
Power Efficient MIMO Techniques For 3gpp Lte And Beyond

Spectral, Energy, and Hardware Efficiency

Medium Access Control Protocol Based Approach

Fundamentals of Massive MIMO

Green Communications

Massive MIMO

Optimal Power Allocation for Energy Efficient MIMO Relay Systems in 5G Wireless Communication

Energy-Efficient Pilot-Data Power Control in MU-MIMO Communication Systems

Energy Efficiency in Wireless Networks

Second International Conference, ICICCT 2017, New Delhi, India, May 13, 2017, Revised Selected Papers

Wireless Sensor Networks and Energy Efficiency: Protocols, Routing and Management

Practical Approaches for RF Impairments Reduction

Affordable Nonlinear MIMO Systems

Fundamentals of 5G Mobile Networks

M3HPCST-2020, Ghaziabad, India, January 9-11, 2020

MIMO Processing for 4G and Beyond

Progress in Advanced Computing and Intelligent Engineering

Index Modulation Techniques for Energy-efficient Transmission in Large-scale MIMO Systems

Multi-Carrier Digital Communications

Spectrum Sharing in Cognitive Radio Networks

International Conference, DICTAP 2011, Dijon, France, June 21-23, 2011. Proceedings

Optimizing Massive MIMO

Design and Implementation for Emerging Wireless Systems

Handbook of Green Information and Communication Systems

Heterogeneous Cellular Networks
Fundamentals of LTE
Emerging Intelligent Computing Technology and Applications. With Aspects of Artificial Intelligence
Green Internet of Things (IoT): Energy Efficiency Perspective
12th International Conference, NEW2AN 2012, and 5th Conference, ruSMART 2012, St. Petersburg, Russia, August 27-29, 2012,
Proceedings
Energy Balancing in Wireless Networks with MIMO Communications
Energy Management in Wireless Cellular and Ad-hoc Networks
Green Communication and Networking
MIMO Technology for Energy-efficient Communications
Methods and Applications
First International Conference, GreeNets 2011, Colmar, France, October 5-7, 2011, Revised Selected Papers
Information, Communication and Computing Technology
5th International Conference on Intelligent Computing, ICIC 2009 Ulsan, South Korea, September 16-19, 2009 Proceedings
Cable and Wireless Networks
Multi-antenna Transceiver Techniques for 3G and Beyond
Fundamentals and System Designs

*Power Efficient Mimo Techniques For
3gpp Lte And Beyond*

Downloaded from <ftp.wtvq.com> by guest

HINTON WILLIAMS

Spectral, Energy, and Hardware Efficiency Springer

This book constitutes the thoroughly refereed post-conference proceedings of the First International Joint Conference on Green Communication and Networking (GreeNets 2011), held in Colmar, France, on October 5-7, 2011. The 16 revised full papers presented were carefully selected and reviewed from numerous submissions and explain the scope and challenges of designing,

building, and deploying GreeNets. In this regard, the conference aims to establish a forum to bring together research professionals from diverse fields including green mobile networks, system architectures, networking & communication protocols, applications, test-bed and prototype, traffic balance and energy-efficient cooperation transmission, system and application issues related to GreeNets.

Medium Access Control Protocol Based Approach Springer
Science & Business Media

This book constitutes the refereed proceedings of the Second International Conference on Information, Communication and

Computing Technology, ICICCT 2017, held in New Delhi, India, in May 2017. The 29 revised full papers and the 5 revised short papers presented in this volume were carefully reviewed and selected from 219 submissions. The papers are organized in topical sections on network systems and communication security; software engineering; algorithm and high performance computing.

Fundamentals of Massive MIMO Springer Nature

This book focuses on environmental sustainability by employing elements of engineering and green computing through modern educational concepts and solutions. It visualizes the potential of artificial intelligence, enhanced by business activities and strategies for rapid implementation, in manufacturing and green technology. This book covers utilization of renewable resources and implementation of the latest energy-generation technologies. It discusses how to save natural resources from depletion and illustrates facilitation of green technology in industry through usage of advanced materials. The book also covers environmental sustainability and current trends in manufacturing. The book provides the basic concepts of green technology, along with the technology aspects, for researchers, faculty, and students.

