Foreword

The development of portable devices and wireless networks has created an increasing demand for radio spectrum channels. This situation has generated a search for more efficient schemes to manage the radio spectrum. Currently, static allocation of frequency bands is the most prevalent way of spectrum management. This strategy has become inefficient, since recent spectrum usage surveys in several locations show that the radio spectrum has been underutilized. Therefore, there is a need for strategies to dynamically manage the access to the radio spectrum. These strategies should take advantage of unused channels without affecting incumbent systems.

A more efficient use of this resource can revolutionize the wireless and mobile communications arena, which will produce not only a technological but also an economic impact on diverse areas that depend on wireless connectivity, such as commerce, education, industry, among others. New technologies that are starving for more spectrum channels will flourish, and operating prices will become more affordable. New wireless applications in markets not currently attractive to conventional operators will also become viable, consequently impacting societies and communities that otherwise would not have that opportunity.

This timely handbook is a collection of current cutting-edge research techniques, trends, and practical applications in the field of radio spectrum. In the book’s chapters, you will find descriptions of state-of-the art research projects on the many aspects of cognitive radio and radio spectrum, such as radio spectrum sensing, access, management, security, models, and applications.

This handbook will be a valuable addition to academic and research libraries and hopefully a solid resource for engineers, researchers, scientists, students, and educators involved in information technology, computer science, electrical engineering, and mechanical engineering. It will also be useful reading for anyone interested in learning more about the growing field of radio spectrum management using cognitive radio and software defined radio technologies.

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S. Hossein Mousavinezhad, PhD, Professor, and past Chair, Electrical Engineering, College of Science and Engineering, Idaho State University, is an active member of IEEE and ASEE, having chaired sessions in national/international and regional conferences. He is an ABET Program Evaluator (PEV) for Electrical Engineering and Computer Engineering. He is the Founding General Chair of the IEEE International Electro Information Technology Conferences, www.eit-conference.org. He is IEEE Education Society Vice President and Van Valkenburg Early Career Teaching Award Chair. He was the ECE Program Chair of the 2002 ASEE Annual Conference, Montreal, Quebec, June 16-19 and serves on the division’s ExComm. Professor Mousavinezhad received Michigan State University ECE Department’s Distinguished Alumni Award, May 2009, ASEE ECE Division’s 2007 Meritorious Service Award, ASEE/NCS Distinguished Service Award, April 6, 2002, for significant and sustained leadership. In 2010 and 1994, he received ASEE PNW Section and Zone II Outstanding Campus Representative Awards, respectively. He is also a Senior Member of IEEE, has been a reviewer for IEEE Transactions. His teaching and research interests include Digital Signal Processing (DSP) and Bioelectromagnetics. He has been a reviewer for engineering textbooks including DSP First by McClellan, Schafer, and Yoder, published by Prentice Hall, 1998, and Signal Processing First, Prentice Hall, 2003. He is head of WECEDHA. Hossein is a member of the Editorial Advisory Board of the international research journal Integrated Computer-Aided Engineering. He has published a book chapter, IGI Global. Dr. Mousavinezhad was part of the group promoting economic development in Michigan, MEDC, and was responsible for bringing Innovation Forums to Western Michigan University, January 21, 1999. These forums were a series of meetings and seminars focused on university and industry collaboration initiated by the Michigan Governor. The Forums were sponsored by the Kellogg and Dow Foundations and were designed for finding strategies to create more Hi-Tech jobs in the state. As part of his responsibilities as Professor and Chair of the ECE Department at Western Michigan University, he prepared ABET reports for the two programs offered by the Department (EE and CpE). The graduate programs offered by the ECE Department grew and he was responsible for initiating the first MSEE program in 1987. A new ECE PhD program was offered starting Fall 2002. In addition to administrative responsibilities, he has managed to teach undergraduate/graduate courses in his research area of Digital Signal Processing. He is co-PIs for DSP and globalization and Power/Energy grants funded by NSF. In addition, he received equipment grants from Texas Instruments in support of his teaching/research activities in the DSP field. During May 2009, he received Michigan State University’s Electrical and Computer Engineering John D. Ryder Distinguished Alumni Award for contributions in furthering the mission of the department—which is to provide undergraduate and graduate education characterized by quality, access, and relevance, and to develop distinctive research programs in electro-sciences, systems, and computer engineering, with the promise of sustained excellence as measured in scholarship, external investment, reputation, and impact.