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Modified Massive MIMO Antenna Design for Better Result in 5G Communication

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ABSTRACT: The design of dual band compact massive MIMO antenna is presented in this paper for two different frequencies that arethis paper presents the design of massive MIMO Antenna that are for two different frequencies, 2.32GHz and 4.94 GHz and with a return loss of -23.46 dB and -61.77 dB respectively. It shows good bandwidth of 0.80 at 4.94 Ghz frequency and 0.37 Ghz at 2.32 Ghz frequency. Here are two slot are introduced on substrateto improve return loss and isolation. Various parameters like gain, isolation envelope correlation coefficient, axial ratio are shown are shown. These results show that the design can be suitable for different applications with high accuracy and less losses.CST Microwave Studio software is used to perform simulations. This antenna shows desired gain and bandwidth, so the antenna a perfect choice for 5G applications. Simulated parameters indicate that the proposed antenna have linearly polarized radiation pattern as shown in axial ratio

KEYWORDS: Dual band, Massive MIMO

I. INTRODUCTION

It involves the application of MIMO technology on a much larger scale for greater network coverage and capacity. [1]

It provide uniformly good service to wireless terminals in high-mobility environments Massive MIMO is a multi-user MIMO (multiple-input multiple output) technology In MU-MIMO, base station sends multiple data streams, one per user, using the same time-frequency resources.[2]

Massive MIMO uses many more transmit and receive antennas to increase transmission gain and spectral efficiency. [3]

Massive MIMO have the following characteristics like fully digital signal processing reciprocity of propagation and TDD operation, computation inexpensive precoding/decoding, array gain, channel hardening, uniformly good quality of service to all terminals in cell and autonomous operation at base station.[4]

II. DESIGN OF MASSIVE MIMO ANTENNA

The presented massive MIMO design is simulated on CST studio suite that have 8 elements and co-axial feeding as shown in figure 1This design is developed after proper literature reviewwhere various Research papers, books, journal, thesis, dissertations and the internet.

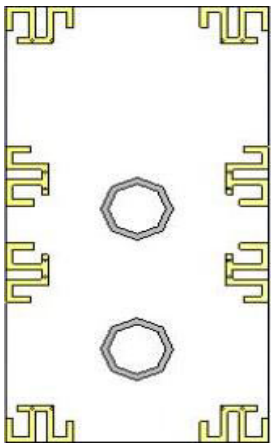

Fig.1. Design of propose antenna

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Are the sources of information. Massive MIMO antenna is comes into the picture after the 5G is introduced to us. The dimensions of proposed patch antenna are as follows:

Substrate width (sw) is 72.8mm, substrate length (sl) is 140mm, substrate height (sh) is 1mm,along with ground height of 0.36mm with same ground width and laength,co axial feed is used to excite the antenna with 0.27mm outer radius of feed.The substrate used for design is FR4.

Also slots in the patch enable us that design designbetween patch with improved bandwidth and efficiency shows that with increase in the length and width of the slot the resonant frequency of the antenna is “shifted towards the lower side”.[8]

III. SIMULATION RESULT OF MASSIVE MIMO

Presented massive MIMO antenna is designed to get low return loss and good gain

Return Loss

Simulation result for this antenna is shows in figure 2.It shows dual band at frequency 2.32 Ghz and 4.94Ghz withbandwidth of 0.32 Ghz and 0.80 Ghz. It shows the return loss of -23.46db and -61.77 db respectively.

