International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 06 Issue: 05 | May - 2022 Impact Factor: 7.185 ISSN: 2582-3930

Multiband Microstrip Patch Antenna for Wireless Applications

Yatharth Malik, Saurabh Kaushik, Vasu Chaudhary

Electronics and communication, Meerut Institute of Engineering and Technology, Meerut, India

Abstract - The project is named **" Multiband Microstrip Patch Antenna For Wireless Applications "** Multiband phased array antennas used in today's multi-function communication applications. Generally microstrip antenna arrays like the kotch array and sierpinski array are used but in some circuits where space is limited and arrays are not used. Therefore to achieve the multiband operation with limited space an antenna is designed E-shaped in combination with a split ring resonator to achieve the multiband operation. The simulation and experimental results show that the projected antenna operates at four different frequencies, 1.8GHz, 3.6GHz, 4.53GHz, and 5.73GHz, which can be used for various wireless applications like GSM 1800 (1.71– 1.78 GHz), Wi-MAX (3.4-3.69GHz) - IEEE 802.16 standards, Wi-Fi/WLAN (5.15-5.82 GHz). All the simulation outputs like resonant frequency, return loss, radiation patterns and fabricated antenna measured result is presented in this paper. The antenna is simulated using CST 2014 software.

Keywords— Put your keywords here, keywords are separated by comma.

I. INTRODUCTION

In the present generation wireless communication systems are quickly developing due to increasing demand for mobile equipment which is to be connected with different devices operating at multiple frequencies . Multiband antenna plays a crucial role in wireless communication systems as it can operate in multiple frequency bands for different wireless applications like (GSM) Global System for Mobile communication, (WLAN) Wireless Local Area Network , (Wi-MAX) Worldwide Interoperability for Microwave Access, and (Wi-Fi) Wireless Fidelity.

The advantage of the multiband antenna is its ability to integrate multiple frequency bands in a single antenna which makes the design and process more complex than single and dual-band antennas. From literature the fractal antenna arrays like the Kotch array and Sierpinski array are also used to achieve the multiband operations . The fractal antennas increase the design density. The microstrip patch antenna is a well-suited device for wireless communications which can be easily integrated with microwave circuits because of its low volume, thin profile, lightweight, and low cost, which can work at multiple frequencies. Hence, the multiband Microstrip patch antenna is of great concern nowadays.

II. PROPOSED PATCH ANTENNA DESIGN AND CONFIGURATION

The simulation models of the two proposed design microstrip antenna structures this is antennas, called the rectangular antenna design two rectangle slots (antenna 1) etching on the reference (conventional) antenna (RA), and notch rectangle antenna with circle slot (antenna 2) by print rectangle notch on corner of reference antenna and cutting circle slot on the middle of the patch antenna. The slot on the microstrip antenna is explored. The slot on the microstrip patch can be fixed by using a fraudulence relationship between the dipole and the slot 23,24,25 . The invented antennas are printed on the front side of the Roger RT5880 substrate. The height hs of 3.18 mm, relative permittivity Ɛr=2.2. The constant Ɛr of microstrip material should be between 2.2 and 12 for antenna designing. The height of the substrate, h << λ0 (where λ0 equals operating wavelength) . The resonant frequency fr = 2.4 GHz. The total substrate size (Ws x Ls) of all antennas is (94 × 78mm2). Each patch structure of these antennas is the size of patch (Wp) x length (Lp) of (47 × 38 mm2). The inset feeding type is used for the design because of its ease of fabrication in the PCB form, and easy matching with the existing system. The projected microstrip antennas are configured to improve impedance bandwidth outcomes due to changes in substrate height and dielectric constancy. If substrate height is increased, the bandwidth of the antenna is also increased. This is because the bandwidth of the antenna is directly proportional to the substrate height. The feed width wf and length lf, though the characteristic impedance is 50 Ω. A full ground plane is on the backside of the substrate material. Copper is used as the conducting material for patches and grounds.

