REVIEW ON COMPACT ASYMMETRIC COPLANAR STRIP FED ANTENNA FOR MOBILE WIRELESS COMMUNICATION

Onkar Musmade[1], A.S. Deshpande[2]

[1]*PG student, Department of Electronics and Telecommunication, ICOER wagholi, pune, Maharashtra, India*
[2]*Assistant Professor, Department of Electronics and Telecommunication, ICOER wagholi pune, Maharashtra, India*

ABSTRACT

This paper reprints the aspects, design and investigation of compact asymmetric coplanar strip (ACS) fed antenna for modern mobile communication operation is presented. Comparison analysis is carried out against various feeding techniques related to microstrip antennas including Coplanar Wave Guide (CPW) antennas. With space utilization being premium factor in the vast majority of the application, the need compact antenna apparatuses that can fascinate the basic requirements of antenna. In this way need of option sustaining strategy is required. An altered form of the CPW feed antenna, called the ACS feed radio antenna has been fundamentally investigated nowadays. The antenna changed form of the CPW feed antenna and has some improvement in measurements as that of the CPW feed antenna. Investigated study depicts the design constraints and requirements of ACS feed antennas for modern mobile communication applications including multi-band environments for 2.4 GHz LTE IEEE 802.11 b/g (2.4–2.484 GHz), 3.5 GHz WiMAX IEEE 802.16 (3.4–3.6GHz), 5.2/5.8GHz WLAN IEEE 802.11 a (5.15–5.35 GHz and 5.725–5.825 GHz) and 5.5 GHz HIPERLAN2 (5.47–5.725 GHz.

Keyword: - *Asymmetric Coplanar Strip , Coplanar Wave Guide, Long term evolution etc*.

1. INTRODUCTION

Monopole antennas have discovered boundless applications in mobile communication frameworks. The expanded utilization of mobile communication framework has empowered the enthusiasm for the multi band applications with monopole antennas It is noticed that monopole antennas are for the most part mounted over a substantial ground plane and energized by a strip feeding arrangement. A antennas are bolstered by a CPW-feeds knows as coplanar waveguides, it is utilized as a part of short distance combinations like Bluetooth and WLAN at 5.2/5.8 GHz. This has additionally escalated the requirement for the coordination of multi band antennas working at these frequencies into versatile devices and in consolidating mobile wireless equipments.

The requirement for minimization of total size of antennas with different sorts of applications has been suggested different types of monopole antennas covering Planar Inverted F antennas (PIFA), Co-planar Waveguide Antennas (CPW) and so on. The broadly utilized monopole antennas have principal points of advantages like straightforward and simple structure, omnidirectional radiation patters, low profile, lightweight and relatively higher working scope of frequencies. These antennas are usually energized by a probe feed or a smaller scale strip lines with a bigger ground plane and has a double layer designs. Uniplanar feeding systems picked up consideration because of important points like single metallic layer structure and simple incorporation to solid state microwave coordinated circuit (MMIC) board. Coplanar waveguide nourish (CPW) is the generally utilized uniplanar feeding methods .The different kind of CPW feeding antennas are double recurrence monopole antennas in (DCS) computerized correspondence system and 2.4 GHz WLAN band, another is a dual band Y shape monopole antennas acquire operation for the PCS/WLAN systems

A compact dual band slot antenna for WLAN application is reported [2]. The operating frequencies of the antenna are set at 2.4–2.485 GHz (the low band) and 5.15–5.825 GHz (the high band), which are for the WLAN (IEEE 802.11 a/b/g) system having simple structure and wide bandwidth [4]. A Meandered T-Shaped Monopole Antenna for dual band is reported [5].

In this paper, ACS feed MSA for mobile wireless communication like LTE, WiMAX and WLAN application with slotting approach has been suggested.

