

Preface

Radio frequency identification (RFID) and Wireless sensor networks (WSN) are the two key wireless technologies that have diversified applications in the present and the upcoming systems in this area. RFID is a wireless automated recognition technology which is primarily used to recognize objects or to follow their position without providing any sign about the physical form of the substance. On the other hand, WSN not only offers information about the state of the substance and environment but also enables multi-hop wireless communications. The integration of the promising technologies of RFID and WSN increases their overall functionality and capability and gives a novel outlook to a wide variety of useful applications. As per the literature survey, a need of the simulator for the integrated environment of RFID and WSN was felt and thus presented in this book with its true perspective.

The resource-constrained nature of sensor network impelled the respective research community to address various challenges in its design and operations that degrade its performance. On the other hand, protocols and varying number of applications having different limitations in their nature make it further challenging for such resource-constrained networks to attain application expectations. These challenges appear at various layers of OSI model starting from physical layer up to application layer. At routing-layer, routing protocols are mainly concerned with sensor network operation. Various performance parameters are applied to smart node in order to analyze and optimize querying protocols.

This book is focused on identifying the performance challenges of WSN and RFID analyzing their impact on the performance of routing protocols. For this purpose, a thorough literature survey is performed to identify the issues affecting the routing protocols performance. Then to validate the impact of identified challenges from the literature, a mathematical model is presented to calculate the end-to-end delays of a routing protocol ACQUIRE and a comparison is provided between two routing protocols (ACQUIRE and DIRECTED DIFFUSION) for evaluation. On the basis of achieved results and the literature review, recommendations are made for better selection of protocol regarding the application nature in the presence of considered challenges. In addition, this book also covers

a proposed simulator that integrates both RFID and WSN technologies. Therefore, the manuscript is divided into two major parts: integrated architecture of smart node and power-optimized protocol for query and information interchange. An application scenario has been run in order to test the functionality of RFID and sensor networks. Further, for better understanding, an integrated RFID tag with a sensor node has been communicated with the base station/end system.

This book consists of six chapters. Chapter 1 introduces the RFID and WSN technologies, their evolution, and the main differences between them.

Chapter 2 elaborates the two technologies in terms of their components, memory hierarchy, characteristics of routing protocols, and their techniques.

Chapter 3 highlights the challenges and issues in the area of RFID and WSN. It also underlines the contemporary research carried out in this field and what is expected in the near future.

Chapter 4 is all about the delay model for ACQUIRE, its energy estimation, and analysis.

Chapter 5 explains the simulator for smart node in which proposed solutions to existing challenges are addressed with reasonable results.

Finally, Chap. 6 is based on the simulation-based case study and analysis of network model and simulation model. Analysis of case study simulation has been carried out, and subsequently, recommendations are made on the basis of simulated results.

RFID-WSN Integrated Architecture for Energy and Delay-Aware Routing

A Simulation Approach

Ahmed, J.; Siyal, M.Y.; Tayyab, M.; Nawaz, M.

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