

# 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  
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# Dynamic White Space Spectrum Access

**Joydeep Dutta**



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

*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).

*Towards new e-Infrastructure and e-Services for Developing Countries* Rafik Zitouni, Amreesh Phokeer, Josiah Chavula, Ahmed Elmokashfi, Assane Gueye, Nabil Benamar, 2021-03-03 This book constitutes the thoroughly refereed proceedings of the 12th International Conference on e-Infrastructure and e-Services for Developing Countries AFRICOMM 2020 held in Ebène City, Mauritius, in December 2020. Due to the COVID-19 pandemic, the conference was held virtually. The 20 full papers were carefully selected from 90 submissions. The papers are organized in four thematic sections: on dynamic spectrum access and mesh networks; wireless sensing and 5G networks; software defined networking; Internet of Things; e-services and big data; DNS resilience and performance.

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.

Cognitive MAC Designs for OSA Networks Mahsa Derakhshani, Tho Le-Ngoc, 2014-12-09 This SpringerBrief presents recent advances in the cognitive MAC designs for opportunistic spectrum access (OSA) networks. It covers the basic MAC functionalities and MAC enhancements of IEEE 802.11. Later chapters discuss the existing MAC protocols for OSA and classify them based on characteristic features. The authors provide new research in adaptive carrier sensing based MAC designs tailored for OSA which optimize spectrum utilization and ensure a peaceful coexistence of licensed and unlicensed systems. Analytically devised via optimization and game theoretic approaches, these adaptive MAC

designs are shown to effectively reduce collisions between both primary and secondary network users Researchers and professionals working in wireless communications and networks will find this content valuable This brief is also a useful study guide for advanced level students in computer science and electrical engineering

*Smart Grid and Innovative Frontiers in Telecommunications* Peter Han Joo Chong, Boon-Chong Seet, Michael Chai, Saeed Ur Rehman, 2018-07-06 This book constitutes the proceedings of the Third International Conference on Smart Grid and Innovative Frontiers in Telecommunications SmartGIFT held in Auckland New Zealand in April 2018 The 28 revised full papers presented were carefully reviewed and selected from 44 submissions They focus on smart grid as the next generation of electrical grid which will enable the smart integration of conventional renewable and distributed power generation energy storage transmission and distribution and demand management The benefits of smart grid include enhanced reliability and resilience higher intelligence and optimized control decentralized operation higher operational efficiency more efficient demand management and better power quality

Mobile Broadband Communications for Public Safety Ramon Ferrús, Oriol Sallent, 2015-10-12 This book provides a timely and comprehensive overview of the introduction of LTE technology for PPDR communications It describes the operational scenarios and emerging multimedia and data centric applications in demand and discusses the main techno economic drivers that are believed to be pivotal for an efficient and cost effective delivery of mobile broadband PPDR communications The capabilities and features of the LTE standard for improved support of mission critical communications e g proximity services group communications are covered in detail Also different network implementation options to deliver mobile broadband PPDR communications services over dedicated or commercial LTE based networks are discussed including the applicability of the Mobile Virtual Network Operator MVNO model and other hybrid models Radio spectrum matters are also discussed in depth outlining spectrum needs and providing an outlook into allocated and candidate spectrum bands for PPDR communications and suitable dynamic spectrum sharing solutions in PPDR communications Explanations are accompanied by a vast collection of references that allow the more intrigued reader to gain further insight into the addressed topics

**Spectrum sensing techniques in cognitive radio** Joydeep Dutta, 2022-05-09 Document from the year 2022 in the subject Physics Technical Physics grade A language English abstract Cognitive Radio offers non interfering use of spectrum which requires three main tasks Spectrum Sensing Spectrum Analysis and Spectrum Allocation The aim of this study is to focus on spectrum sensing in cognitive radio which is a recently introduced technology in order to increase the spectrum efficiency Increasing efficiency of the spectrum usage is an urgent need as the number of wireless users is increasing rapidly Cognitive radio arises to be a good solution to spectral crowding problem by introducing the opportunistic usage of frequency bands that are not heavily occupied by licensed users Primary user since they cannot be utilized by users other Secondary user than the license owners at the moment Cognitive radio can sense the spectrum and detect the idle frequency bands thus secondary users can be allocated in those bands when primary users do not use those in

order to avoid any interference to primary user by secondary users Several Spectrum Sensing Methods proposed in the literature are theoretically analyzed and interpreted in the sense of advantages and drawbacks

