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Development of CPW Fed Notch Cut with E-Shape Slot Antenna for WLAN & WIMAX Applications

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***Abstract*— A Coplanar Waveguide (CPW) Fed Notch Cut Monopole antenna for WiMAX and WLAN applications is proposed. The antenna, which employs compact measurements are directly controlled of altered U-shape transmitting patch with E-shape opening having ultra-wide band characteristics. The dimension of the proposed Antenna is 33.9mm X 30.5mm X 1.6 mm. The Proposed antenna was fabricated on a less cost, resistant FR4 substrate, which is strengthening with a woven fiberglass fabric. FR4 implies flame retardant and sort 4 demonstrates woven glass fortified epoxy gum. By meticulously choosing the points of this aperture, equitable bandwidth of the antenna can be acquired so that manipulating strips awning 2.4/5.2/5.8 GHz WLAN and 2.5/3.5/5.5 GHz WiMAX bands. The constant outcomes as well exhibits that the advanced antenna has significant bandwidth and is acceptable to be incorporated within the lightweight appliances for WiMAX /WLAN applications. The numerous attribute limitations like Return Loss, VSWR and Radiation pattern are considered. The proposed CPW Antenna is simulated by utilizing ANSOFT HFSS software.**

Index Terms—Microstrip Antenna, Monopole Antenna, WLAN, WiMAX, Coplanar Waveguide Feed

I. INTRODUCTION

The advances of remote transmission frameworks looked quickly forever spreading requests for broadband resource and transmission rates to reinforce interactive media, facsimile, articulation, and information processing system. Systematize to retort the quickly increasing requests; an antenna must be accountable in ample recurrence bands. Appropriately, the multispectral antenna is preferred in numerous techniques. Also, an advanced antenna needs not only the task of contributing a double- or multiband performance, but also an easy arrangement, miniature area, and simple combination with the complex circuit. Published microstrip frameworks have been extensively explored and it is a fine possibility for wireless transmission since its extends a short description, i.e. lightweight and simple processibility, simple to manufacture by using methods like reproduction and UV lithography , are simple to sustain, simple to use in an assortment and common directionality, which contributes a substantial lead above conventional antennas .Contrasting feed techniques, feed by exploration and integrating through vent, were used for excessive load separation .In inclusion to clarify the feeding arrangement and keep extent, a coplanar waveguide (CPW) perspective were extensively utilized for antenna signal structure since its broad bandwidth, flattened shapes, and simple combination along solid microwave coordinate loops which assists pair of nonmaterial methods.

For little and amplified scope remote approaches, amount of receiving wire models worthy for remote nearby region organize (WLAN: 2.4-2.483, 5.15-5.35, and 5.725-5.85 GHz) and around the world compatibility for microwave approach (WiMAX: 2.5-2.69, 3.3-3.8, and 5.25-5.85 GHz) execution turned out to be considered and created. Receiving wires are successful of diminishing recurrence affect and thus moving forward plan introduction has been advanced with openings adjustments for WiMAX and WLAN execution. As for observational approaches, all these radio wire shapes have expounded arrangement that results in extra cost for radio wire arrangements.

II. ANTENNA DESIGN

Figure 1 shows the structure of the proposed monopole antenna. The size of proposed CPW Monopole antenna is 33.9 X 30.5 X 1.6 mm3. The receiving wire which is fabricated on 1.6-mm thick FR4 substrate with a relative permittivity value of 4.4 is developed utilizing altered U-design transmitting patch with E-design slots. The antenna was fabricated on a limit price, resistant FR4 substrate, which is strengthened along a fabricate glass reinforced plastic substance. FR4 stands for flame retardant and type 4 indicates woven fiber strengthened plastics wax. The transmitting patch is signaled by coplanar waveguide (CPW) radiation line along the width (4.5 mm) and length (14 mm). The dominant emitting components of the antenna, that are notched on the ground plane having a E-design aperture, that assemble the receiving wire to accomplish more noteworthy impedance

