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Signal Processing for 5G Fa-Long Luo 2016-10-17 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).

Algorithms for Communications Systems and their Applications Nevio Benvenuto 2021-02-01 The definitive guide to problem-solving in the design of communications systems In Algorithms for Communications Systems and their Applications, 2nd Edition, authors Benvenuto, Cherubini, and Tomasin have delivered the ultimate and practical guide to applying algorithms in communications systems. Written for researchers and professionals in the areas of digital communications, signal processing, and computer engineering, Algorithms for Communications Systems presents algorithmic and computational procedures within communications systems that overcome a wide range of problems facing system designers. New material in this fully updated edition includes: MIMO systems (Space-time block coding/Spatial multiplexing /Beamforming and interference management/Channel Estimation) OFDM and SC-FDMA (Synchronization/Resource allocation (bit and power loading)/Filtered OFDM) Improved radio channel model (Doppler and shadowing/mmWave) Polar codes (including practical decoding methods) 5G systems (New Radio architecture/initial access for mmWave/physical channels) The book retains the essential coding and signal processing theoretical and operative elements expected from a classic text, further adopting the new radio of 5G systems as a case study to create the definitive guide to modern communications systems.

K-Best Decoders for 5G+ Wireless Communication Mehnaz Rahman 2016-08-31 This book discusses new, efficient and hardware realizable algorithms that can attain the performance of beyond 5G wireless communication. The authors explain topics gradually, stepping from basic MIMO detection to optimized schemes for both hard and soft domain MIMO detection and also to the feasible VLSI implementation, scalable to any MIMO configuration (including massive MIMO, used in satellite/space communication). The techniques described in this book enable readers to implement real designs, with reduced computational complexity and improved performance.

5G and Beyond Parag Chatterjee 2022-05-11 The Internet of Things (IoT) has seen the eventual shift to the "Internet of Everything" in the recent years, unveiling its ubiquitous presence spanning from smart transports to smart healthcare, from smart education to smart shopping. With the 5G rollouts across the different countries of the world, it raises newer perspectives toward the integration of 5G in IoT. For IoT-based smart devices, 5G not only means speed, but also better stability, efficiency, and more secure connectivity. The reach of 5G in IoT is extending in multifarious areas like self-driving vehicles, smart grids for renewable energy, AI-enabled robots on factory floors, intelligent healthcare services . . . The endless list is the real future of 5G in IoT. Features: Fundamental and applied perspectives to 5G integration in IoT Transdisciplinary vision with aspects of Artificial Intelligence, Industry 4.0, and hands-on practice tools Discussion of trending research issues in 5G and IoT As 5G technologies catalyze a paradigm shift in the domain of IoT, this book serves as a reference for the researchers in the field of IoT and 5G, proffering the landscape to the trending aspects as well as the key topics of discussion in the years to come.

Information Systems Design and Intelligent Applications Vikrant Bhateja 2018-03-01 The book is a collection of high-quality peer-reviewed research papers presented at International Conference on Information System Design and Intelligent Applications (INDIA 2017) held at Duy Tan University, Da Nang, Vietnam during 15-17 June 2017. The book covers a wide range of topics of computer science and information technology discipline ranging from image processing, database application, data mining, grid and cloud computing, bioinformatics and many others. The various intelligent tools like swarm intelligence, artificial intelligence, evolutionary

algorithms, bio-inspired algorithms have been well applied in different domains for solving various challenging problems.

