Cognitive radio technology provides automatic adjustments in transmission and reception parameters to communicate effectively among the nodes of the communication network with minimum interference. The parameter modification is based upon many factors in the external and internal radio environment such as radio frequency, user behavior, and network state. Cognitive radio networks have a promising future and have excellent applications of wireless networks. In this context, this book can be considered as a platform to introduce readers to the next generation wireless networks and their applications. The contents of the book will provide the readers a firm understanding of the fundamental concepts of cognitive radios, wireless networks, mobile ad hoc networks, security issues, protocols at different layers (MAC layer, network layer and transport layers), simulations and performance evaluation, applications of cognitive radios, and efficient use of the spectrum using various models including neural networks, genetic algorithms, and game theory models.

The mission of this book is to integrate both research as well as education and present details about one of the promising technologies of the next generation wireless networks (cognitive radio networks and its applications) in such a manner that it can be used both as a textbook for undergraduate and graduate courses, as well as a good reference book that guides researchers to solve complex problems and discusses future challenges for open research problems in this area. This is the first such comprehensive book on cognitive radio networks and its applications that could be useful for both students and researchers, as well as for industry practitioners and business professionals.

The first chapter of the book provides a comprehensive introduction to cognitive radio networks. The rest of the chapters are organized into three sections:

**Section 1:** Spectrum Sensing.
**Section 2:** Architecture and Security Issues.
**Section 3:** Design and Applications for Cellular and Ad Hoc Networks.

The chapters in the different sections have been organized systematically such that the readers do not get lost with the complexity of the materials presented in the individual chapters. There will be continuity among the chapters and even though each chapter has been contributed by different authors, the editors have ensured that the chapters are written in such a way that the flow of contents across the chapters is more logical and easy to understand. The book can be used as a prescribed book for an advanced undergraduate elective course or a Masters level graduate course on cognitive radio networks: We suggest Chapters 1, 2, 6, 7, 8, 11, 14 and 15 for this purpose. With the fundamental knowledge gained from the above-mentioned chapters, the remaining chapters of the book can be used as good case studies for a student to pursue further research on cognitive radio networks and their applications to ad hoc networks.