Design of Stacked Triple Band Circular-Shape Textile Antenna WLAN/Bluetooth/ Hiper LAN Application

Mohit Gaharwar, D. C. Dhubkarya

Abstract: ***This paper proposed a triple band stacked textile antenna on a defected ground plane for remote on-body communication. In this stacked antenna jeans & cotton substrates have been utilized as a substrate which permittivity is 1.7 & 1.6 respectively and patch has been made by copper tape. This anticipated antenna provides directivity of 3.155 dBi at 1.9 GHz and 5.309 dBi at 3.286 GHz.***

Index Terms: Glass epoxy, Microstrip antenna, Gain, Radiation pattern, stacked, CST

I. INTRODUCTION

Present day media transmission systems require reception apparatuses with more extensive data transmissions. This has started radio wire explore in different ways, one of which is by utilizing stacked formed receiving wire components. With the quick improvement of remote correspondences, the remote correspondence framework has expanded the interest for wideband execution with multi-band applications. To meet these necessities, double band microstrip fix reception apparatuses are broadly utilized in various fields of correspondence for their minimized size, flexibility, ease and superior. Most importantly, they emanate more than one example. In like manner, by utilizing this double band receiving wire, framework execution can be expanded, and it offers dependability to the reception apparatus fashioner for interfacing distinctive specialized gadgets with this radio wire for transmitting and getting signals. Besides, expanding request in the remote correspondence advertise has additionally prompted the requirement for double energized trademark, since polarization assorted variety takes into account diminished establishment costs. Also, the decent variety gain from polarization assorted variety is boosted if both the information ports of the double captivated reception apparatus get radiation in a symmetrical way [1-3].

Stacked arrangement is chosen with a uniform ground to achieve expansive data transfer capacity. Many stacked structures are discussed in [4] a technique for broadband receiving wire configuration is given and the surrendered reception apparatus accomplishes to 25.7% data transmission. Broadband stacked structures are studied with 59.7% & 44% data transfer capacity in [5] & [6]. A circularly polarized stacked reception apparatus is introduced in [7] with 30% transmission capacity. Another Stacked reception apparatus gives a data transfer capacity of 38% with gain of 5.9 dBi [8]. The equivalent circuit has been enhanced in [9] with 34.9% data transfer capacity having gain of 8.07dBi with minimized size. Likewise as of late a couple of broadband stacked reception apparatuses have been accounted for utilizing diverse strategies like hole sponsored radio wire [10-12], F shape nourished stacked receiving wire [13-15] where wide transfer speed is accomplished to the detriment of increment in receiving wire volume.

II. ANTENNA DESIGN PROCEDURE

Submit your manuscript electronically for review. In view of the previously mentioned investigation, the plan strategy of the proposed reception apparatus can be outlined as the accompanying advances. As a matter of first importance, the stacked patch can realize triple band activity, and the double layer structure counterbalances the deformity of microstrip antenna slight data transmission to some degree. In this way, stacked substrate with two-layer emanating patch is acquainted in the proposed radio wire with acknowledge triple band trademark. At that point, adaptable coaxial tests can improve the data transmission of patch antenna.

The initial phase in planning a radio wire is to pick a suitable substrate. To give mechanical assist, the substrate should comprise of a dielectric material, which may influence the electrical execution of the receiving wire, circuits and transmission line. A substrate must kept in this manner, at the same time fulfill the electrical and mechanical necessities, which is some of the time hard to meet. The dielectric substrate-1 is essentially a jeans fabric with a dielectric constant ε_r = 1.7 and substrate-2 was made of cotton with a dielectric constant 1.6. Table 1 presents data sheet including thickness of the both the substrate is 2 mm.

Table 1: Data sheet

Ground	Material used	Copper
	Length(mm)	60
	Width(mm)	18
Substrate 1 (Jeans)	Material used	Jeans
	Length(mm)	60
	Width(mm)	66
	Thickness	1
Substrate 2	Material used	Cotton

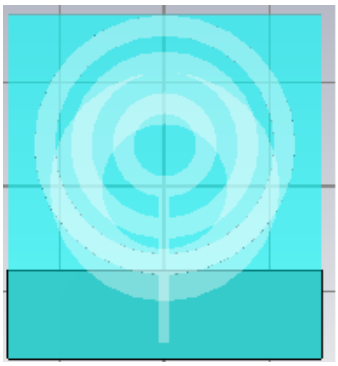
Revised Manuscript Received on May 06, 2019

Mohit Gaharwar, ECE, AKTU/ Sachdeva Institute of Technology, Mathura, India.

