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Reconfigurable Microstrip Patch Antenna with Switching In Three Switchable Frequency Bands

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ABSTRACT
First a Switchable reconfigurable microstrip patch antenna is designed in this paper, Using Corner connection/disconnection and additional patch connection/disconnection techniques, it is further developed to provide switching in three switchable frequency bands. Five p-i-n diodes are used to provide three switchable operating bands with centre frequencies of 5.1 GHz(first band), 5.45 GHz(second band), and 6.3 GHz (third band). The antennas measured performance matches the calculations closely.
INDEX TERMS Microstrip patch antenna p-i-n diode proximity coupling, reconfigurable antenna tapered microstrip line.

I. INTRODUCTION

Reconfigurable antennas are very popular in modern and future wireless communication systems such as LTE and 5G. Reconfigurability can be achieved from antennas in many ways such as frequency radiation pattern or combined of these reconfigure able antennas with switching are used to double the system capacity and reduce multipath fading. these antennas are best suited in such cases and reduce the loss and enhance. the signal strength due to reflections from objects or any other obstacles of the receiving signal may change its direction and reduces the amplitude circularly polarized antennas are insensitive to the orientation of receiving and transmitting antenna. these antennas are best suited in such cases and reduce the polarization loss and enhance the signal strength microstrip based circularly polarized antennas offers only one corner of the patch this method offers simplicity and reduces the number of switches in the structure to get the same characteristics that obtained with the diagonal corner truncation. Another method to obtain CP is to load the microstrip patch antenna through a stub that perturbs the fields and generates two orthogonal modes with equal amplitude and 90 phase difference. reported antennas in had capability to switch its polarization among LP or CP (left-hand or right -hand CP) in a single operating band by using various techniques. However modern wireless systems require antenna to be operated in more than one frequency band. compared to the dual polarized antennas polarization reconfigurable antennas to be more advantageous due to their compact structure and reduce manufacturing complexity and effective use of electromagnetic systems.

II. Literature Review

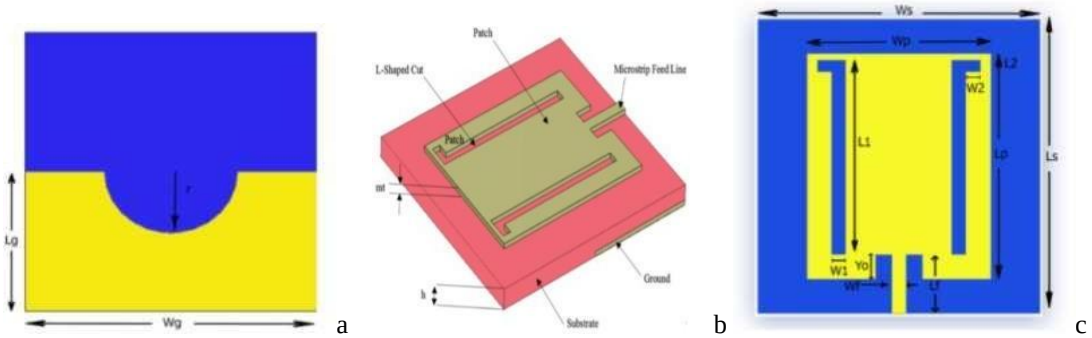
1. K. Srinivasan, et all, 2021 "Design and Analysis of microstrip antenna": The microstrip slot antenna is designed to work at frequencies ranging from 5 to
10 GHz. The suggested antenna's return loss is -21dB at 5GHz and -29dB at 10GHz, and the acquired VSWR is lessthan2, resulting in better impedance matching. The antenna has a wide range of uses in the C band. The suggested structure has been simulated using the Anasys HFSS Software tool.
2. Suganya J, 2020 "Microstrip patch -slot Antenna with high Gain for Frequency Diversity application":
Switching on or off the PIN diodes in the proposed antenna allows for frequency reconfiguration. Frequency reconfigurability is achieved with three resonant frequencies (3.963GHz, 3.07GHz, and

2.95GHz) in three separate modes of operation. The proposed antenna provides a dual-band operation for MIMO in WLAN and 4G systems.

3. SonalDuabal et all, 2020 "Multiband reconfigurable antenna for wireless applications": A hook with a 2020 mm^2 area is presented and its reconfigurability is investigated. The radiator, in combination with the active patch, allows for frequency reconfiguration. For different wireless applications such as WLAN, Wi-Max, UMTS, and ITS, the antenna switches between three bands (1.9 GHz- 2.1GHz-8.3GHz) based on the diode states.

4. Minakshmi Shaw, et all, 2020 "frequency reconfigurable microstrip patch antenna for IRNSS applications": this paper presents a compact frequency reconfigurable antenna for IRNSS applications. The proposed antenna can switch the s-band. The reconfigurability for the designed antenna is achieved by incorporating RF PIN (three) diode between the radiating element and resonated slot. The proposed antenna is resonated at 1.1753GHz (1.16GHz to 2.51GHz) and 2.4895GHz(2.47 GHz to 2.51GHz) with ON and OFF condition of PIN diodes , respectively. It is compact and low -profile structure with maximum gain of 8.51 dBs with low cross polarization (CP) of approximate <-30 dB and width size are 120*120mm.