2. WIRELESS COMMUNICATION STANDARDS

Mobile communication systems reformed the way individuals impart, combining interchanges and portability. Advancement of wireless systems get to advances is going to achieve its fourth generation (4G). Looking past, wireless communication get to advances have taken after various developmental ways gone for brought together having target: execution and productivity in high versatile condition. The original (1G) has satisfied the essential versatile voice, while the second generation (2G) has presented limit and scope. This is trailed by the third generation (3G), which has journey for information at higher paces to pave the way for genuinely "portable broadband" experience, which will be additionally acknowledged by the fourth generation (4G). The Fourth generation (4G) will give access to wide range of media transmission administrations, including propelled portable administrations, bolstered by versatile and settled systems, which are progressively bundle based, alongside a help for low to high portability applications and wide range of data rates, as per benefit requests in multiuser condition. This paper gives an abnormal state diagram of the development of Mobile Wireless Communication Networks from 3G to 4G. Is portrayed LTE (Long Term Evolution) a fourth era (4G) versatile system innovation.

2.1 Long Term Evolution (LTE)

LTE stands for Long Term Evolution it might have been began as undertaking to 2004 by telecommunication body known as the Third Generation Partnership Project(3GPP). SAE (System Architecture Evolution) may be those relating Development of the GPRS/3G packet core system development. The word LTE is normally used to represent able both LTE and SAE. LTE advanced from earlier 3GPP framework known as Universal Mobile Telecommunication System (UMTS), which thus advanced from the Global System for Mobile Communications (GSM). Indeed related determinations were formally known as the developed UMTS formally known as the extended terrestrial radio access (E-UTRA) and evolved UMTS terrestrial radio access network (E-UTRAN). First version of LTE was documented in Release 8 of the 3GPP specifications.[12]

A fast builds of versatile data use and development of new requisitions for example, MMOG (Multimedia Online Gaming), portable TV, Web 2. 0, streaming contents need motivated those 3rd generation partnership protocol (3GPP) will worth of effort on the long term evolution (LTE) on the way towards Fourth-generation network. Primary objective of LTE will be to give acceptable a high data rate, low inactivity packet optimized radio access technology supporting flexible bandwidth deployments. [12]

2.2 Wireless Local Area Network (WLAN)

As of late IEEE 802. 11 wireless area network (WLAN) bring turn into universal over the world in the license-free spectrum off 2.4 and 5GHz bands. 802.11 protocol aggregations are 2.2.Wireless Local Area Networks (WLAN) standard produced by International Institute of Electrical and Electronics Engineers (IEEE). The 2.4GHz ISM band is adopted vast majority of the nations on the universe. Over A percentage of nations and regions, the use circumstances about 5GHz ISM band may be a greater amount. The high carrier frequency has a negative effect, making the popularity of 802.11a limited, although it is the first version of the protocol group.802.11a standard was an amendment of the original 802.11 standard, which was approved in 1999.802.11 standards have a big family, including about 22 types of standards. In the previous ten years, IEEE802. 11a/b/g were used broadly.

2.2 World Interoperability for Microwave Access (WiMAX)

WiMAX that stands for World Interoperability for Microwave Access, is a standard based on IEEE 802.16 broadband wireless access metropolitan area technology, and it is an air-interface standard for microwave and millimetre-wave band. WiMAX also known as IEEE Wireless MAN (Metropolitan Area Network), can provide an effective interoperability broadband wireless access method under the MAN of a point to multipoint multi-vendor environment. Wireless mesh networks (WMNs) are widely envisioned to be a key technology to improve the capacity and coverage for wireless broadband access services at reasonable costs in rural areas where wired communication infrastructure is too costly to install [11].

