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A Compact 4 Port MIMO Diversified Antenna for X-Band Applications

M. Rajasekhar[1], S.CH. Kantha Rao[2], T. R. Chaithanya[3], and B. S. Ganesh[4]

[1]Associate Professor, Department of Electronics and Communication Engineering, PACE Institute of Technology and Sciences, Ongole, India
[2]Professor, Department of Computer Science & Engineering, PACE Institute of Technology and Sciences, Ongole, India
[3,4]Assistant Professor, Department of Electronics and Communication Engineering, PACE Institute of Technology and Sciences, Ongole, India

Correspondence should be addressed to M. Rajasekhar; dr_rajasekhar@pace.ac.in

ABSTRACT- Antennas Currently there is large scope in wireless applications due to increased scalability and mobility. Users need these technologies to improve data accessing information from anywhere along with high data speed giving rise to 5G technology. Today's recent growth increased by huge capacity, data rate and high throughput with single antenna system fulfilling the given requirement more likely to do multipath fading and had low data rate. The drawbacks can be overcome by the MIMO antenna in the wireless communication system.In this paper we designed a rectangular patch antenna with semicircle defective ground substrate which improves the efficiency and reduce interference. These might have wide range of applications in WLAN and WiMAX. This has an advantage of less interference using MIMO antenna. The proposed antenna will be working at frequency of 4-6GHZ (c-band) and frequency (x-band) applications mainly satellite and WiMAX applications.

KEYWORDS- X band, MIMO antenna.

I. INTRODUCTION

All evolving technologies use wireless communications which require antennas to provide multiple services within single device. Then solution was MIMO antenna. There are many types which brought a solution like Single input single output (SISO), Multiple Input Single Output (MISO), Multiple Input Multiple output (MIMO). Currently we are using MIMO antenna. In wireless communications multiple antennas are used at transmitter and receiver know as MIMO antennas which reduce the errors and optimize data speed and are also capable of transmitting information through the channel simultaneously with low loss. These antennas provide high system performance along with efficient gain and provide robustness to the system with efficient power. It has high signal to noise ratio. These antennas must work in multi band applications since they play a essential part of the needs for services. Widespread application in engineering needs and necessities of daily life for wireless local area networks and global interoperability for microwave access. Multi band can work in several frequency bands by eliminating unwanted bands. There are many applications for x-band generally used in modern radars. We designed an Vo2 MIMO antenna to reduce interference and improve efficiency of antenna.

Firstly, VO2 is a phase transition substance with metal or insulator-like characteristics. Around the critical temperature of 68 degrees Celsius, it exhibits a sudden shift in conductivity, going from 10 S/m to 105 S/m in a span of 4 to 6 degrees..

As per advantages of MIMO recieving wire like low multipath blurring and low co-channel [1-12] when more recieving wires set together the radiation qualities will lessen. A T-shape stub, rectangular openings is utilized for the common coupling < −20 dB [6]. By and large, radio wires with the designs liked to have S12 < −20 dB for 2.4/5.8 GHz WLAN applications [13]. In a CPW-took care of trapezoid-molded MIMO radio wire with ring molded of ground plane was intended for the WI-MAX and WLAN with common coupling under −20dB [14]. A double band double enraptured high disengagement recieving wire is offering over 95% proficiency is proposed in [10]. 20Db is expressed in two component double band MIMO radio wire [11]. A double band transformed F MIMO recieving wire with two monopoles to get WLAN data transmission [14]. A tri-band MIMO recieving wire intended for WLAN/WiMAX these applications are consistently positioned in c-molded monopoles [18]. At the various frequencies, the MIMO recieving wire assortment of hexagonal patches [19].

Super wideband (UWB) innovations are enjoying the benefits are minimal expense and high date rate. To take care of this issue different info numerous result (MIMO) innovation has been recommended. UWB remote correspondence frameworks for MIMO is a key innovation. UWB is the electromagnetic obstruction of one more issue of MIMO radio wires with high two sort of minimal MIMO recieving wire are introduced for UWB [12] AND [13]. The seclusion is redesigned by the 7dB over the band by involving a square ring DGS in aa ordered MIMO recieving wire [9]. This MIMO radio wire is planned with a ventured opening DGS to short the common coupling not exactly -20dB over the working recurrence band [10] while this large number of shapes are organized over restricted groups. These are having numerous techniques, for example, polarization variety, space variety, openings and stubs in the ground plane, split ground, changed molded ground plane of these have recommended to diminish the common coupling in wideband MIMO recieving wire [11-25]. Topsy-turvy coplanar strip (ACS) of two flight of stairs organized recieving wire is put in symmetrically. To work on the segregation of wall metal stub > 15 dB over 3.1-10.6 GHz [11]. Two render L-shaped stubs and a T-shaped slot are establishment in ground plane to lower the mutual coupling < −20 dB over 2.26–6.78 GHz [12].