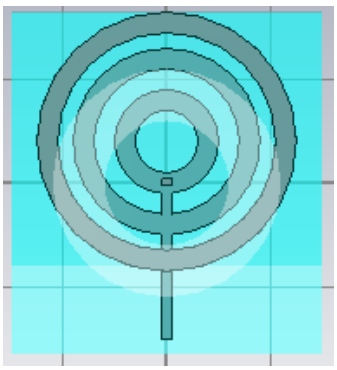
Dr D.C Dhubkarya, ECE, Bundelkhand Institute Of Engineering & Technology, Jhansi, India..

(Cotton)	Length(mm)	60
	Width(mm)	66
	Thickness	1mm

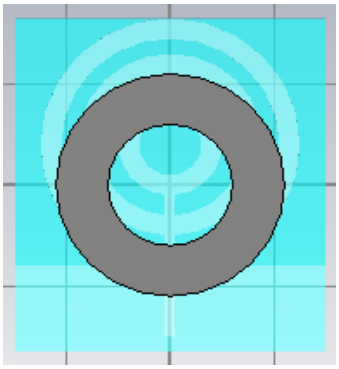
	Material used	Copper
Middle Patch	Outer radius of outer circle (mm)	25
	Inner radius of outer circle (mm)	21
	Outer radius of middle circle (mm)	18
	Inner radius of middle circle (mm)	14
	Outer radius of inner circle (mm)	10
	Inner radius of inner circle (mm)	6
Upper Patch	Outer radius (mm)	22
	Inner radius (mm)	12



(a) Defected ground



(b) Middle patch



(c) Upper patch

Fig.1. Structure of anticipated stacked textile antenna

III. RESULTS AND DISCUSSIONS

A ground plane was imprinted on the contrary side of the substrate from the stacked antenna. For the most part, bigger ground planes permit better radiation execution, however an exchange off must be made against the last size of the reception apparatus permitted. Moreover, bigger regions of material cost more to create. There are various strategies to sustain a flag to a microstrip antenna, despite the fact that the most worthwhile for this structure is line feed as appeared in Fig.1.

Fig.1 shows stacked circular shape structure of preferred textile antenna which is lastly designed with the help of CST software. Figure 1.2 shows return loss of desired stacked textile antenna that gives triple bandwidths of 23.34% from 1.712 GHz to 2.164 GHz, 20.78% from 2.276 GHz to 2.804 GHz and 52.52% from 2.92 GHz to 5 GHz. Return Loss is the segment of a signal that is lost because of an impression of intensity at a line irregularity.

The 3-D pattern is plotted in Fig.3 and it shows the measured directivity of 3.15 dBi at 1.9 GHz and 5.309 dBi at 3.286 GHz. The smith outline is the graphical portrayal of a complex numerical equation. It is the round plot of the attributes of microwave segments. The Smith Chart is the most utilized device for microwave designers to envision complex-esteemed amounts and ascertain the mapping between them. Fig.4 shows the smith chart of anticipated stacked textile antenna.

