



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJIRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 11, Issue 7, July 2022

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.118



9940 572 462



6381 907 438



ijirset@gmail.com



www.ijirset.com

Dual Band MIMO Antenna for 5G Application

Aastha Malekar, Samiksha Ramekar, Rudrayani Chede, Prof Shweta Meshram

Department of Electronics and Telecommunications Engineering, Government College of Engineering, Amravati, Maharashtra, India

ABSTRACT: In this paper, a dual band MIMO antenna is proposed for fifth generation 5G communication based on decoupling antenna. In this antenna ground branch decoupling structure is used. This structure is placed at two adjacent antenna which provides better isolation. According to the simulation reflection coefficient is less than 6db and the isolation offered by decoupling is higher than 12db that meet the needs of 5G communication over the range.....

KEYWORDS: 5G, MIMO system, self decoupled antenna pairs, mobile antennas

I. INTRODUCTION

In recent years, the advancement of telecommunication technology has provided many challenges in the area of antenna. Now a days dual band and multi band antennas are frequently used. In this paper, a dual band 8 antenna MIMO is proposed using decoupling structure.

At present, with the development of wireless technology, the available area for antennas in the terminal mobile phone is continuously reduced, and the research on reducing the antenna size in the terminal mobile phone has attracted wide attention. In the design of mobile MIMO antennas, many researchers use decoupling structures to reduce the coupling effect between antenna elements and improve the isolations. However, decoupling structure is only used to reduce the coupling effect for terminal antennas limited by spatial size, which seems to be a waste of space. Therefore, we study how to make decoupling structure to implement more functions. If the decoupling structure can also make the antenna change from single frequency to multi-frequency operation, improve the antenna pattern, etc., this is far-reaching for antenna design.

In this project, a compact dual-band eight elements MIMO antenna array with decoupling structure is presented. The innovation of the decoupling structure proposed in this paper not only improves the isolations effectively, but also generates a new resonant point in another frequency band. The details of the proposed MIMO antenna array are described, and the results of S-parameters and radiation fields MIMO antenna array are also presented.

As the mutual coupling between the antenna elements deteriorates the channel capacities of MIMO antenna system, decoupling structures are utilized between the antenna elements to enhance isolations. Common decoupling structure includes grounded branch, neutralization lines, decoupling networks and so on. These decoupling structures have been studied and widely used to reduce the coupling effect of MIMO antenna arrays. The decoupling structure designed in this project works like a grounded branch. By absorbing the energy coupled from the adjacent antenna, the coupling effect on the other antenna unit is reduced.

II. LITERATURE REVIEW

In the 4-shaped MIMO antenna system with its novel antenna element geometry, the measured isolation in the low band was very poor, and in this letter, we implement a new defected ground plane structure (DGS) and microstrip matching network to enhance the isolation between the two closely packed antennas. The performance of the proposed two-element MIMO antenna system is then compared against other two-element MIMO antenna systems.

In the paper, published by XueMing Ling and RongLin Li, a dual-band MIMO antenna array is proposed. The antenna array with two back-to-back monopoles is fabricated on a printed circuit board (PCB). Several branches were introduced to increase the isolation. The MIMO antenna design and experimental results were presented.

In the paper, by Zhouyou Ren, and Anping Zhao a dual-band 4-antenna MIMO system based on the self-decoupled antenna pair is proposed. In particular, by placing two adjacent antenna elements of the antenna pair very close to each other and by arranging the two antenna elements to share one common coupled grounding branch, very good antenna isolation can be obtained.

A compact dual-band eight elements MIMO antenna array with decoupling structure was presented by Wen Jiang. The innovation of the decoupling structure proposed in this paper not only improves the isolations effectively, but also generates a new resonant point in another frequency band.

MIMO dual-band antenna

As it is very difficult to use separate antennas for different applications, dual-band antennas are used. Multiple frequencies supported by a single antenna is more suitable for wireless and mobile communication applications because of the compact size requirement.

- ❖ Multi-element without metal rim antenna
 - Provide optimized gain, wide bandwidth, high efficiency good isolation.
 - The design of feeding network is complicated.
 - Increase in gain and isolation can be achieved using meta surface-based antenna.
- ❖ Multi-element with metal rim antenna
 - Use of varactor diodes, provide reconfigurable antenna design.
 - Reconfigurable antenna uses a switching mechanism hence the design is complex.
 - MIMO antenna design along with carrier aggregation techniques enhances the data rate.

For smartphone applications, MIMO antennas are the best candidate as it supports beamforming. The MIMO multiple patch antenna is comparatively simple to design and implement for smartphones and cognitive radios. To enhance the antenna parameters further, a multi-element antenna can be implemented in MIMO. Also, after the addition of metal rim to MIMO antennas, fundamental and higher order resonance frequencies are generated which results in bandwidth enhancement. Such MIMO antennas with metal rim are suitable for smartphones and smartwatches.

III. SOFTWAREIMPLEMENTATION

CST Studio Suite is first installed, then after depending on the system configuration, some modules are installed. Afterwards Typical setup is used which includes the installation of Distributed Computing Components. Then license server is installed.

