A Dual band Triangular shaped DRA Array for WLAN/WiMAX Applications

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Abstract— **In this paper, a dual-band triangular dielectric resonator antenna (DRA) array is presented for wireless local area network (WLAN) and worldwide interoperability for microwave access (WiMAX) applications. Here, two triangular dielectric resonators are used as an array. The DRA array is excited by conformal strip connected to microstrip line which is an effective feed mechanism to obtain dual-band operation. Simulation process was done by using a CST microwave studio. The result shows that the proposed antenna achieves an impedance bandwidth from 3.35 to 3.70 GHz and 4.52 to 5.34 GHz covering 3.5 GHz WiMAX band and 5.2 GHz WLAN band. Parametric studies are carried out by varying the heights of the triangular shaped dielectric resonators and conformal strips. Simulated results show that DRA array has a better resonant frequency for DR height, h_r = 11.5 mm and conformal strip height h_c=10.4 mm. The average peak gain achieved is 7.02 dBi and 8.9 dBi at 3.5 GHz and 5.2 GHz respectively and directivity varies from 6.06 dBi to 9.26 dBi for overall frequency range. The proposed design can also be used for HIPERLAN (high-performance radio LAN) applications which operate at 5.15 GHz to 5.30 GHz. With these features, this design of triangular DRA array is suitable for dual-band wireless communication systems.**

Keywords- DRA array, Conformal patch feed, wireless local area network (WLAN), worldwide interoperability for Microwave access (WiMAX).

I. Introduction

In recent years, the dielectric resonator antenna (DRA) has been widely studied due to its several advantages such as high radiation efficiency, light weight, low profile, various DR shapes (rectangular, cylindrical, spherical etc.) and different feed mechanisms (probe, microstrip line, slot, coplanar line etc.) [1–4]. DRA's size and bandwidth can be easily controlled by varying the dielectric constant of materials in a wide range [1]. In many cases with a single element DRA, desired specifications cannot be achieved. For example high gain, high efficiency, directional radiation pattern cannot be synthesized with a single DRA of any shape. In these applications, a DRA array with appropriate element arrangement and feed configurations can be used to provide desired specifications [5–7].

Dielectric Resonator Antenna is widely used in today's electronic warfare, missile, radar and communication systems. They find use both in military and commercial applications. The dual-wideband technology has become one of the most fascinating technologies in in-door communication due to its great advantages including large capacity of data, high speed data rate and small size. However, WLAN (5.15 to 5.825 GHz) and Wi-MAX (3.3 to 3.7GHz), which are limited by IEEE 802.11a, HIPERLNA/2 and IEEE 802.16, overlap each other [8, 9].

In this paper, we proposed a triangular dielectric resonator antenna array fed by microstrip line for WLAN and WiMAX applications. The CST microwave studio software has been used to analyze the performance of the designed antenna array such as S parameter, input impedance, radiation patterns, gain and directivity. The obtained results show significant performance improvement in terms of impedance bandwidth and radiation pattern.

II. Antenna Design

Fig 1 (a) shows the geometry of the proposed DRA array, where triangular-shaped dielectric resonators having dielectric constant 9.2, are placed above a substrate with a dielectric constant 4.4. Below the substrate is a ground plane. The dimension of the ground plane is 58×56 mm^2. The same dimension is used for substrate also. The DRA array consists of two equilateral triangles where the resonators having height h_r = 11.5 mm and sides L_r = 20 mm. The excitation mechanism adopts as conformal strips, attached on one side of the dielectric resonator and connected to a microstrip feed line [10, 11]. The conformal strip has height h_c = 10.4 mm and width W_c = 3 mm. The microstrip feed line is etched on FR4 substrate with width W_f = 3mm, W_{f2} =28 mm, length L_f = L_{f2} = 14 mm and is connected to a SMA connector. Fig 1(b) shows the schematic view of the triangular DRA array.