A Comprehensive Guide to 5G Security Madhusanka Liyanage 2018-03-19 The first comprehensive guide to the design and implementation of security in 5G wireless networks and devices Security models for 3G and 4G networks based on Universal SIM cards worked very well. But they are not fully applicable to the unique security requirements of 5G networks. 5G will face additional challenges due to increased user privacy concerns, new trust and service models and requirements to support IoT and mission-critical applications. While multiple books already exist on 5G, this is the first to focus exclusively on security for the emerging 5G ecosystem. 5G networks are not only expected to be faster, but provide a backbone for many new services, such as IoT and the Industrial Internet. Those services will provide connectivity for everything from autonomous cars and UAVs to remote health monitoring through body-attached sensors, smart logistics through item tracking to remote diagnostics and preventive maintenance of equipment. Most services will be integrated with Cloud computing and novel concepts, such as mobile edge computing, which will require smooth and transparent communications between user devices, data centers and operator networks. Featuring contributions from an international team of experts at the forefront of 5G system design and security, this book: Provides priceless insights into the current and future threats to mobile networks and mechanisms to protect it Covers critical lifecycle functions and stages of 5G security and how to build an effective security architecture for 5G based mobile networks Addresses mobile network security based on network-centricity, device-centricity, information-centricity and people-centricity views Explores security considerations for all relative stakeholders of mobile networks, including mobile network operators, mobile network virtual operators, mobile users, wireless users, Internet-of things, and cybersecurity experts Providing a comprehensive guide to state-of-the-art in 5G security theory and practice, A Comprehensive Guide to 5G Security is an important working resource for researchers, engineers and business professionals working on 5G development and deployment.

Digital Signal Processing 101 Michael Parker 2010-05-26 Digital Signal Processing 101: Everything You Need to Know to Get Started provides a basic tutorial on digital signal processing (DSP). Beginning with discussions of numerical representation and complex numbers and exponentials, it goes on to explain difficult concepts such as sampling, aliasing, imaginary numbers, and frequency response. It does so using easy-to-understand examples and a minimum of mathematics. In addition, there is an overview of the DSP functions and implementation used in several DSP-intensive fields or applications, from error correction to CDMA mobile communication to airborne radar systems. This book is intended for those who have absolutely no previous experience with DSP, but are comfortable with high-school-level math skills. It is also for those who work in or provide components for industries that are made possible by DSP. Sample industries include wireless mobile phone and infrastructure equipment, broadcast and cable video, DSL modems, satellite communications, medical imaging, audio, radar, sonar, surveillance, and electrical motor control. Dismayed when presented with a mass of equations as an explanation of DSP? This is the book for you! Clear examples and a non-mathematical approach gets you up to speed with DSP Includes an overview of the DSP functions and implementation used in typical DSP-intensive applications, including error correction, CDMA mobile communication, and radar systems

Bandwidth Efficient Coding John B. Anderson 2017-03-03 This book addresses coding, a new solution to the major challenge of communicating more bits of information in the same radio spectrum. Explores concepts and new transmission methods that have arisen in the last 15 years Discusses the method of faster than Nyquist signaling Provides self-education resources by including design parameters and short MATLAB routines Bandwidth Efficient Coding takes a fresh look at classical information theory and introduces a different point of view for research and development engineers and graduate students in communication engineering and wireless communication.

Machine Learning and Intelligent Communications Xuemai Gu 2018-01-20 This two volume set constitutes the refereed post-conference proceedings of the Second International Conference on Machine Learning and Intelligent Communications, MLICOM 2017, held in Weihai, China, in August 2017. The 143 revised full papers were carefully selected from 225 submissions. The papers are organized thematically in machine learning, intelligent positioning and navigation, intelligent multimedia processing and security, intelligent wireless mobile network and security, cognitive radio and intelligent networking, intelligent internet of things, intelligent satellite communications and networking, intelligent remote sensing, visual computing and three-dimensional modeling, green communication and intelligent networking, intelligent ad-hoc and sensor networks, intelligent resource allocation in wireless and cloud networks, intelligent signal processing in wireless and optical communications, intelligent radar signal processing, intelligent cooperative communications and networking.

