

Preface

The major expectation from the fourth generation (4G) of wireless communication networks is to be able to handle much higher data rates, which will be in the range of 1Gb in the WLAN environment and 100 Mb in cellular networks. A user, with a large range of mobility, will access the network and will be able to seamlessly reconnect to different networks, even within the same session. The spectra allocation is expected to be more flexible, and even flexible spectra sharing among the different subnetworks is anticipated. In such a ‘composite radio environment’ (CRE), there will be a need for more adaptive and reconfigurable solutions on all layers in the network. For this reason the first part of the book deals with adaptive link, MAC, network and TCP layers including a chapter on crosslayer optimization. This is followed by chapters on mobility management and adaptive radio resource management. The composite radio environment will include presence of WLAN, cellular mobile networks, digital video broadcasting, satellite, mobile *ad hoc* and sensor networks.

Two additional chapters on *ad hoc* and sensor networks should help the reader understand the main problems and available solutions in these fields. The above chapters are followed by a chapter on security, which is a very important segment of wireless networks.

Within the more advanced solutions, the chapter on active networks covers topics like programmable networks, reference models, evolution to 4G wireless networks, 4G mobile network architecture, cognitive packet networks, the random neural networks based algorithms, game theory models in cognitive radio networks, cognitive radio networks as a game and biologically inspired networks, including bionet architecture.

Among other topics, the chapter on networks management includes self-organization in 4G networks, mobile agent-based network management, mobile agent platform, mobile agents in multioperator networks, integration of routing algorithm and mobile agents and *ad hoc* network management.

Network information theory has become an important segment of the research, and the chapter covering this topic includes effective capacity of advanced cellular network, capacity of *ad hoc* networks, information theory and network architectures, cooperative transmission in wireless multihop *ad hoc* networks, network coding, capacity of wireless networks using

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MIMO technology and capacity of sensor networks with many-to-one transmissions. Two additional chapters, energy efficient wireless networks and QoS management, are also included in the book.

As an extra resource a significant amount of material is available on the book's companion website at www.wiley.com/go/glisc in the form of three comprehensive appendices: Appendix A provides a review of the protocol stacks for the most important existing wireless networks, Appendix B presents a comprehensive review of results for the MAC layer and Appendix C provides an introduction to queueing theory.

The material included in this book is a result of the collective effort of researchers across the globe. Whenever appropriate, the reference to the original work, measurement results or diagrams is made. The lists of references includes approximately 2000 titles.

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