Cognitive Radio Communications And Networks Principles And Practice

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Sensing Techniques for Next Generation Cognitive Radio Networks - Bagwari, Ashish 2018-08-30
The inadequate use of wireless spectrum resources has recently motivated researchers and practitioners to look for new ways to improve resource efficiency. As a result, new cognitive radio technologies have been proposed as an effective solution. Sensing Techniques for Next Generation Cognitive Radio Networks is a pivotal reference source that provides vital research on the application of spectrum sensing techniques. While highlighting topics such as radio identification, compressive sensing, and wavelet transform, this publication explores the standards and the methods of cognitive radio network architecture. This book is ideally designed for IT and network engineers, practitioners, and researchers seeking current research on radio scene analysis for cognitive radios and networks.
LTE Communications and Networks - Masood Ur Rehman 2018-04-18
A comprehensive resource to the latest developments of system enhancement techniques of Femtocells, power management, interference mitigation and antenna design LTE Communications and Networks fills a gap in the literature to offer a comprehensive review of the most current developments of LTE Femtocells and antennas and explores their future growth. With contributions from a group of experts that represent the fields of wireless communications and mobile communications, signal processing and antenna design, this text identifies technical challenges and presents recent results related to the development, integration and enhancement of LTE systems in portable devices. The authors examine topics such as application of cognitive radio with efficient sensing mechanisms, interference mitigation and power management schemes for the LTE systems. They also provide a comprehensive account of design challenges and approaches, performance enhancement techniques and effects of user’s presence on the LTE antennas. LTE Communications and Networks also highlights the promising technologies of multiband, multimode and reconfigurable antennas for efficient design of portable LTE devices. Designed to be a practical resource, this text: Explores the interference mitigation, power control and spectrum management in LTE Femtocells and related issues Contains information on the design challenges, different approaches, performance enhancement and application case scenarios for the LTE antennas Covers the most recent developments of system enhancement

techniques in terms of Femtocells, power management, interference mitigation and antenna design Includes contributions from leading experts in the field Written for industry professionals and researchers, LTE Communications and Networks is a groundbreaking book that presents a comprehensive treatment to the LTE systems in the context of Femtocells and antenna design and covers the wide range of issues related to the topic.

Cognitive Radio in 4G/5G Wireless Communication Systems - Shahriar Shirvani Moghaddam 2018-12-05

The limitation of the radio spectrum and the rapid growth of communication applications make optimal usage of radio resources essential. Cognitive radio (CR) is an attractive research area for 4G/5G wireless communication systems, which enables unlicensed users to access the spectrum. Delivering higher spectral efficiency, supporting the higher number of users, and achieving higher coverage and throughput are the main advantages of CR-based networks compared to conventional ones. The main goal of this book is to provide highlights of current research topics in the field of CR-based systems. The book consists of six chapters in three sections focusing on primary and secondary users, spectrum sensing, spectrum sharing, CR-based IoT, emulation attack, and interference alignment.

Scalability, Density, and Decision Making in Cognitive Wireless Networks - Preston Marshall 2012-11-08

"This cohesive treatment of cognitive radio and networking technology integrates information and decision theory to provide insight into relationships throughout all layers of networks and across all wireless applications. It encompasses conventional considerations of spectrum and waveform selection, and covers topology determination, routing policies, content positioning, and future hybrid architectures that fully integrate wireless and wired services. Features specific examples of decision-making structures and criteria required to extend network density and scaling to unprecedented levels. - Integrates sensing, control plane and content operations into a single cohesive structure - Provides simpler and more powerful models of network operation - Presents a unique approach to decision-making and mechanisms to adjust control plane activity to ensure network scaling. - Generalises the concepts of shared and adaptive spectrum policies - Addresses network transport operations and dynamic management of cognitive wireless networks' own information seeking behaviour"--

Digital Front-End in Wireless Communications and Broadcasting - Fa-Long Luo 2011-09-29

Covering everything from signal processing algorithms to integrated circuit design, this complete guide to digital front-end is invaluable for professional engineers and researchers in the fields of signal processing, wireless communication and circuit design. Showing how theory is translated into practical technology, it covers all the relevant standards and gives readers the ideal design methodology to manage a rapidly increasing range of applications. Step-by-step information for designing practical systems is provided, with a systematic presentation of theory, principles, algorithms, standards and implementation. Design trade-offs are also included, as are practical implementation examples from real-world systems. A broad range of topics is covered, including digital pre-distortion (DPD), digital up-conversion (DUC), digital down-conversion (DDC) and DC-offset calibration. Other important areas discussed are peak-to-average power ratio (PAPR) reduction, crest factor reduction (CFR), pulse-shaping, image rejection, digital mixing, delay/gain/imbalance compensation, error correction, noise-shaping, numerical controlled oscillator (NCO) and various diversity methods.