IoT as a Service Yi-Bing Lin 2018-10-17 This book constitutes the thoroughly refereed proceedings of the 3rd International Conference on IoT as a service, IoTaaS 2017, held in Taichung, Taiwan, in September 2017. The 46 full papers were carefully selected from 65 submissions. The papers deal with the "Everything as a Service" deployment paradigm which enables the easy adoption of IoT based services and applications by end-users, and forces providers of smart objects and middleware platforms to architect their solutions accordingly. The three special sessions organized were Wearable Technology and Applications (WTAA), Building Smart Machine Applications (BSMA), and Security and Privacy in Internet of Things, Services and People (SP-IoTSP). The WTAA special session aimed to address the challenges of maintaining high efficiency of WTAA in terms of high recognition rate, energy consumption, computational costs and so forth. The BSMA special session aimed to explore how to construct smart machines architecture for the industry under the background of IoT and big data. The SP-IoTSP special session aimed to investigate recent research and future directions for IoTSP security and privacy.

BROADBAND CONNECTIVITY IN 5G AND BEYOND 2022

Digital Communication for Practicing Engineers Feng Ouyang 2019-10-08 Offers concise, practical knowledge on modern communication systems to help students transition smoothly into the workplace and beyond This book presents the most relevant concepts and technologies of today's communication systems and presents them in a concise and intuitive manner. It covers advanced topics such as Orthogonal Frequency-Division Multiplexing (OFDM) and Multiple-Input Multiple-Output (MIMO) Technology, which are enabling technologies for modern communication systems such as WiFi (including the latest enhancements) and LTE-Advanced. Following a brief introduction to the field, Digital Communication for Practicing Engineers immerses readers in the theories and technologies that engineers deal with. It starts off with Shannon Theorem and Information Theory, before moving on to basic modules of a communication system, including modulation, statistical detection, channel coding, synchronization, and equalization. The next part of the book discusses advanced topics such as OFDM and MIMO, and introduces several emerging technologies in the context of 5G cellular system radio interface. The book closes by outlining several current research areas in digital communications. In addition, this text: Breaks down the subject into self-contained lectures, which can be read individually or as a whole Focuses on the pros and cons of widely used techniques, while providing references for detailed mathematical analysis Follows the current technology trends, including advanced topics such as OFDM and MIMO Touches on content this is not usually contained in textbooks such as cyclo-stationary symbol timing recovery, adaptive self-interference canceler, and Tomlinson-Harashima precoder Includes many illustrations, homework problems, and examples Digital Communication for Practicing Engineers is an ideal guide for graduate students and professionals in

digital communication looking to understand, work with, and adapt to the current and future technology.

Cyberspace Data and Intelligence, and Cyber-Living, Syndrome, and Health Huansheng Ning 2019-12-10 This two-volume set (CCIS 1137 and CCIS 1138) constitutes the proceedings of the Third International Conference on Cyberspace Data and Intelligence, Cyber DI 2019, and the International Conference on Cyber-Living, Cyber-Syndrome, and Cyber-Health, CyberLife 2019, held under the umbrella of the 2019 Cyberspace Congress, held in Beijing, China, in December 2019. The 64 full papers presented together with 18 short papers were carefully reviewed and selected from 160 submissions. The papers are grouped in the following topics: cyber data, information and knowledge; cyber and cyber-enabled intelligence; communication and computing; cyber philosophy, cyberlogic and cyber science; and cyber health and smart healthcare.

Handbook of Signal Processing Systems Shuvra S. Bhattacharyya 2018-10-13 In this new edition of the Handbook of Signal Processing Systems, many of the chapters from the previous editions have been updated, and several new chapters have been added. The new contributions include chapters on signal processing methods for light field displays, throughput analysis of dataflow graphs, modeling for reconfigurable signal processing systems, fast Fourier transform architectures, deep neural networks, programmable architectures for histogram of oriented gradients processing, high dynamic range video coding, system-on-chip architectures for data analytics, analysis of finite word-length effects in fixed-point systems, and models of architecture. There are more than 700 tables and illustrations; in this edition over 300 are in color. This new edition of the handbook is organized in three parts. Part I motivates representative applications that drive and apply state-of-the art methods for design and implementation of signal processing systems; Part II discusses architectures for implementing these applications; and Part III focuses on compilers, as well as models of computation and their associated design tools and methodologies.

