Millimeter Wave Wireless Communications Prentice Hall Communications Engineering And Emerging Technologies

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Wireless technology is a truly revolutionary paradigm shift, enabling multimedia communications between people and devices from any location. It also underpins exciting applications such as sensor networks, smart homes, telematics, and automated highways. This book provides a comprehensive introduction to the underlying theory, design techniques and analytical tools of wireless communications, focusing primarily on the core principles of wireless system design. The book begins with an overview of wireless systems and standards. The characteristics of the wireless channel are then described, including their fundamental capacity limits. Various modulation, coding, and signal processing schemes are then discussed in detail, including state-of-the-art adaptive modulation, multicarrier, spread spectrum, and multiple antenna techniques. The concluding chapters deal with multiuser communications, cellular system design, and ad-hoc network design. Design insights and tradeoffs are emphasized throughout the book. It contains many worked examples, over 200 figures, almost 300 homework exercises, over 700 references, and is an ideal textbook for students.

Communications represent a strategic sector for privacy protection and for personal, company, national and international security. The interception, damage or loss of information during communication can generate material and non material economic damages from both a personal and collective point of view. The purpose of this book is to give the reader information relating to all aspects of communications security, beginning at the base ideas and building to reach the most advanced and updated concepts. The book will be of interest to integrated system designers, telecommunication designers, system engineers, system analysts, security managers, technicians, intelligence personnel, security personnel, police, army, private investigators, scientists, graduate and postgraduate students and anyone that needs to communicate in a secure way.

Complete and comprehensive application-focused reference on millimetre wave antennas Millimetre Wave Antennas for Gigabit Wireless Communications covers a vast wealth of material with a strong focus on the current design and analysis principles of millimetre wave antennas for wireless devices. It provides practising engineers with the design rules and considerations required in designing antennas for the terminal. The authors include coverage of new configurations with advanced angular and frequency filtering characteristics, new design and analysis techniques, and methods for filter miniaturization. The book reviews up-to-date research results and utilizes numerous design examples to emphasize computer analysis and synthesis whilst also discussing the applications of commercially available software. Key Features: Advanced and up-to-date treatment of one of the fastest growing fields of wireless communications Covers topics such as Gigabit wireless communications and its required antennas, passive and active antenna design and analysis techniques, multibeam antennas and MIMO, IEEE 802.15.3c, WiMedia, and advanced materials and technologies Offers a practical guide to integrated antennas for specific configurations requirements Addresses a number of complex, real-world problems that system and antenna engineers are going to face in millimetre-wave communications industry and provides solutions Contains detailed design examples, drawings and predicted performance This book is an invaluable tool for antenna professionals (engineers, designers, and developers), microwave professionals, wireless communication system professionals,
and industries with microwave and millimetre wave research projects. Advanced students and researchers working in the field of millimetre wave engineering will also find this book very useful.

The Accessible Guide to Modern Wireless Communication for Undergraduates, Graduates, and Practicing Electrical Engineers Wireless communication is a critical discipline of electrical engineering and computer science, yet the concepts have remained elusive for students who are not specialists in the area. This text makes digital communication and receiver algorithms for wireless communication broadly accessible to undergraduates, graduates, and practicing electrical engineers. Notably, the book builds on a signal processing foundation and does not require prior courses on analog or digital communication. Introduction to Wireless Digital Communication establishes the principles of communication, from a digital signal processing perspective, including key mathematical background, transmitter and receiver signal processing algorithms, channel models, and generalizations to multiple antennas. Robert Heath’s “less is more” approach focuses on typical solutions to common problems in wireless engineering. Heath presents digital communication fundamentals from a signal processing perspective, focusing on the complex pulse amplitude modulation approach used in most commercial wireless systems. He describes specific receiver algorithms for implementing wireless communication links, including synchronization, carrier frequency offset estimation, channel estimation, and equalization. While most concepts are presented for systems with single transmit and receive antennas, Heath concludes by extending those concepts to contemporary MIMO systems. To promote learning, each chapter includes previews, bullet-point summaries, examples, and numerous homework problems to help readers test their knowledge. Basics of wireless communication: applications, history, and the central role of signal processing Digital communication essentials: components, channels, distortion, coding/decoding, encryption, and modulation/demodulation Signal processing: linear time invariant systems, probability/random processes, Fourier transforms, derivation of complex baseband signal representation and equivalent channels, and multi-rate signal processing Least-squared estimation techniques that build on the linear algebra typically taught to electrical engineering undergraduates Complex pulse amplitude modulation: symbol mapping, constellations, signal bandwidth, and noise Synchronization, including symbol, frame, and carrier frequency offset estimation Frequency selective channel estimation and equalization MIMO techniques using multiple transmit and/or receive antennas, including SIMO, MISO, and MIMO-OFDM Register your product at informit.com/register for convenient access to downloads, updates, and corrections as they become available.

