

# A Compact Rupee Shaped Dual Band Antenna for WiMAX and WLAN Applications

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## ABSTRACT

A compact rupee shaped CPW-fed antenna with dual-band operation for worldwide interoperability for microwave access (WiMAX) and wireless local area network (WLAN) applications is proposed in this paper. The antenna has a very simple structure and a compact size of  $17 \times 17.5 \times 1.6 \text{ mm}^3$ . A prototype is fabricated and then tested. The measured impedance bandwidth at VSWR 2:1 is 700 MHz from 3.2-3.9 GHz and 870 MHz from 4.7-5.5 GHz which covers the 5.2/5.8 GHz WLAN and 3.5/5.5 GHz WiMAX bands. The measured and simulated results are found to be in good agreement.

## Keywords

CPW-fed, compact antenna, WiMAX, WLAN.

## 1. INTRODUCTION

In the recent years much attention has been paid towards the development of compact multi-band antennas with less fabrication cost and good performance characteristics for various wireless communication applications such as wireless local area network (WLAN) and worldwide interoperability for microwave access (WiMAX). Various types of multi-frequency antennas have been designed and developed over the few years, which can be used for multi-frequency operations, such as Planar Inverted F-shaped Antenna (PIFA) [1], monopole antenna [2], patch antenna [3], slot antenna, and others [4-6]. Out of these, printed monopole antennas are most suitable for integration on the circuit board of a communication device, which gives the attractive features of occupying very small volume of the system and decreasing the fabrication cost of the final product. From the available literature, the printed monopole antennas reported in [7-9] are capable of single-band operation only, and the printed dual-band inverted-F monopole antenna shown in [10] requires a shorting pin for ground connection, which increases the antenna complexity and the fabrication cost as well. In addition to the design using the printed monopole antenna, the printed dipole antenna for dual-band operation has also been given in [11], in which two separate dipoles of different arm lengths are printed on both sides of a dielectric substrate and the longer and shorter dipoles arms, respectively, the antenna had been designed to generate a resonant mode for operating in the 2.4 and 5.2 GHz bands.

Various designs of dual-band antennas have also been demonstrated in the recent years. For example, the antenna presented in [12] consists of a rectangular patch and straight strips with different lengths, and the antenna proposed in [13] comprises a direct-radiating patch and a parasitic C-shaped strip. To enhance the bandwidth, a dual wideband monopole

antenna [14] was proposed with a parasitic patch using electromagnetic coupling mechanism to cover the whole WLAN bands and WiMAX bands. However, the overall size of the antenna is somewhat large ( $48 \times 58 \text{ mm}^2$ ), occupying much of the device space. A modified ground plane on the bottom layer further more improves the high frequency performances [15]. Some CPW-fed monopole antennas also have been proposed to meet the dual-band requirements, such as G-shaped [16] and triangle-shaped [17-18]. The above stated prototypes usually use large ground plane and thick substrate. All the above reported antennas are good in bandwidth and radiation characteristic, while a few of them are having relatively larger size, and therefore they are very difficult to integrate with miniaturized wireless mobile communication devices.

In this paper, a compact rupee shaped Coplanar Waveguide (CPW) fed antenna design with dual-band operation is proposed, the geometry of which is described in Section 2. The antenna has a compact size and is useful for WLAN and WiMAX applications. The proposed antenna consists of a rupee shape patch, two rectangular strips extending from the rupee shape patch, and a CPW feed line. The proposed antenna was designed, optimized and tested using electromagnetic software; CST Microwave Studio based on the Finite Integration Technique (FIT). By properly selecting the dimensions of the proposed antenna, good dual-band impedance bandwidth and radiation characteristics suitable for the WLAN/WiMAX communication systems can be obtained. Measured results show that the antenna has the impedance bandwidth of 700 MHz (3.2-3.9 GHz), and 870 MHz (4.7-5.5 GHz), which can cover the 5.2 GHz WLAN bands and 3.5/5.5 GHz WiMAX bands. More Details of simulated results and behavioral analysis are presented and discussed in the following sections.

## 2. ANTENNA DESIGN

As shown in Figure 1, the configuration of the proposed antenna is designed, optimized, and fabricated on a 1.6 mm thick FR4 substrate having permittivity of 4.4 and loss tangent of 0.02. The overall size of the antenna is  $17 \times 17.5 \times 1.6 \text{ mm}^3$ . The rupee shape patch is fed by a 50Ω CPW line. Two rectangular shaped strips are employed to produce two resonant modes. The dimensions of the proposed antenna are optimized and shown in Table 1.