Machine Learning for Future Wireless Communications Fa-Long Luo 2020-02-10 A comprehensive review to the theory, application and research of machine learning for future wireless communications In one single volume, Machine Learning for Future Wireless Communications provides a comprehensive and highly accessible treatment to the theory, applications and current research developments to the technology aspects related to machine learning for wireless communications and networks. The technology development of machine learning for wireless communications has grown explosively and is one of the biggest trends in related academic, research and industry communities. Deep neural networks-based machine learning technology is a promising tool to attack the big challenge in wireless communications and networks imposed by the increasing demands in terms of capacity, coverage, latency, efficiency flexibility, compatibility, quality of experience and silicon convergence. The author – a noted expert on the topic – covers a wide range of topics including system architecture and optimization, physical-layer and cross-layer processing, air interface and protocol design, beamforming and antenna configuration, network coding and slicing, cell acquisition and handover, scheduling and rate adaption, radio access control, smart proactive caching and adaptive resource allocations. Uniquely organized into three categories: Spectrum Intelligence, Transmission Intelligence and Network Intelligence, this important resource: Offers a comprehensive review of the theory, applications and current developments of machine learning for wireless communications and networks Covers a range of topics from architecture and optimization to adaptive resource allocations Reviews state-of-the-art machine learning based solutions for network coverage Includes an overview of the applications of machine learning algorithms in future wireless networks Explores flexible backhaul and front-haul, cross-layer optimization and coding, full-duplex radio, digital front-end (DFE) and radio-frequency (RF) processing Written for professional engineers, researchers, scientists, manufacturers, network operators, software developers and graduate students, Machine Learning for Future Wireless Communications presents in 21 chapters a comprehensive review of the topic authored by an expert in the field.

Advances of Science and Technology Mulugeta Admasu Delele 2021 This two-volume set constitutes the refereed post-conference proceedings of the 8th International Conference on Advancement of Science and Technology, ICAST 2020, which took place in Bahir Dar, Ethiopia, in October 2020.The 74 revised full papers were carefully reviewed and selected from more than 200 submissions of which 157 were sent out for peer review. The papers present economic and technologic developments in modern societies in 6 tracks: Chemical, food and bio-process engineering; Electrical and computer engineering; IT, computer science and software engineering; Civil, water resources, and environmental engineering; Mechanical and industrial engineering; Material science and engineering.

Innovations in Smart Cities Applications Edition 3 Mohamed Ben Ahmed 2020-02-04 This book highlights original research and recent advances in various fields related to smart cities and their applications. It gathers papers presented at the Fourth International Conference on Smart City Applications (SCA19), held on October 2–4, 2019, in Casablanca, Morocco. Bringing together contributions by prominent researchers from around the globe, the book offers an invaluable instructional and research tool for courses on computer science, electrical engineering, and urban sciences. It is also an excellent reference guide for professionals, researchers, and academics in the field of smart cities. This book covers topics including: • Smart Citizenship • Smart Education • Digital Business and Smart Governance • Smart Health Care • New Generation of Networks and Systems for Smart Cities • Smart Grids and Electrical Engineering • Smart Mobility • Smart Security • Sustainable Building • Sustainable Environment

Artificial Intelligence for Signal Processing and Wireless Communication Abhinav Sharma 2022-04-04 This book focuses on artificial intelligence in the field of digital signal processing and wireless communication. The implementation of machine learning and deep learning in audio, image, and video processing is presented, while adaptive signal processing and biomedical signal processing are also explored through DL algorithms, as well as 5G and green communication. Finally, metaheuristic algorithms of related mathematical problems are explored.

Radio Propagation Measurements and Channel Modeling Theodore S. Rappaport 2022-08-31 A complete guide for creating accurate channel-propagation measurements and channel models at millimeter-wave and sub-terahertz bands. Including examples, this book provides practical guidance on RF propagation channels, including measurement system verification and an overview of current and future channel models for these frequencies.