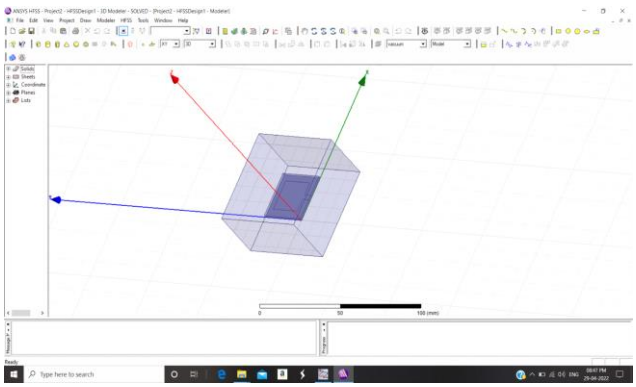


Fig.1

III. DISCUSSION OF SIMULATION RESULTS

Due to rapid development in the field of wireless communication there is an increasing demand for such technology that offers larger bandwidth with higher data rates. Therefore UWB is of more interest to the researchers and techniques have been used to use this band (3.1GHz 10.6GHz) more efficiently. Patch antennas are very much in use because of their low weight and ease of fabrication. In this paper, a patch antenna has been used to design a multiband antenna for UWB, WIFI, and WIMAX applications. To improve the antenna characteristics design has been modified. Simulations have been done using CST microwave studio and fabrication has also been carried out.

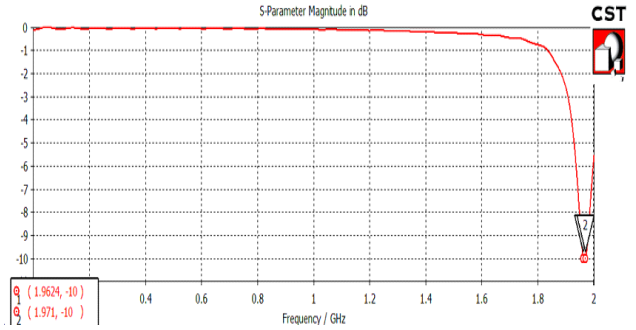
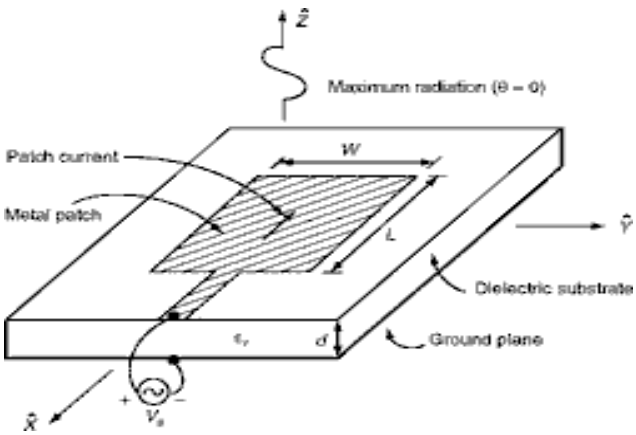


Fig.2



REFERENCES

1. J. R. James, P.S. Hall. Handbook of microstrip antennas, I.E.E. Electromagnetic Waves Series 28–Peter Peregrinus LTD, 1989.

2. Best, S. R. Electrically Small Multiband Antennas, In: Multiband Integrated Antennas for 4G Terminals, D.A. Sanchez-Hernandez 132 , Artech House, ISBN 978-1-59693-331-6, Boston, USA. 2008.

3. M. Helier, Techniques micro-ondes, Structures de guidage, dispositifs passifs tubes micro-ondes, Ellipses, Collection Technosup Les Cours De l'école Superieure D D'electricité, ISBN 2-7298-0497.April, 2001.

4. H.Gaha, F.Choubani, J.David, A.Bouallegue,Conception des antennes imprimées multibandes,

5. J.-S. Chen, Multi frequency characteristics of annular ring slot antennas, Microwave and Optical Technology Letters, Vol. 38, No. 6, pp. 506-511, Sep.2003.

6. Y.T. Liu, S.W. Su, C.L. Tang, H.T. Chen, K.L.Wong , On vehicle low profile metal plate antenna for AMPS/GDM/DCS/PCS/UMTS multiband operations, Microwave and Optical Technology Letters, Vol. 41, No 2, pp. 144-146, Apr. 2004.

7. Y.S. Liu , J.S Sun , R.H. Lu , Y.J. Lee, New multiband printed meander antenna for wireless applications, Microwave and Optical Technology Letters, Vol. 47, No 6, pp. 539-543, Dec. 2005.

IV. CONCLUSIONS

From this literature review we conclude that fixed patch configuration is effectively used in multiband antennas and overcomes the effect of narrow bandwidth and provides high performance. So from this, we have proposed an antenna that will support a triple band operation that will operate in GPS L1 band, GSM band, and WLAN frequency bands. And we will also try to maintain high performance like high gain, broad bandwidth, improved beamwidth , and Low cross-polarization making it suitable for GPS, GSM, and WLAN Applications.