Green Communications Linköping University Electronic Press
MIMO Processing for 4G and Beyond: Fundamentals and Evolution offers a cutting-edge look at multiple-input multiple-output (MIMO) signal processing, namely its detection (in both time and frequency domains) and precoding. It examines its integration with OFDM, UWB, and CDMA, along with the impact of these combinations at the system level. Massive M

Massive MIMO Logos Verlag Berlin GmbH

This book gives a comprehensive guide on the fundamental concepts, applications, algorithms, protocols, new trends and challenges, and research results in the area of Green Information and Communications Systems. It is an invaluable resource giving knowledge on the core and specialized issues in the field, making it highly suitable for both the new and experienced researcher in this area. Key Features: Core research topics of green information and communication systems are covered from a network design perspective, giving both theoretical and practical perspectives Provides a unified covering of otherwise disperse selected topics on green computing, information, communication and networking Includes a set of downloadable PowerPoint slides and glossary of terms for each chapter A 'whose-who' of international contributors Extensive bibliography for enhancing further knowledge Coverage includes: Smart grid technologies and communications Spectrum management Cognitive and autonomous radio systems Computing and communication architectures Data centres Distributed networking Cloud computing Next generation wireless communication systems 4G access networking Optical core networks Cooperation transmission Security and privacy Core research topics of green information and communication systems are covered from a network design perspective, giving both a theoretical and practical perspective A 'whose-who' of international contributors Extensive bibliography for enhancing further knowledge
Optimal Power Allocation for Energy Efficient MIMO Relay Systems in 5G Wireless Communication Springer
Energy-Efficient Pilot-Data Power Control in MU-MIMO

Communication Systems

Energy-Efficient Pilot-Data Power Control in MU-MIMO

Communication Systems Springer

"This book focuses on wireless sensor networks and their operation, covering topics including routing, energy efficiency and management"--

[Energy Efficiency in Wireless Networks](#) CRC Press

Power Efficiency in Broadband Wireless Communications focuses on the improvement of power efficiency in wireless communication systems, especially of mobile devices. Reviewing cutting-edge techniques for conserving power and boosting power efficiency, the book examines various technologies and their impact on consumer devices. It considers each technology, first by introducing the main physical layer components in recent wireless communication systems along with their shortcomings, and then proposing solutions for overcoming these shortcomings. The book covers orthogonal frequency division multiplexing (OFDM) signal generation and formulation and examines the advantages and disadvantages of OFDM systems compared to alternative multiplexing. It introduces one of the main drawbacks of OFDM systems, peak-to-average power ratio (PAPR), and discusses several PAPR techniques. It also explains how to overcome the main drawbacks of real-world OFDM system applications. Considers power amplifier linearization for increasing power efficiency and reducing system costs and power dissipation Describes the implementation scenario of the most promising linearization technique, digital predistortion Presents some experimental demonstrations of digital predistortion when the device under test is in the loop Because the most costly

device in a communication system that has a direct impact on power efficiency and power consumption is the power amplifier, the book details the behavior and characteristics of different classes of power amplifiers. Describing the evolution of the mobile cellular communication system, it details a cost-effective technique to help you increase power efficiency, reduce system costs, and prolong battery life in next generation mobile devices. *Second International Conference, ICICCT 2017, New Delhi, India, May 13, 2017, Revised Selected Papers* IGI Global

This book investigates energy management approaches for energy efficient or energy-centric system design and architecture and presents end-to-end energy management in the recent heterogeneous-type wireless network medium. It also considers energy management in wireless sensor and mesh networks by exploiting energy efficient transmission techniques and protocols. and explores energy management in emerging applications, services and engineering to be facilitated with 5G networks such as WBANs, VANETS and Cognitive networks. A special focus of the book is on the examination of the energy management practices in emerging wireless cellular and ad hoc networks. Considering the broad scope of energy management in wireless cellular and ad hoc networks, this book is organized into six sections covering range of Energy efficient systems and architectures; Energy efficient transmission and techniques; Energy efficient applications and services.

[Wireless Sensor Networks and Energy Efficiency: Protocols, Routing and Management](#) Academic Press

The past decades have seen a rapid growth of mobile data traffic, both in terms of connected devices and data rate. To