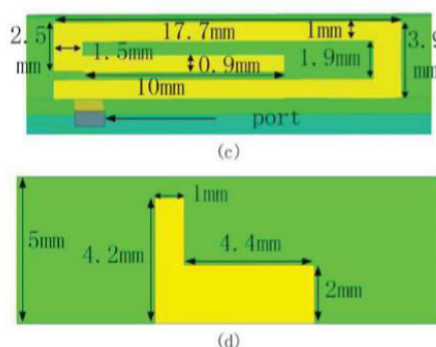


Fig1. Design and Characteristics of Antenna

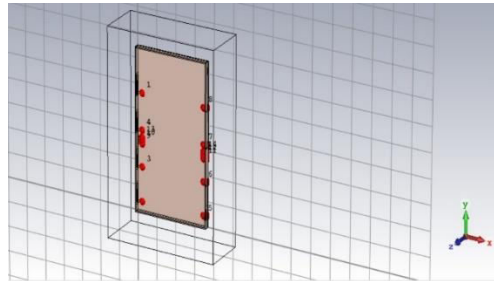


Fig2. Constructional view of MIMO antenna

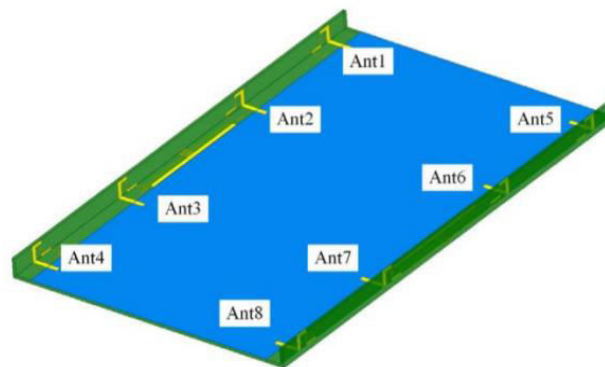


Fig3. Configuration of eight antenna MIMO array

IV.CONCLUSION AND FUTURE WORK

Here, a compact dual band MIMO antenna is designed. It gives in-depth examination of the technique used to improvise isolation in the antenna. According to this project, reducing coupling effect between antenna element and improvisation of isolation is very important issue in MIMO antenna. While designing of MIMO antenna we came across the need to put into more functions in decoupling structure which can help in transforming an antenna from single frequency to multi-frequency, reduce mutual coupling, etc..

4.REFERENCES

1. Mohammad S. Sharawi, Senior Member, IEEE, Ahmed B. Numan, Muhammad U. Khan, and Daniel N. Aloï, Senior Member, IEEE, "A Dual-Element DualBand MIMO Antenna System with Enhanced Isolation for Mobile Terminals", IEEE ANTENNAS AND WIRELESS PROPAGATION LETTERS, VOL. 11, 2012.
2. Muhammad Saeed Khan, Muhammad Farhan Shafique, Member, IEEE, Aftab Naqvi, Antonio-D Capobianco, Member, IEEE, Bilal Ijaz, and Benjamin D. Braaten, Senior Member, IEEE, "A Miniaturized Dual-Band MIMO Antenna for WLAN Applications", IEEE ANTENNAS AND WIRELESS PROPAGATION LETTERS, VOL. 14, 2015.
3. AbdelheqBoukarkar, Student Member, IEEE, Xian Qi Lin, Senior Member, IEEE, Yuan Jiang, Student Member, IEEE, Li Ying Nie, Peng Mei, Student Member, IEEE, and Yi Qiang Yu, Member, IEEE, "A Miniaturized Extremely Close-Spaced Four-Element Dual-Band MIMO Antenna System with Polarization and Pattern Diversity", IEEE ANTENNAS AND WIRELESS PROPAGATION LETTERS, VOL. 17, NO. 1, JANUARY 2018.
4. ZHOYOU REN, (Member, IEEE), AND ANPING ZHAO, (Senior Member, IEEE), "Dual-Band MIMO Antenna with Compact Self-Decoupled Antenna Pairs for 5G Mobile Applications", July 9, 2019.



5. WEN JIANG, (Member, IEEE), YANGQIANG CUI, BO LIU, WEI HU, (Member, IEEE), AND YAN XI, “A Dual-Band MIMO Antenna with Enhanced Isolation for 5G Smartphone Applications”, August 27, 2019.
6. Lun Cui, Jingli Guo, Ying Liu, Senior Member, IEEE, and Chow-Yen-Desmond Sim, Senior Member, IEEE, “An 8-Element Dual-Band MIMO Antenna with ix Decoupling Stub for 5G Smartphone Applications”, IEEE ANTENNAS AND WIRELESS PROPAGATION LETTERS, VOL. 18, NO. 10, OCTOBER 2019.
7. Sumitkumar, Rajeshwari R. Malekar, Hema Raut, “Fifth Generation Antennas: A Comprehensive Review of Design and Performance Enhancement Techniques”, September 1, 202



INNO SPACE
SJIF Scientific Journal Impact Factor
Impact Factor: 8.118



ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 **9940 572 462**  **6381 907 438**  **ijirset@gmail.com**



www.ijirset.com

Scan to save the contact details