

# Dynamic Spectrum Access in the Time Domain: Modeling and Exploiting White Space

Stefan Geirhofer and Lang Tong, Cornell University  
Brim M. Sadler, United States Army Research Laboratory  
IEEE Communications Magazine 2007  
Speaker: Chun Hsu 許君

# Dynamic White Space Spectrum Access

**Amr Fahim**



## **Dynamic White Space Spectrum Access:**

**Dynamic Sharing of Wireless Spectrum** Haibo Zhou, Quan Yu, Xuemin (Sherman) Shen, Shaohua Wu, Qinyu Zhang, 2016-09-02 This book focuses on the current research on the dynamic spectrum sharing for efficient spectrum resource utilization which covers the overlay spectrum sharing underlay spectrum sharing and database assisted spectrum sharing related research issues Followed by a comprehensive review and in depth discussion of the current state of the art research literature and industry standardization this book first presents a novel overlay spectrum sharing framework for dynamic utilization of available cellular frequency bands formulates the dynamic spectrum sharing problem as a dynamic resource demand supply matching problem and accordingly develops a distributed fast spectrum sharing algorithm to solve the resource matching problem A self awareness power control approach for multi hop routing selection is proposed which can establish an effective and practical routing selection optimization in secondary access networks and minimize the interference to primary users Finally this book offers dynamic secondary access scheme for database assisted spectrum sharing networks which is targeted to support the prosperous wireless multimedia networking applications by leveraging the TV white spaces of geolocation databases while satisfying QoS guarantees of secondary users The overlay spectrum sharing underlay spectrum sharing and database assisted white spaces spectrum sharing research results that are presented in this book provide useful insights for the design of next generation wireless access networks This book motivates a new line of thinking for efficient spectrum resource utilization and performance enhancements of future wireless access applications

TV White Space Ser Wah Oh, Yugang Ma, Ming-Hung Tao, Edward Peh, 2016-09-27 Provides an in depth coverage of TV White Space Technology TVWS and the various challenges of its new innovations This book covers the full spectrum of TVWS technology including regulations technology standardizations and worldwide deployments It begins with an introduction to cognitive radio and TVWS The regulation activities in TVWS throughout North America Europe and Asia Pacific are covered in depth After a discussion of regulations the authors examine the standardizations developed to specify the enabling technologies of TVWS systems The following chapter focuses on the key technologies that differentiate TVWS from a conventional wireless communication system Describes various worldwide use cases and deployments based on the needs of the consumers Covers IEEE 802 19 1 IEEE 802 22 IEEE 802 11af IEEE 802 15 4m and IETF protocol for Accessing White Spaces Studies the market and commercial potential of TVWS and other spectrum sharing technologies Discusses technological trends in spectrum sharing and additional applications that could leverage on TVWS and other spectrum sharing technologies TV White Space The First Step Towards Better Utilization of Frequency Spectrum is written for telecommunications networks operators researchers engineers government regulators technical managers and network equipment manufacturers

**Modern Standardization** Ron Schneiderman, 2015-03-27 This book includes a collection of standards specific case studies The case studies offer an opportunity to combine the teaching preferences of educators with

the goals of the SEC Standards Education Committee providing students with real world insight into the technical political and economic arenas of engineering Encourages students to think critically about standards development and technology solutions Reinforces the usage of standards as an impetus for innovation Will help understand the dynamics and impacts of standards A curriculum guide is available to instructors who have adopted the book for a course To obtain the guide please send a request to [ieeeproposals@wiley.com](mailto:ieeeproposals@wiley.com)

**Radio Frequency Integrated Circuit Design for Cognitive Radio Systems** Amr Fahim, 2015-03-03 This book fills an information gap on cognitive radios since the discussion focuses on the implementation issues that are unique to cognitive radios and how to solve them at both the architecture and circuit levels This is the first book to describe in detail cognitive radio systems as well as the circuit implementation and architectures required to implement such systems Throughout the book requirements and constraints imposed by cognitive radio systems are emphasized when discussing the circuit implementation details This is a valuable reference for anybody with background in analog and radio frequency RF integrated circuit design needing to learn more about integrated circuits requirements and implementation for cognitive radio systems