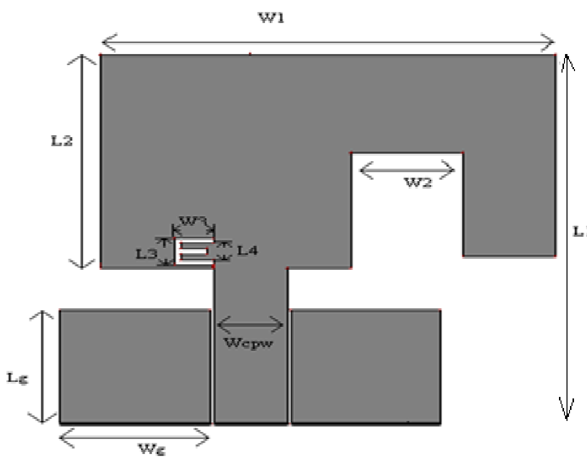


Figure 1: Structure of CPW Monopole Antenna

The position of monopole antenna shape is equilateral patch, this serendipitously fabricate the fix equalizations second rate band of WLAN / WiMAX usage. Also to adjust the combine of second rate and prevalent band, progressed urgent radio wire is adjusted and modified L-structure rifle is merged together with equilateral fix as display in below table 1 that outcomes modified U- organized releasing. Similar gadget ability exist built up to be chivalrous as long as upgrading the receiving wire transfer speed. An electromagnetic (EM) solver, Ansoft HFSS, became locked in to look at the automatic assets and broadcast usage of the antenna.

Parameter	Size (mm)	Parameter	Size (mm)
Lg	10.475	Wg	9.25
L1	33.9	W1	27.95
L2	19.9	W2	6.725
L3	2.575	W3	2.475
Wepw	4.5	L4	1.475

Table 1: Parameters of the Proposed Antenna

a) Simulation Using HFSS:

The above antenna design is simulated and studied using HFSS (High-Frequency Simulation Software) version 13.0 software as shown below in Fig.2

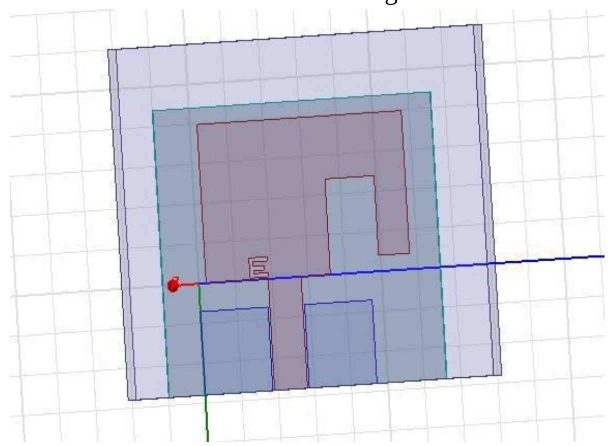


Figure 2: Top view on the antenna designed in HFSS

III.SIMULATION RESULTS OF CPW MONOPOLE ANTENNA USING HFSS

*a)*Return loss

The return loss obtained for the CPW Monopole antenna designed in HFSs corresponding to fig 2 is shown in fig 3. From this figure observed below, the return loss is -32.98 at 5.4 GHz, the return loss lies below -10 dB.