# Dual Band Step Shaped Antenna Array For Wlan And Wimax

**M Mosston**

A decorative graphic element consisting of a light blue horizontal bar with a rounded right end, and a red-to-white gradient semi-circle positioned behind the bar's end.

## **Dual Band Step Shaped Antenna Array For Wlan And Wimax:**

**Ambient Communications and Computer Systems** Yu-Chen Hu, Shailesh Tiwari, Krishn K. Mishra, Munesh C.

Trivedi, 2019-03-30 This book includes high quality peer reviewed papers from the International Conference on Recent Advancement in Computer Communication and Computational Sciences RACCCS 2018 held at Aryabhata College of Engineering Research Center Ajmer India on August 10 11 2018 presenting the latest developments and technical solutions in computational sciences Networking and communication are the backbone of data science data and knowledge engineering which have a wide scope for implementation in engineering sciences This book offers insights that reflect the advances in these fields from upcoming researchers and leading academicians across the globe Covering a variety of topics such as intelligent hardware and software design advanced communications intelligent computing technologies advanced software engineering the web and informatics and intelligent image processing it helps those in the computer industry and academia use the advances in next generation communication and computational technology to shape real world applications

*Multifunctional and Multiband Planar Antennas for Emerging Wireless Applications* Jayshri Kulkarni, Chow-Yen-Desmond Sim, Jawad Yaseen Siddiqui, Anisha M. Apte, Ajay Kumar Poddar, Ulrich L. Rohde, 2023-12-19 This work focuses on designing multiband printed single Multiple Input Multiple Output MIMO CP antennas for WLAN V2X and NR Sub 6GHz 5G applications It also delves into the design and implementation of a Four Port MIMO antenna for wireless applications addressing theoretical foundations and challenges Additionally the book explores critical aspects of software defined radios SDR including modulation signal processing radio systems TX RX blocks SDR enabled phased arrays and beam hopping techniques with relevance to 5G 6G and IoT applications Features Explores advancements in planar monopole antennas including bandwidth enhancement techniques Analyzes innovative antenna design structures like miniaturized and conformal monopole antennas and discusses modeling and implementation Spotlights WLAN and Wi Fi 6 6E antenna design for next gen laptops with practical insights Addresses the use of triple band antenna arrays for MIMO applications in laptops Focuses on planar antenna advancements for diverse wireless bands and applications Explores multiband printed single MIMO CP antennas for WLAN V2X and NR Sub 6GHz 5G Covers the design and implementation of a Four Port MIMO antenna for wireless applications including theoretical foundations and challenges Explores SDR modulation signal processing radio systems TX RX blocks SDR enabled phased arrays and beam hopping techniques for 5G 6G and IoT applications This book is aimed at graduate students and researchers in electrical and electronic engineering antennas and wireless communication systems

**Advanced Wireless Communication and Sensor Networks** Ashish Bagwari, Geetam Singh Tomar, Jyotshana Bagwari, Jorge Luis Victória Barbosa, Musti K.S. Sastry, 2023-07-12 This book covers wireless communication security issues advanced wireless sensor networks WSNs routing protocols of WSNs with cross layer solutions emerging trends in the advanced WSNs power management distributed sensing and data gathering techniques for WSNs WSNs security applications