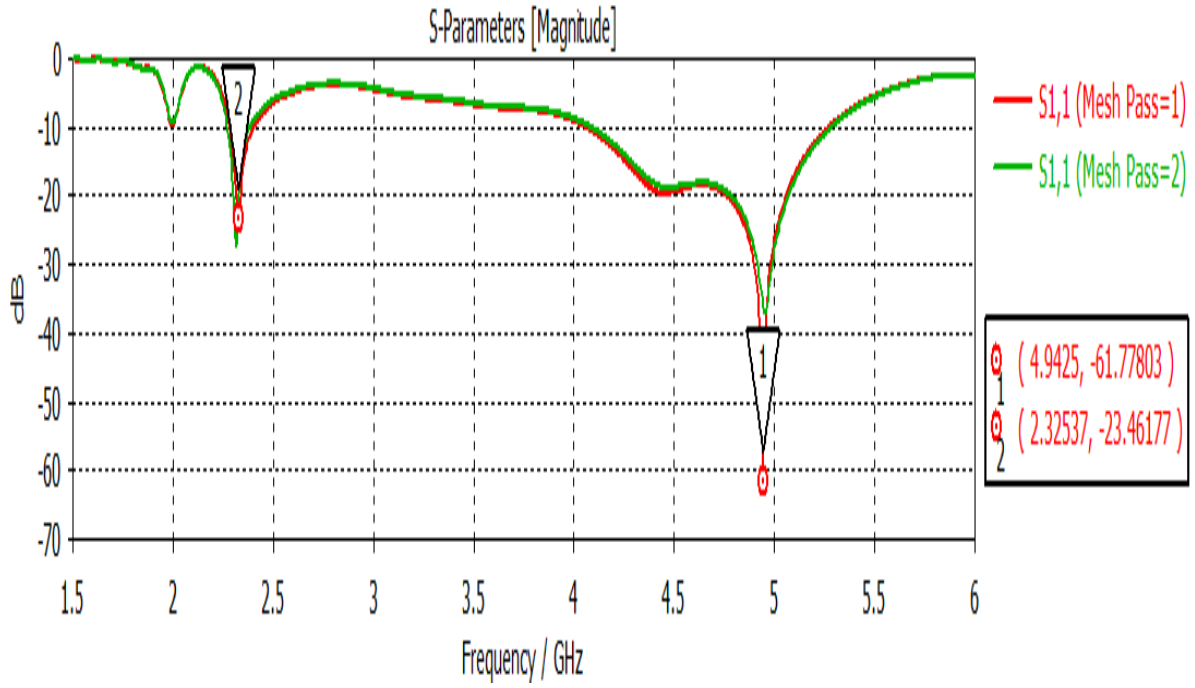

Fig.3 Return Loss of proposed antenna

Envelope co-relation coefficient of proposed antenna

Low envelope co-relation coefficient is also the quality of good antenna and the proposed antenna shows approx. 0 value of ECC on resonating frequency.

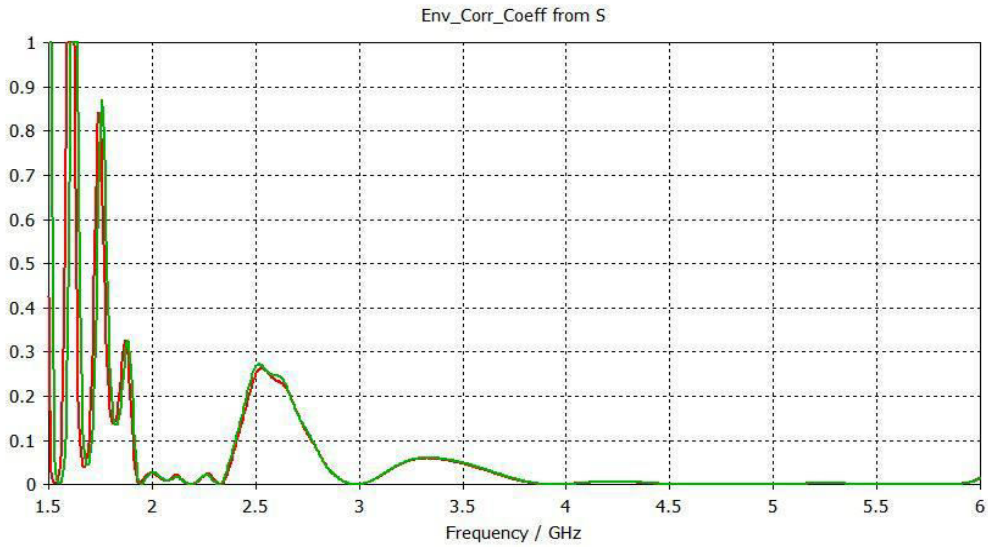

Fig.4. ECC of proposed antenna

Gain

The proposed antenna shows 1.608dbiand 3.204 dbigain value at the resonant frequency in fig.5