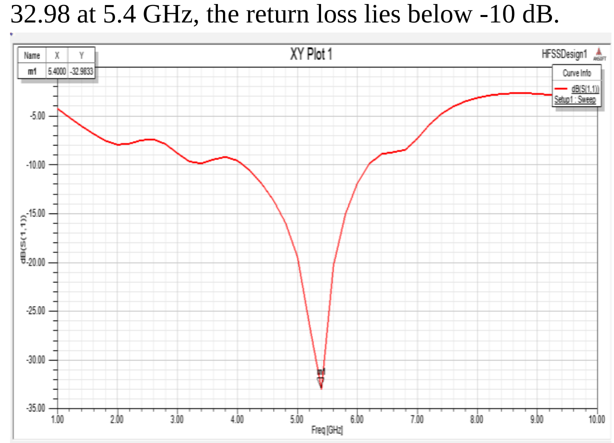


Figure 3: Return loss for CPW Monopole Antenna

b)VSWR

The less VSWR which communes to perfect equivalent is combination. The VSWR of the CPW Fed Monopole antenna designed in HFSS corresponding to figure 1 is shown in figure 3. For reasonable approach, it must be in the middle of 1 and 2.

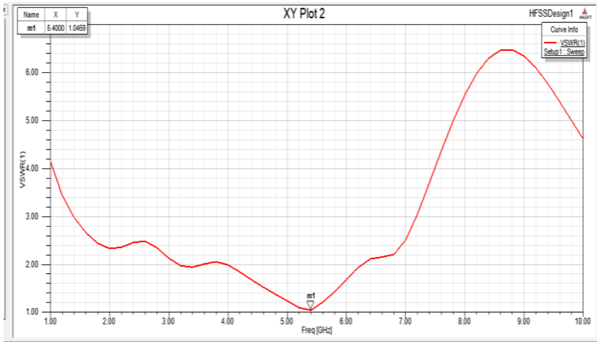
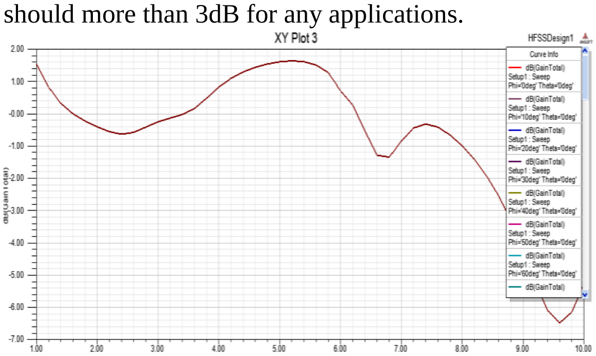


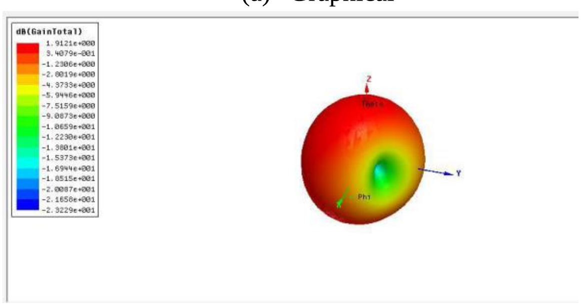
Figure 4: VSWR for CPW Monopole Antenna

c) Gain

Gain is naught even so the capacity transferred per quantity solidified point of view. The gain of CPW fed Monopole antenna designed in HFSS corresponding to figure 1 is shown in figure 4. The gain of any antenna should more than 3dB for any applications.



(a) Graphical



(b) Polar

Figure 5: Gain for CPW Antenna (a) graphical (b) polar

d) Radiation Pattern

A radiation pattern characterizes the variation of the capacity scattered by an antenna as a outcome of the supervision aside from the antenna. This capacity inequality as an outcome of the approach inclination is discerned in the antenna's far-field. The radiation pattern of CPW fed monopole antenna designed in HFSS corresponding to figure 1 is shown in the figure 5.

