Dynamic Spectrum Access And Management In Cognitive Radio Networks

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Dynamic Spectrum Management - Ying-Chang Liang 2019-11-02

This open access book, authored by a world-leading researcher in this field, describes fundamentals of dynamic spectrum management, provides a systematic overview on the enabling technologies covering cognitive radio, blockchain, and artificial intelligence, and offers valuable guidance for designing advanced wireless communications systems. This book is intended for a broad range of readers, including students and professionals in this field, as well as radio spectrum policy makers.

Dynamic Spectrum Management - Ying-Chang Liang 2020-09-18

This open access book, authored by a world-leading researcher in this field, describes fundamentals of dynamic spectrum management, provides a systematic overview on the enabling technologies covering cognitive radio, blockchain, and artificial intelligence, and offers valuable guidance for designing advanced wireless communications systems. This book is intended for a broad range of readers, including students and professionals in this field, as well as radio spectrum policy makers.

Machine Learning and Cognitive Computing for Mobile Communications and Wireless Networks - Krishna Kant Singh 2020-07-08

Communication and network technology has witnessed recent rapid development and numerous information services and applications

have been developed globally. These technologies have high impact on society and the way people are leading their lives. The advancement in technology has undoubtedly improved the quality of service and user experience yet a lot needs to be still done. Some areas that still need improvement include seamless wide-area coverage, high-capacity hot-spots, low-power massive-connections, low-latency and high-reliability and so on. Thus, it is highly desirable to develop smart technologies for communication to improve the overall services and management of wireless communication. Machine learning and cognitive computing have converged to give some groundbreaking solutions for smart machines. With these two technologies coming together, the machines can acquire the ability to reason similar to the human brain. The research area of machine learning and cognitive computing cover many fields like psychology, biology, signal processing, physics, information theory, mathematics, and statistics that can be used effectively for topology management. Therefore, the utilization of machine learning techniques like data analytics and cognitive power will lead to better performance of communication and wireless systems.

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 and Dynamic Spectrum Access - Lars Berlemann 2009-07-10

Cognitive Radio for Dynamic Spectrum Access gives a comprehensive overview of the main concepts behind radio spectrum regulation, dynamic spectrum access and cognitive radio. Spectrum measurements are introduced to illustrate the inefficiencies in today's spectrum usage and the book also discusses enablers for horizontal and vertical spectrum sharing. Among others a game-theory-based approach for spectrum sharing is described and evaluated. Institution and standardisation approaches in academic research and industry are highlighted including IEEE SCC41, 802.11k/n/s/y and 802.22 which lead towards commercial exploitation of cognitive radio. In conclusion, this book looks at the initial steps towards the vision of true cognitive radio and the potential impact on telecommunication business. Introduces the benefits and challenges of cognitive radio Presents cognitive radio in research and industry and covers implications for operators from the perspective of a telecom operator Examines how cognitive radio techniques will considerably change the wireless communication market.

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"--

Resource Management in Future Internet - Vladimir Poulkov 2022-09-01

Future Internet and Internet of Things set out a new vision for connectivity, real-time applications and services. Data procured from the use of a large number of heterogeneous physical and virtual devices must be real-time processed and analyzed for the goal of effective resource management and control while maintaining the required performance and quality of service. In addition, the development of the communication networks towards heterogeneous and new generation broadband connectivity brings up new requirements towards the way of managing and controlling of the available resources. Thus for the effective resource management in future internet novel approaches must be proposed and developed. It could be seen that recently a considerable amount of effort has been devoted on behalf of industry and academia, towards the research and design of methods for effective management of resources in internet and multimedia communications. The book reviews some specific topics in the field of future internet and internet technologies that are closely related to the issue of finding effective solutions for the management of resources and performance. Technical topics discussed in the book include: • Future Internet Technologies;• Internet of things;• Multimedia Networks;• Wireless Access Networks;• Software Communications;• Positioning and Localization in Communications;• Resource Management.Resource Management in future Internet is recommended for specialists working in the field of information and communication industries as well as academic staff and researchers working in the field of multimedia communications and telecommunication networks.

Spectrum Sharing in Cognitive Radio Networks - Shweta Pandit 2017-04-12

This book discusses the use of the spectrum sharing techniques in cognitive radio technology,

in order to address the problem of spectrum scarcity for future wireless communications. The authors describe a cognitive radio medium access control (MAC) protocol, with which throughput maximization has been achieved. The discussion also includes use of this MAC protocol for imperfect sensing scenarios and its effect on the performance of cognitive radio systems. The authors also discuss how energy efficiency has been maximized in this system, by applying a simple algorithm for optimizing the transmit power of the cognitive user. The study about the channel fading in the cognitive user and licensed user and power adaption policy in this scenario under peak transmit power and interference power constraint is also present in this book.