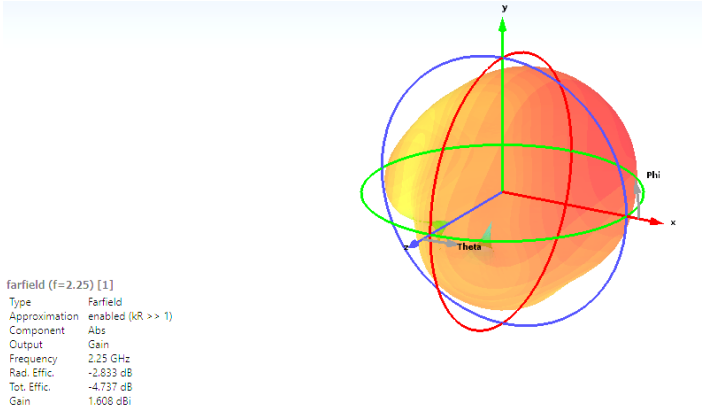

Fig.5. Gain of proposed antenna at 2.32 Ghz

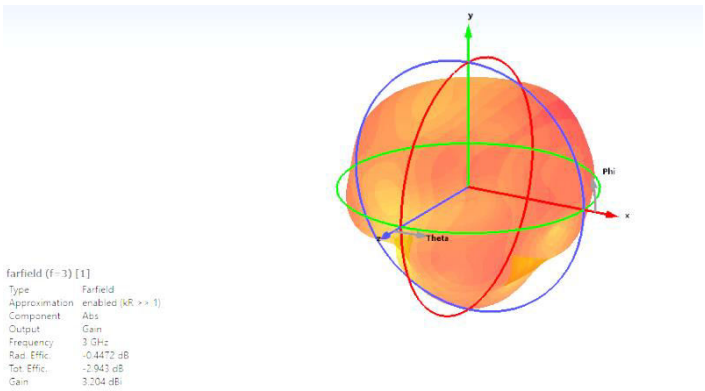

Fig.6. Gain of proposed antenna at 4.94 Ghz

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Radiation Pattern (E-field and H-field pattern)

The radiation pattern of proposed antenna is given in fig.7, fig.8, fig.9, fig.10. It provides - 2.4db side lobe at H-field pattern.