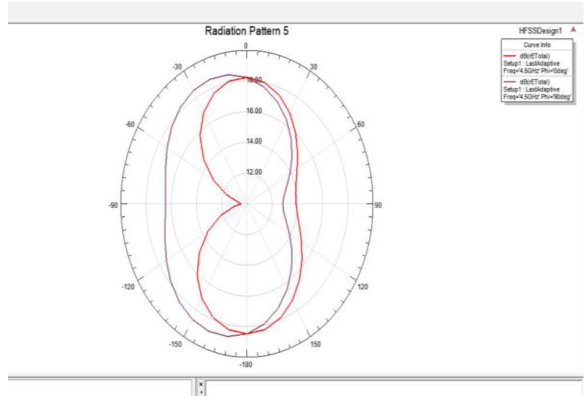


Figure 6: Radiation pattern of CPW antenna (a) at 5.4 GHz

IV. FABRICATION MODEL OF CPW MONOPOLE ANTENNA AND ITS RESULTS

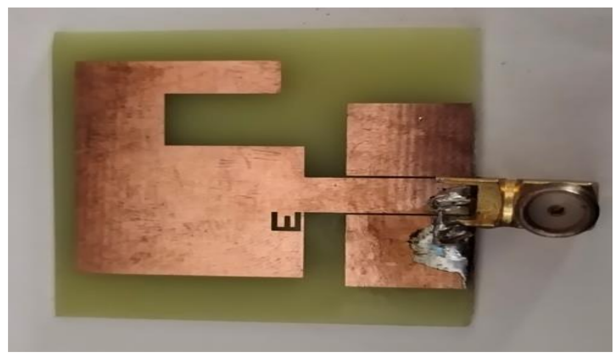


Figure 7: Fabricated Antenna

The simulated results of the designed antenna in HFSS (High-frequency Simulation Software) and practically obtained results from the fabricated model like return loss, VSWR of CPW Monopole antenna with overlapped slots and circular edges are compared in graphical representation below.

PRACTICAL RESULTS

a) Return Loss

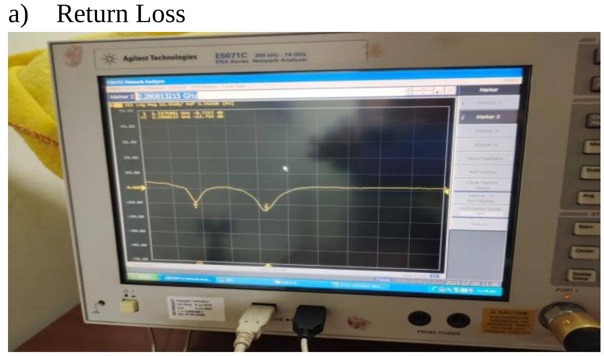


Figure 8: Return loss of fabricated CPW Antenna

b) VSWR

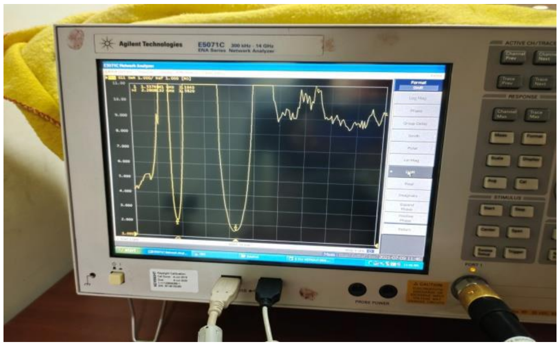


Figure 9: Return loss of fabricated CPW Antenna

COMPARISON RESULTS

a) Return Loss

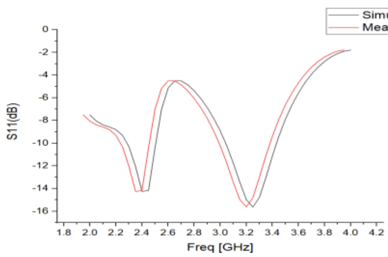


Figure 10: Comparison of Return loss

b) VSWR

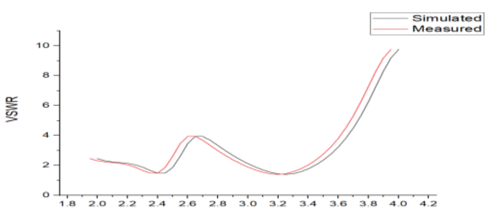


Figure 11: Comparison of VSWR

The practically results of the designed CPW Monopole Antenna is obtained through a network analyzer and check the parameters of Return loss and VSWR

