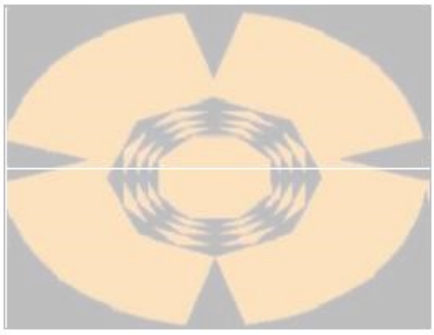

Fig6. Top view of Fractal PIFA [9]

F. Square Patch PIFA Design

The presented paper is a rectangular patch Planar Inverted F- Antenna (PIFA) for mobile terminals. It consists of a square radiating patch, shorting pin, floor airplane and a feed wire. The antenna is succesful of protecting PCS-1900 bands and DCS-1800. When in contrast with basic PIFA design, this structure has a rectangular pinnacle plate alternatively of rectangular plate. By the use of rectangular patch, it is viewed that the extent of the antenna can be reduced. The antenna is simulated the use of High Frequency Structure Software (HFSS). The diagram of the antenna is shown in determine 7 [14].

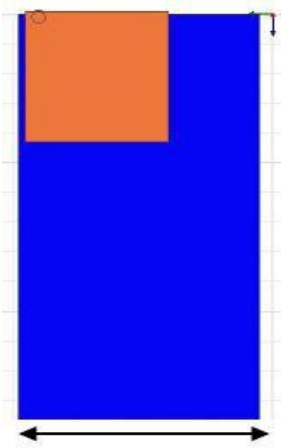

Fig7. Square Patch PIFA[14]

III. CONCLUSION

In this paper special designs of Planar Inverted F Antenna (PIFA) are studied in a certain manner. It has been seen that PIFA is easy to manufacture and has easy structures. PIFA offers a good deal better scope when compared to different traditional antenna whilst thinking about SAR (Specific Absorption Rate). Also the bandwidth of PIFA is higher than different antennas. Hence it can be concluded that PIFA is anticipated to have a promising future in wireless technologies.

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