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.

Cognitive Radio Mobile Ad Hoc Networks - F. Richard Yu 2011-09-28

Cognitive radios (CR) technology is capable of

sensing its surrounding environment and adapting its internal states by making corresponding changes in certain operating parameters. CR is envisaged to solve the problems of the limited available spectrum and the inefficiency in the spectrum usage. CR has been considered in mobile ad hoc networks (MANETs), which enable wireless devices to dynamically establish networks without necessarily using a fixed infrastructure. The changing spectrum environment and the importance of protecting the transmission of the licensed users of the spectrum mainly differentiate classical MANETs from CR-MANETs. The cognitive capability and re-configurability of CR-MANETs have opened up several areas of research which have been explored extensively and continue to attract research and development. The book will describe CR-MANETs concepts, intrinsic properties and research challenges of CR-MANETs. Distributed spectrum management functionalities, such as spectrum sensing and sharing, will be presented. The design, optimization and performance evaluation of security issues and upper layers in CR-MANETs, such as transport and application layers, will be investigated.

2nd EAI International Conference on Big Data Innovation for Sustainable Cognitive Computing - Anandakumar Haldorai 2020-09-30

This proceeding features papers discussing big data innovation for sustainable cognitive computing. The papers feature details on cognitive computing and its self-learning systems that use data mining, pattern recognition and natural language processing (NLP) to mirror the way the human brain works. This international conference focuses on cognitive computing technologies, from knowledge representation techniques and natural language processing algorithms to dynamic learning approaches. Topics covered include Data Science for Cognitive Analysis, Real-Time Ubiquitous Data Science, Platform for Privacy Preserving Data Science, and Internet-Based Cognitive Platform. The 2nd EAI International Conference on Big Data Innovation for Sustainable Cognitive Computing (BDCC 2019) took place in Coimbatore, India on December 12-13, 2019. Contains proceedings from 2nd EAI International Conference on Big Data Innovation for Sustainable Cognitive Computing (BDCC 2019), Coimbatore, India, December 12-13, 2019; Features topics ranging from Data Science for Cognitive Analysis to Internet-Based Cognitive Platforms; Includes contributions from researchers, academics, and professionals from around the world.

Quantitative Analysis of Cognitive Radio and Network Performance - Preston Marshall 2010

Cognitive radio – a paradigm for wireless communication in which either a network or a

wireless node changes its transmission or reception parameters to communicate more efficiently and avoid interference -- is one of the most exciting emerging fields in communications technology. Taking an integrated development approach, this cutting-edge book provides you with clear methods for performing quantitative analysis of cognitive radio techniques in a variety of environments. This detailed reference presents a quantitative structure that helps you determine the capability of cognitive radio to address a number of constraints of current radio design. Critical to understanding the operation of cognitive radio, the book develops an analytic model for a range of spectrum environments. Moreover, this unique resource offers you unique insight into the application of dynamic spectrum access (DSA) to improve the performance of all classes of wireless devices. DVD Included! Contains sample cognitive radio environments and closed form approximations of these environments in MATLAB file format. This data enables you to reproduce the analysis provided in the book, perform the exercises in each chapter, and extend the work through independent investigation and research.

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.

Cognitive Radio and Interference Management: Technology and Strategy - Ku, Meng-Lin 2012-08-31

Broadcast spectrum is scarce, both in terms of our ability to access existing spectrum and as a result of access rules created by governments. An emerging paradigm called cognitive radio, however, has the potential to allow different systems to dynamically access and opportunistically exploit the same frequency band in an efficient way, thereby allowing broadcasters to use spectrum more efficiently. Cognitive Radio and Interference Management: Technology and Strategy brings together state-of-the-art research results on cognitive radio and interference

management from both theoretical and practical perspectives. It serves as a bridge between people who are working to develop theoretical and practical research in cognitive radio and interference management, and therefore facilitate the future development of cognitive radio and its applications.

Dynamic Spectrum Access Decisions - George F. Elmasry 2020-09-01

Optimize your dynamic spectrum access approach using the latest applications and techniques Dynamic Spectrum Access Decisions: Local, Distributed, Centralized and Hybrid Designs prepares engineers to build optimum communications systems by describing at the outset what type of spectrum sensing capabilities are needed. Meant for anyone who has a basic understanding of wireless communications and networks and an interest in the physical and MAC layers of communication systems, this book has a tremendous range of civilian and military applications. Dynamic Spectrum Access Decisions provides fulsome discussions of cognitive radios and networks, but also DSA technologies that operate outside the context of cognitive radios. DSA has applications in: Licensed spectrum bands Unlicensed spectrum bands Civilian communications Military communications Consisting of a set of techniques derived from network information theory and game theory, DSA improves the performance of communications networks. This book addresses advanced topics in this area and assumes basic knowledge of wireless communications.