A UWB diversity antenna with isolation > 20 dB is designed over 3.1–5 GHz. This antenna has greater 70% efficiency and stable correlation coefficient whereas the shape operates only over upper UWB. A simple step shaped impedance resonator is used to decreases the mutual coupling in a printed UWB MIMO antenna. The two semicircle-shaped monopoles with a stepped structure placed at 90◦ to each other its designed over 2–10.6 GHz. The mutual coupling < −20 dB is achieved by using in ground plane for Bluetooth, Wi-Fi, Wi-Max and UWB applications.

II. PROPOSED ANTENNA DESIGN

The VO2 MIMO antenna setup is planned by utilizing the substrate FR4 Epoxy with dielectric consistent 4.4 with a smaller volume of Wsub × Lsub × hsub mm3. The substrate utilized in the plan is printed with square fix and ground on the opposite side. The transmitting patch is taken care of by a tightened microstrip feed. Figure.1 shows the square transmitting patch of aspect W × L mm2 of impedance bandwidth of 34.4 % to 40%. A tapered microstrip feed is used to excite the patch for better impedance matching. Semicircular slots of radius (R) are inscribed and etched on the ground not only improve the impedance bandwidth (3.80-12.65 GHz) but also achieves good matching of the impedance shown in figure.2. Figure.3 proposed antenna lighten interference cause by WiMAX (3.3-3.8 GHz) and WLAN (5.150-5.825 GHz). Now W shape stub is designed at quarter length of patch to provide impedance matching. These stubs, slots are used to enhance the antenna specifications. To improve gain elliptical stub of radius R1 and R2 is inscribed in the patch. The final single unit MIMO antenna is designed but due increase of applications in MIMO antenna and 5G technologies we need a requirement of multiple input and multiple output. Hence single version is converted into MIMO antenna.

Now this final single microstrip antenna is duplicated in two orthogonal planes XZ and YZ axis. 4 antennas are deigned considering the requirements which are symmetrical to one another. 4 port UWB antenna is obtained to achieve compactness, mutual coupling and impedance matching at low frequencies. Four port UWB MIMO antenna can provide better efficiency. Vo2 film is placed at the intersection of planes which provides isolation from interference of gain as shown in figure 3.