**TV White Space Communications and Networks** Robert Stewart, David Dr. Crawford, Andrew Sterling, 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

**LTE-Advanced and Next Generation Wireless Networks** Guillaume de la Roche, Andrés Alayón-Glazunov, Ben Allen, 2012-11-05 LTE A and Next Generation Wireless Networks Channel Modeling and Performance describes recent advances in propagation and channel modeling necessary for simulating next generation wireless systems Due to the radio spectrum scarcity two fundamental changes are anticipated compared to the current status Firstly the strict reservation of a specific band for a unique standard could evolve toward a priority policy allowing the co existence of secondary users in a band allocated to a primary system Secondly a huge increase of the number of cells is expected by combining outdoor base stations with smaller cells such as pico femto cells and relays This evolution is accompanied with the emergence of cognitive radio that becomes a reality in terminals together with the development of self organization capabilities and distributed cooperative behaviors The book is divided into three parts Part I addresses the fundamentals e g technologies channel modeling principles etc Part II addresses propagation and modeling discussing topics such as indoor propagation outdoor propagation etc Part III explores system performance and applications e g MIMO Over the air testing electromagnetic safety etc

**Cognitive Communications** David Grace, Honggang

Zhang,2012-10-01 This book discusses in depth the concept of distributed artificial intelligence DAI and its application to cognitive communications In this book the authors present an overview of cognitive communications encompassing both cognitive radio and cognitive networks and also other application areas such as cognitive acoustics The book also explains the specific rationale for the integration of different forms of distributed artificial intelligence into cognitive communications something which is often neglected in many forms of technical contributions available today Furthermore the chapters are divided into four disciplines wireless communications distributed artificial intelligence regulatory policy and economics and implementation The book contains contributions from leading experts academia and industry in the field Key Features Covers the broader field of cognitive communications as a whole addressing application to communication systems in general e g cognitive acoustics and Distributed Artificial Intelligence DAI Illustrates how different DAI based techniques can be used to self organise the radio spectrum Explores the regulatory policy and economic issues of cognitive communications in the context of secondary spectrum access Discusses application and implementation of cognitive communications techniques in different application areas e g Cognitive Femtocell Networks CFN Written by experts in the field from both academia and industry Cognitive Communications will be an invaluable guide for research community PhD students researchers in the areas of wireless communications and development engineers involved in the design and development of mobile portable and fixed wireless systems wireless network design engineer Undergraduate and postgraduate students on elective courses in electronic engineering or computer science and the research and engineering community will also find this book of interest

**White Space Communication** Amit Kumar Mishra,David Lloyd Johnson,2014-10-13 This monograph presents a collection of major developments leading toward the implementation of white space technology an emerging wireless standard for using wireless spectrum in locations where it is unused by licensed users Some of the key research areas in the field are covered These include emerging standards technical insights from early pilots and simulations software defined radio platforms geo location spectrum databases and current white space spectrum usage in India and South Africa

*Cognitive Vehicular Networks* Anna Maria Vegni,Dharma P. Agrawal,2016-03-16 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 [Game Theory Framework Applied to Wireless Communication Networks](#) Yang, Chungang,Li, Jiandong,2015-08-26 The popularity of smart phones and other mobile devices has brought about major expansion in the realm of wireless communications With this growth comes the need to improve upon network capacity and overall user experience and game based methods can offer further enhancements in this area Game Theory

Framework Applied to Wireless Communication Networks is a pivotal reference source for the latest scholarly research on the application of game theoretic approaches to enhance wireless networking. Featuring prevailing coverage on a range of topics relating to the advanced game model mechanism designs and effective equilibrium concepts, this publication is an essential reference source for researchers, students, technology developers and engineers. This publication features extensive research based chapters across a broad scope of relevant topics including potential games, coalition formation, game heterogeneous networks, radio resource allocation, coverage optimization, distributed dynamic resource allocation, dynamic spectrum access, physical layer security and cooperative video transmission.