Spectrum Access and Management for Cognitive Radio Networks - Mohammad A Matin 2016-09-16

This book presents cutting-edge research contributions that address various aspects of network design, optimization, implementation, and application of cognitive radio technologies. It demonstrates how to make better utilization of the available spectrum, cognitive radios and spectrum access to achieve effective spectrum sharing between licensed and unlicensed users. The book provides academics and researchers essential information on current developments and future trends in cognitive radios for possible integration with the upcoming 5G networks. In addition, it includes a brief introduction to cognitive radio networks for newcomers to the field.

Self-Organization and Green Applications in Cognitive Radio Networks - Al-Dulaimi, Anwer 2013-01-31

Self-Organization and Green Applications in Cognitive Radio Networks provides recent research on the developments of efficient cognitive network topology. The most current procedures and results are presented to demonstrate how developments in this area can reduce complications, confusion, and even costs. The book also identifies future challenges that are

predicted to arrive in the Cognitive Radio Network along with potential solutions. This innovative publication is unique because it suggests green, energy efficient and cost efficient resolutions to the inevitable challenges in the network.

Cognitive Radio Technology Applications for Wireless and Mobile Ad Hoc Networks - Meghanathan, Natarajan 2013-06-30

Radio interference is a problem that has plagued air communication since its inception. Advances in cognitive radio science help to mitigate these concerns. Cognitive Radio Technology Applications for Wireless and Mobile Ad Hoc Networks provides an in-depth exploration of cognitive radio and its applications in mobile and/or wireless network settings. The book combines a discussion of existing literature with current and future research to create an integrated approach that is useful both as a textbook for students of computer science and as a reference book for researchers and practitioners engaged in solving the complex problems and future challenges of cognitive radio technologies.

Cognitive Networks - Jaime Lloret Mauri 2014-12-09

A cognitive network makes use of the information gathered from the network in order to sense the environment, plan actions according to the input, and make appropriate decisions using a reasoning engine. The ability of cognitive networks to learn from the past and use that knowledge to improve future decisions makes them a key area of interest for anyone whose work involves wireless networks and communications. Cognitive Networks: Applications and Deployments examines recent developments in cognitive networks from the perspective of cutting-edge applications and deployments. Presenting the contributions of internationally renowned experts, it supplies complete and balanced treatment of the fundamentals of both cognitive radio communications and cognitive networks—together with implementation details. The book includes case studies and detailed descriptions of cognitive radio platforms and testbeds that demonstrate how to build real-world cognitive radio systems and network architectures. It begins with an introduction to efficient spectrum management and presents a survey on joint routing and dynamic spectrum access in cognitive radio networks. Next, it examines radio spectrum sensing and network coding and design. It explores intelligent routing in graded cognitive networks and presents an energy-efficient routing protocol for cognitive radio ad hoc networks. The book concludes by considering dynamic radio spectrum access and examining vehicular cognitive networks and applications. Presenting the latest standards and spectrum policy developments, the book's strong practical orientation provides you with the understanding you will need to participate in the

development of compliant cognitive systems.

Cognitive Wireless Communication Networks - Ekram Hossain 2010-11-04

This book provides a unified view on the state-of-the-art of cognitive radio technology. It includes a set of research and survey articles featuring the recent advances in theory and applications of cognitive radio technology for the next generation (e.g., fourth generation) wireless communication networks. The contributed articles cover both the theoretical concepts (e.g., information-theoretic analysis) and system-level implementation issues.

Cognitive Radio Networking and Security - K. J. Ray Liu 2010-10-28

With the rapid growth of new wireless devices and applications over the past decade, the demand for wireless radio spectrum is increasing relentlessly. The development of cognitive radio networking provides a framework for making the best possible use of limited spectrum resources, and it is revolutionising the telecommunications industry. This book presents the fundamentals of designing, implementing, and deploying cognitive radio communication and networking systems. Uniquely, it focuses on game theory and its applications to various aspects of cognitive networking. It covers in detail the core aspects of cognitive radio, including cooperation, situational awareness, learning, and security mechanisms and strategies. In addition, it provides novel, state-of-the-art concepts and recent results. This is an ideal reference for researchers, students and professionals in industry who need to learn the applications of game theory to cognitive networking.