Handbook of Cognitive Radio - Wei Zhang 2019-05-11

This major reference work provides the most up-to-date research advances and theories in cognitive radio technology, from cognitive radio principles and theory to cognitive radio standards and systems, from fundamental limits of cognitive radio channels to cognitive radio networks, from the current cognitive radio practices and examples to future 5G cognitive cellular networks. This handbook will include some emerging applications of cognitive radio in areas such as smart grid, internet-of-things, big data, small cell/heterogeneous networks, and in 5G. The potential readers include postgraduate students, academic staff,

telecommunications engineering, spectrum policy makers, and industry entrepreneurs.

Cognitive Radio Networks - Kwang-Cheng Chen 2009-03-30

Giving a basic overview of the technologies supporting cognitive radio this introductory-level text follows a logical approach, starting with the physical layer and concluding with applications and general issues. It provides a background to advances in the field of cognitive radios and a new exploration of how these radios can work together as a network. Cognitive Radio Networks starts with an introduction to the fundamentals of wireless communications, introducing technologies such as OFDM & MIMO. It moves onto cover software defined radio and explores and contrasts wireless, cooperative and cognitive networks and communications. Spectrum sensing, medium access control and network layer design are examined before the book concludes by covering the topics of trusted cognitive radio networks and spectrum management. Unique in providing a brief but clear tutorial and reference to cognitive radio networks this book is a single reference, written at the appropriate level for newcomers as well as providing an encompassing text for those with more knowledge of the subject. One of the first books to provide a systematic description of cognitive radio networks Provides pervasive background knowledge including both wireless communications and wireless networks Written by leading experts in the field Full network stack investigation

Handbook of Research on Software-Defined and Cognitive Radio Technologies for Dynamic Spectrum Management - Kaabouch, Naima 2014-10-31

The inadequate use of wireless spectrum resources has recently motivated researchers and practitioners to look for new ways to improve resource efficiency. As a result, new cognitive radio technologies have been proposed as an effective solution. The Handbook of Research on Software-Defined and Cognitive Radio Technologies for Dynamic Spectrum Management examines the emerging technologies being used to overcome radio spectrum scarcity. Providing timely and comprehensive coverage on topics pertaining to channel estimation, spectrum sensing, communication security, frequency hopping, and smart antennas, this research work is essential for use by educators, industrialists, and graduate students, as well as academicians researching in the field.

Radio Resource Allocation and Dynamic Spectrum Access - Badr Benmammar 2013-02-05

We are currently witnessing an increase in telecommunicationsnorms and standards given the recent advances in this field. Theincreasing number of normalized standards paves the way for anincrease in the range of services available for each consumer.Moreover, the majority of available radio frequencies have alreadybeen allocated. This explains the emergence of cognitive radio (CR)– the sharing of the spectrum between a primary user and asecondary user. In this book, we will present the state of the artof the different techniques for spectrum access using cooperationand competition to solve the problem of spectrum allocation andensure better management of radio resources in a radio cognitivecontext. The different aspects of research explored up until now onthe applications of multi-agent systems (MAS) in the field ofcognitive radio are analyzed in this book. The first chapter beginswith an insight into wireless networks and mobiles, with specialfocus on the IEEE 802.22 norm, which is a norm dedicated to CR.Chapter 2 goes into detail about CR, which is a technical field atthe boundary between telecommunications and Artificial Intelligence(AI). In Chapter 3, the concept of the “agent” from AIis expanded to MAS and associated applications. Finally, Chapter 4establishes an overview of the use of AI techniques, in particularMAS, for its allocation of radio resources and dynamic access tothe spectrum in CR. Contents 1. Wireless and Mobile Networks. 2. Cognitive Radio. 3. Multi-agent Systems. 4. Dynamic Spectrum Access. About the Authors Badr Benmammar has been Associate Professor at UABT (UniversityAbou Bekr Belkaïd Tlemcen), Algeria since 2010 and was aresearch fellow at CNRS LaBRI Laboratory of the University ofBordeaux 1 until 2007. He is currently carrying out research at theLaboratory of Telecommunications of Tlemcen (LTT), UABT, Algeria.His main research activities concern the cognitive radio

network,Quality of Service on mobile and wireless networks, end-to-endsignaling protocols and agent technology. His work on Quality ofService has led to many publications in journals and conferenceproceedings. Asma Amraoui is currently a PhD candidate; she is preparing adoctoral thesis on a topic of research that explores the use ofartificial intelligence techniques in cognitive radio networks. Sheis attached to the Laboratory of Telecommunications of Tlemcen(LTT) in Algeria.