research of advanced WSNs with simulation results and simulation tools for WSNs Features Covers technologies supporting advanced wireless communication systems sensor networks and the conceptual development of the subject Discusses advanced data gathering and sharing distributed sensing techniques with its business applicability Includes numerous worked out mathematical equations and formulas as well as essential principles including figures illustrations algorithms and flow charts Provides pervasive background knowledge including both wireless communications and WSNs Covers wireless networks as well as sensor network models in detail This book is aimed at graduate students researchers and academics working in the field of computer science wireless communication technology and advanced WSNs *Advances in Communication, Devices and Networking* Sourav Dhar,Dinh-Thuan Do,Samarendra Nath Sur,Howard Chuan-Ming Liu,2022-08-29 This book covers recent trends in the field of devices wireless communication and networking It gathers selected papers presented at the 5th International Conference on Communication Devices and Networking ICCDN 2021 which was organized by the Department of Electronics and Communication Engineering Sikkim Manipal Institute of Technology Sikkim India on 15 16 December 2021 Gathering cutting edge research papers prepared by researchers engineers and industry professionals it will help young and experienced scientists and developers alike to explore new perspectives and offer them inspirations on how to address real world problems in the areas of electronics communication devices and networking Band-Notch Characteristics in Ultra-Wideband Antennas Taimoor Khan,Yahia M.M. Antar,2021-06-08 This book comprehensively reviews ultra wideband UWB and UWB multi input multi output MIMO antennas with band notched characteristics with a focus on interference cancellation functionality The book is organized into seven chapters that cover single band dual band and multi band notched UWB antennas followed by band notched characteristics in UWB MIMO antennas Further it explains the mechanism of reconfigurability and tunability in band notched UWB antennas including advanced applications of UWB systems Overall it covers different techniques of canceling the electromagnetic interference in UWB in a concise volume Features Provides a comprehensive presentation of avoiding interference in UWB systems Reviews state of the art literature related to UWB antennas filtennas and various reconfigurable technologies Explains different techniques for producing band notch characteristics in UWB systems Includes discussion on historical perspectives of UWB technology Consolidates different research activities carried out on the electromagnetic interference cancellation techniques in the UWB communication systems Band Notch Characteristics in Ultra Wideband Antennas is aimed at researchers and graduate students in electrical and antenna engineering Taimoor Khan has been an Assistant Professor at the Department of Electronics and Communication Engineering National Institute of Technology Silchar since 2014 In addition to this Dr Khan has also worked as a Visiting Assistant Professor at Asian Institute of Technology Bangkok Thailand during September December 2016 His active research interests include Printed Microwave Circuits Electromagnetic Bandgap Structures Ultra wideband Antennas Dielectric Resonator Antennas Ambient Microwave

Energy Harvesting and Artificial Intelligence Paradigms in Electromagnetics Dr Khan has successfully guided three Ph D theses and is supervising six Ph D students He has published over 75 research articles in well indexed journals and in world renowned conference proceedings Currently he is executing three funded research projects including two international collaborative SPARC and VAJRA research projects In September 2020 Dr Khan has been awarded a prestigious national IETE Prof SVC Aiya Memorial Award for the year 2020 Yahia M M Antar has been a Professor at the Department of Electrical and Computer Engineering Royal Military College of Canada since 1990 He served as the Chair of CNC URSI from 1999 to 2008 Commission B from 1993 to 1999 and has a cross appointment at Queen s University in Kingston He has authored and co authored over 250 journal papers several books and chapters in books over 500 refereed conference papers holds several patents has chaired several national and international conferences and has given plenary talks at many conferences Dr Antar is a fellow of the Engineering Institute of Canada the Electromagnetic Academy and an International Union of Radio Science URSI He was elected by the URSI to the Board as the Vice President in 2008 and in 2014 and to the IEEE AP AdCom in 2009 In 2011 he was appointed as a member of the Canadian Defence Advisory Board DAB of the Canadian Department of National Defence He serves as an Associate Editor for many IEEE and IET Journals and as an IEEE APS Distinguished Lecturer Presently he is working as President Elect for IEEE Antenna and Propagation Society for the year 2020

**Multifunctional MIMO Antennas: Fundamentals and Application** Yadwinder Kumar, Shrivishal Tripathi, Balwinder Raj, 2022-05-19 This book presents a comprehensive approach to antenna designs for various applications including 5G communication the internet of things IoT and wearable devices It discusses models designs and developments of MIMO antennas antenna performance measurement 5G communication challenges and opportunities and MIMO antennas for LTE ISM applications It covers important topics including mmWave antennas antenna arrays for MIMO applications reconfigurable band notched MIMO antennas multiband MIMO antennas wideband MIMO antennas and fractal based compact multiband hybrid antennas FEATURES Discusses antenna design optimization techniques in detail Covers MIMO antenna performance measurement multiband MIMO antennas and wideband MIMO antennas Discusses modeling simulation and specific absorption rate SAR analysis of antennas Provides applications including radio frequency identification RFID wearable antennas and antennas for IoT Multifunctional MIMO Antennas Fundamentals and Application is useful for undergraduate and graduate students and academic researchers in areas including electrical engineering electronics and communication engineering