"In this video training, Professor Rappaport starts by providing an overview to the basics in ultrawideband digital communications. He then introduces topics such as MmWave Propagation, ray tracing, Channel Models, and Antennas. He ends the first section with a discussion on RF and Analog Circuits and Systems for mmWave transceivers. In the second section, Professor Rappaport covers Ultrawideband Baseband circuits, Beamforming, Networking, and device discovery. He describes Modulation, Coding and Relay approaches for mmWave wireless. Finally, he ends the program with a discussion of current 60 GHz mmWave wireless LAN standards."--Resource description page.

Discover the concepts, architectures, components, tools, and techniques needed to design millimeter-wave circuits for current and emerging wireless system applications. Focusing on applications in 5G, connectivity, radar, and more, leading experts in radio frequency integrated circuit (RFIC) design provide a comprehensive treatment of cutting-edge physical-layer technologies for radio frequency (RF) transceivers - specifically RF, analog, mixed-signal, and digital circuits and architectures. The full design chain is covered, from system design requirements through to building blocks, transceivers, and process technology. Gain insight into the key novelties of 5G through authoritative chapters on massive MIMO and phased arrays, and learn about the very latest technology developments, such as FinFET logic process technology for RF and millimeter-wave applications. This is an essential reading and an excellent reference for high-frequency circuit designers in both academia and industry.

Directional antenna technologies have made significant advancements in the last decade. These advances have opened the door to many exciting new design opportunities for wireless networks to enhance quality of service (QoS), performance, and network capacity. In this book, experts from around the world present the latest research and development in wireless networks with directional antennas. Their contributed chapters provide detailed coverage of the models, algorithms, protocols, and applications of wireless networks with various types of directional antennas operating at different frequency bands. Wireless Network Performance Enhancement via Directional Antennas: Models, Protocols, and Systems identifies several interesting research problems in this important field, providing an opportunity to learn about solid solutions to these issues. It also looks at a number of practical hardware designs for the deployment of next-generation antennas, as well as efficient network protocols for exploitation of directional communications. The book is organized into six sections: Directional Antennas - covers the hardware design of different types of antennas Directional MAC - focuses on the principles of designing medium access control (MAC) protocols for directional networks Millimeter Wave - explores different design aspects of millimeter

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wave (mm-Wave) systems, which operate in higher-frequency bands (such as 60 GHz) MIMO - explains how to establish a multiple-input, multiple-output (MIMO) antenna system and describes how it operates in a cognitive radio network Advanced Topics - looks at additional topics such as beamforming in cognitive radio networks, multicast algorithm development, network topology management for connectivity, and sensor network lifetime issues Applications - illustrates some important applications, such as military networks and airborne networking, that benefit from directional networking designs With this book, researchers and engineers will be well-equipped to advance the research and development in this important field. If you’re new to this field, you will find this book to be a valuable reference on basic directional networking principles, engineering design, and challenges.