Spectrum Sharing - Constantinos B. Papadias 2020-06-02

Combines the latest trends in spectrum sharing, both from a research and a standards/regulation/experimental standpoint Written by noted professionals from academia, industry, and research labs, this unique book provides a comprehensive treatment of the principles and architectures for spectrum sharing in order to help with the existing and future spectrum crunch issues. It presents readers with the most current standardization trends, including CEPT / CEE, eLSA, CBRS, MulteFire, LTE-Unlicensed (LTE-U), LTE WLAN integration with Internet Protocol security tunnel (LWIP), and LTE/Wi-Fi aggregation (LWA), and offers substantial trials and experimental results, as well as system-level performance evaluation results. The book also includes a chapter focusing on spectrum policy reinforcement and another on the economics of spectrum sharing. Beginning with the historic form of cognitive radio, Spectrum Sharing: The Next Frontier in Wireless Networks continues with current standardized forms of spectrum sharing, and reviews all of the technical ingredients that may arise in spectrum sharing approaches. It also looks at policy and implementation aspects and ponders the future of the field. White spaces and data base-assisted spectrum sharing are discussed, as well as the licensed shared access approach and cooperative communication techniques. The book also covers reciprocity-based beam forming techniques for spectrum sharing in MIMO networks; resource allocation for shared spectrum networks; large scale wireless spectrum monitoring; and much more. Contains all the latest standardization trends, such as CEPT / ECC, eLSA, CBRS, MulteFire, LTE-Unlicensed (LTE-U), LTE WLAN integration with Internet Protocol security tunnel (LWIP) and LTE/Wi-Fi aggregation (LWA) Presents a number of emerging technologies for future spectrum sharing (collaborative sensing, cooperative communication, reciprocity-based beamforming, etc.), as well as novel spectrum sharing paradigms (e.g. in full duplex and radar systems) Includes substantial trials and experimental results, as well as system-level performance evaluation results Contains a dedicated chapter on spectrum policy reinforcement and one on the economics of spectrum sharing Edited by experts in the field, and featuring contributions by respected professionals in the field world wide Spectrum Sharing: The Next Frontier in Wireless Networks is highly recommended for graduate students and researchers working in the areas of wireless communications and signal processing engineering. It would also benefit radio communications engineers and practitioners.

Cognitive Radio Communications and Networks - Alexander M. Wyglinski 2009-11-13

Cognitive Radio Communications and Networks gives comprehensive and balanced coverage of the principles of cognitive radio communications, cognitive networks, and details of their implementation, including the latest developments in the standards and spectrum policy. Case studies, end-of-chapter questions, and descriptions of various platforms and test beds, together with sample code, give hands-on knowledge of how cognitive radio systems can be implemented in practice. Extensive treatment is given to several standards, including IEEE 802.22 for TV White Spaces and IEEE SCC41 Written by leading people in the field, both at universities and major industrial research laboratories, this tutorial text gives communications engineers, R&D engineers, researchers, undergraduate and post graduate students a complete reference on the application of wireless communications and network theory for the design and implementation of cognitive radio systems and networks Each chapter is written by internationally renowned experts, giving complete and balanced treatment of the fundamentals of both cognitive radio communications and cognitive networks, together with implementation details Extensive treatment of the latest standards and spectrum policy developments enables the development of compliant

cognitive systems Strong practical orientation – through case studies and descriptions of cognitive radio platforms and testbeds – shows how real world cognitive radio systems and network architectures have been built Alexander M. Wyglinski is an Assistant Professor of Electrical and Computer Engineering at Worcester Polytechnic Institute (WPI), Director of the WPI Limerick Project Center, and Director of the Wireless Innovation Laboratory (WI Lab) Each chapter is written by internationally renowned experts, giving complete and balanced treatment of the fundamentals of both cognitive radio communications and cognitive networks, together with implementation details Extensive treatment of the latest standards and spectrum policy developments enables the development of compliant cognitive systems Strong practical orientation – through case studies and descriptions of cognitive radio platforms and testbeds – shows how "real world" cognitive radio systems and network architectures have been built

Cognitive Radio Networks - Chee Wei Tan 2018

Cognitive Vehicular Networks - Anna Maria Vegni 2016-02-22

A comprehensive text on both current and emerging areas of cognitive vehicular networks, this book focuses on a new class of mobile ad hoc networks. It uses a pedagogical approach utilizing cognitive aspects applied to vehicular environments and comprises contributions from well-known and high profile researchers in their respective specialties. The book provides significant technical and practical insights on different perspectives, starting from a basic background on cognitive radio, interrelated technologies, application to vehicular networks, technical challenges, and future trends.