3. ACS ANTENNA SYSTEM

Wireless connectivity need enabled more versatile lifestyle loaded with comforts for portable computing devices. Consumers will quickly interest those same comforts for their advanced home, interfacing their PCs, individual advanced recorders, MP3 recorders and players, advanced camcorders and advanced cameras, high-definition TVs' (HDTVs), set-top boxes (STBs), gaming systems, personage digital assistants (PDAs) and Mobile phones should unite with one another to wireless personal area network (WPAN)in the home. Be that as today's wireless local area network (WLAN) also WPAN advances can't meeting the necessities about tomorrow's connectivity for such a host about rising purchaser electronic units that oblige secondary data transfer capacity. Another engineering organization is necessary on help the needs of high-bandwidth in WPANs. With disguise huge numbers provisions with normal antennas might be referred as multiband antenna, developing an amount of provisions under same. Multiband systems avoid duplications for different antennas that may make utilized to separate applications. Microstrip antennas with single band, double band, triple band also quad band operations can be integrated into a same frame of radiating structure, reducing complexity and making system compact.

A CPW feed provides easy integration and assembling of antennas with existing MMIC technology on a single sided PCB board. The structure of CPW feed UWB antenna is shown in Fig 1.With space being premium in most of the application, the need to have compact antennas that can still facilitate the basic antenna requirements has increased. Thus need of alternative feeding technique is required. A modified version of the CPW feed antenna, called the ACS feed antenna has been significantly explored these days.ACS feed antenna can approximately reduce50% size as that of the traditional CPW feed antenna. However, these antennas undergo slight variation in radiation characteristics behaviour due to the asymmetrical nature of the antenna. Hence, use of these antennas for application where radiation pattern does not significantly affect the performance of the system is advised. Fig 2 shows the structure of the ACS feed antenna. As observed from Figure 1 we can see that the ACS feed antenna is approximately cut in two half pieces while only one-half piece is retained.

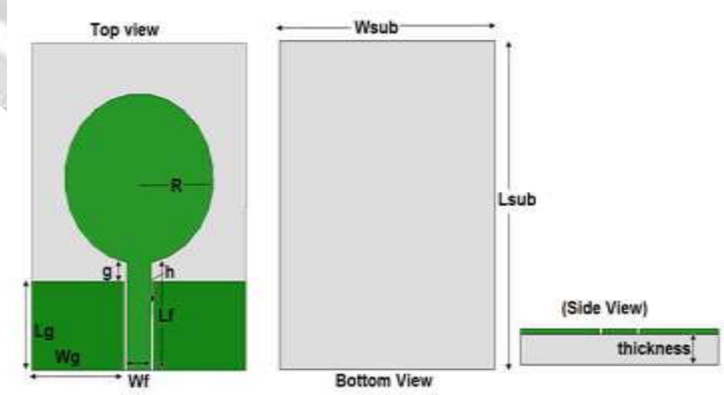

Fig -1: Structure of CPW Fed Antenna

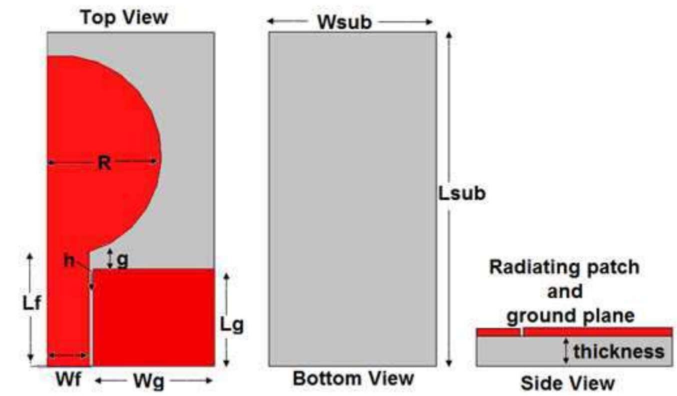

Fig -2: Structure of ACS Fed Antenna

4. LITERATURE SURVEY

In recent years, there have been several new concepts applied for monopole antenna to be designed for LTE, WLAN and WiMAX applications

A novel compact asymmetric coplanar strip (ACS)-fed printed antenna using dual edge resonators for tri-band operation is proposed in [1]. The proposed tri-band antenna is based on an ACS-fed beveled monopole, to which an E-shaped coupled resonator and an L-shaped slot resonator are introduced for achieving two new independent resonances and miniaturization of size. The antenna has a small overall dimension of only 12×23×1 mm. The experimental results demonstrate the proposed antenna is capable of operating over the frequency ranges, 2.37–2.52 GHz, 3.38–3.71 GHz and 4.92–5.96 GHz, suitable for 2.4/5.2/5.8 GHz WLAN and 3.5/5.5 GHz WiMAX applications [1].