This book presents state-of-the-art research on robust resource allocation in current and future wireless networks. The authors describe the nominal resource allocation problems in wireless networks and explain why introducing robustness in such networks is desirable. Then, depending on the objectives of the problem, namely maximizing the social utility or the per-user utility, cooperative or competitive approaches are explained and their corresponding robust problems are considered in detail. For each approach, the costs and benefits of robust schemes are discussed and the algorithms for reducing their costs and improving their benefits are presented. Considering the fact that such problems are inherently non-convex and intractable, a taxonomy of different relaxation techniques is presented, and applications of such techniques are shown via several examples throughout the book. Finally, the authors argue that resource allocation continues to be an important issue in future wireless networks, and propose specific problems for future research.

Beyond 2020, wireless communication systems will have to support more than 1,000 times the traffic volume of today’s systems. This extremely high traffic load is a major issue faced by 5G designers and researchers. This challenge will be met by a combination of parallel techniques that will use more spectrum more flexibly, realize higher spectral efficiency, and densify cells. Novel techniques and paradigms must be developed to meet these goals. The book addresses diverse key-point issues of next-generation wireless communications systems and identifies promising solutions. The book’s core is concentrated to techniques and methods belonging to what is generally called radio access network.

This book presents the fundamental concepts, recent advancements, and opportunities for future research in various key enabling technologies in next-generation wireless communications. The book serves as a comprehensive source of information in all areas of wireless communications with a particular emphasis on physical (PHY) layer techniques related to 5G wireless systems and beyond. In particular, this book focuses on different emerging techniques that can be adopted in 5G wireless networks. Some of those techniques include massive-MIMO, mm-Wave communications, spectrum sharing, device-to-device (D2D) and vehicular to anything (V2X) communications, radio-frequency (RF) based energy harvesting, and NOMA. Subsequent chapters cover the fundamentals and PHY layer design aspects of different techniques that can be useful for the readers to get familiar with the emerging technologies and their applications.

mmWave Massive MIMO: A Paradigm for 5G is the first book of its kind to hinge together related discussions on mmWave and Massive MIMO under the umbrella of 5G networks. New networking scenarios are identified, along with fundamental design requirements for mmWave Massive MIMO networks from an architectural and practical perspective. Working towards final deployment, this book updates the research community on the current mmWave Massive MIMO roadmap, taking into account the future emerging technologies emanating from 3GPP/IEEE. The book’s editors draw on their vast experience in international research on the forefront of the mmWave Massive MIMO research arena and standardization. This book aims to talk openly about the topic, and will serve as a useful reference not only for postgraduates students to learn more on this evolving field, but also as inspiration for mobile communication researchers who want to make further innovative strides in the field to mark their legacy in the 5G arena. Contains tutorials on the basics of mmWave and Massive MIMO Identifies new 5G networking scenarios, along with design requirements from an architectural and practical perspective Details the latest updates on the evolution of the mmWave Massive MIMO roadmap, considering future emerging technologies emanating from 3GPP/IEEE Includes contributions from leading experts in the field in modeling and prototype design for mmWave Massive MIMO design Presents an ideal reference that not only helps postgraduate students learn more in this evolving field, but also inspires mobile communication researchers towards further innovation

By 2020, if not before, mobile computing and wireless systems are expected to enter the fifth generation (5G), which promises evolutionary if not revolutionary services. What those advanced services will look like, sound like, and feel like is the theme of the book Advances in Mobile Computing and Communications: Perspectives and Emerging Trends in 5G Networks. The book explores futuristic and compelling ideas in latest developments of communication and networking aspects of 5G. As such, it serves as an excellent guide for advanced developers, communication network scientists, researchers, academicians, and graduate students. The authors address computing models, communication architecture, and protocols based on 3G, LTE, LTE-A, 4G, and beyond. Topics include advances in 4G, radio propagation and channel...
modeling aspects of 4G networks, limited feedback for 4G, and game theory application for power control and subcarrier allocation in OFDMA cellular networks. Additionally, the book covers millimeter-wave technology for 5G networks, multicellular heterogeneous networks, and energy-efficient mobile wireless network operations for 4G and beyond using HetNets. Finally, the authors delve into opportunistic multiconnect networks with P2P WiFi and cellular providers and video streaming over wireless channels for 4G and beyond.

