Preface

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Biographical notes: Xiuzhen (Susan) Cheng is an Assistant Professor at the Department of Computer Science, The George Washington University. She received her MS and PhD Degrees in Computer Science from the University of Minnesota – Twin Cities in 2000 and 2002, respectively. Her current research interests include wireless and mobile computing, sensor networking, wireless and mobile security, and algorithm design and analysis. She worked as a Program Director in the National Science Foundation for six months in 2006. She received the NSF CAREER Award in 2004.

Wei Wayne Li is a Professor of Computer Science at Texas Southern University, Houston, USA. He served as a tenured faculty and tenure track faculty in the University of Toledo and University of Louisiana at Lafayette before. He was once selected as the Endowed Chair Professor in Bell South Mobility/BORSF in Telecommunications at ULL, and was also a recipient of US Air Force Summer Faculty Fellowship. His research interests are in the design and analysis of various wireless and mobile networks. He has published over 60 peer-reviewed journal papers and four professional books.

Min Song received his PhD in Computer Science from the University of Toledo in 2001. His research interests include protocols design and performance analysis of mobile ad hoc networks and sensor networks, network security, and wireless communications. He joined Old Dominion University in summer 2002, and he is presently an Associate Professor in the Department of Electrical and Computer Engineering. He is the recipient of NSF CAREER award. He received early tenure and promotion in summer 2007. He is the Founder and Director of Wireless Communications and Networking Laboratory. He is an IEEE Senior Member.

Taieb Znati received a PhD Degree in Computer Science from Michigan State University in 1988 and a MS Degree from Purdue University in 1984. He is a Professor in the Department of Computer Science at the University of Pittsburgh. Currently, he serves as the Director of the Computer and Network Systems Division at the National Science Foundation (NSF). He also served as a Senior Program Director in the Advanced Networking Infrastructure and Research Division, and as the Committee Chairperson of the Information Technology Research Program at NSF. His research interests are on network science and engineering, with the focus on the design of scalable, robust, and reliable network architectures and protocols.

Recent advances in electronic and computer technologies have paved the way for the proliferation of ubiquitous wireless networks. Fast deployment of these communication networks for the users is preferred under many situations. Topics that are related to ad hoc and sensor networking, mobile computing, and system performance evaluation have been extensively studied recently. Potential applications of these networks include search and rescue, smart homes, battlefield surveillance, environment monitoring and control, etc. The goals of this special issue are to publish the most recent results in the development of system aspects of wireless networks and provide a forum for researchers to discuss and express their views on the current trends and state-of-the-art solutions addressing various issues in wireless networks.

The first paper, by Yu, Mokhtar and Merabti, describes a self-organised lightweight middleware architecture for wireless sensor networks. The objective of this middleware is to provide standard network management services for diverse sensing applications to maintain their service quality without much human intervention. The high-level abstraction of this middleware hides away the details of management operations from sensor applications. This middleware can also adapt and reconfigure its functionality autonomously to cope with changes of node conditions, resources or network environment. In addition, the authors propose an alternate power management solution to achieve energy efficiency via controlling the management performance of sensor nodes. This power management approach reduces the energy consumption of a sensor node without frequent reconfiguration of network management structure.

The second paper, by Cardei, Pavan and Bettati, proposes an architecture for end-to-end statistical delay guarantees in mobile wireless optical networks. The architecture uses an admission control technique that limits link utilisation for real-time traffic flows in order to reduce queuing delay. The admission control uses a 2-phase commit protocol for handling Quality of Service (QoS) negotiation and adaptation. A delay model using the concept of virtual traffic accommodates variations in link capacity variations as well as transient outages. The papers also presents a mechanism for deploying QoS-enabled dependable TCP services in this type of networks.

The third paper, by Xu, Hong and Jiang, studies the bounds of lifetime for Time Hopping Impulse Radio Ultra Wide Band (TH-IR UWB) wireless sensor networks. Given n sensor nodes are randomly deployed, the results indicate that the lifetime of cluster-based network is at least $\sqrt{n}/(\log n)^{\alpha-1/2}$ times longer than that of non-cluster-based TH-IR UWB wireless sensor networks. The bounds also reveal the network lifetime increases with node density; thus a large-scale dense cluster-based TH-IR UWB wireless sensor network is more practical.

The fourth paper, by Bellaachia and Weerasinghe, analyses the performance of four routing protocols in wireless sensor networks. In the first protocol, DIRECT, all sensor nodes directly send its information to the base station. In the second protocol, LEACH, sensor nodes send data directly to the cluster head and the cluster head then sends the data to the base station. The third protocol, PEGASIS, is similar to LEACH but the nodes transmit through other nodes that are closer to the base station, rather than directly transmitting to the cluster head. The fourth protocol, HIT-M, is a hybrid of LEACH and PEGASIS. It uses the chain like structure used in PEGASIS to reduce energy costs. Sensor networks were simulated using TOSSIM simulator. Several experiments were conducted to analyse the performance of these protocols. The experimental results show that HIT-M outperforms the other three protocols while PEGASIS has better performance than LEACH and DIRECT.

The fifth paper, by Chuah and Yang, evaluates the performance of a node density-based adaptive routing scheme for disruption tolerant networks. First, the authors design a Node-Density Based Adaptive Routing (NDBAR) scheme that allows regular nodes to volunteer as message ferries when there are very few nodes around them to ensure the feasibility of continued communications. Then they conduct simulation study to verify the design. Simulation results indicate that the NDBAR scheme can achieve the highest delivery ratio compared to other approaches in sparse ad hoc networks that are prone to frequent disruptions.

The sixth paper, by Zhang and Salari, presents the utilisation analysis and comparison for a homogeneous wireless multimedia system with both priority and non-priority calls. The authors investigate how the utilisation depends on the channel allocation schemes and whether a buffer space affects the performance of the system in terms of the utilisation of the system. Simulation results show that a buffer space does not affect the utilisation of the system. Further, they observe that when the traffic load is light or moderate, the fixed channel allocation scheme achieves the best utilisation, while the dynamic channel allocation scheme achieves the worst and the hybrid channel allocation performs moderately. For heavy traffic, there is not significant difference in system utilisation among these allocation schemes.

The final paper, by Lee, Kimura and Ebihara, proposes an intelligent mobility protocol benefiting from Cellular IP which integrates cellular systems and IP technology in an efficient way. The proposed scheme enables L2 and L3 handovers to be performed in parallel by utilising power-save mode of IEEE 802.11 in order to speed up the entire handover procedure. Analytical and simulation studies on the handover latency and packet delivery cost have verified that the proposed scheme demonstrates much better performance over other protocols.

In closing, we would like to thank all the reviewers and authors for their contribution to this special issue. We would also like to thank EIC of the *International Journal of Ad Hoc and Ubiquitous Computing*, Professor Chao and Chen, for offering us the opportunity to edit this special issue. For more information about this special issue, please visit http://www.inderscience.com/index.php.