The dual-band design of the proposed triangular DRA array adopts different methods [12-15]. The coupling between the DR and the feed mechanism can be easily adjusted by changing the size of the conformal patch, thus a dual-band impedance matching has been obtained. The desired frequencies for WLAN/WiMAX are obtained by changing the heights of dielectric resonators.

Dual Band Step Shaped Antenna Array For Wlan And Wimax

Raed A. Abd-Alhameed,Issa Elfergani,Jonathan Rodriguez

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 Aryabhatta 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 communicationand 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

Recent Technical Developments in Energy-Efficient 5G Mobile Cells Raed A. Abd-Alhameed,Issa Elfergani,Jonathan Rodriguez,2020-06-17 This book addresses the true innovation in engineering design that may be promoted by blending together models and methodologies from different disciplines and in this book the target was exactly to follow this approach to deliver a new disruptive architecture to deliver these next generation mobile small cell technologies According to this design philosophy the work within this book resides in the intersection of engineering paradigms that includes cooperation network coding and smart energy aware frontends These technologies will not only be considered as individual building blocks but re engineered according to an inter design approach resulting in the enabler for energy efficient femtocell like services on the move The book aims to narrow the gap between the current networking technologies and the foreseen requirements that are targeted at the future development of the 5G mobile and wireless communications networks in terms of the higher networking capacity the ability to support more users the lower cost per bit the enhanced energy efficiency and adaptability to new services and devices for example smart cities and the Internet of things IoT 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 Antenna Fundamentals for Legacy Mobile Applications and Beyond Issa Elfergani,Abubakar Sadiq Hussaini,Jonathan Rodriguez,Raed Abd-Alhameed,2017-10-03 This book highlights technology trends and challenges that trace the evolution of antenna design starting from 3rd generation phones and moving towards the latest release of LTE A The authors explore how the simple monopole and whip antenna from the GSM years have evolved towards what we have today an antenna design that is compact multi band in nature and caters to multiple elements on the same patch to provide high throughput connectivity The scope of the book targets a broad range of subjects including the microstrip antenna PIFA antenna and the monopole antenna to be used for different applications over three different mobile generations Beyond that the authors take a step into the future and look at antenna requirements for 5G communications which already has the 5G drive in place with prominent scenarios and use cases emerging They examine these and put in place the challenges that lie ahead for antenna design particularly in mm Wave design The book provides a reference for practicing engineers and under post graduate students working in this field **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 **Applications of Artificial Intelligence in 5G and Internet of Things** Vinod M. Kapse,Lalit Garg,Pavan Kumar Shukla,Varadraj Gurupur,Amit Krishna Dwivedi,2025-04-30 This is the proceedings of the 1st International Conference on Applications of AI in 5G and IoT ICAAI5GI2024 It brings together ground breaking research and practical insights into integrating Artificial Intelligence within 5G and the Internet of Things IoT This compilation highlights the latest advancements and innovative solutions emerging at the intersection of AI 5G and IoT technologies It also delves into a wide array of topics including the role of AI in enhancing 5G network efficiency the development of intelligent IoT devices and the creation of smart environments powered by these cutting edge technologies It further showcases key findings on AI driven applications in 5G for seamless communication improved connectivity and advanced data processing techniques along with IoT solutions for smart cities industrial automation healthcare and beyond It would be a valuable read for researchers engineers and professionals in AI 5G IoT and related fields It serves as an essential resource for those seeking to stay at the forefront of technological advancements in these rapidly evolving domains **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 mm3 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 mm3 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 mm3 and is compact compared to other dual band antenna arrays **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

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

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 includes 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 mm3 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 mm3 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 Beam Reconfigurable Array Antenna with Dual Band for WLAN Application Muhammad Zairil Muhammad Nor,2013 **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 ind trialized nations appetite for talk on the go and providing much needed communications infrastructure in developing countries The desire for wi less 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 in vations 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 m tiple received signals Smart antennas can adaptively reject co channel int ference 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 A PLANAR COMPACT DUAL-BAND MICROSTRIP ANTENNA FOR WLAN APPLICATIONS A. SNEHA KEERTHI,M. NAVEENA,

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