Public Safety Networks from LTE to 5G Abdulrahman Yarali 2020-02-03 This timely book provides an overview of technologies for Public Safety Networks (PSNs). Including real-life examples of network application and services, it introduces readers to the many public safety network technologies and covers the historical developments as well as emerging trends in PSNs such as today's 4G and tomorrow's 5G cellular network related solutions. em style="mso-bidi-font-style: normal;"Public Safety Networks from LTE to 5G explores the gradual changes and transformation in the PSNs from the traditional approaches in communications, and examines the new technologies that have permeated this realm, as well as their advantages. It gives readers a look at the challenges public safety networks face by developing solutions for data rates such as introducing broadband data services into safer communication. Topics covered include: TETRA and TETRAPOL; Digital Mobile Radio (DMR), Next-Generation Digital Narrowband (NXDN), Digital Private Mobile Radio (dPMR); and Professional Digital Trunking (PDT). The book also presents information on FirstNet, ESN, and Safenet; Satellite Communications in EMS (Emergency Management) and Public Protection and Disaster Relief (PPDR); Wi-Fi in Ambulances;

Technology in Patrol Communications; and more.

Smart Grids and Their Communication Systems Ersan Kabalci 2018-09-01 The book presents a broad overview of emerging smart grid technologies and communication systems, offering a helpful guide for future research in the field of electrical engineering and communication engineering. It explores recent advances in several computing technologies and their performance evaluation, and addresses a wide range of topics, such as the essentials of smart grids for fifth generation (5G) communication systems. It also elaborates the role of emerging communication systems such as 5G, internet of things (IoT), IEEE 802.15.4 and cognitive radio networks in smart grids. The book includes detailed surveys and case studies on current trends in smart grid systems and communications for smart metering and monitoring, smart grid energy storage systems, modulations and waveforms for 5G networks. As such, it will be of interest to practitioners and researchers in the field of smart grid and communication infrastructures alike.

Introduction to Wireless Digital Communication Robert W. Heath Jr. 2017-04-04 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 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.

Information Theoretic Perspectives on 5G Systems and Beyond Shlomo Shamai (Shitz) 2022-02-28 Understand key information-theoretic principles that underpin the design of next-generation cellular systems with this invaluable resource. This book is the perfect tool for researchers and graduate students in the field of information theory and wireless communications, as well as for practitioners in the telecommunications industry.

Scalable Signal Processing in Cloud Radio Access Networks Ying-Jun Angela Zhang 2019-04-23 This Springerbreif introduces a threshold-based channel sparsification approach, and then, the sparsity is exploited for scalable channel training. Last but not least, this brief introduces two scalable cooperative signal detection algorithms in C-RANs. The authors wish to spur new research activities in the following important question: how to leverage the revolutionary architecture of C-RAN to attain unprecedented system capacity at an affordable cost and complexity. Cloud radio access network (C-RAN) is a novel mobile network architecture that has a lot of significance in future wireless networks like 5G. the high density of remote radio heads in C-RANs leads to severe scalability issues in terms of computational and implementation complexities. This Springerbreif undertakes a comprehensive study on scalable signal processing for C-RANs, where 'scalable' means that the computational and implementation complexities do not grow rapidly with the network size. This Springerbreif will be target researchers and professionals working in the Cloud Radio Access Network (C-Ran) field, as well as advanced-level students studying electrical engineering.

Advances in Computing and Network Communications Sabu M. Thampi 2021-04-20 This book constitutes the thoroughly refereed post-conference proceedings of the 4th International Conference on Computing and Network Communications (CoCoNet'20), October 14–17, 2020, Chennai, India. The papers presented were carefully reviewed and selected from several initial submissions. The papers are organized in topical sections on Signal, Image and Speech Processing, Wireless and Mobile Communication, Internet of Things, Cloud and Edge Computing, Distributed Systems, Machine Intelligence, Data Analytics, Cybersecurity, Artificial Intelligence and Cognitive Computing and Circuits and Systems. The book is directed to the researchers and scientists engaged in various fields of computing and network communication domains.