5G NR: Architecture, Technology, Implementation, and Operation of 3GPP New Radio Standards is an in-depth, systematic, technical reference on 3GPP's New Radio standards (Release 15 and beyond), covering the underlying theory, functional descriptions, practical considerations and implementation of the 5G new radio access technology. The book describes the design and operation of individual components and shows how they are integrated into the overall system and operate from a systems perspective. Uniquely, this book gives detailed information on RAN protocol layers, transport, network architecture and services, as well as practical implementation and deployment issues, making it suitable for researchers and engineers who are designing and developing 5G systems. Reflecting on the author's 30 plus years of experience in signal processing, microelectronics and wireless communication system design, this book is ideal for professional engineers, researchers and graduate students working and researching in cellular communication systems and protocols as well as mobile broadband wireless standards. Strong focus on practical considerations, implementation and deployment issues. Takes a top-down approach to explain system operation and functional interconnection. Covers all functional components, features, and interfaces based on clear protocol structure and block diagrams. Describes RF and transceiver design considerations in sub-6 GHz and mmWave bands. Covers network slicing, SDN/NFV/MEC networks and cloud and virtualized RAN architectures. Comprehensive coverage of NR multi-antenna techniques and beamformed operation. A consistent and integrated coverage reflecting the author's decades of experience in developing 3G, 4G and 5G technologies and writing two successful books in these areas.

Fully updated edition of the comprehensive, single-source reference on satellite technology and its applications. Covering both the technology and its applications, Satellite Technology is a concise reference on satellites for commercial, scientific and military purposes. The book explains satellite technology fully, beginning by offering an introduction to the fundamentals, before covering orbits and trajectories, launch and in-orbit operations, hardware, communication techniques, multiple access techniques, and link design fundamentals. This new edition also includes comprehensive chapters on Satellite Networks and Satellite Technology – Emerging Trends. Providing a complete survey of applications, from remote sensing and military uses, to navigational and scientific applications, the authors also present an inclusive compendium on satellites and satellite launch vehicles. Filled with diagrams and illustrations, this book serves as an ideal introduction for those new to the topic, as well as a reference point for professionals. Fully updated edition of the comprehensive, single-source reference on satellite technology and its applications: remote sensing, weather, navigation, scientific, and military, including new chapters on Satellite Networks and Satellite Technology – Emerging Trends. Covers the full range of satellite applications in remote sensing, meteorology, the military, navigation and science, and communications, including satellite-to-undersea communication, satellite cell-phones, and global Xpress system of INMARSAT. The cross-disciplinary coverage makes the book an essential reference book for professionals, R&D scientists and students at postgraduate level. Companion website provides a complete compendium on satellites and satellite launch vehicles. An ideal introduction for Professionals and R&D scientists in the field. Engineering Students. Cross-disciplinary information for engineers and technical managers.

Wireless networks are facing growing demand for high capacity, better coverage, support of new applications and broad range of services. In this book, the authors first present an overview of beamforming antennas and millimeter wave communications followed by a discussion on the challenges and issues facing MAC and multi-hop routing in the wireless networks with beamforming antennas. Then, they discuss various MAC and routing protocols that are specifically designed to address those issues and exploit the benefits of millimeter wave and beamforming antennas. Authors also present a framework to provide Quality of Service (QoS) in contention-based wireless networks with beamforming antennas. Finally, the book is concluded with a discussion on open research topics for future generation WLAN systems.

An accessible, comprehensive and coherent treatment of MIMO communication, drawing on ideas from information theory and signal processing.

The third edition of this popular reference covers enabling technologies for building up 5G wireless networks. Due to extensive research and complexity of the incoming solutions for the next generation of wireless networks it is anticipated that the industry will select a subset of these results and leave some advanced technologies to be implemented later. This new edition presents a carefully chosen combination of the candidate network architectures and the required tools for their analysis. Due to the complexity of the technology, the discussion on 5G will be extensive and it will be difficult to reach consensus on the new global standard. The discussion will have to
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include the vendors, operators, regulators as well as the research and academic community in the field. Having a comprehensive book will help many participants to join actively the discussion and make meaningful contribution to shaping the new standard.