satisfy the evergrowing data traffic demand in wireless communication systems, the current cellular systems have to be redesigned to increase both spectral efficiency and energy efficiency. Massive MIMO (Multiple-Input-Multiple-Output) is one solution that satisfy both requirements. In massive MIMO systems, hundreds of antennas are employed at the base station to provide service to many users at the same time and frequency. This enables the system to serve the users with uniformly good quality of service simultaneously, with low-cost hardware and without using extra bandwidth and energy. To achieve this, proper resource allocation is needed. Among the available resources, transmit power beamforming are the most important degrees of freedom to control the spectral efficiency and energy efficiency. Due to the use of excessive number of antennas and low-end hardware at the base station, new aspects of power allocation and beamforming compared to current systems arises. In the first part of the thesis, new uplink power allocation schemes that based on long term channel statistics is proposed. Since quality of the channel estimates is crucial in massive MIMO, in addition to data power allocation, joint power allocation that includes the pilot power as additional variable should be considered. Therefore a new framework for power allocation that matches practical systems is developed, as the methods developed in the literature cannot be applied directly to massive MIMO systems. Simulation results confirm the advantages brought by the the proposed new framework. In the second part, we introduces a new approach to solve the joint precoding and power allocation for different objective in downlink scenarios by a combination of random matrix theory and optimization theory. The new approach results

in a simplified problem that, though non-convex, obeys a simple separable structure. Simulation results showed that the proposed scheme provides large gains over heuristic solutions when the number of users in the cell is large, which is suitable for applying in massive MIMO systems. In the third part we investigate the effects of using low-end amplifiers at the base stations. The non-linear behavior of power consumption in these amplifiers changes the power consumption model at the base station, thereby changes the power allocation and beamforming design. Different scenarios are investigated and results show that a certain number of antennas can be turned off in some scenarios. In the last part we consider the use of non-orthogonal-multiple-access (NOMA) inside massive MIMO systems in practical scenarios where channel state information (CSI) is acquired through pilot signaling. Achievable rate analysis is carried out for different pilot signaling schemes including both uplink and downlink pilots. Numerical results show that when downlink CSI is available at the users, our proposed NOMA scheme outperforms orthogonal schemes. However with more groups of users present in the cell, it is preferable to use multi-user beamforming instead of NOMA.

Practical Approaches for RF Impairments Reduction John Wiley & Sons

This book constitutes the joint refereed proceedings of the 13 International Conference on Next Generation Teletraffic and Wired/Wireless Advanced Networking, NEW2AN, and the 6th Conference on Internet of Things and Smart Spaces, ruSMART 2013, held in St. Petersburg, Russia, in August 2013. The total of 38 papers was carefully reviewed and selected for inclusion in this book. The 14 papers selected from ruSMART are organized in

topical sections named: internet of things, smart spaces technologies; and smart systems. The 24 papers from NEW2AN deal with the following topics: performance and efficiency analysis, network and transport layer issues; cognitive radio networks; sensor and mesh networks; upper layer protocols and applications; ad-hoc, cellular and satellite networks.

Affordable Nonlinear MIMO Systems Springer

Written by pioneers of the concept, this is the first complete guide to the physical and engineering principles of Massive MIMO. Assuming only a basic background in communications and statistical signal processing, it will guide readers through key topics in multi-cell systems such as propagation modeling, multiplexing and de-multiplexing, channel estimation, power control, and performance evaluation. The authors' unique capacity-bounding approach will enable readers to carry out effective system performance analyses and develop advanced Massive MIMO techniques and algorithms. Numerous case studies, as well as problem sets and solutions accompanying the book online, will help readers put knowledge into practice and acquire the skill set needed to design and analyze complex wireless communication systems. Whether you are a graduate student, researcher, or industry professional working in the field of wireless communications, this will be an indispensable guide for years to come.

Fundamentals of 5G Mobile Networks Cambridge University Press

This volume explores the connections between mathematical modeling, computational methods, and high performance computing, and how recent developments in these areas can help to solve complex problems in the natural sciences and

engineering. The content of the book is based on talks and papers presented at the conference Modern Mathematical Methods and High Performance Computing in Science & Technology (M3HPCST), held at Inderprastha Engineering College in Ghaziabad, India in January 2020. A wide range of both theoretical and applied topics are covered in detail, including the conceptualization of infinity, efficient domain decomposition, high capacity wireless communication, infectious disease modeling, and more. These chapters are organized around the following areas: Partial and ordinary differential equations Optimization and optimal control High performance and scientific computing Stochastic models and statistics Recent Trends in Mathematical Modeling and High Performance Computing will be of interest to researchers in both mathematics and engineering, as well as to practitioners who face complex models and extensive computations.

M3HPCST-2020, Ghaziabad, India, January 9-11, 2020

Springer

Fundamentals of 5G Mobile Networks provides an overview of the key features of the 5th Generation (5G) mobile networks, discussing the motivation for 5G and the main challenges in developing this new technology. This book provides an insight into the key areas of research that will define this new system technology paving the path towards future research and development. The book is multi-disciplinary in nature, and aims to cover a whole host of intertwined subjects that will predominantly influence the 5G landscape, including the future Internet, cloud computing, small cells and self-organizing networks (SONs), cooperative communications, dynamic

spectrum management and cognitive radio, Broadcast-Broadband convergence, 5G security challenge, and green RF. This book aims to be the first of its kind towards painting a holistic perspective on 5G Mobile, allowing 5G stakeholders to capture key technology trends on different layering domains and to identify potential inter-disciplinary design aspects that need to be solved in order to deliver a 5G Mobile system that operates seamlessly.