Evolution in Signal Processing and Telecommunication Networks P. Satish Rama Chowdary 2022-03-23 This book discusses the latest developments and outlines future trends in the fields of microelectronics, electromagnetics and telecommunication. It contains original research works presented at the International Conference on Microelectronics, Electromagnetics and Telecommunication (ICMEET 2021), held in Bhubaneswar, Odisha, India during 27–28 August, 2021. The papers were written by scientists, research scholars and practitioners from leading universities, engineering colleges and R&D institutes from all over the world and share the latest breakthroughs in and promising solutions to the most important issues facing today's society.

Industrial Networks and Intelligent Systems Trung Q Duong 2019-01-17 This book constitutes the refereed proceedings of the 4th EAI International Conference on Industrial Networks and Intelligent Systems, INISCOM 2018, held in Da Nang, Vietnam, in August 2018. The 26 full papers were selected from 38 submissions and are organized thematically in tracks: Telecommunications Systems and Networks; Industrial Networks and Applications; Hardware and Software Design and Development; Information Processing and Data Analysis; Signal Processing; Security and Privacy.

FPGA-based Implementation of Signal Processing Systems Roger Woods 2017-05 Revised edition of: FPGA-based implementation of signal processing systems / Roger Woods ... [et al.]. 2008.

Full-Duplex Communications for Future Wireless Networks Hirley Alves 2020-04-21 This book focuses on the multidisciplinary state-of-the-art of full-duplex wireless communications and applications. Moreover, this book contributes with an overview of the fundamentals of full-duplex communications, and introduces the most recent advances in self-interference cancellation from antenna design to digital domain. Moreover, the reader will discover analytical and empirical models to deal with residual self-interference and to assess its effects in various scenarios and applications. Therefore, this is a highly informative and carefully presented book by the leading scientists in the area, providing a comprehensive overview of full-duplex technology from the perspective of various researchers, and

research groups worldwide. This book is designed for researchers and professionals working in wireless communications and engineers willing to understand the challenges and solutions full-duplex communication so to implement a full-duplex system.

Multiple Access Technologies for 5G Jie Zeng 2021-06-08 Starting with an overview of current research progresses on multiple access technology, the book then presents the theoretical fundamentals, technical principles, transmission scheme, key technologies and evaluation results of new multi-access technologies, especially focusing on its typical applications 5G communication systems. With extensive practical cases, it is an essential reference for researchers, engineers and graduate students.

5G System Design Patrick Marsch 2018-06-11 This book provides a comprehensive overview of the latest research and standardization progress towards the 5th generation (5G) of mobile communications technology and beyond. It covers a wide range of topics from 5G use cases and their requirements, to spectrum, 5G end-to-end (E2E) system architecture including core network (CN), transport network (TN) and radio access network (RAN) architecture, network slicing, security and network management. It further dives into the detailed functional design and the evaluation of different 5G concepts, and provides details on planned trials and pre-commercial deployments across the globe. While the book naturally captures the latest agreements in 3rd Generation Partnership Project (3GPP) New Radio (NR) Release 15, it goes significantly beyond this by describing the likely developments towards the final 5G system that will ultimately utilize a wide range of spectrum bands, address all envisioned 5G use cases, and meet or exceed the International Mobile Telecommunications (IMT) requirements for the year 2020 and beyond (IMT-2020). em style="mso-bidi-font-style: normal;"5G System Design: Architectural and Functional Considerations and Long Term Research is based on the knowledge and consensus from 158 leading researchers and standardization experts from 54 companies or institutes around the globe, representing key mobile network operators, network vendors, academic institutions and regional bodies for 5G. Different from earlier books on 5G, it does not focus on single 5G technology components, but describes the full 5G system design from E2E architecture to detailed functional design, including details on 5G performance, implementation and roll-out.