**Neural Computing for Advanced Applications** Haijun Zhang, Kim Fung Tsang, Fu Lee Wang, Tianyong Hao, Zenghui Wang, Zhou Wu, Zhao Zhang, Kevin Hung, 2025-11-12 This two volume set CCIS 2664 and 2665 constitutes the refereed proceedings of the 6th International Conference on Neural Computing for Advanced Applications NCAA 2025 held in Hong Kong China during July 4 6 2025 The 62 full papers presented in these proceedings were carefully reviewed and selected from 160 submissions The papers are organized in the following topical sections Part I Neural network

NN theory NN based control systems neuro system integration and engineering applications Deep learning driven pattern recognition computer vision and its industrial applications Part II Natural language processing knowledge graphs recommender systems and their applications Neural computing based fault diagnosis and forecasting prognostic management and cyber physical system security Sequence learning for spreading dynamics forecasting and intelligent techniques against epidemic spreading Multimodal deep learning for representation fusion and applications Workshop session International Conference on Cognitive Intelligence ICCI

**Handbook of Research on Emerging Designs and Applications for Microwave and Millimeter Wave Circuits** Zbitou, Jamal, Hefnawi, Mostafa, Aytouna, Fouad, El Oualkadi, Ahmed, 2023-01-23 Microwave and millimeter wave mm wave circuits and systems have been widely employed in various emerging technologies such as 5G and beyond wireless mobile communication systems autonomous driving electronic warfare and radar systems To better understand the benefits challenges and opportunities of this technology further study is required The Handbook of Research on Emerging Designs and Applications for Microwave and Millimeter Wave Circuits describes the latest advances in microwave and mm wave applications and provides state of the art research in the domain of microwave mm wave and THz devices and systems Covering key topics such as antennas circuits propagation and energy harvesting this major reference work is ideal for computer scientists industry professionals researchers academicians practitioners scholars instructors and students

**Radio Frequency and Microwave Design for Next Generation Wireless Applications** Rajkishor Kumar, Avinash Chandra, Indrasen Singh, Vijay Kumar, Yu-Chen Hu, 2026-02-09 This book covers both transmitters and receivers of modern microwave devices designed for a wide range of practical applications It focuses on different types of antennas filters amplifiers and oscillators and their optimization techniques for the design of networks which are most useful in modern communication systems such as the Internet of Things remote sensing and space applications Key Features Focuses on specific applications of microwave device design such as wearable implantable body centric networks and Internet of Medical Things Covers the design and implementation of the defense networks and discusses the application of RADAR optimization algorithms Presents advanced topics such as the integration of machine learning and artificial intelligence for designing microwave devices Examines modern microwave devices for next generation communication systems such as 5G and beyond satellites and RADAR applications Explains the implementation and challenges for unmanned aerial vehicles ground penetrating radar and remote sensing applications on aerial platforms This book is primarily written for senior undergraduates graduate students and academic researchers in the fields of electrical engineering electronics and communication engineering computer science and engineering and telecommunications

**A Compact High Gain Dual-band Antenna Array for WLAN Applications** Vian Reynders, 2019 The continuously growing number of wireless devices and the demand for wireless local area network WLAN coverage received a lot of research and design attention during the past decade The WLAN application is a popular dual band IEEE standard which operates in two