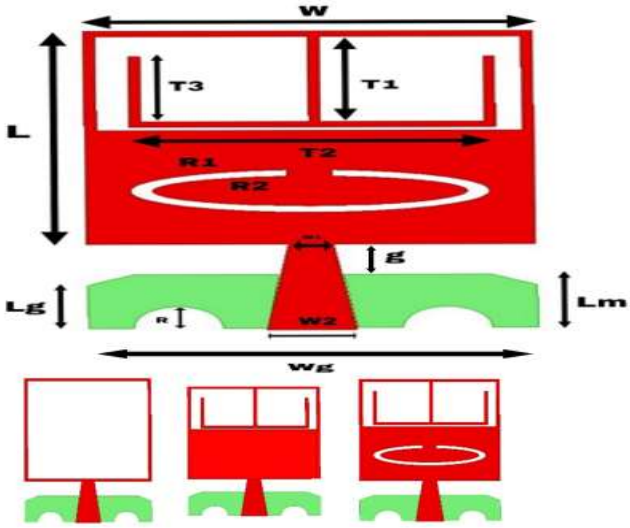


Figure 1: Iterations of antenna

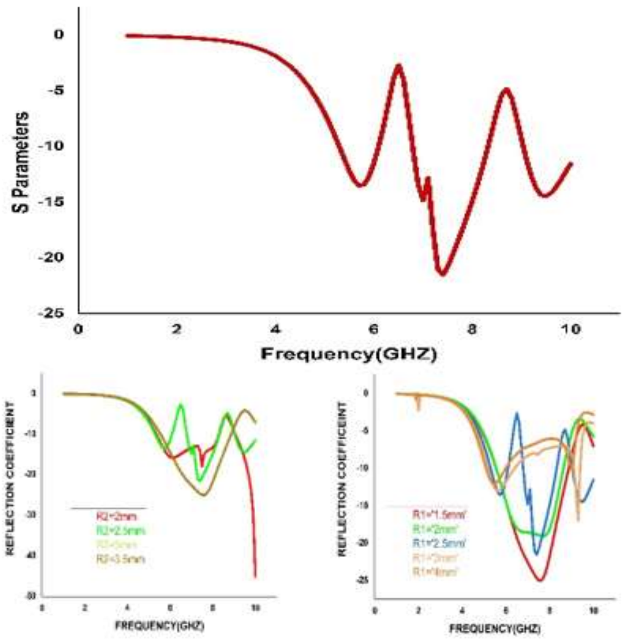


Figure 2: Iterations of antenna

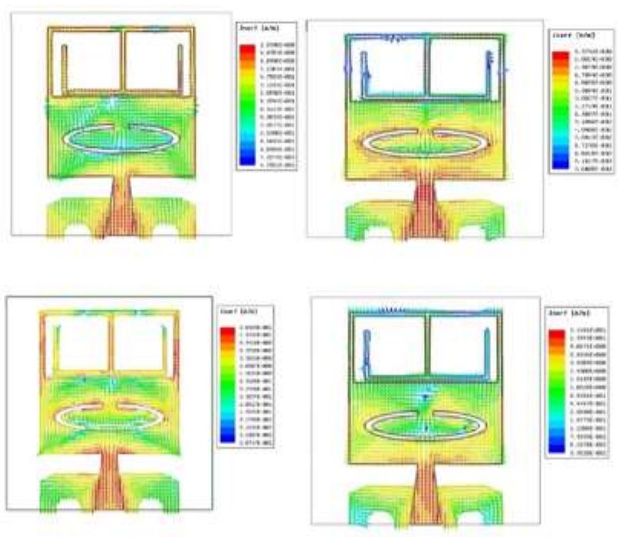


Figure 3: Current distribution of antenna

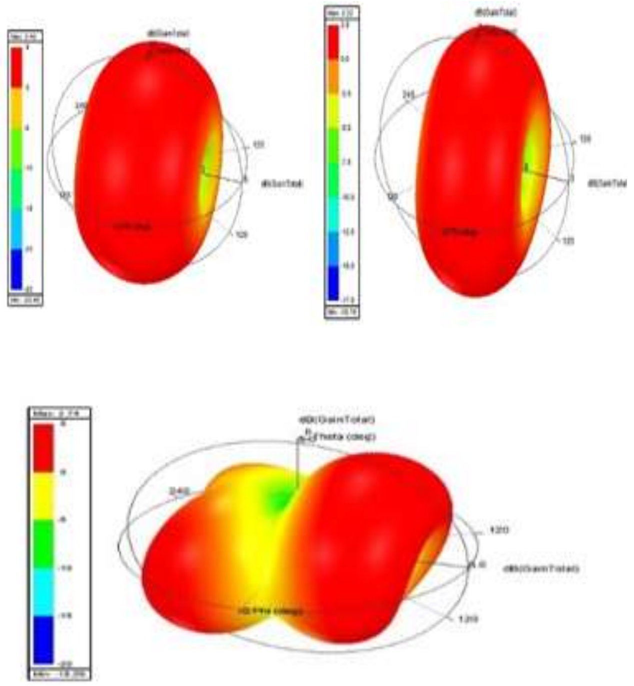


Figure 4: Gain of antenna

The Radiation patterns of designed antenna as shown in figure.5.

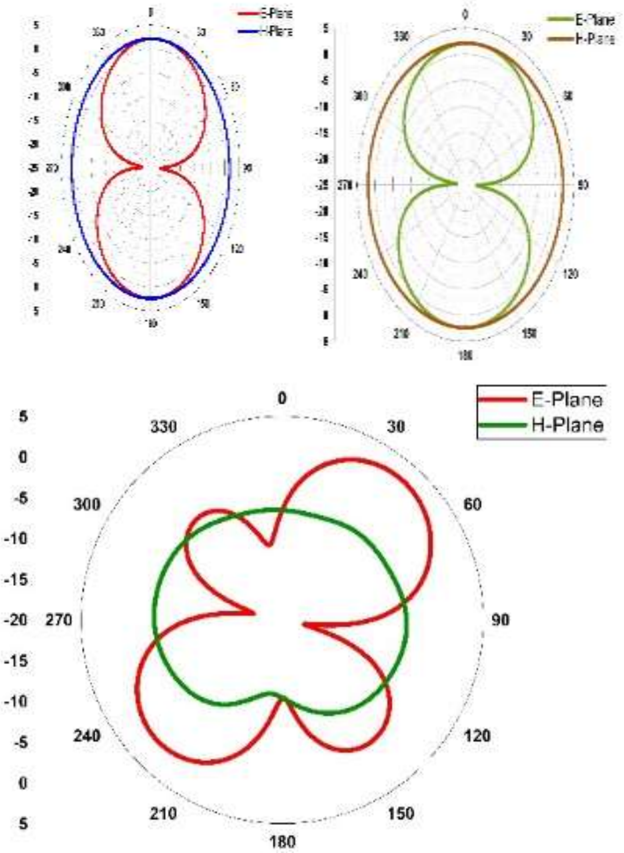
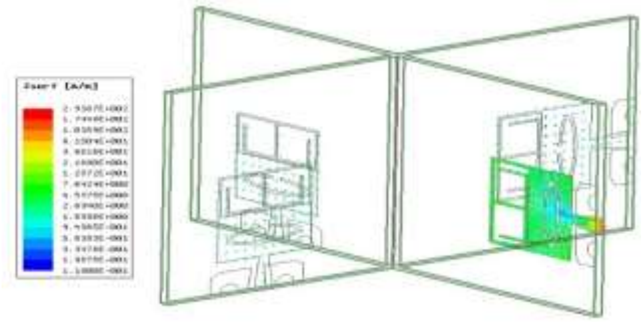