V RESULT ANALYSIS

Ref	Antenna size	S11	VSWR	Gain
1	25*35*1.6mm3	-28.5dB	<2	2.44 dB
2	33.1*32.7 *0.254mm	-10dB	<2	4.87 dB
3	138mm * 40mm	-10dB	<2	4 dB
4	54mm * 38 mm	-22.5dB	<2	6 dB
5	24*28*1.6mm3	-18.3dB	<2	1.9 dB
Proposed	25mm * 35mm	-14.79dB	1.86	9.32 dB

I have taken the reference papers related to CPW Monopole Antennas for WMAX / WLAN Applications in that I have compare the Return loss, VSWR and Antenna Gain from through proposed CPW Antenna.

VI CONCLUSION

A CPW fed Notch Cut with E-Shape Slot Monopole antenna is reasonable for WLAN / WiMAX applications are displayed. To progress the execution of customary receiving wire and broaden its transmission capacity the fix is stacked with openings. The recreated result has -10 dB impedance transmission capacities of 4.9 GHz within the band of 2.3-7.2GHz which enfolds of WLAN/WiMAX. Impacts of changing measurements of essential formation specifications on the radio wire and different constraints like VSWR, radiation design and their execution are too be considered. The parametric ponders appears critical impacts on the impedance transmission capacity of the advanced radio wire. Besides, the advanced radio wire has a few focal points, such as little measure, great radiation designs and great proficiency. These characteristics are exceptionally appealing for a few remote communications frameworks.

REFERENCE

[1] C. Mahatthanajatuphat and P. Akkaraekthalin, S. Saleekaw, M. Krairiksh, " A Bidirectional multiband antenna with modified fractal slot fed by CPW," Progress In Electromagnetics Research, PIER 95, 59{72, 2009

[2] Wen-Chung Liu, Chao-Ming Wu, and Nien-Chang Chu, "A Compact CPW-Fed Slotted Patch Antenna for Dual-Band Operation," IEEE Antennas and wireless propagation letters, VOL. 9, 2010

[3] X. Li, L. Yang, S.-X. Gong, and Y.-J. Yang, " Bidrectional high gain antenna for WLAN applications," Progress in Electromagnetics Research Letters, Vol. 6, 99–106, 2009

[4] Y.-Y. Cui, Y.-Q. Sun, H.-C. Yang, C.-L. Ruan, " A new triple band CPW-fed monopole antenna for WLAN and WiMAX Applications," Progress in Electromagnetics Research M, Vol.2,141–151, 2008

[5] Ritika Saini, Davinder Parkash, "CPW fed Rectangular Shape Microstrip Patch Antenna with DGS for LAN/WiMAX Application," International Journal of Advanced Research in Computer Science, Volume 4, No. 11, Nov-Dec 2013

[6] Yue Li, Zhijun Zhang, Wenhua Chen, Zhenghe Feng, and Magdy F. Iskander, "A Dual-Polarization Slot Antenna Using a Compact CPW Feeding Structure," IEEE Antennas and wireless propagation letters, VOL. 9, 2010

[7] L.-M. Si and X. Lv, "CPW-Fed multiband omni-directional planar microstrip antenna using composite meta material resonators for wireless communications," Progress in Electromagnetic Research, PIER 83, 133–146, 2008

[8] T. Wang, Y.-Z. Yin, J. Yang, Y.-L. Zhang, and J.-J. Xie "Compact triple-band antenna using defected ground structure for WLAN/WIMAX application," Progress in Electromagnetics Research Letters, Vol. 35, 155-164, 2012

[9] Islam, F., Ali, M., Majlis, B.Y., Misran, N. "Design, simulation and fabrication of a microstrip patch antenna for dual band application," International Conference on Electrical and Computer Engineering, pp 799 – 802, Dec. 2008