Wireless Internet Of Things: Principles And Practice Gyasi-agyei Amoakoh 2020-04-22

Internet of Things, Smart Spaces, and Next Generation Networks and Systems Olga Galinina 2019-09-11 This book constitutes the joint refereed proceedings of the 19th International Conference on Next Generation Teletraffic and Wired/Wireless Advanced Networks and Systems, NEW2AN 2019, and the 12th Conference on Internet of Things and Smart Spaces, ruSMART 2019. The 66 revised full papers presented were carefully reviewed and selected from 192 submissions. The papers of NEW2AN address various aspects of next-generation data networks, with special attention to advanced wireless networking and applications. In particular, they deal with novel and innovative approaches to performance and efficiency analysis of 5G and beyond systems, employed game-theoretical formulations, advanced queuing theory, and stochastic geometry, while also covering the Internet of Things, cyber security, optics, signal processing, as well as business aspects.ruSMART 2019, provides a forum for academic and industrial researchers to discuss new ideas and trends in the emerging areas. The 12th conference on the Internet of Things and Smart Spaces, ruSMART 2019, provides a forum for academic and industrial researchers to discuss new ideas and trends in the emerging areas.

5G NR Sassan Ahmadi 2019-06-15 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

Communications and Networking Honghao Gao 2020-02-26 This two volume set constitutes the refereed proceedings of the 14th EAI International Conference on Communications and Networking, ChinaCom 2019, held in November/December 2019 in Shanghai, China. The 81 papers presented were carefully selected from 162 submissions. The papers are organized in topical sections on Internet of Things (IoT), antenna, microwave and cellular communication, wireless communications and networking, network and information security, communication QoS, reliability and modeling, pattern recognition and image signal processing, and information processing.

Key Technologies for 5G Wireless Systems Vincent W. S. Wong 2017-03-02 Get up to speed with the protocols, network architectures and techniques for 5G wireless networks with this comprehensive guide.

Green, Energy-Efficient and Sustainable Networks Josip Lorincz 2020-01-21 The book Green, Energy-Efficient and Sustainable Networks provides insights and solutions for a range of problems in the field of obtaining greener, energy-efficient, and sustainable networks. The book contains the outcomes of the Special Issue on "Green, Energy-Efficient and Sustainable Networks" of the Sensors journal. Seventeen high-quality papers published in the Special Issue have been collected and reproduced in this book, demonstrating significant achievements in the field. Among the published papers, one paper is an editorial and one is a review, while the remaining 15 works are research articles. The published papers are self-contained peer-reviewed scientific works that are authored by more than 75 different contributors with both academic and industry backgrounds. The editorial paper gives an introduction to the problem of information and communication technology (ICT) energy consumption and greenhouse gas emissions, presenting the state of the art and future trends in terms of improving the energy-efficiency of wireless networks and data centers, as the major energy consumers in the ICT sector. In addition, the published articles aim to improve energy efficiency in the fields of software-defined networking, Internet of things, machine learning, authentication, energy harvesting, wireless relay systems, routing metrics, wireless sensor networks, device-to-device communications, heterogeneous wireless networks, and image sensing. The last paper is a review that gives a detailed overview of energy-efficiency improvements and methods for the implementation of fifth-generation networks and beyond. This book can serve as a source of information in industrial, teaching, and/or research and development activities. The book is a valuable source of information, since it presents recent advances in different fields related to greening and improving the energy-efficiency and sustainability of those ICTs particularly addressed in this book