distinct bands with a large centre frequency ratio This dissertation presents the design and performance of a compact high gain dual band and directional antenna array meant to be used for such applications The low band as stated by the IEEE 802 11b standard covers the frequency range of 2 400 GHz to 2 484 GHz and the high band is defined by IEEE 802 11a and starts at 5 150 GHz and stops at 5 850 GHz The frequency ratio between the centres of the two bands is 2 25 1 and is considered a large ratio The antenna array design is based on an existing dual band antenna configuration A parametric study was conducted on the antenna configuration features to obtain a detailed understanding of the antenna performance changes in relation to the physical parameters The original design was modified to obtain a new sub array design which can be used in an array for higher gain performance The sub array antenna element consists of one capacitively loaded dipole for the lower 2 4 GHz band and four smaller rectangular dipoles for the high 5 5 GHz band The low band dipole is fed with a microstrip line whereas the four high band dipoles are fed with a slot line Four of these sub array antenna elements are configured into an array for increased gain performance The final gain of the antenna array was measured as 12 dBi at the 2 4 GHz band and 16 dBi at the 5 5 GHz band The radiation patterns of both the low and high bands have side lobes 10 dB below the main lobe and front to back lobe ratios of at least 17 dB The volume of the final antenna is 128 A 30 4 128 A 30 4 12 mm<sup>3</sup> and is compact compared to other dual band antenna arrays The continuously growing number of wireless devices and the demand for wireless local area network WLAN coverage received a lot of research and design attention during the past decade The WLAN application is a popular dual band IEEE standard which operates in two distinct bands with a large centre frequency ratio This dissertation presents the design and performance of a compact high gain dual band and directional antenna array meant to be used for such applications The low band as stated by the IEEE 802 11b standard covers the frequency range of 2 400 GHz to 2 484 GHz and the high band is defined by IEEE 802 11a and starts at 5 150 GHz and stops at 5 850 GHz The frequency ratio between the centres of the two bands is 2 25 1 and is considered a large ratio The antenna array design is based on an existing dual band antenna configuration A parametric study was conducted on the antenna configuration features to obtain a detailed understanding of the antenna performance changes in relation to the physical parameters The original design was modified to obtain a new sub array design which can be used in an array for higher gain performance The sub array antenna element consists of one capacitively loaded dipole for the lower 2 4 GHz band and four smaller rectangular dipoles for the high 5 5 GHz band The low band dipole is fed with a microstrip line whereas the four high band dipoles are fed with a slot line Four of these sub array antenna elements are configured into an array for increased gain performance The final gain of the antenna array was measured as 12 dBi at the 2 4 GHz band and 16 dBi at the 5 5 GHz band The radiation patterns of both the low and high bands have side lobes 10 dB below the main lobe and front to back lobe ratios of at least 17 dB The volume of the final antenna is 128 A 30 4 128 A 30 4 12 mm<sup>3</sup> and is compact compared to other dual band antenna arrays The continuously growing number of wireless devices and the demand for wireless local area network WLAN

coverage received a lot of research and design attention during the past decade. The WLAN application is a popular dual band IEEE standard which operates in two distinct bands with a large centre frequency ratio. This dissertation presents the design and performance of a compact high gain dual band and directional antenna array meant to be used for such applications. The low band as stated by the IEEE 802.11b standard covers the frequency range of 2.400 GHz to 2.484 GHz and the high band is defined by IEEE 802.11a and starts at 5.150 GHz and stops at 5.850 GHz. The frequency ratio between the centres of the two bands is 2.5:1 and is considered a large ratio. The antenna array design is based on an existing dual band antenna configuration. A parametric study was conducted on the antenna configuration features to obtain a detailed understanding of the antenna performance changes in relation to the physical parameters. The original design was modified to obtain a new sub array design which can be used in an array for higher gain performance. The sub array antenna element consists of one capacitively loaded dipole for the lower 2.4 GHz band and four smaller rectangular dipoles for the high 5.5 GHz band. The low band dipole is fed with a microstrip line whereas the four high band dipoles are fed with a slot line. Four of these sub array antenna elements are configured into an array for increased gain performance. The final gain of the antenna array was measured as 12 dBi at the 2.4 GHz band and 16 dBi at the 5.5 GHz band. The radiation patterns of both the low and high bands have side lobes 10 dB below the main lobe and front to back lobe ratios of at least 17 dB. The volume of the final antenna is 128 A 30 4 128 A 30 4 12 mm<sup>3</sup> and is compact compared to other dual band antenna arrays.

*A Compact Double-psi-shaped Dual Band Patch Antenna for WLAN/LTE Applications*, 2018

**Design and Simulation Based Studies of a Dual Band Antenna for WLAN/WiMax Application** Shrikant Pandey, Sudeep Baudha, Amit Gupta, 2012

**Dual Band Microstrip Patch Antenna for WiMAX Application** Palash Chandra Karmaker, Mohammad Monir Morshed, Md. Ruhul Amin, 2011-11

**The Design of Dual-band and Broadband Antenna Using Double-sided and U-slotted Parasitically Coupled Array Structure for LTE and WLAN Applications** Md Imtiaz Islam, 2016

The main objectives of this study include to design fabricate double sided array antenna for LTE and WLAN applications and validate the performance in terms reflection coefficient radiation pattern and gain. To design a wideband and dual band U slotted parasitically coupled antenna array and validate the performance using parasitic coupling. To design fabricate different orientation of U slot in parasitically coupled antenna array and validate the flexibility using parasitic coupling.

