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Autore	Biglieri Ezio
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design; 1.6.1 Global control plane; 1.6.2 Spectrum servers, spectrum brokers, and network information servers; 1.6.3 Security aspects of cognitive radio; 1.7 Hardware and system design considerations; 1.7.1 Design tradeoffs in usage scenarios; 1.7.2 Antenna design in cognitive radio systems; 1.7.3 Analog-to-digital converters; 1.7.4 Wideband channels and noncontiguous transmission
1.8 Spectrum coexistence in cognitive radio networks1.8.1 Spectrum pooling and bandwidth exchange; 1.8.2 Cross-layer scheduling in cognitive radio networks; 1.9 Prototyping; 1.10 Standardization activity in cognitive radio; 1.11 Organization of this book; References; References; 2 Capacity of cognitive radio networks; 2.1 Introduction; 2.2 Cognitive radio network paradigms; 2.2.1 Underlay paradigm; 2.2.2 Overlay paradigm; 2.2.3 Interweave paradigm; 2.2.4 Comparison of cognitive radio paradigms; 2.3 Fundamental performance limits of wireless networks; 2.3.1 Performance metrics
2.3.2 Mathematical definition of capacity2.3.3 Capacity region of wireless networks; 2.4 Interference channels without cognition; 2.4.1 K-user interference channels; 2.4.2 Two-user interference channel capacity; 2.4.3 Interference channel techniques for cognitive radios; 2.5 Underlay cognitive radio networks; 2.5.1 Underlay capacity region; 2.5.2 Capacity results for specific scenarios; 2.6 Interweave cognitive radio networks; 2.6.1 Shannon capacity; 2.6.2 Random switch model for secondary channels; 2.6.3 Scaling laws for interweave networks; 2.7 Overlay cognitive radio networks
2.7.1 Cognitive encoder for the two-user overlay channel2.7.2 Capacity results; 2.7.3 K-user overlay networks; 2.8 Summary; 2.9 Further reading; References; 3 Propagation issues for cognitive radio; 3.1 Introduction; 3.1.1 Propagation in the cognitive radio bands; 3.1.2 Impact of propagation on sensing; 3.1.3 Impact of propagation on transmission; 3.1.4 Outline of the chapter; 3.2 Generic channel response; 3.3 Introduction to path loss; 3.3.1 Free-space path loss; 3.3.2 Path loss in CR scenarios; 3.4 Path loss models for wireless channels; 3.4.1 General formulation; 3.4.2 Shadow fading, S
3.4.3 Median path loss, PLmed

Sommario/riassunto

Widely regarded as one of the most promising emerging technologies for driving the future development of wireless communications, cognitive radio has the potential to mitigate the problem of increasing radio spectrum scarcity through dynamic spectrum allocation. Drawing on fundamental elements of information theory, network theory, propagation, optimisation and signal processing, a team of leading experts present a systematic treatment of the core physical and networking principles of cognitive radio and explore key design considerations for the development of new cognitive radio systems. Containing all the underlying principles you need to develop practical applications in cognitive radio, this book is an essential reference for students, researchers and practitioners alike in the field of wireless communications and signal processing.