**TV White Space Spectrum Technologies** Rashid Abdelhaleem Saeed, Stephen J. Shellhammer, 2016-04-19 Although sophisticated wireless radio technologies make it possible for unlicensed wireless devices to take advantage of un used broadcast TV spectra those looking to advance the field have lacked a book that covers cognitive radio in TV white spaces TVWS Filling this need TV White Space Spectrum Technologies Regulations Standards and Applications Annabel Z. Dodd, 2012 Telecom guide for business people and nontechnical professionals Updated for cloud services social media and advanced mobile networks *Cognitive Radios* Danijela Branislav Čabrić, 2007 [A Decision-theoretic Approach to Resource-constrained Wireless Networking](#) Yunxia Chen, 2007 [Journal of Communications and Networks](#) , 2009

*Space Law* Paul Stephen Dempsey, 2004 Brings together in a single collection all international and national space regulations and related materials of interest Although the United States was the most dominant nation during the early development of space law a growing number of nations have since contributed their national law to the field of space jurisprudence and increasingly non U S law has been added To reflect this development the title has been changed to Space law a title which more appropriately reflects the comprehensive content of the volumes [TV White Space Spectrum Technologies](#) Sa'īd Rāshid, Stephen Shellhammer, 2012 Although sophisticated wireless radio technologies make it possible for unlicensed wireless devices to take advantage of un used broadcast TV spectra those looking to advance the field have lacked a book that covers cognitive radio in TV white spaces TVWS Filling this need TV White Space Spectrum Technologies Regulations Standards and Applications explains how white space technology can be used to enable the additional spectrum access that is so badly needed Providing a comprehensive overview and analysis of the topics related to TVWS this forward looking reference contains contributions from key industry players standards developers and researchers from around the world in TV white space dynamic spectrum access and cognitive radio fields It supplies an extensive survey of new technologies applications regulations and open research areas in TVWS The book is organized in four parts Regulations and Profiles Covers regulations spectrum policies channelization and system requirements Standards Examines TVWS standards efforts in different standard developing organizations with emphasis on the IEEE 802 22 wireless network standard Coexistence Presents coexistence techniques between all potential TVWS standards technologies devices and service providers with emphasis on the Federal Communications Commission's FCC recent regulations and policies and IEEE 802 19 coexistence study group efforts Important Aspects Considers spectrum allocation use cases and security issues in the TVWS network This complete reference includes coverage of system requirements collaborative sensing spectrum sharing privacy and interoperability Suggesting a number of applications that can be deployed to provide new services to users including broadband Internet applications the book highlights potential business opportunities and addresses the deployment