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.

Mechanisms and Games for Dynamic Spectrum Allocation - Tansu Alpcan 2014

An innovative and comprehensive book presenting state-of-the-art research into wireless spectrum allocation based on game theory and mechanism design.

Dynamic Spectrum Access and Management in Cognitive Radio Networks - Ekram Hossain 2009-06-18

An all-inclusive introduction to this revolutionary technology, presenting the key research issues and state-of-the-art design, analysis, and optimization techniques.

Spectrum Sharing in Cognitive Radio Networks - Ghanshyam Singh 2021-05-27

SPECTRUM SHARING IN COGNITIVE RADIO NETWORKS Discover the latest advances in spectrum sharing in wireless networks from two internationally recognized experts in the field Spectrum Sharing in Cognitive Radio Networks: Towards Highly Connected Environments delivers an in-depth and insightful examination of hybrid spectrum access techniques with advanced frame structures designed for efficient spectrum utilization. The accomplished authors present the energy and spectrum efficient frameworks used in high-demand distributed architectures by relying on the self-scheduled medium access control (SMC-MAC) protocol in cognitive radio networks. The book begins with an exploration of the fundamentals of recent advances in spectrum sharing techniques before moving onto advanced frame structures with spectrum accessing approaches and the role of spectrum prediction and spectrum monitoring to eliminate interference. The authors also cover spectrum mobility, interference, and spectrum management for connected environments in substantial detail. Spectrum Sharing in Cognitive Radio Networks: Towards Highly Connected Environments offers readers a recent and rational theoretical mathematical model of spectrum sharing strategies that can be used for practical simulation of future generation wireless communication technologies. It also highlights ongoing trends, revealing fresh research outcomes that will be of interest to active researchers in the area. Readers will also benefit from: An inclusive study of connected environments, 3GPP Releases, and the evolution of wireless communication generations with a discussion of advanced frame structures and access strategies in cognitive radio networks A treatment of cognitive radio networks using spectrum prediction and monitoring techniques An analysis of the effects of imperfect spectrum monitoring on cognitive radio networks An exploration of spectrum mobility in cognitive radio networks using spectrum prediction and monitoring techniques An examination of MIMO-based CR-NOMA communication systems for spectral and interference efficient designs Perfect for senior undergraduate and graduate students in Electrical and Electronics Communication Engineering programs, Spectrum Sharing in Cognitive Radio Networks: Towards Highly Connected Environments will also earn a place in the libraries of professional engineers and researchers working in the field, whether in private industry, government, or academia.

Cooperative and Cognitive Satellite Systems -

Symeon Chatzinotas 2015-05-27

Cooperative and Cognitive Satellite Systems provides a solid overview of the current research in the field of cooperative and cognitive satellite systems, helping users understand how to incorporate state-of-the-art communication techniques in innovative satellite network architectures to enable the next generation of satellite systems. The book is edited and written by top researchers and practitioners in the field, providing a comprehensive explanation of current research that allows users to discover future technologies and their applications, integrate satellite and terrestrial systems and services to create innovative network architectures, understand the requirements and possibilities for future satellite communications standards and protocols, and evaluate the feasibility and practical constraints involved in the deployment process. Provides a solid overview of the current research in the field of co-operative and cognitive satellite systems Presents concepts in multibeam and multicarrier joint processing and high performance random access schemes Explains hybrid and dual satellite systems, cognitive broadband satellite systems, spectrum exploitation, and resource allocation

Dynamic Spectrum Management in Cognitive Radio - Partha Pratim Bhattacharya 2012-05

The radio frequency is a limited natural resource and getting enabled day by day due to growing demand of the wireless communication applications. To operate on a specific frequency band, license are needed. The use of radio spectrum in each country is governed by the corresponding government agencies. In conventional technique each user is assigned a license to operate in a certain frequency band. Most of the time spectrum remains unused. The allocated spectrum is not utilized properly; it varies with time, frequency and geographical locations. Thus to overcome the spectrum scarcity and unutilized frequency band, a new communication technique cognitive radio (CR) and dynamic spectrum access (DSA) are introduced. CR network provides efficient utilization of the radio spectrum and highly reliable communication to users whenever and wherever needed. DSA technology allows unlicensed secondary system to share the spectrum with licensed primary system. In this thesis, dynamic spectrum access techniques are discussed and few methods of spectrum management, power management are proposed and presented.

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 Networks - Yan Zhang 2019-08-30

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.