Cognitive Radio Networks - Yang Xiao 2008-12-24

Fueled by ongoing and increasing consumer demand, the explosive growth in spectrum-based communications continues to tax the finite resources of the available spectrum. One possible solution, Cognitive Radio Network (CRN), allows unlicensed users opportunistic access to licensed bands without interfering with existing users. Although some initial study has been conducted in this field, researchers need a systematic reference book that presents clear definitions, functions, and current challenges of the CRNs. Cognitive Radio Networks presents state-of-the-art approaches and novel technologies for cognitive wireless radio networks and sheds light on future developments in these areas. Comprising the contributions of many prominent world-wide cognitive radio researchers, this book covers all CRN essentials including spectrum sensing, spectrum handoff, spectrum sharing, and CRN routing schemes. Divided into five parts, the book addresses the physical layer, medium access control, the routing layer, cross-layer considerations and advanced topics in cognitive radio networks. The chapters also review research, management, support, and cognitive techniques such as position and network awareness, infrastructure and physical and link layer concerns. The editors of this volume are noted experts in the field of wireless networks and security. Dr. Yang Xiao’s research has been supported by the U.S. National Science Foundation (NSF), U.S. Army Research, Fleet & Industrial Supply Center San Diego (FISCSD), and the University of Alabama’s Research Grants Committee. Dr. Fei Hu has worked with NSF, Cisco, Lockheed Martin, Sprint, and other organizations. By bringing together the combined input of international experts, these editors have advanced the field of this nascent technology and helped to forge new paths of discovery for progressive communications possibilities.

Intelligent Network Management and Control - Badr Benmammar 2021-05-11

The management and control of networks can no longer be envisaged without the introduction of artificial intelligence at all stages. Intelligent Network Management and Control deals with topical issues related mainly to intelligent security of computer networks, deployment of security services in SDN (software-defined networking), optimization of networks using artificial intelligence techniques and multi-criteria optimization methods for selecting networks in a heterogeneous environment. This book also focuses on selecting cloud computing services, intelligent unloading of calculations in the context of mobile cloud computing, intelligent resource management in a smart grid-cloud

system for better energy efficiency, new architectures for the Internet of Vehicles (IoV), the application of artificial intelligence in cognitive radio networks and intelligent radio input to meet the on-road communication needs of autonomous vehicles.

Cognitive Radio Architecture - Joseph Mitola, III 2006-09-14

An exciting new technology, described by the one who invented it This is the first book dedicated to cognitive radio, a promising new technology that is poised to revolutionize the telecommunications industry with increased wireless flexibility. Cognitive radio technology integrates computational intelligence into software-defined radio for embedded intelligent agents that adapt to RF environments and user needs. Using this technology, users can more fully exploit the radio spectrum and services available from wireless connectivity. For example, an attempt to send a 10MB e-mail in a zone where carrier charges are high might cause a cognitive radio to alert its user and suggest waiting until getting to the office to use the LAN instead. Cognitive Radio Architecture examines an "ideal cognitive radio" that features autonomous machine learning, computer vision, and spoken or written language perception. The author of this exciting new book is the inventor of the technology and a leader in the field. Following his step-by-step introduction, readers can start building aware/adaptive radios and then make steps towards cognitive radio. After an introduction to adaptive, aware, and cognitive radio, the author develops three major themes in three sections: Foundations Radio Competence User Domain Competence The book makes the design principles of cognitive radio more accessible to students of teleinformatics, as well as to wireless communications systems developers. It therefore embraces the practice of cognitive radio as well as the theory. In particular, the publication develops a cognitive architecture that integrates disparate disciplines, including autonomous machine learning, computer vision, and language perception technologies. An accompanying CD-ROM contains the Java source code and compiled class files for applications developed in the book. In addition, for the convenience of the reader, Web resources introducing key concepts such as speech applications programmer interfaces (APIs) are included. Although still five to ten years away from full deployment, telecommunications giants and research labs around the world are already dedicating R&D to this new technology. Telecommunications engineers as well as advanced undergraduate and graduate students can learn the promising possibilities of this innovative technology from the one who invented it. Note: CD-ROM/DVD and other supplementary materials are not included as part of eBook file.

Cognitive Radio Policy and Regulation - Arturas Medeisis 2014-02-12

This book offers a timely reflection on how the proliferation of advanced wireless communications technologies, particularly cognitive radio (CR) can be enabled by thoroughly-considered policy and appropriate regulation. It looks at the prospects of CR from the divergent standpoints of technological development and economic market reality. The book provides a broad survey of various techno-economic and policy aspects of CR development and provides the reader with an understanding of the complexities involved as well as a toolbox of possible solutions to enable the evolutionary leap towards successful implementation of disruptive CR technology or indeed any other novel wireless technologies. Cognitive Radio Policy and Regulation showcases the original ideas and concepts introduced into the field of CR and dynamic spectrum access policy over nearly four years of work within COST Action IC0905 TERRA, a think-tank with participants from more than 20 countries. The book’s subject matter includes: • deployment scenarios for CR; • technical approaches for improved spectrum sharing; • economic aspects of CR policy and regulation; • impact assessment of cognitive and software-defined radio; and • novel approaches to spectrum policy and regulation for the age of CR. The book will interest researchers in the field of wireless communications, especially those working with standardization and policy issues, as well as industry and regulatory professionals concerned with radio spectrum management and the general development of wireless communications. Considerable complementary reference material such as power point slides and technical reports that illustrates and expands on the contents of the book is provided on the companion website to the book, found at http://www.cost-terra.org/CR-policy-book