MIMO Processing for 4G and Beyond CRC Press

This book provides an overview of the latest research and development of new technologies for cognitive radio, mobile communications, and wireless networks. The contributors discuss the research and requirement analysis and initial standardization work towards 5G cellular systems and the capacity problems it presents. They show how cognitive radio, with the capability to flexibly adapt its parameters, has been proposed as the enabling technology for unlicensed secondary users to dynamically access the licensed spectrum owned by legacy primary users on a negotiated or an opportunistic basis. They go on to show how cognitive radio is now perceived in a much broader paradigm that will contribute to solve the resource allocation problem that 5G requirements raise. The chapters represent hand-selected expanded papers from EAI sponsored and hosted conferences such as the 12th EAI International Conference on Mobile and Ubiquitous Systems, the 11th EAI International Conference on Heterogeneous Networking for Quality, Reliability, Security and Robustness, the 10th International Conference on Cognitive Radio Oriented Wireless Networks, the 8th International Conference on Mobile Multimedia Communications, and the EAI International

Conference on Software Defined Wireless Networks and Cognitive Technologies for IoT.

Progress in Advanced Computing and Intelligent Engineering Springer Nature

The International Conference on Intelligent Computing (ICIC) was formed to provide an annual forum dedicated to the emerging and challenging topics in artificial intelligence, machine learning, bioinformatics, and computational biology, etc. It aims to bring together researchers and practitioners from both academia and industry to share ideas, problems, and solutions related to the multifaceted aspects of intelligent computing. ICIC 2009, held in Ulsan, Korea, September 16-19, 2009, constituted the 5th International Conference on Intelligent Computing. It built upon the success of ICIC 2008, ICIC 2007, ICIC 2006, and ICIC 2005 held in Shanghai, Qingdao, Kunming, and Hefei, China, 2008, 2007, 2006, and 2005, respectively. This year, the conference concentrated mainly on the theories and methodologies as well as the emerging applications of intelligent computing. Its aim was to unify the picture of contemporary intelligent computing techniques as an integral concept that highlights the trends in advanced computational intelligence and bridges theoretical research with applications. Therefore, the theme for this conference was "Emerging Intelligent Computing Technology and Applications." Papers focusing on this theme were solicited, addressing theories, methodologies, and applications in science and technology.

Index Modulation Techniques for Energy-efficient Transmission in Large-scale MIMO Systems John Wiley & Sons

Multi-antenna techniques are widely considered to be the most

promising avenue for significantly increasing the bandwidth efficiency of wireless data transmission systems. In so called MIMO (multiple input multiple output) systems, multiple antennas are deployed both at the transmitter and the receiver. In MISO (multiple input single output) systems, the receiver has only one antenna, and the multiple transmit antennas are used for transmit diversity. The key aspects of multiple antenna transceiver techniques for evolving 3G systems and beyond are presented. MIMO and MISO (transmit diversity) techniques are explained in a common setting. In particular, the book covers linear processing transmit diversity methods with and without side information at the transmitter (feedback), including the current transmit diversity concepts in the WCDMA standards, as well as promising MIMO concepts, crucial for future high data rate systems. As an example, MIMO and MISO aspects of 3GPP HSDPA (high speed downlink packet access) will be considered. Furthermore, examples of high throughput, low complexity space-time codes will be provided, when signalling without side information (open loop concepts). The theory of linear space-time block codes will be developed, and optimal non-orthogonal high throughput codes will be constructed, both for MIMO and MISO systems. Performance may be further improved by feedback from receiver to transmitter. The corresponding closed loop modes in the current 3GPP specifications will be discussed, along with their extensions for more than two transmit antennas. In addition, feedback signalling for MIMO channels will be addressed. Optimal quantisation methods of the feedback messages will be discussed. Finally, hybrid schemes are constructed, where the amount of feedback is reduced using partly open, partly closed

loop signalling. * Provides a concise and up-to-date description of perhaps the most active area of research in wireless communications * Unique in presenting recent developments in both WCDMA and MIMO * MIMO and MISO techniques are explained in a common setting * Special emphasis is placed on combining theoretical understanding with engineering applicability For Research engineers in academia and industry, and development engineers in 3G system design as well as research students.