Fundamentals of Cognitive Radio - Peyman Setoodeh 2017-07-31

A comprehensive treatment of cognitive radio networks and the specialized techniques used to improve wireless communications The human brain, as exemplified by cognitive radar, cognitive radio, and cognitive computing, inspires the field of Cognitive Dynamic Systems. In particular, cognitive radio is growing at an exponential rate. Fundamentals of Cognitive Radio details different aspects of the human brain and provides examples of how it can be mimicked by cognitive dynamic systems. The text offers a communication-theoretic background, including information on resource allocation in wireless networks and the concept of robustness. The authors provide a thorough mathematical background with data on game theory, variational inequalities, and projected dynamic systems. They then delve more deeply into resource allocation in cognitive radio networks. The text investigates the dynamics of cognitive radio networks from the perspectives of information theory, optimization, and control theory. It also provides a vision for the new world of wireless communications by integration of cellular and cognitive radio networks. This groundbreaking book: Shows how wireless communication systems increasingly use cognition to enhance their networks Explores how cognitive radio networks can be viewed as spectrum supply chain networks Derives analytic models for two complementary regimes for spectrum sharing (open-access and market-driven) to study both equilibrium and disequilibrium behaviors of networks Studies cognitive heterogeneous networks with emphasis on economic provisioning for resource sharing Introduces a framework that addresses the issue of spectrum sharing across licensed and unlicensed bands aimed for Pareto optimality Written for students of cognition, communication engineers, telecommunications professionals, and others, Fundamentals of Cognitive Radio offers a new generation of ideas and provides a fresh way of thinking about cognitive techniques in order to improve radio networks.

Cognitive Radio, Mobile Communications and

Wireless Networks - Mubashir Husain Rehmani 2018-07-30

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

Essentials of Cognitive Radio - Linda Doyle 2009-04-30

The key concepts and challenges you need to know about in a quick, practical guide, with minimum mathematics.

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

Dynamic Spectrum Management - Ying-Chang Liang 2020-10-08

This open access book, authored by a world-leading researcher in this field, describes fundamentals of dynamic spectrum management, provides a systematic overview on the enabling technologies covering cognitive radio, blockchain, and artificial intelligence, and offers valuable guidance for designing advanced wireless communications systems. This book is intended for a broad range of readers, including students and professionals in this field, as well as radio spectrum policy makers. This work was published by Saint Philip Street Press pursuant to a Creative Commons license permitting commercial use. All rights not granted by the work's license are retained by the author or authors.

Cognitive Radio Networks - Yan Zhang 2016-04-19

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Dynamic Spectrum Access Decisions - George F. Elmasry 2020-08-24

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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.

New Trends in Computational Vision and Bio-inspired Computing - S. Smys 2020-09-27

This volume gathers selected, peer-reviewed original contributions presented at the International Conference on Computational Vision and Bio-inspired Computing (ICCVBIC) conference which was held in Coimbatore, India, on November 29-30, 2018. The works included here offer a rich and diverse sampling of recent

developments in the fields of Computational Vision, Fuzzy, Image Processing and Bio-inspired Computing. The topics covered include computer vision; cryptography and digital privacy; machine learning and artificial neural networks; genetic algorithms and computational intelligence; the Internet of Things; and biometric systems, to name but a few. The applications discussed range from security, healthcare and epidemic control to urban computing, agriculture and robotics. In this book, researchers, graduate students and professionals will find innovative solutions to real-world problems in industry and society as a whole, together with inspirations for further research.

Multimedia over Cognitive Radio Networks - Fei Hu 2014-12-04

With nearly 7 billion mobile phone subscriptions worldwide, mobility and computing have become pervasive in our society and business. Moreover, new mobile multimedia communication services are challenging telecommunication operators. To support the significant increase in multimedia traffic—especially video—over wireless networks, new technological infrastructure must be created. Cognitive Radio Networks (CRNs) are widely regarded as one of the most promising technologies for future wireless communications. This book explains how to efficiently deliver video, audio, and other data over CRNs. Covering advanced algorithms, protocols, and hardware-/software-based experiments, this book describes how to encode video in a prioritized way to send to dynamic radio links. It discusses different FEC codes for video reliability and explains how different machine learning algorithms can be used for video quality control. It also explains how to use readily available software tools to build a CRN simulation model. This book explains both theoretical and experimental designs. It describes how universal software radio peripheral (USRP) boards can be used for real-time, high-resolution video transmission. It also discusses how a USRP board can sense the spectrum dynamics and how it can be controlled by GNU Radio software. A separate chapter discusses how the network simulator ns-2 can be used to build a simulated CRN platform.