Cognitive Radio Communication and Networking - Robert Caiming Qiu 2012-09-10

The author presents a unified treatment of this highly interdisciplinary topic to help define the notion of cognitive radio. The book begins with addressing issues such as the fundamental system concept and basic mathematical tools such as spectrum sensing and machine learning, before moving on to more advanced concepts and discussions about the future of cognitive radio. From the fundamentals in spectrum sensing to the applications of cognitive algorithms to radio communications, and discussion of radio platforms and testbeds to show the applicability of the theory to practice, the author aims to provide an introduction to a fast moving topic for students and researchers seeking to develop a thorough understanding of cognitive radio networks. Examines basic mathematical tools before moving on to more advanced concepts and discussions about the future of cognitive radio Describe the fundamentals of cognitive radio, providing a step by step treatment of the topics to enable progressive learning Includes questions, exercises and suggestions for extra reading at the end of each chapter Topics covered in the book include: Spectrum Sensing: Basic Techniques; Cooperative Spectrum Sensing Wideband Spectrum Sensing; Agile Transmission Techniques: Orthogonal Frequency Division Multiplexing Multiple Input Multiple Output for Cognitive Radio; Convex Optimization for Cognitive Radio; Cognitive Core (I): Algorithms for Reasoning and Learning; Cognitive Core (II): Game Theory; Cognitive Radio Network IEEE 802.22: The First Cognitive Radio Wireless Regional Area Network Standard, and Radio Platforms and Testbeds.

Cognitive Radio Technology - Bruce A. Fette 2009-04-28

This book gives a thorough knowledge of cognitive radio concepts, principles, standards, spectrum policy issues and product implementation details. In addition to 16 chapters covering all the basics of cognitive radio, this new edition has eight brand-new chapters covering cognitive radio in multiple antenna systems, policy language and policy engine, spectrum sensing, rendezvous techniques, spectrum consumption models, protocols for adaptation, cognitive networking, and information on the latest standards, making it an indispensable resource for the RF and wireless engineer. The new edition of this cutting edge reference, which gives a thorough knowledge of principles, implementation details, standards, policy issues in one volume, enables the RF and wireless engineer to master and apply today’s cognitive radio technologies. Bruce Fette, PhD, is Chief Scientist in the Communications Networking Division of General Dynamics C4 Systems in Scottsdale, AZ. He worked with the Software Defined Radio (SDR) Forum from its inception, currently performing the role of Technical Chair, and is a panelist for the IEEE Conference on Acoustics Speech and Signal Processing Industrial Technology Track. He currently heads the General Dynamics Signal Processing Center of Excellence in the Communication Networks Division. Dr. Fette has 36 patents and has been awarded the "Distinguished Innovator Award". * Foreword and a chapter contribution by Joe Mitola, the creator of the field * Discussion of cognitive aids to the user, spectrum owner, network operator * Explanation of capabilities such as time – position awareness, speech and language awareness, multi-objective radio and network optimization, and supporting database infrastructure * Detailed information on product implementation to aid product developers * Thorough descriptions of each cognitive radio component technology provided by leaders of their respective fields, and the latest in high performance analysis – implementation techniques * Explanations of the complex architecture and terminology of the current standards activities * Discussions of market opportunities created by cognitive radio technology

Cognitive Radio Sensor Networks: Applications, Architectures, and Challenges - Rehmani, Mubashir Husain 2014-06-30

"This book examines how wireless sensor nodes with cognitive radio capabilities can address these network challenges and improve the spectrum utilization, presenting a broader picture on the applications, architecture, challenges, and open research directions in the area of WSN research"--Provided by publisher.

Cognitive Radio Oriented Wireless Networks - Mark Weichold 2015-10-12

This book constitutes the thoroughly refereed post-conference proceedings of the 10th International Conference on Cognitive Radio Oriented Wireless Networks, CROWNCOM 2015, held in Doha, Qatar, in April 2015. The 66 revised full papers presented were carefully reviewed and selected from 110 submissions and cover the evolution of cognitive radio technology pertaining to 5G networks. The papers are clustered to topics on dynamic spectrum access/management, networking protocols for CR, modeling and theory, HW architecture and implementations, next generation of cognitive networks, standards and business models, and emerging applications for cognitive networks.

Underwater Communications and Networks - Yi Lou 2021-11-15

This textbook covers all related communication technologies of underwater wireless communication, such as acoustic communication, optical communication, and magneto-inductive communication. After describing each technology, the authors relay their pros and cons, as it is essential to learn the underlying mechanism, advancements, and limitations of these techniques. Therefore, this book provides basics fundamentals of the three technologies, their advantages and disadvantages, and their applications. The authors also introduce research trends, pointing readers in the direction of research in the field of underwater wireless communication. The book is an essential textbook for undergraduate and graduate students in the field of underwater communications. The book is also useful as a reference to undergraduate engineering students, science students, and practicing engineers. The book includes end-of-chapter questions and numerical problems.