Multi-Carrier Digital Communications Springer

The last ten years have seen a massive growth in the number of connected wireless devices. Billions of devices are connected and managed by wireless networks. At the same time, each device needs a high throughput to support applications such as voice, real-time video, movies, and games. Demands for wireless throughput and the number of wireless devices will always increase. In addition, there is a growing concern about energy consumption of wireless communication systems. Thus, future wireless systems have to satisfy three main requirements: i) having a high throughput; ii) simultaneously serving many users; and iii) having less energy consumption. Massive multiple-input multiple-output (MIMO) technology, where a base station (BS) equipped with very large number of antennas (collocated or distributed) serves many users in the same time-frequency resource, can meet the above requirements, and hence, it is a promising candidate technology for next generations of wireless systems. With massive antenna arrays at the BS, for most propagation environments, the channels become favorable, i.e., the channel vectors between the users and the BS are (nearly)

pairwisely orthogonal, and hence, linear processing is nearly optimal. A huge throughput and energy efficiency can be achieved due to the multiplexing gain and the array gain. In particular, with a simple power control scheme, Massive MIMO can offer uniformly good service for all users. In this dissertation, we focus on the performance of Massive MIMO. The dissertation consists of two main parts: fundamentals and system designs of Massive MIMO. In the first part, we focus on fundamental limits of the system performance under practical constraints such as low complexity processing, limited length of each coherence interval, intercell interference, and finite-dimensional channels. We first study the potential for power savings of the Massive MIMO uplink with maximum-ratio combining (MRC), zero-forcing, and minimum mean-square error receivers, under perfect and imperfect channels. The energy and spectral efficiency tradeoff is investigated. Secondly, we consider a physical channel model where the angular domain is divided into a finite number of distinct directions. A lower bound on the capacity is derived, and the effect of pilot contamination in this finite-dimensional channel model is analyzed. Finally, some aspects of favorable propagation in Massive MIMO under Rayleigh fading and line-of-sight (LoS) channels are investigated. We show that both Rayleigh fading and LoS environments offer favorable propagation. In the second part, based on the fundamental analysis in the first part, we propose some system designs for Massive MIMO. The acquisition of channel state information (CSI) is very important in Massive MIMO. Typically, the channels are estimated at the BS through uplink training. Owing to the limited length of the coherence interval, the system performance is limited by pilot

contamination. To reduce the pilot contamination effect, we propose an eigenvalue-decomposition-based scheme to estimate the channel directly from the received data. The proposed scheme results in better performance compared with the conventional training schemes due to the reduced pilot contamination. Another important issue of CSI acquisition in Massive MIMO is how to acquire CSI at the users. To address this issue, we propose two channel estimation schemes at the users: i) a downlink "beamforming training" scheme, and ii) a method for blind estimation of the effective downlink channel gains. In both schemes, the channel estimation overhead is independent of the number of BS antennas. We also derive the optimal pilot and data powers as well as the training duration allocation to maximize the sum spectral efficiency of the Massive MIMO uplink with MRC receivers, for a given total energy budget spent in a coherence interval. Finally, applications of Massive MIMO in relay channels are proposed and analyzed. Specifically, we consider multipair relaying systems where many sources simultaneously communicate with many destinations in the same time-frequency resource with the help of a massive MIMO relay. A massive MIMO relay is equipped with many collocated or distributed antennas. We consider different duplexing modes (full-duplex and half-duplex) and different relaying protocols (amplify-and-forward, decode-and-forward, two-way relaying, and one-way relaying) at the relay. The potential benefits of massive MIMO technology in these relaying systems are explored in terms of spectral efficiency and power efficiency.

Spectrum Sharing in Cognitive Radio Networks CRC Press

This book describes a new design approach for energy-efficient,

Domain-Specific Instruction set Processor (DSIP) architectures for the wireless baseband domain. The innovative techniques presented enable co-design of algorithms, architectures and technology, for efficient implementation of the most advanced technologies. To demonstrate the feasibility of the author's design approach, case studies are included for crucial functionality of advanced wireless systems with increased computational performance, flexibility and reusability. Designers

using this approach will benefit from reduced development/product costs and greater scalability to future process technology nodes.

International Conference, DICTAP 2011, Dijon, France, June 21-23, 2011. Proceedings Linköping University Electronic Press

This book sets out the theoretical principles of visible light communication (VLC), and outlines key applications of this cutting-edge technology.