MIMO systems have been known to better the quality of service for wireless communication systems. This book discusses emerging techniques in MIMO systems to reduce complexities and keep benefits unaffected at the same time. It discusses about benefits and shortcomings of various MIMO technologies like spatial multiplexing, space time coding, spatial modulation, transmit antenna selection and various power allocation schemes to optimize the performance. Crux of the book is focus on MIMO communication over generalized fading channels as they can model the propagation of signals in a non-homogeneous environment. Relevant MATLAB codes are also included in the appendices. Book is aimed at graduate students and researchers in electronics and wireless engineering specifically interested in electromagnetic theory, antennas and propagation, future wireless systems, signal processing.

The Definitive, Comprehensive Guide to Cutting-Edge Millimeter Wave Wireless Design “ This is a great book on mmWave systems that covers many aspects of the technology targeted for beginners all the way to the advanced users. The authors are some of the most credible scholars I know of who are well respected by the industry. I highly recommend studying this book in detail.” —Ali Sadri, Ph.D., Sr. Director, Intel Corporation, MCG mmWave Standards and Advanced Technologies Millimeter wave (mmWave) is today's breakthrough frontier for emerging wireless mobile cellular networks, wireless local area networks, personal area networks, and vehicular communications. In the near future, mmWave products, systems, theories, and devices will come together to deliver mobile data rates thousands of times faster than today's existing cellular and WiFi networks. In Millimeter Wave Wireless Communications, four of the field's pioneers draw on their immense experience as researchers, entrepreneurs, inventors, and consultants, empowering engineers at all levels to succeed with mmWave. They deliver exceptionally clear and useful guidance for newcomers, as well as the first complete desk reference for design experts. The authors explain mmWave signal propagation, mmWave circuit design, antenna designs, communication theory, and current standards (including IEEE 802.15.3c, Wireless HD, and ECMA/WiMedia). They cover comprehensive mmWave wireless design issues, for 60 GHz and other mmWave bands, from channel to antenna to receiver, introducing emerging design techniques that will be invaluable for research engineers in both industry and academia. Topics include Fundamentals: communication theory, channel propagation, circuits, antennas, architectures, capabilities, and applications Digital communication: baseband signal/channel models, modulation, equalization, error control coding, multiple input multiple output (MIMO) principles, and hardware architectures Radio wave propagation characteristics: indoor and outdoor applications Antennas/antenna arrays, on-chip and in-package antennas, fabrication, and packaging Analog circuit design: mmWave transistors, fabrication, and transceiver design approaches Baseband circuit design: multi-gigabit-per-second, high-fidelity DAC and ADC converters Physical layer: algorithmic choices, design considerations, and impairment solutions; and how to overcome clipping, quantization, and nonlinearity Higher-layer design: beam adaptation protocols, relaying, multimedia transmission, and multiband considerations 60 GHz standardization: IEEE 802.15.3c for WPAN, Wireless HD, ECMA-387, IEEE 802.11ad, Wireless Gigabit Alliance (WiGig)

This book addresses in-depth technical issues, limitations, considerations and challenges facing millimeter-wave (MMW) integrated circuit and system designers in designing MMW wireless communication systems from the complementary metal-oxide semiconductor (CMOS) perspective. It offers both a comprehensive explanation of fundamental theories and a broad coverage of MMW integrated circuits and systems. CMOS Millimeter-Wave Integrated Circuits for Next Generation Wireless Communication Systems is an excellent reference for faculty, researchers and students working in electrical and electronic engineering, wireless communication, integrated circuit design and circuits and systems. While primarily written for upper-level undergraduate courses, it is also an excellent introduction to the subject for instructors, graduate students, researchers, integrated circuit designers and practicing engineers. Advanced readers could also benefit from this book as it includes many recent state-of-the-art MMW circuits.

