

Preface

Cyber-Physical Systems (CPS) is one of the most promising directions in the field of information and communication technologies. It has attracted intensive attention and participation from both industry and from academia in the past few years. CPS are integrations of computation, networking, and physical dynamics, in which embedded devices are networked to sense, monitor, and control the physical world. This radical transformation from stand-alone devices to networked systems facilitates various innovative applications, not only on a large scale but also for personal and micro-level use. To fully explore the potential of CPS, however, various applications including Wireless Body Area Networks (WBANs) require high Quality of Services (QoS) in terms of timeliness, reliability, energy efficiency, and other metrics. Medium Access Control (MAC) layer plays a critical role in meeting these requirements. For instance, reliability can be achieved with enhanced scheduling schemes, appropriate channel access protocols, improved schemes for retransmission, and optimal packet size at MAC layer. The major objective of this book is to examine the challenges and issues at MAC layer with an in-depth analysis of state-of-the-art protocols based on IEEE 802.15.4. In addition, this book also presents the design and evaluation of an adaptive MAC protocol for medical CPS, which exemplifies how to achieve real-time and reliable communications in CPS by exploiting IEEE 802.15.4-based MAC protocols. This book will be of interest to researchers, practitioners, and students to better understand the QoS requirements of CPS at MAC sublayer.

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