Figure 5: Radiation Pattern of antenna

The proposed 4 port MIMO antenna reflection with respect to frequency as shown in figure.6. and radiation patterns as shown in figure.7.

A. *Port Mimo Antenna*



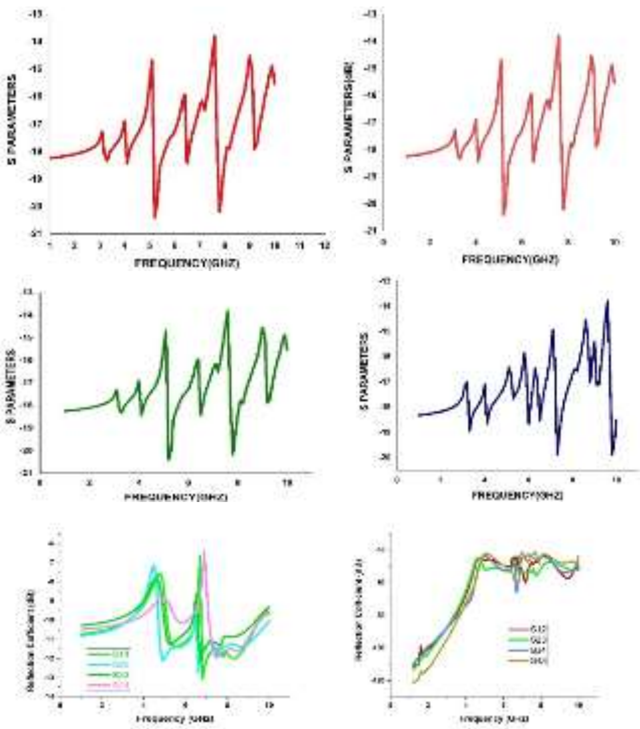


Figure 6: Four port MIMO results

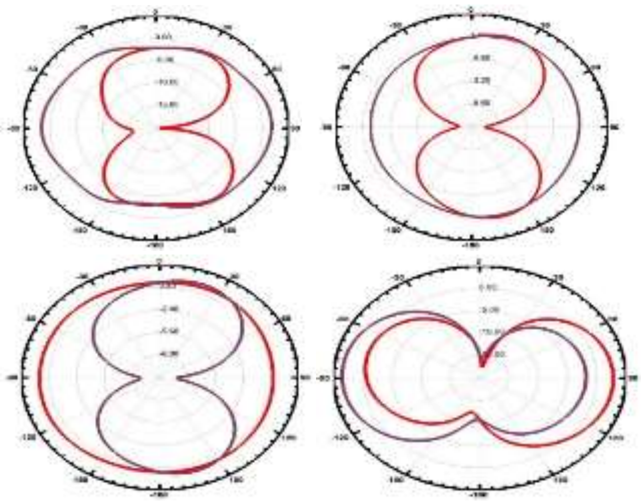


Figure 7: Four port MIMO Radiation patterns

III. CONCLUSION

A MIMO arrangement of compact 4 port x band antenna applications has been proposed for small double band applications, an eight-component reduced MIMO design has been suggested. In order to provide dependable wireless connectivity with a high data throughput in the expanding mutual coupling, envelope correlation coefficient, and channel capacity loss in the MIMO antenna criteria. The framework has excellent impedance synchronization and can operate on LTE/WiMAX principles. These might have wide range of applications in WLAN and WiMAX. This has an advantage of less interference using MIMO antenna. The proposed antenna will be working at frequency of 4-6GHZ (c-band) and frequency (x-band) applications mainly satellite and WiMAX applications.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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