*Multi-band Low-profile Antennas for WLAN and WiMAX Applications* Ernst Willem Coetzee, 2018

The demand for modern wireless communication systems have grown at a remarkable rate and the Wireless Local Area Network WLAN and Worldwide Interoperability for Microwave Access WiMAX frequency bands have been recognized as a cost effective and reliable solution for high speed wireless communication. The WLAN frequency bands are from 2.4 a 22 0 2 483 GHz 5 15 a 22 0 5 25 GHz and 5 725 a 22 0 5 825 GHz while the WiMAX frequency band is from 3 4 a 22 0 3 6 GHz which are for the IEEE802.11a IEEE802.11b IEEE802.16d and IEEE802.16e standards. The objective of this dissertation was to develop a new and improved high gain

WLAN antenna with a low profile and directional radiation pattern The proposed antennas were based on an ultra wideband slot radiating element which consisted of a microstrip feedline with a strip slot pair The work also required the design of an artificial magnetic conductor AMC surface to achieve a low profile antenna with high gain The antenna combined with the AMC reflector achieved a high gain and a directional radiation pattern The design of the proposed antenna resulted in a triple band WLAN antenna with an overall size of 80A 30 480A 30 410 01 mm<sup>3</sup> with an average gain of 10 2 dBi across the WLAN bands The antenna also achieved a directional radiation pattern with a front to back better than 24 dB in the WLAN bands The design of a quad band WLAN and WiMAX antenna was also performed The quad band antenna operated in the 2 4 GHz 5 2 GHz and 5 8 GHz WLAN bands as well as the 3 5 GHz WiMAX band The antenna had an overall size of 80A 30 480A 30 410 01 mm<sup>3</sup> with an average gain of 9 3 dBi across the WLAN and WiMAX frequency bands The antenna also achieved a directional radiation pattern with a front to back better than 22 dB in the WLAN and WiMAX bands The simulated and measured results for both antennas were compared and have a good agreement The results achieved by the proposed triple and quad band antennas exceeded the performance of other high gain and directional WLAN antennas found in the literature Comparing the results of the quad band antenna with a strip slot antenna found in literature the overall volume and average gain has improved by 34 7% and 2 2% respectively

*Compact Multifunctional Dipole Antenna Array for MIMO Systems* Mikhail Aleksandrovich Chernyavskiy, Kapil Dandekar, 2012 Adviser Kapil R Dandekar

**Beam Reconfigurable Array Antenna with Dual Band for WLAN Application** Muhammad Zairil Muhammad Nor, 2013 *A PLANAR COMPACT DUAL-BAND MICROSTRIP ANTENNA FOR WLAN APPLICATIONS* A. SNEHA KEERTHI, M. NAVEENA,

**Chip Antenna Array for WiMAX Application** Hanisah Mohamad Ali, 2010 *Wireless Communication Using Dual Antenna Arrays* Da-shan Shiu, 2005-12-17

At present the expansion of tetherless communications is a technological trend surpassed perhaps only by the explosive growth of the Internet Wireless systems are being deployed today mainly for telephony satisfying the industrialized nations appetite for talk on the go and providing much needed communications infrastructure in developing countries The desire for wireless access to the Internet is starting to add fuel to the growth of tetherless communications Indeed the synergy of wireless and Internet technologies will lead to a host of exciting new applications some of which are not yet envisioned Future generation wireless systems will achieve capacities much higher than the systems of today by incorporating myriad improvements These innovations include transmission in higher frequency bands smart antennas multi user detection new forward error correction techniques and advanced network resource allocation techniques The term smart antenna usually refers to the deployment of multiple antennas at the base station site coupled with special processing of the multiple received signals Smart antennas can adaptively reject co channel interference and mitigate multipath fading and have been identified by many as a promising means to extend base station coverage increase system capacity and enhance quality of service

## **Dual Band Step Shaped Antenna Array For Wlan And Wimax** Book Review: Unveiling the Magic of Language

In an electronic digital era where connections and knowledge reign supreme, the enchanting power of language has become more apparent than ever. Its ability to stir emotions, provoke thought, and instigate transformation is truly remarkable. This extraordinary book, aptly titled "**Dual Band Step Shaped Antenna Array For Wlan And Wimax**," published by a very acclaimed author, immerses readers in a captivating exploration of the significance of language and its profound impact on our existence. Throughout this critique, we will delve in to the book is central themes, evaluate its unique writing style, and assess its overall influence on its readership.

<https://matrix.jamesarcher.co/files/Resources/fetch.php/Karlson%20On%20The%20Roof%20Astrid%20Lindgren.pdf>

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### **Dual Band Step Shaped Antenna Array For Wlan And Wimax Introduction**

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