Principles of Cognitive Radio - Ezio Biglieri 2013

Expert authors draw on fundamental theory to explain the core principles and key design considerations for developing cognitive radio systems.

Introduction to Cognitive Radio Networks and Applications - Geetam Tomar 2016-10-03

Cognitive radio is 5-G technology, comes under IEEE 802.22 WRAN (Wireless Regional Area Network) standards. It is currently experiencing rapid growth due to its potential to solve many of the problems affecting present-day wireless systems. The foremost objective of "Introduction to Cognitive Radio Networks and Applications" is to educate wireless communication generalists about cognitive radio communication networks. Written by international leading experts in the field, this book caters to the needs of researchers in the field who require a basis in the principles and the challenges of cognitive radio networks.

Advanced Wireless Sensing Techniques for 5G Networks - Ashish Bagwari 2018-09-21

This book written for students of electronics and communication, students of computer science and communications engineers addresses topics such as Introduction of CRN, Advanced spectrum sensing techniques, Cooperative sensing techniques, Distributed sensing techniques, Issues in advanced sensing techniques, and Applications of 5G Networks. It provides new algorithms, explores recent results, and evaluates the performance of technologies in use in this area. It also provides new research topics and sensing techniques related to 5G networks for researchers.

Cognitive Radio Techniques - Kandeepan Sithamparanathan 2012

Providing an in-depth treatment of the core enablers of cognitive radio technology, this unique book places emphasis on critical areas that have not been sufficiently covered in existing literature. You find expert guidance in the key enablers with respect to communications and signal processing. The book presents fundamentals, basic solutions, detailed discussions of important enabler issues, and advanced algorithms to save you time with your projects in the field. For the first time in any book, you find an adequately detailed treatment of spectrum sensing that covers nearly every aspect of the subject. Moreover, this valuable resource provides you with thorough working knowledge of localization and interference mitigation as enablers of cognitive radio technology. The book includes all the necessary mathematics, statistical and probabilistic treatments, and performance analysis to give you a comprehensive understanding of the material.

Cognitive Networks - Qusay Mahmoud 2007-09-11

Cognitive networks can dynamically adapt their operational parameters

in response to user needs or changing environmental conditions. They can learn from these adaptations and exploit knowledge to make future decisions. Cognitive networks are the future, and they are needed simply because they enable users to focus on things other than configuring and managing networks. Without cognitive networks, the pervasive computing vision calls for every consumer to be a network technician. The applications of cognitive networks enable the vision of pervasive computing, seamless mobility, ad-hoc networks, and dynamic spectrum allocation, among others. In detail, the authors describe the main features of cognitive networks clearly indicating that cognitive network design can be applied to any type of network, being fixed or wireless. They explain why cognitive networks promise better protection against security attacks and network intruders and how such networks will benefit the service operator as well as the consumer. Cognitive Networks Explores the state-of-the-art in cognitive networks, compiling a roadmap to future research. Covers the topic of cognitive radio including semantic aspects. Presents hot topics such as biologically-inspired networking, autonomic networking, and adaptive networking. Introduces the applications of machine learning and distributed reasoning to cognitive networks. Addresses cross-layer design and optimization. Discusses security and intrusion detection in cognitive networks. Cognitive Networks is essential reading for advanced students, researchers, as well as practitioners interested in cognitive & wireless networks, pervasive computing, distributed learning, seamless mobility, and self-governed networks. With forewords by Joseph Mitola III as well as Sudhir Dixit.

Cognitive Radio Networks - Yan Zhang 2010-05-25

While still in the early stages of research and development, cognitive radio is a highly promising communications paradigm with the ability to effectively address the spectrum insufficiency problem. Written by those pioneering the field, Cognitive Radio Networks: Architectures, Protocols, and Standards offers a complete view of cognitive radio—including introductory concepts, fundamental techniques, regulations, standards, system implementations, and recent developments. From the physical layer to protocol layer, world-class editors provide comprehensive technical and regulatory guidance across cognitive radio, dynamic spectrum access, and cognitive wireless networks. The book examines routing, Medium Access Control (MAC), cooperation schemes, resource management, mobility, and game theory approach. Organized into three sections for ease of reference: Introduces and addresses the issues in the physical layer, including sensing, capacity, and power control Examines issues in the protocol layers and supplies practical solutions Explores applications, including cognitive radio systems Complete with illustrative figures that allow for complete cross-referencing, this authoritative reference provides readers with the understanding of the fundamental concepts, principles, and framework of cognitive wireless systems needed to initiate the development of future-generation wireless systems and networks.