challenges that are likely to arise *EDN*, 2008 Opportunistic Spectrum Sharing and White Space Access Oliver Holland, Hanna Bogucka, Arturas Medeisis, 2015-04-22 Details the paradigms of opportunistic spectrum sharing and white space access as effective means to satisfy increasing demand for high speed wireless communication and for novel wireless communication applications This book addresses opportunistic spectrum sharing and white space access being particularly mindful of practical considerations and solutions In Part I spectrum sharing implementation issues are considered in terms of hardware platforms and software architectures for realization of flexible and spectrally agile transceivers Part II addresses practical mechanisms supporting spectrum sharing including spectrum sensing for opportunistic spectrum access machine learning and decision making capabilities aggregation of spectrum opportunities and spectrally agile radio waveforms Part III presents the ongoing work on policy and regulation for efficient and reliable spectrum sharing including major recent steps forward in TV White Space TVWS regulation and associated geolocation database approaches policy management aspects and novel licensing schemes supporting spectrum sharing In Part IV business and economic aspects of spectrum sharing are considered including spectrum value modeling discussion of issues around disruptive innovation that are pertinent to opportunistic spectrum sharing and white space access and business benefits assessment of the novel spectrum sharing regulatory proposal Licensed Shared Access Part V discusses deployments of opportunistic spectrum sharing and white space access solutions in practice including work on TVWS system implementations standardization activities and development and testing of systems according to the standards Discusses aspects of pioneering standards such as the IEEE 802.22 Wi-Fi standard the IEEE 802.11af White-Fi standard the IEEE Dynamic Spectrum Access Networks Standards Committee standards and the ETSI Reconfiguration Radio Systems standards Investigates regulatory and regulatory linked solutions assisting opportunistic spectrum sharing and white space access including geo location database approaches and licensing enhancements Covers the pricing and value of spectrum the economic effects and potentials of such technologies and provides detailed business assessments of some particularly innovative regulatory proposals The flexible and efficient use of radio frequencies is necessary to cater for the increasing data traffic demand worldwide This book addresses this necessity through its extensive coverage of opportunistic spectrum sharing and white space access solutions Opportunistic Spectrum Sharing and White Space Access: The Practical Reality is a great resource for telecommunication engineers researchers and students **Communications Regulation**, 2003 **TV White Space Spectrum Technologies** Rashid Saeed, Stephen Shellhammer, 2016 Although sophisticated wireless radio technologies make it possible for unlicensed wireless devices to take advantage of unused broadcast TV spectra those looking to advance the field have lacked a book that covers cognitive radio in TV white spaces TVWS Filling this need TV White Space Spectrum Technologies: Regulations, Standards, and Applications explains how white space technology can be used to enable the additional spectrum access that is so badly needed Providing a comprehensive overview and analysis of the topics related to TVWS this forward looking

reference contains contributions from key industry players standards developers and researchers from around the world in TV white space dynamic spectrum access and cognitive radio fields It supplies an extensive survey of new technologies applications regulations and open research areas in TVWS The book is organized in four parts Regulations and Profiles Covers regulations spectrum policies channelization and system requirements Standards Examines TVWS standards efforts in different standard developing organizations with emphasis on the IEEE 802 22 wireless network standard Coexistence Presents coexistence techniques between all potential TVWS standards technologies devices and service providers with emphasis on the Federal Communications Commission s FCC recent regulations and policies and IEEE 802 19 coexistence study group efforts Important Aspects Considers spectrum allocation use cases and security issues in the TVWS network This complete reference includes coverage of system requirements collaborative sensing spectrum sharing privacy and interoperability Suggesting a number of applications that can be deployed to provide new services to users including broadband Internet applications the book highlights potential business opportunities and addresses the deployment challenges that are likely to arise *Cognitive Radio Technology* Bruce A. Fette, 2006-08-08 Publisher description

*Wireless Crash Course : Third Edition* Paul Bedell, 2012-09-05 GET A SOLID GROUNDING IN CUTTING EDGE CELLULAR TECHNOLOGY Gain an overall understanding of the constantly evolving spectrum of wireless technologies devices and standards Completely revised throughout Wireless Crash Course Third Edition offers straightforward explanations of all aspects of cellular networks and provides clear information on cellular design and operational concepts Learn the fundamentals of cell base stations radio frequency RF technologies microwave radio systems and 3G and 4G LTE technologies and discover practical new applications and mobile data technologies Examples photos and illustrations from the field are included in this practical guide COVERAGE INCLUDES Cellular radio history and development The cell base station Basic cellular network design and operation Radio frequency RF operation and technologies Antennas RF power and sectorization Distributed antenna systems DAS Base station elements and RF signal flow 2G and 3G digital wireless technologies Cellular generations overview 4G and Long Term Evolution LTE Microwave radio systems Cell site to MTSO network connections The MTSO core network and network operations center NOC Personal communication services PCS and current marketplace Towers Capacity management propagation models and drive testing Interconnection to the landline public switched telephone network PSTN Roaming and intercarrier networking Mobile data technologies The business side of wireless Mobile applications

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