**Global Standard Setting in Internet Governance** Alison Harcourt, George Christou, Seamus Simpson, 2020-01-31. The book addresses representation of the public interest in Internet standard developing organisations (SDOs). Much of the existing literature on Internet governance focuses on international organisations such as the United Nations (UN), the Internet Governance Forum (IGF) and the Internet Corporation for Assigned Names and Numbers (ICANN). The literature covering standard developing organisations has to date focused on organisational aspects. This book breaks new ground with investigation of standard development within SDO fora. Case studies centre on standards relating to privacy and security, mobile communications, Intellectual Property Rights (IPR) and copyright. The book lifts the lid on internet standard setting with detailed insight into a world which, although highly technical, very much affects the way in which citizens live and work on a daily basis. In doing this, it adds significantly to the trajectory of research on Internet standards and SDOs that explore the relationship between politics and protocols. The analysis contributes to academic debates on democracy and the internet, global self regulation and civil society and international decision making processes in unstructured environments. The book advances work on the Multiple Streams Framework (MS) by applying it to decision making in non state environments, namely SDOs which have long been dominated by private actors. The book is aimed at academic audiences in political science, computer science, communications and science and technology studies as well as representatives from civil society, the civil service, government, engineers and experts working within SDO fora. It will also be accessible to students at the postgraduate and undergraduate levels.

**Cyber-Physical Systems** Fei Hu, 2013-09-26. This book supplies comprehensive coverage of the principles and design of CPSs. It addresses the many challenges that must be overcome and outlines a roadmap of how to get there. Covering the most important design theories and modeling methods for a practical CPS text, presents concrete CPS designs for popular civilian applications including building and energy management. Reflecting the importance of human health care in society, it includes CPS examples of rehabilitation applications such as virtual reality based disability recovery platforms.

**Cognitive Radio Networks** Yang Xiao, Fei Hu, 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 s

**Cognitive Wireless Networks** Zhiyong Feng,Qixun Zhang,Ping Zhang,2015-05-15  
 This brief examines the current research in cognitive wireless networks CWNs Along with a review of challenges in CWNs this brief presents novel theoretical studies and architecture models for CWNs advances in the cognitive information awareness and delivery and intelligent resource management technologies The brief presents the motivations and concepts of CWNs including theoretical studies of temporal and geographic distribution entropy as well as cognitive information metrics A new architecture model of CWNs is proposed with theoretical functional and deployment architectures supporting cognitive information flow and resource flow Key technologies are identified to achieve the efficient cognitive information awareness and delivery The brief concludes by validating the effectiveness of proposed theories and technologies using the CWNs testbed and discussing the importance of standardization practices The context and analysis provided by this text are ideal for researchers and practitioners interested in wireless networks and cognitive information Cognitive Wireless Networks is also valuable for advanced level students studying resource management and networking

**Cooperative Vehicular Communications in the Drive-thru Internet** Haibo Zhou,Lin Gui,Quan Yu,Xuemin (Sherman) Shen,2015-07-21  
 This brief presents a unified analytical framework for the evaluation of drive thru Internet performance and accordingly proposes an optimal spatial access control management approach A comprehensive overview and in depth discussion of the research literature is included It summarizes the main concepts and methods and highlights future research directions The brief also introduces a novel cooperative vehicular communication framework together with a delicate linear cluster formation scheme and low delay content forwarding approach to provide a flexible and efficient vehicular content distribution in the drive thru Internet The presented medium access control and vehicular content distribution related research results in this brief provide useful insights for the design approach of Wi Fi enabled vehicular communications and it motivates a new line of thinking for the performance enhancements of future vehicular networking Advanced level students researchers and professionals interested in vehicular networks or coordinated network sharing will find Cooperative Vehicular Communications in the Drive thru Internet a valuable reference