A comprehensive and approachable introduction to 5G Written by a noted expert on the subject, An Introduction to 5G: The New Radio, 5G Network and Beyond offers an introductory system-level guide to 5G. The material covered includes: The use cases and requirements of the 5G system The architecture of the next generation radio access network and the 5G core The implementation of HTTP/2 on the service-based interfaces of the 5G core The signalling procedures that govern the end-to-end-operation of the system The new features that are introduced in Releases 16 and 17 An Introduction to 5G is written for engineering professionals in mobile telecommunications, for those in non-technical roles such as management, marketing and intellectual property, and for students. It requires no more than a basic understanding of mobile communications, and includes detailed references to the underlying 3GPP specifications for 5G. The book's approach provides a comprehensive, end-to-end overview of the 5G standard, which enables readers...
to move on with confidence to the more specialized texts and to the specifications themselves.

This book comprises select proceedings of the International Conference on Smart Cities: Opportunities and Challenges (ICSC 2019). The book contains chapters based on urban planning and design, policies and financial management, environment, energy, transportation, smart materials, sustainable development, information technologies, data management and urban sociology reflecting the major themes of the conference. The contents focus on current research towards improved governance and efficient management of infrastructure such as water, energy, transportation and housing for sustainable development, economic growth, and improved quality of life, especially for developing nations. This book will be useful for academicians, researchers, and policy makers interested in designing, developing, planning, managing, and maintaining smart cities.

A comprehensive and invaluable guide to 5G technology, implementation and practice in one single volume. For all things 5G, this book is a must-read. Signal processing techniques have played the most important role in wireless communications since the second generation of cellular systems. It is anticipated that new techniques employed in 5G wireless networks will not only improve peak service rates significantly, but also enhance capacity, coverage, reliability, low-latency, efficiency, flexibility, compatibility and convergence to meet the increasing demands imposed by applications such as big data, cloud service, machine-to-machine (M2M) and mission-critical communications. This book is a comprehensive and detailed guide to all signal processing techniques employed in 5G wireless networks. Uniquely organized into four categories, New Modulation and Coding, New Spatial Processing, New Spectrum Opportunities and New System-level Enabling Technologies, it covers everything from network architecture, physical-layer (down-link and up-link), protocols and air interface, to cell acquisition, scheduling and rate adaption, access procedures and relaying to spectrum allocations. All technology aspects and major roadmaps of global 5G standard development and deployments are included in the book. Key Features: Offers step-by-step guidance on bringing 5G technology into practice, by applying algorithms and design methodology to real-time circuit implementation, taking into account rapidly growing applications that have multi-standards and multi-systems. Addresses spatial signal processing for 5G, in particular massive multiple-input multiple-output (massive-MIMO), FD-MIMO and 3D-MIMO along with orbital angular momentum multiplexing, 3D beamforming and diversity. Provides detailed algorithms and implementations, and compares all multicarrier modulation and multiple access schemes that offer superior data transmission performance including FBMC, GFDM, F-OFDM, UFMC, SEFDM, FTN, MUSA, SCMA and NOMA. Demonstrates the translation of signal processing theories into practical solutions for new spectrum opportunities in terms of millimeter wave, full-duplex transmission and license assisted access. Presents well-designed implementation examples, from individual function block to system level for effective and accurate learning. Covers signal processing aspects of emerging system and network architectures, including ultra-dense networks (UDN), software-defined networks (SDN), device-to-device (D2D) communications and cloud radio access network (C-RAN).