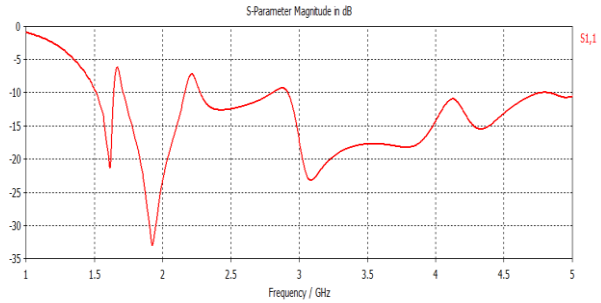
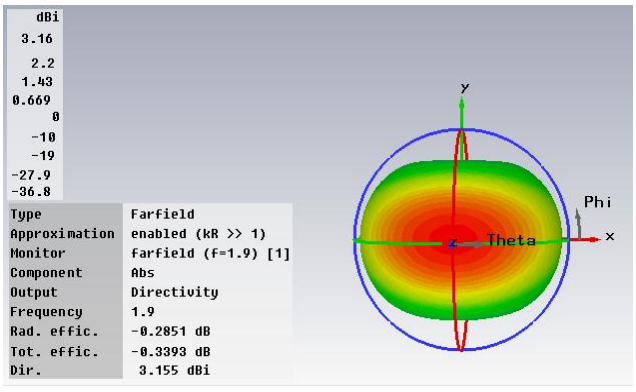
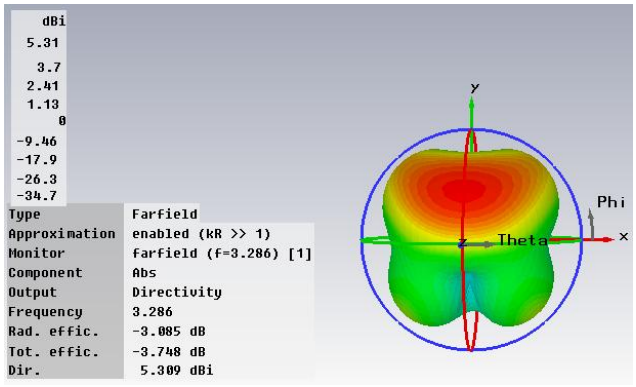


Fig.2. Reflection coefficient of stacked textile antenna



(a)



(b)

Fig. 3.3-D Radiation pattern of anticipated stacked textile antenna at (a) 1.5 GHz (b) 3.286 GHz

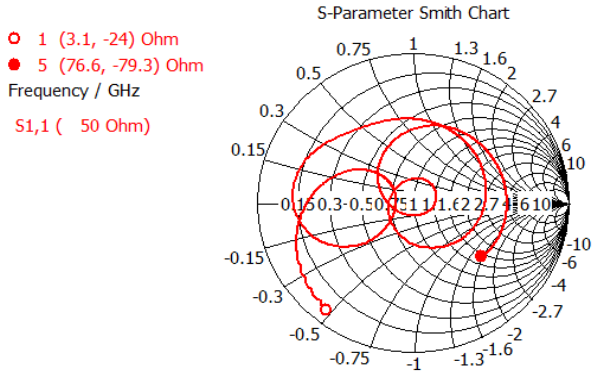


Fig.4. Smith graph of the stacked textile antenna

IV. CONCLUSION

Triple band widths of 23.34% from 1.712 GHz to 2.164 GHz, 20.78% from 2.276 GHz to 2.804 GHz and 52.52% from 2.92 GHz to 5 GHz were achieved by the anticipated antenna. This anticipated antenna provides directivity of 3.155 dBi at 1.9 GHz and 5.309 dBi at 3.286 GHz that is fit for WLAN/Bluetooth/Hiper LAN Application.

ACKNOWLEDGMENT

The first author would like to express his appreciation to Dr. D. C Dhubkraya Department of Electronics and Communication Engineering at Bundelkhand Institute of Engineering & Technology, Jhansi, for his help and useful suggestions.

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AUTHORS PROFILE

Mohit Gaharwar, presently working as Associate Professor and H.O.D (E&C and EE Department) at Sachdeva Institute of Technology, Farah, Mathura (U.P). He has obtained degrees of BE from FET RBS College Agra, M.tech from IET Khandari Agra in Microwave and Radar Engineering and pursuing PhD from AKTU Lucknow. His research interests include Microwave Engineering and Antenna. He has published more than 14 research papers in national, international journals and conferences and also guided master's dissertations. He is also life member of ISIAM .

Dr. D.C Dhubkarya, is working as an Associate Professor in the Department of Electronics and Communication Engineering at Bundelkhand Institute of Engineering & Technology, Jhansi, India. He has obtained degrees of BE from MITS Gwalior, M.tech from IIT Roorkee in Microwave and Radar Engineering and PhD from BU Jhansi. His research interests include Microwave Engineering and Antenna. He has published more than 70 research papers in national, international journals and conferences and guided number of doctorate and masters dissertations.