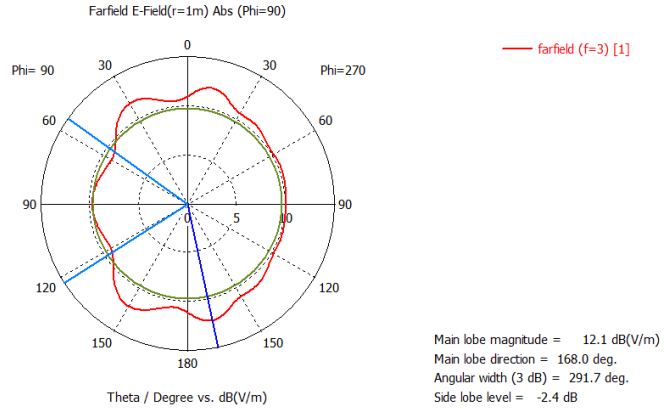

Fig.7 E-field pattern at 2.32 Ghz

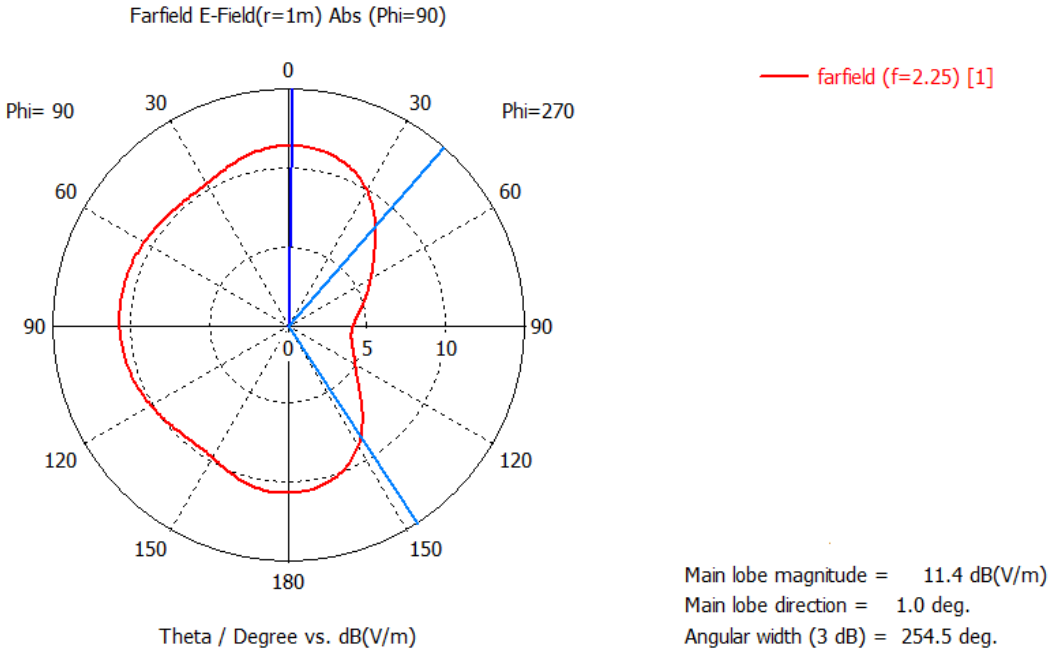

Fig.8 E-field pattern at 4.94 Ghz

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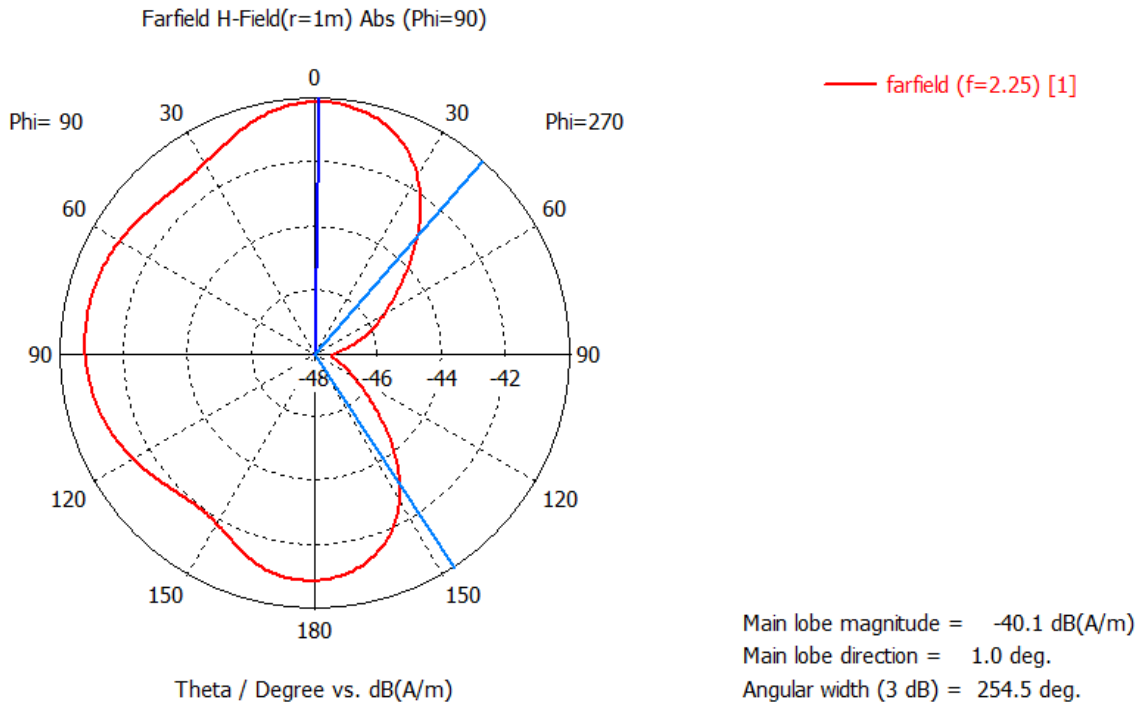