A simple beveled monopole design excited by a compact ACS feed can obtain a wide frequency band at 5.5 GHz which covers the 5.2/5.8 GHz WLAN standard applications. The beveled edge is employed to compensate for the discontinuity between ACS feed line and the radiator so as to achieve a better impedance match [2]

The ECER is composed of an E-shaped open slot and a rectangular strip, acting as a printed inductor and capacitor respectively. Therefore, an equivalent parallel LC resonator is formed when they are coupled with each other. Additionally, in order to excite another resonant mode at the 3.5 GHz WiMAX band, a special LSER is employed as the other edge resonator embedded in the limited area of the bevelled monopole. The resonant length of L-shaped slot is close to a quarter-wavelength at 3.5 GHz. Lastly, the proposed antenna is constructed by combining the two edge-resonant structures. The proposed ECER and LSER introduce additional two resonances operating at 2.4 GHz and 3.5 GHz respectively besides the original 5.5 GHz resonance of the bevelled monopole. The proposed antenna exhibits good impedance matching, almost monopole-like radiation pattern and stable antenna gains, showing it is suitable for WLAN/WiMAX applications [3].

A planar triple-band stepped monopole antenna is presented in [4]. This asymmetric coplanar strip (ACS)-fed structure with single ground is used to reduce the oversize of antenna, a single stepped monopole is designed to realize dual band frequencies shaped trip connecting the signal trip with the ground plane offers a more exible and stronger coupling, an I-shaped stub inverted to the ground is employed to turn the impedance matching effectively, then a snake-shaped slot inserting on the ground plane is applied to launch a new frequency. The proposed antenna, with a very compact size of 21.6*12 mm, generates three desired resonant frequencies at about 2.4 (2.38-2.51), 3.5(3.31-3.58), 5.4 (5.14-5.65) GHz for WLAN and WiMAX applications. This antenna presents high bands isolation and good pass-band performance shaped trip connecting the signal trip with the asymmetric ground and etching a snake shaped slot on the ground plane, a compact antenna with three designed operating bands covering 2.4/5.2 GHz WLAN bands and 3.5 GHz WiMAX band is presented[5].

One short and one long strip are extended from the feed line. It is studied that resonant frequencies are dependent on relative length of the two arms. With a single long strip as proposed in there are two resonant modes. With an additional short strip, we found that the short strip may also be used to tune the frequency and/orthe bandwidth. This property may increase the design flexibilities [6].

The radiator of the antenna is very compact with an area of only 3.5*17 mm.Inverted L slots are used to achieve three resonant modes for triple band applications With small and simple structure antenna has 10-dB impedance bandwidths of 120 MHz (2.39–2.51 GHz), 340 MHz (3.38–3.72 GHz), and 1450 MHz (4.79–6.24 GHz) to cover all the2.4/5.2/5.8-GHz WLAN and the 3.5/5.5-GHz WiMAX bands, and good dipole-like radiation characteristic.[7].

By optimizing the parameters of antenna, it can produce a triband covering the 2.4/5.2/5.5-GHz WLAN and 3.5/5.5-GHz WiMAX bands. Antenna is formed by cutting off three rectangular substrates from the whole rectangular substrate of Antenna 4 in order to get a smaller antenna size while preserving the antenna performance (covering the 2.4/5.2/5.8-GHz WLAN and 3.5/5.5-GHzWiMAX bands)[8].

Low-profile planar monopole antenna is proposed in [9] to operate within WLAN and WiMAX frequency bands. The antenna is consisting of three radiating elements. Also has the additional strip to control antenna performance. The coupling between the two meandered monopole radiating elements is used to reduce the size of the proposed antenna. The resonance frequency and the impedance bandwidth can be tuned by adjusting the coupling between these two radiating elements and the ACS ground plane. The antenna has the desired radiation characteristics, and impedance bandwidth, and it has a moderate gain, and these characteristics make the antenna promising for WLAN and WiMAX applications [9].