Signal Processing Aspects of Cell-Free Massive MIMO Giovanni Interdonato 2019-03-20 The fifth generation of mobile communication systems (5G) promises unprecedented levels of connectivity and quality of service (QoS) to satisfy the incessant growth in the number

of mobile smart devices and the huge increase in data demand. One of the primary ways 5G network technology will be accomplished is through network densification, namely increasing the number of antennas per site and deploying smaller and smaller cells. Massive MIMO, where MIMO stands for multiple-input multiple-output, is widely expected to be a key enabler of 5G. This technology leverages an aggressive spatial multiplexing, from using a large number of transmitting/receiving antennas, to multiply the capacity of a wireless channel. A massive MIMO base station (BS) is equipped with a large number of antennas, much larger than the number of active users. The users are coherently served by all the antennas, in the same time-frequency resources but separated in the spatial domain by receiving very directive signals. By supporting such a highly spatially-focused transmission (precoding), massive MIMO provides higher spectral and energy efficiency, and reduces the inter-cell interference compared to existing mobile systems. The inter-cell interference is however becoming the major bottleneck as we densify the networks. It cannot be removed as long as we rely on a network-centric implementation, since the inter-cell interference concept is inherent to the cellular paradigm. Cell-free massive MIMO refers to a massive MIMO system where the BS antennas, herein referred to as access points (APs), are geographically spread out. The APs are connected, through a fronthaul network, to a central processing unit (CPU) which is responsible for coordinating the coherent joint transmission. Such a distributed architecture provides additional macro-diversity, and the co-processing at multiple APs entirely suppresses the inter-cell interference. Each user is surrounded by serving APs and experiences no cell boundaries. This user-centric approach, combined with the system scalability that characterizes the massive MIMO design, constitutes a paradigm shift compared to the conventional centralized and distributed wireless communication systems. On the other hand, such a distributed system requires higher capacity of back/front-haul connections, and the signal co-processing increases the signaling overhead. In this thesis, we focus on some signal processing aspects of cell-free massive MIMO. More specifically, we firstly investigate if the downlink channel estimation, via downlink pilots, brings gains to cell-free massive MIMO or the statistical channel state information (CSI) knowledge at the users is enough to reliably perform data decoding, as in conventional co-located massive MIMO. Allocating downlink pilots is costly resource-wise, thus we also propose resource saving-oriented strategies for downlink pilot assignment. Secondly, we study further fully distributed and scalable precoding schemes in order to outperform cell-free massive MIMO in its canonical form, which consists in single-antenna APs implementing conjugate beamforming (also known as maximum ratio transmission).

Multiplexing Somayeh Mohammady 2019-09-04 Mobile communication has been a critical part of everyday life for the last 30 years. As the demand for wireless communications and higher data rates on these links continues its rapid growth, engineers, scientists, and researchers are required to advance the hardware and software needed to deliver systems for 5G, Massive multiple-input, multiple-output (MIMO), and optical backhaul networks. Now, more than ever before, the fundamental concept of multiplexing is at play. This book is a unique reference for understanding the concept of multiplexing. It provides comprehensive coverage of the practical applications of multiplexing to help the reader better understand its use in these systems. It is a great resource, especially for engineers working on digital signal processing, radio frequency (RF), antenna design, beamforming, and network designs. The book contains chapters on the following topics: • History of multiplexing and how it applies to current technologies; • Different types and applications of multiplexing; • Multiplexing techniques in wireless networks; • Multiple-Input, Multiple-Output Orthogonal Frequency-Division Multiplexing (MIMO-OFD); • Direct-Sequence Optical-Code Division Multiple-Access (DS-OCDMA); • Optically multiplexed systems

Applied Reconfigurable Computing. Architectures, Tools, and Applications Nikolaos Voros 2018-04-25 This book constitutes the proceedings of the 14th International Conference on Applied Reconfigurable Computing, ARC 2018, held in Santorini, Greece, in May 2018. The 29 full papers and 22 short presented in this volume were carefully reviewed and selected from 78 submissions. In addition, the volume contains 9 contributions from research projects. The papers were organized in topical sections named: machine learning and neural networks; FPGA-based design and CGRA optimizations; applications and surveys; fault-tolerance, security and communication architectures; reconfigurable and adaptive architectures; design methods and fast prototyping; FPGA-based design and applications; and special session: research projects.