LTE-Advanced and Next Generation Wireless Networks - Guillaume de la Roche 2012-11-05

LTE- A and Next Generation Wireless Networks: ChannelModeling and Performance describes recent advances inpropagation and channel modeling necessary for simulating nextgeneration wireless systems. Due to the radio spectrum scarcity,two fundamental changes are anticipated compared to the currentstatus. Firstly, the strict reservation of a specific band for aunique standard could evolve toward a priority policy allowing theco-existence of secondary users in a band allocated to a primarysystem. Secondly, a huge increase of the number of cells isexpected by combining outdoor base stations with smaller cells suchas pico/femto cells and relays. This evolution is accompanied withthe emergence of cognitive radio that becomes a reality interminals together with the development of self-organizationcapabilities and distributed cooperative behaviors. The book is divided into three parts: Part I addresses the fundamentals (e.g. technologies, channelmodeling principles etc.) Part II addresses propagation and modeling discussing topicssuch as indoor propagation, outdoor propagation, etc. Part III explores system performance and applications (e.g.MIMO Over-the-air testing, electromagnetic safety, etc).

Cognitive Radio, Software Defined Radio, and Adaptive Wireless Systems

- Hüseyin Arslan 2007-09-05
Today's wireless services have come a long way since the roll out of the conventional voice-centric cellular systems. The demand for wireless access in voice and high rate data multi-media applications has been increasing. New generation wireless communication systems are aimed at accommodating this demand through better resource management and improved transmission technologies. The interest in increasing Spectrum Access and improving Spectrum Efficiency combined with both the introduction of Software Defined Radios and the realization that machine learning can be applied to radios has created new intriguing possibilities for wireless radio researchers. This book is aimed to discuss the cognitive radio, software defined radio (SDR), and adaptive radio concepts from several aspects. Cognitive radio and cognitive networks will be investigated from a broad aspect of wireless communication system enhancement while giving special emphasis on better spectrum utilization. Applications of cognitive radio, SDR and cognitive radio architectures, spectrum efficiency and soft spectrum usage, adaptive wireless system design, measurements and awareness of various parameters including interference temperature and geo-location information are some of the important topics that will be covered in this book. Cognitive Radio, Software Defined Radio, and Adaptive Wireless Systems is intended to be both an introductory technology survey/tutorial for beginners and an advanced mathematical overview intended for technical professionals in the communications industry, technical managers, and researchers in both academia and industry.
Green Radio Communication Networks - Ekram Hossain 2012-07-05
Presents state-of-the-art research on green radio communications and networking technology to researchers and professionals working in wireless communication.
Cognitive Radio and its Application for Next Generation Cellular and Wireless Networks - Hrishikesh Venkataraman 2012-04-28
This book provides a broad introduction to Cognitive Radio, which attempts to mimic human cognition and reasoning applied to Software Defined Radio and reconfigurable radio over wireless networks. It provides readers with significant technical and practical insights into different aspects of Cognitive Radio, starting from a basic background, the principle behind the technology, the inter-related technologies and application to cellular and vehicular networks, the technical challenges, implementation and future trends. The discussion balances theoretical concepts and practical implementation. Wherever feasible, the different concepts explained are linked to application of the corresponding scheme in a particular wireless standard. This book has two sections: the first section begins with an introduction to cognitive radio and discusses in detail various, inter-dependent technologies such as network coding, software-based radio, dirty RF, etc. and their relation to cognitive radio. The second section deals with two key applications of cognitive radio – next generation cellular networks and vehicular networks. The focus is on the impact and the benefit of having cognitive radio-based mechanisms for radio resource allocation, multihop data transmission, co-operative communication, cross-layer solutions and FPGA-level framework design, as well as the effect of relays as cognitive gateways and real-time, seamless multimedia transmission using cognitive radio.
Innovations in Electronics and Communication Engineering - H. S. Saini 2017-11-08
The book contains high quality papers presented in the Fifth International Conference on Innovations in Electronics and Communication Engineering (ICIECE 2016) held at Guru Nanak Institutions, Hyderabad, India during 8 and 9 July 2016. The objective is to provide the latest developments in the field of electronics and communication engineering specially the areas like Image Processing, Wireless Communications, Radar Signal Processing, Embedded Systems and VLSI Design. The book aims to provide an opportunity for researchers, scientists, technocrats, academicians and engineers to exchange their innovative ideas and research findings in the field of Electronics and Communication Engineering.
Cognitive Wireless Networks - Frank H. P. Fitzek 2007-09-07
This book advocates the idea of breaking up the cellular communication architecture by introducing cooperative strategies among wireless

devices through cognitive wireless networking. It details the cooperative and cognitive aspects for future wireless communication networks. Coverage includes social and biological inspired behavior applied to wireless networks, peer-to-peer networking, cooperative networks, and spectrum sensing and management.