*Communications Infrastructure, Systems and Applications* Rashid Mehmood,Eduardo Cerqueira,Radoslaw Piesiewicz,Imrich Chlamtac,2009-12-12 The First International ICST Conference on Communications Infrastructure Systems and Applications in Europe EuropeComm 2009 was held August 11 13 2009 in London EuropeComm 2009 brought together decision makers from the EU comm sion top researchers and industry executives to discuss the directions of communications research and development in Europe The event also attracted academia and industry representatives as well as government officials to discuss the current developments and future trends in technology applications and services in the communications field Organizing this conference was motivated by the fact that the development and ployment of future services will require a common global scale infrastructure and therefore it is important that designers and stakeholders from all the systems stacks come together to discuss these developments Rapidly

decreasing costs of computational power storage capacity and communication bandwidth have led to the development of a multitude of applications carrying an increasingly huge amount of traffic on the global networking infrastructure. What we have seen is an evolution of infrastructure looking for networked applications has evolved into an infrastructure struggling to meet the social technological and business challenges posed by the plethora of bandwidth hungry emerging applications.

**Advancement in Microstrip Antennas with Recent Applications** Ahmed Kishk, 2013-03-06 The book discusses basic and advanced concepts of microstrip antennas including design procedure and recent applications. Book topics include discussion of arrays, spectral domain high Tc superconducting microstrip antennas, optimization, multiband, dual and circular polarization, microstrip to waveguide transitions and improving bandwidth and resonance frequency. Antenna synthesis, materials, microstrip circuits, spectral domain waveform evaluation, aperture coupled antenna geometry and miniaturization are further book topics. Planar UWB antennas are widely covered and new dual polarized UWB antennas are newly introduced. Design of UWB antennas with single or multi notch bands are also considered. Recent applications such as cognitive radio, reconfigurable antennas, wearable antennas and flexible antennas are presented. The book audience will be comprised of electrical and computer engineers and other scientists well versed in microstrip antenna technology.

**e-Infrastructure and e-Services for Developing Countries** Amos Nungu, Bjorn Pehrson, Julianne Sansa-Otim, 2015-04-20 This book constitutes the thoroughly refereed proceedings of the 6th International Conference on e-Infrastructure and e-Services for Developing Countries AFRICOMM 2014 held in Kampala, Uganda, November 24-25, 2014. The 31 revised full papers were carefully selected from 57 submissions and cover topics such as communication infrastructure, health, IoT, cloud computing and TVWS, ICT4D applications, access to information and ICT4D miscellaneous. **Economics of**

**Database-Assisted Spectrum Sharing** Yuan Luo, Lin Gao, Jianwei Huang, 2016-08-13 This book examines the interaction between the technical and economic issues in database-assisted dynamic spectrum networks. It explains various business models for different network settings, analyzing the user behaviors and system equilibrium under each model. With the explosive growth of mobile devices and bandwidth hungry applications, radio spectrum is becoming increasingly congested and scarce. Database-assisted dynamic spectrum sharing is a promising technology for solving the problem of spectrum scarcity and congestion by allowing unlicensed mobile devices to dynamically access the underutilized licensed spectrum resources through the assistance of a database. Database-assisted spectrum sharing network architecture has received wide and enthusiastic support from spectrum regulators, standards bodies and industrial organizations. This book serves as a resource for researchers in white space communications and networking for regulators in the wireless industry and for graduate students and senior undergraduate students taking a course on network economics. **e-Infrastructure and**

**e-Services for Developing Countries** Victor Odumuyiwa, Ojo Adegboyega, Charles Uwadia, 2018-08-20 This book constitutes the thoroughly refereed proceedings of the 9th International Conference on e-Infrastructure and e-Services for Developing



Countries AFRICOMM 2017 held in Lagos Nigeria in December 2017 The 19 full papers 12 short papers and 5 workshop papers were carefully selected from 81 submissions The papers were presented in eight sessions e government network and load management digital inclusion knowledge extraction representation and sharing networks and communications ICT applications for development decision support e business and e services internet measurement

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