This book provides a comprehensive overview of the emerging technologies for next-generation 5G mobile communications, with insights into the long-term future of 5G. Written by international leading experts on the subject, this contributed volume covers a wide range of technologies, research results, and networking methods. Key enabling technologies for 5G systems include, but are not limited to, millimeter-wave communications, massive MIMO technology and non-orthogonal multiple access. 5G will herald an even greater rise in the prominence of mobile access based upon both human-centric and machine-centric networks. Compared with existing 4G communications systems, unprecedented numbers of smart and heterogeneous wireless devices will be accessing future 5G mobile systems. As a result, a new paradigm shift is required to deal with challenges on explosively growing requirements in mobile data traffic volume (1000x), number of connected devices (10–100x), typical end-user data rate (10–100x), and device/network lifetime (10x). Achieving these ambitious goals calls for revolutionary candidate technologies in future 5G mobile systems. Designed for researchers and professionals involved with networks and communication systems, 5G Mobile Communications is a straightforward, easy-to-read analysis of the possibilities of 5G systems.

Explore foundational and advanced issues in UAV cellular communications with this cutting-edge and timely new resource UAV Communications for 5G and Beyond delivers a comprehensive overview of the potential applications, networking architectures, research findings, enabling technologies, experimental measurement results, and industry standardizations for UAV communications in cellular systems. The book covers both existing LTE infrastructure, as well as future 5G and-beyond systems. UAV Communications covers a range of topics that will be of interest to students and professionals alike. Issues of UAV detection and identification are discussed, as is the positioning of autonomous aerial vehicles. More fundamental subjects, like the necessary tradeoffs involved in UAV communication are examined in detail. The distinguished editors offer readers an opportunity to improve their ability to plan and design for the near-future, explosive growth in the number of UAVs, as well as the correspondingly demanding systems that come with them. Readers will learn about a wide variety of timely and practical UAV topics, like: Performance measurement for
aerial vehicles over cellular networks, particularly with respect to existing LTE performance inter-cell interference coordination with drones. Massive multiple-input and multiple-output (MIMO) for Cellular UAV communications, including beamforming, null-steering, and the performance of forward-link C&C channels. 3GPP standardization for cellular-supported UAVs, including UAV traffic requirements, channel modeling, and interference challenges. Trajectory optimization for UAV communications. Perfect for professional engineers and researchers working in the field of unmanned aerial vehicles, UAV Communications for 5G and Beyond also belongs on the bookshelves of students in masters and PhD programs studying the integration of UAVs into cellular communication systems.

This book provides a comprehensive introduction to the underlying theory, design techniques and analytical results of wireless communication networks, focusing on the core principles of wireless network design. It elaborates the network utility maximization (NUM) theory with applications in resource allocation of wireless networks, with a central aim of design and the QoS guarantee. It presents and discusses state-of-the-art developments in resource allocation and performance optimization in wireless communication networks. It provides an overview of the general background including the basic wireless communication networks and the relevant protocols, architectures, methods and algorithms.

This book, edited and authored by world leading experts, gives a review of the principles, methods and techniques of important and emerging research topics and technologies in wireless communications and transmission techniques. The reader will: Quickly grasp a new area of research Understand the underlying principles of a topic and its application ASCertain how a topic relates to other areas and learn of the research issues yet to be resolved. Reviews important and emerging topics of research in wireless technology in a quick tutorial format. Presents core principles in wireless transmission theory. Provides reference content on core principles, technologies, algorithms, and applications. Includes comprehensive references to journal articles and other literature on which to build further, more specific and detailed knowledge.

This book focuses on the development of circuit and system design techniques for millimeter wave wireless communication systems above 90GHz and fabricated in nanometer scale CMOS technologies. The authors demonstrate a hands-on methodology that was applied to design six different chips, in order to overcome a variety of design challenges. Behavior of both actives and passives, and how to design them to achieve high performance is discussed in detail. This book serves as a valuable reference for millimeter wave designers, working at both the transistor level and system level.

This book reports on the latest advances in the modeling, analysis and efficient management of information in Internet of Things (IoT) applications in the context of 5G access technologies. It presents cutting-edge applications made possible by the implementation of femtocell networks and millimeter wave communications solutions, examining them from the perspective of the universally and constantly connected IoT. Moreover, it describes novel architectural approaches to the IoT and presents the new framework possibilities offered by 5G mobile networks, including middleware requirements, node-centrality and the location of extensive functionalities at the edge. By providing researchers and professionals with a timely snapshot of emerging mobile communication systems, and highlighting the main pitfalls and potential solutions, the book fills an important gap in the literature and will foster the further developments of 5G hosting IoT devices.