A triband monopole antenna using parasitic element is proposed. Different width L shaped slots are used in antenna the antenna resonates at LTE 2.5GHz, WiMAX 3.2GHz, AND WLAN 5GHz.The antenna size is small as 23*20 mm.Antenna simulated using IE3D software for various antenna parameters [10]

5. CONCLUSION

Various wireless communication standards has been presented.ACS feed antenna provides more compact size compared to CPW feed antenna In this paper ACS fed monopole antenna for mobile wireless communication standards like LTE, WiMAX and WLAN application with different approach like slotting, etching has been suggested.

6. REFERENCES

[1].WEI HU,JIAN-JUN WU,SHU-FENG ZHENG. Compact ACS-Fed Printed Antenna using Dual Edge Resonators for Tri-band Operation. *IEEE Antenna Wireless Propag. Lett*., vol. 15, pp 1536-1225,2016.

[2]. N. CHANG AND J. JIANG. Meandered T-Shaped Monopole Antenna. *IEEE Trans. Antennas Propag*., vol. 57, no. 12, pp. 3976–3978, Dec. 2009.

[3]. W. C. LIU AND C. F.HSU. Dual-band cpw-fed y-shaped monopole Antenna For PCS/WLAN Application.*IEEE Electron. Lett*., vol. 41, no. 7,pp. 390–391, Mar. 2005.

[4]. H. CHEN, X. YANG, Y.-Z.YIN, S.-T.FAN, AND J.-J. WU. Triband Planar Monopole Antenna With Compact Radiator For WLAN/WiMAX Applications.*IEEE Antenna Wireless Propag.Lett.*, vol. 12, pp. 1440-1443, 2013.

[5]. A. MEHDIPOUR, A. R. SEBAK, C. W. TRUEMAN, AND T. A. DENIDNI. Compact Multiband Planar Antenna For 2.4/3.5/5.2/5.8-GHz Wireless Applications. *IEEE Antennas Wireless Propag. Lett.*, vol. 11, pp. 144–147, 2012.

[6].H.Q. ZHAI, Z. H.MA, Y. HAN, AND C. H. LIANG.A Compact Printed Antenna For Triple-Band WLAN/WiMAX Applications.*IEEE Antennas Wireless Propag.Lett.*, vol. 12, pp. 65–68, 2013.

[7]. S.VERMA AND P. KUMAR. Compact Triple-Band Antenna For WiMax And WLAN Applications. *Electron. Lett.*, vol. 50, no. 7, pp. 484–486, Mar. 2014.

[8]. M. MOOSAZADEH AND S. KHARKOVSKY. Compact and small planar monopole antenna with Symmetrical L- and U-Shaped Slots for WLAN/WiMAX Applications. *IEEE Antennas Wireless Propag.Lett.*, vol. 13, pp. 388–

391, 2014.

[9]. W.C. LIU, C. M. WU, AND Y. DAI. Design of triple-Frequency Microstrip-Fed Monopole Antenna Using Defected Ground Structure. *IEEE Trans. Antennas Propag.*, vol. 59, no. 7, pp. 2457–2463, Jul. 2011.

[10].ASHWINI ANIL KADAM and PROF A.S.DESHPADE,A Compact tri-band monopole antenna for handheld devices.IJARIIE ISSN (0)-2395- 4396 vol.3issue 4,2017

[11].Shuang Song and Biju Issac "Analysis of WiFI and WiMax and Wireless Network Coexisternce"*International Journal of Computer Networks and Communications (IJCNC) Vol 6 2014*

[12].HESHAM A SALMAN.LAMIAA FATTOUH IBRAHIM ZAKI FAYED. Overview of LTE-Advanced Mobile Network Plan Layout. International conference on intelligent systems, Modeling and Simulation.2014.