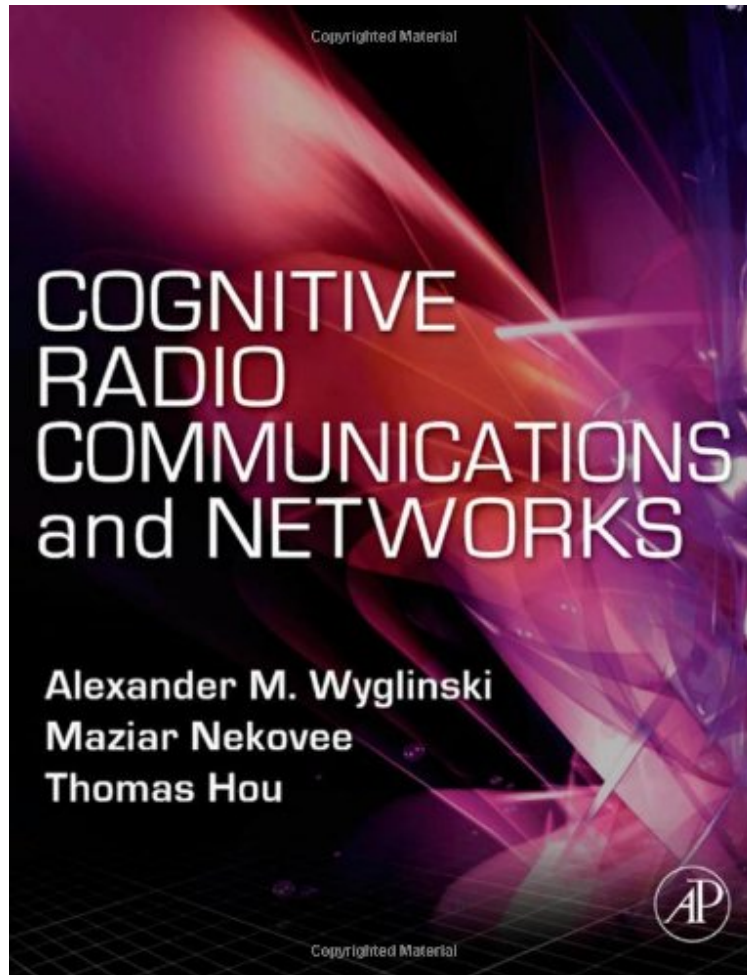


Cognitive Radio Communications and Networks: Principles and Practice

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seamless connectivity. The reader will gain understanding regarding issues in spectrum sensing, spectrum analysis and spectrum decisions. This text should be useful to engineers, radio technologists, radiographers and makers of public policy. This area is interesting because cognitive radio, which learns and adapts to utilize the environment, is on the threshold of changing our lives in ways that we cannot yet predict, both good and not necessarily good. And if that doesn't grab somebody, employment prospects probably will. According to the Occupational Outlook Handbook (published by the U.S. Department of Labor - and highly respected), "Employment is expected to grow faster than average." This is an area that can be entered into without the usual employment barriers, an area with multiple applications in industry. 1 of 1 people found the following review helpful. hard problems By W Boudville For starters, the book makes clear how Cognitive Radio [CR] differs from Software Defined Radio [SDR]. The latter has received much play since it was first mooted in the mid 90s. It refers to doing as much of the transmission and receiving processing in software in a radio as possible. CR, on the other hand, strictly has nothing to do with this. Instead, CR's main job is to use existing wireless spectrum in a dynamic manner, that leads to more efficient overall usage. The book points out that while spectrum is traditionally allocated to various types of users, in practice, in a given region, a given range of reserved spectrum might be unused over several time intervals. This observation of often low spectral usage is the main motivation for CR. It suggests that CR could ideally involve artificial intelligence, with an awareness by the radio of its location, as well as an ability to detect wireless usage across some range of wavelengths. But the heart of the book is a good indicator of the implications. As the reader will note, at the very least, there arises the possibility and the need for cooperative behaviour between various radios in a region. So that they can communicate with each other dynamically across a spectral range. This also involves being aware of any primary user. This is a user who has priority in that spectrum, but who might from time to time not be using it. The CR users are, in general, secondary users, who need to have lower power levels than a primary user, so as not to interfere. Plus, a CR user might want or need to detect when the primary user is active, and turn off or defer its usage till the primary user ceases. In the text, the best introduction seems to be Chapter 13, "Defining CR: History, Applications and Related Concepts". It discusses these ideas in a readily understandable level. Of the other chapters, Chapter 15 on CR security is also well worth a gander. If CR users are deployed, then the possibility arises that some might be rogues. The simplest scenario is where a rogue CR pretends to be a primary user, in order to force other legitimate CR users to vacate the spectrum that the rogue is using or wants to use. The chapter shows that at the very least, radio researchers are trying to think one step ahead and anticipate the existence of bad players. Unlike the field of email, where the protocols were naively defined in the 80s, and nobody expected any incentive for spammers to arise. The text fittingly ends with a chapter by Joseph Mitola, He introduced the ideas of SDR and CR and is perhaps the biggest name in this field. His remarks are worth noting. He sees a trend from Quality of Service to Quality of Information, where a CR is able to customise its actions to its user's needs and location. The chapter notes that CR is more than just better spectrum usage, which is seen as a means to an end. However in practice, as far as much current CR work is concerned, there is often an emphasis on the former. Several chapters show this; a reflection of the cost of spectrum.

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, RD 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.

Wylinksis Cognitive Radio Communications and Networks reviewed in the German-language magazine HF-Praxis