This brief introduces wireless communications ideas and techniques into the study of networked control systems. It focuses on state estimation problems in which sensor measurements (or related quantities) are transmitted over wireless links to a central observer. Wireless communications techniques are used for energy resource management in order to improve the performance of the estimator when transmission occurs over packet dropping links, taking energy use into account explicitly in Kalman filtering and control. The brief allows a reduction in the conservativeness of control designs by taking advantage of the assumed. The brief shows how energy harvesting-based rechargeable batteries or storage devices can offer significant advantages in the deployment of large-scale wireless sensor and actuator networks by avoiding the cost-prohibitive task of battery replacement and allowing self-sustaining sensor to be operation. In contrast with research on energy harvesting largely focused on resource allocation for wireless communication systems design, this brief optimizes estimation objectives such as minimizing the expected estimation error covariance. The resulting power control problems are often stochastic control problems which take into account both system and channel dynamics. The authors show how to pose and solve such design problems using dynamic programming techniques. Researchers and graduate students studying networked control systems will find this brief a helpful source of new ideas and research approaches.

This book presents the proceedings of the 3rd International Conference of Reliable Information and Communication Technology 2018 (IRICT 2018), which was held in Kuala Lumpur, Malaysia, on July 23–24, 2018. The main theme of the conference was “Data Science, AI and IoT Trends for the Fourth Industrial Revolution.” A total of 158 papers were submitted to the conference, of which 103 were accepted and considered for publication in this book. Several hot research topics are covered, including Advances in Data Science and Big Data Analytics, Artificial Intelligence and Soft Computing, Business Intelligence, Internet of Things (IoT) Technologies and Applications, Intelligent Communication Systems, Advances in Computer Vision, Health Informatics, Reliable Cloud Computing Environments, Recent Trends in Knowledge Management, Security Issues in the Cyber World, and Advances in Information Systems Research, Theories and Methods.

This book describes a full range of contemporary techniques for the design of transmitters and receivers for communications systems operating in the range from 1 through to 300 GHz. In this frequency range there is a wide range of technologies that need to be employed, with silicon ICs at the core but, compared with other electronics systems, a much greater use of more specialist devices and components for high performance – for example, high Q-factor/low loss and good power efficiency. Many text books do, of course, cover these topics but what makes this book timely is the rapid adoption of millimetre-waves (frequencies from 30 to 300 GHz) for a wide range of consumer applications such as wireless high definition TV, “5G” Gigabit mobile internet systems and automotive radars. It has taken many years to develop low-cost technologies for suitable transmitters and receivers, so previously these frequencies have been employed only in expensive military and space applications. The book will cover these modern technologies, with the follow topics covered: transmitters and receivers, lumped element filters, transmission lines and S-parameters, RF MEMS, RFICs and MMICs, and many others. In addition, the book includes extensive line diagrams to illustrate circuit diagrams and block diagrams of systems, including diagrams and photographs showing how circuits are implemented practically. Furthermore, case studies are also included to explain the salient features of a range of important wireless communications systems. The book is accompanied with suitable design examples and exercises based on the Advanced Design System – the industry leading CAD tool for wireless design. More importantly, the authors have been working with Keysight Technologies on a learning & teaching initiative which is designed to promote access to industry-standard EDA tools such as ADS. Through its University Educational Support Program, Keysight offers students the opportunity to request a student license, backed up with extensive classroom materials and support resources. This culminates with students having the chance to demonstrate their RF/MW design and measurement expertise through the Keysight RF and Microwave Industry-Ready Student Certification Program: www.keysight.com/find/eesof-university www.keysight.com/find/eesof-student-certification

A comprehensive overview of the 5G landscape covering technology options, most likely use cases and potential system architectures.

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