Fig.9 H-field pattern at 2.32 Ghz

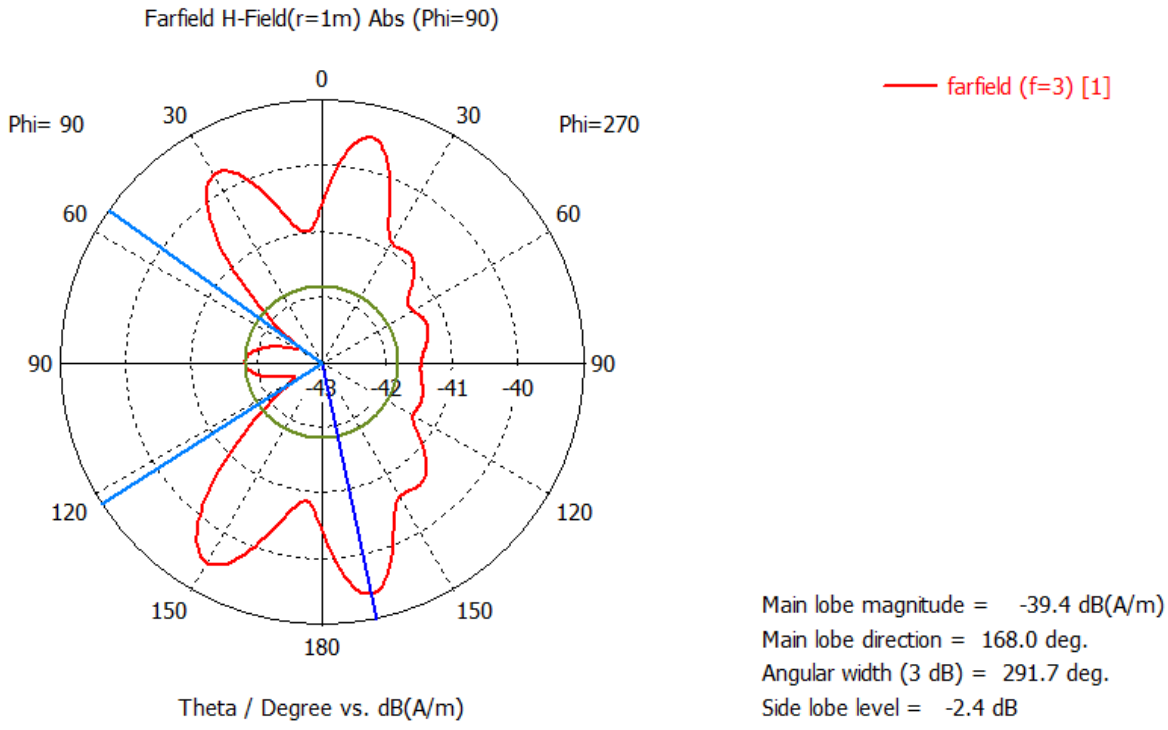

Fig.10 H-field pattern at 4.94 Ghz

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IV. CONCLUSION

A massive MIMO antenna with octagonal slot shows dula band output with good return loss andwide bandwidth at respective frequency with low ECC and high Gain.By this proposed antenna we can state that in case of poor return loss the octagonal slot tecnique is useful to improvement in it.

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