Wireless Communications - Andreas F. Molisch 2012-02-06

"Professor Andreas F. Molisch, renowned researcher and educator, has put together the comprehensive book, Wireless Communications. The second edition, which includes a wealth of new material on important topics, ensures the role of the text as the key resource for every student, researcher, and practitioner in the field." —Professor Moe Win, MIT, USA Wireless communications has grown rapidly over the past decade from a niche market into one of the most important, fast moving industries. Fully updated to incorporate the latest research and developments, Wireless Communications, Second Edition provides an authoritative overview of the principles and applications of mobile communication technology. The author provides an in-depth analysis of current treatment of the area, addressing both the traditional elements, such as Rayleigh fading, BER in flat fading channels, and equalisation, and more recently emerging topics such as multi-user detection in CDMA systems, MIMO systems, and cognitive radio. The dominant wireless standards; including cellular, cordless and wireless LANs; are discussed. Topics featured include: wireless propagation channels, transceivers and signal processing, multiple access and advanced transceiver schemes, and standardised wireless systems. Combines mathematical descriptions with intuitive explanations of the physical facts, enabling readers to acquire a deep understanding of the subject. Includes new chapters on cognitive radio, cooperative communications and relaying, video coding, 3GPP Long Term Evolution, and WiMax; plus significant new sections on multi-user MIMO, 802.11n, and information theory. Companion website featuring: supplementary material on 'DECT', solutions manual and presentation slides for instructors, appendices, list of abbreviations and other useful resources.

TV White Space Communications and Networks - Robert Stewart 2017-11-10

TV White Space Communications and Networks summarizes the current state-of-the-art in this important aspect of wireless communication. Part One covers related technologies, while Part Two looks at policy, regulation and standardization issues. Part Three discusses the commercialization and potential applications of white space networks, rounding out a comprehensive book that provides a standard reference for those researching and commercializing white space networks. Presents broad-ranging coverage of all the key issues in white space networks, including regulation, standards, technologies and commercial applications Brings together an international group of experts to summarize the state-of-the-art Builds on the results of the first trials of white space networks

Modeling and Analysis of Voice and Data in Cognitive Radio Networks - Subodha Gunawardena 2014-03-14

This Springer Brief investigates the voice and elastic/interactive data service support over cognitive radio networks (CRNs), in terms of their delay requirements. The increased demand for wireless communication conflicts with the scarcity of the radio spectrum, but CRNS allow for more efficient use of the networks. The authors review packet level delay requirements of the voice service and session level delay requirements of the elastic/interactive data services, particularly constant-rate and on-off voice traffic capacities in CRNs with centralized and distributed network coordination. Some generic channel access schemes are considered as the coordination mechanism, and call admission control algorithms are developed for non-fully-connected CRNs. Other key topics include the advantages of supporting voice traffic flows with different delay requirements, the mean response time of the elastic data traffic over a centralized CRN, and effects of the traffic load at the base station and file length (service time requirement) distribution on the mean response time. The brief is designed for professionals and researchers working with wireless networks, cognitive radio, and communications. It is also a helpful reference for advanced-level students interested in efficient wireless communications.

Radio Resource Management in Wireless Networks - Ekram Hossain 2017-04-27

Do you need to design efficient wireless communications systems? This unique text provides detailed coverage of radio resource allocation problems in wireless networks and the techniques that can be used to solve them. Covering basic principles and mathematical algorithms, and with a particular focus on power control and channel allocation, you will learn how to model, analyze, and optimize the allocation of resources in both physical and data link layers, and for a range of different network types. Both established and emerging networks are considered, including CDMA and OFDMA wireless networks, relay-based wireless networks, and cognitive radio networks. Numerous exercises help you put knowledge into practice, and provide the tools needed to address some of the current research problems in the field. This is an essential reference whether you are a graduate student, researcher or industry professional working in the field of wireless communication networks.

Data-Driven Wireless Networks - Yue Gao 2018-10-19

This SpringerBrief discusses the applications of spare representation in wireless communications, with a particular focus on the most recent developed compressive sensing (CS) enabled approaches. With the help of sparsity property, sub-Nyquist sampling can be achieved in wideband cognitive radio networks by adopting compressive sensing, which is illustrated in this brief, and it starts with a comprehensive overview of compressive sensing principles. Subsequently, the authors present a complete framework for data-driven compressive spectrum sensing in cognitive radio networks, which guarantees robustness, low-complexity, and security. Particularly, robust compressive spectrum sensing, low-complexity compressive spectrum sensing, and secure compressive sensing based malicious user detection are proposed to address the various issues in wideband cognitive radio networks. Correspondingly, the real-world signals and data collected by experiments carried out during TV white space pilot trial enables data-driven compressive spectrum sensing. The collected data are analysed and used to verify our designs and provide significant insights on the potential of applying compressive sensing to wideband spectrum sensing. This SpringerBrief provides readers a clear picture on how to exploit the compressive sensing to process wireless signals in wideband cognitive radio networks. Students, professors, researchers, scientists, practitioners, and engineers working in the fields of compressive sensing in wireless communications will find this SpringerBrief very useful as a short reference or study guide book. Industry managers, and government research agency employees also working in the fields of compressive sensing in wireless communications will find this SpringerBrief useful as well.

Full-Duplex Communications and Networks - Lingyang Song 2017-03-02

Learn about the key technologies and state of the art in research for full-duplex communications with this comprehensive guide.