5. Wahaj Abbas Awan, et all 2019" frequency reconfigurable patch antenna for millimetre wave application ": the presented work is a "Y" slotted mm- wave reconfigurable patch antenna, suitable for radar, satellite communications, 5G generation Wireless network and millimetre wave energy harvesting. The frequency reconfigurability is achieved using 2 PIN diodes integrated antenna. Four frequencies are produced using our proposed antenna, which is bandwidth, directivity, and VSWR.



a b c

Fig.1. The proposed antenna design(a) prospective view(b) front view and (c) back view.

Methodology used for proposed work is depicted in fig.2

Fig.2. Flowchart of presented work.

Simulation Results

For performance evaluation purpose the investigated antenna is designed and simulated in CST a 3D simulation design tool. the performance of the proposed antenna is studied in terms of Return loss, impedance matching bandwidth, gain, efficiency, and radiation patterns.

Gain Pots

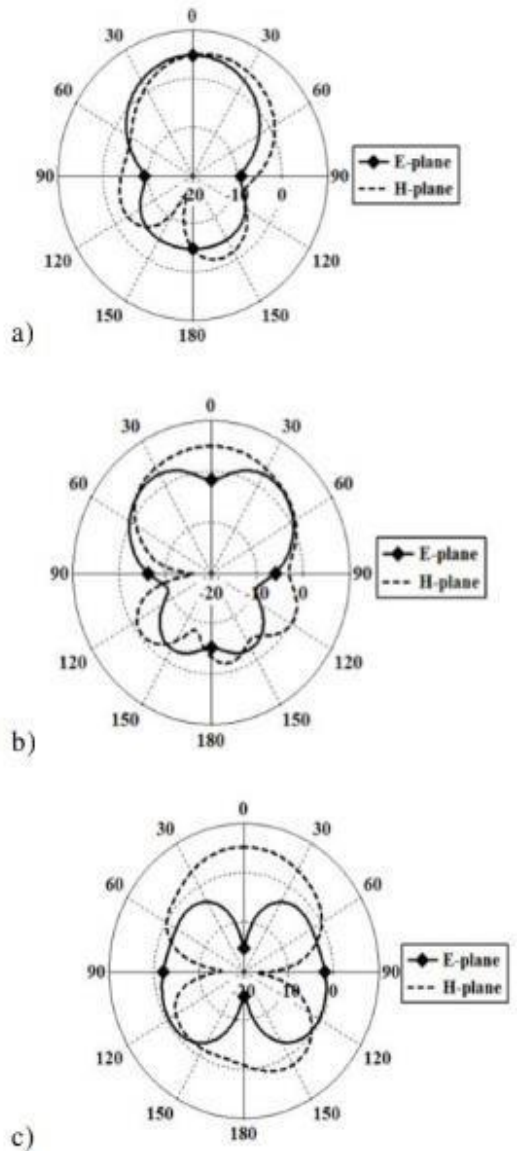


Fig. Gain polar plot at (a) 5.1GHz (b) 5.45GHz and (c) 6.3GHz

III. CONCLUSION

This paper describes a compressed frequency switchable slotted reconfigurable microstrip patch antenna that can switch between three bands. The antenna can be reconfigured to work in up to three different bands. Using p-i-n diodes, from 5.1GHz to 5.45Ghz and 6.3GHz.LTE and WIMAX are examples wireless applications. 7.059dB is the maximum gain. This bolstered the antenna's use in smartphones and Bluetooth headsets.

REFERENCES

[1]. Y.J Sung, "Reconfigurable patch antenna for polarization diversity," IEEE Trans. Antenna

propag., vol. 56, no. 9, pp. 3053-54, Sep. 2008.

[2]. P.-Y. Qin, A. R. Weily, Y. J. Guo, and C.-H. Liang, "Polarization reconfigurable U-slot patch antenna," IEEE Trans. Antennas Propag., vol. 58, no. 10, pp. 3383-88, Oct. 2010.

[3]. M.S. Parihar, A. Basu and S. K. Koul, "polarization sreconfigurable Microstrip antenna," in proc. Asia pac. Microw.Conf.(APMC), SINGAPORE, Dec. 2009, pp. 1918-1921

[4]. Y.J. Sung, T.U. jang and Y.-S. Kim "A reconfigurable antenna for switchable polarization," IEEE Microw. Wireless Compon. Lett., vol. 14, no. 11, pp. 534- 536, nov.2004.

[5]. Y. Wu, C. WU, D. Lai and F. Chen "A Reconfigurable Quadri-Polarization Diversity Aperture- coupled patch antenna", IEEE Trans. Antennas

[6]. Propag., vol.55, no.3, pp. 1009-1012, mar.2007.

[7]. B. Li and Q. Xue, "Polarization – reconfigurable Omnidirectional Antenna Combining Dipole and Loop Radiators," IEEE Antennas Wireless Propag., Lett., vol. 12, pp. 1102- 1105,2013.

[8]. M.S. Nishamol, V.P. SARIN, D. Tony,

[9]. C.K. Aanandan, P. Mohanan and K. Vasudevan, "An Electronically Reconfigurable Microstrip Antenna with Switchable Slots for Polarization Diversity," IEEE Trans. Antennas Propag., vol. 59, no. 9, pp. 3424-3427, sept. 2011.

[10]. P. Zhang, s. Liu, R. Chen and X. Huang," A Reconfigurable microstrip patch antenna with frequency and circular diversities," chinese Journal of Electronics, vol. 25, no. 2, pp. 379-383, mar.2016.