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## Foreword

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Wen-Hwa Liao received the MS and PhD Degrees in Computer Science and Information Engineering from National Central University, Jhongli, Taiwan, in 1992 and 2002, respectively. He was a Visiting Scholar with the University of Louisiana, Lafayette, from October 2001 to May 2002. He joined the Faculty of the Department of Information Management, Tatung University, Taipei, Taiwan, as an Assistant Professor in 2004. He is currently a Full Professor with the Department of Information Management, Tatung University. His current research interests include wireless sensor networks, Ad Hoc wireless networks, WiMAX broadband technologies, and cloud computing. He served as an Associate Guest Editor of the *International Journal of Ad Hoc and Ubiquitous Computing* (IJAHUC, 2011–2014) and an Editorial Board Member of the *International Journal of Distributed Sensor Networks*. He is a member of the IEEE Computer Society and Communication Society.

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Wireless communications and ubiquitous computing in ad-hoc networks have received considerable attention in literature. In general, wireless sensor networks, vehicular ad-hoc networks as well as wireless social networks can be treated as ad-hoc networks with different constraints. The ubiquitous computing developed based on ad-hoc networks further supports human for information access at any time and any place. However, ubiquitous computing in ad-hoc networks faces various challenges like network

scalability, energy limitation, inaccurate location information, interoperability, connectivity and security. Emerging technologies that improve the efficiency of ubiquitous computing include distributed computing, embedded system, mobile computing, wearable computers, and so forth. This special issue is a collection of the selected outstanding papers devoted to the original and high quality contributions such as work in progress and experimental and theoretical research in emerging

technologies for ubiquitous communications, computing and applications in ad-hoc networks. Each paper submitted to the *International Journal of Ad Hoc and Ubiquitous Computing (IJAHUC)* was rigorously reviewed by at least three reviewers in its corresponding research area. Based on the reviews, finally, 9 of 43 papers were recommended to be included in the special issue.

Nadeem Javaid, Ayesha Bibi, Saad Noor Mohammad, Zahoor Ali Khan, and Nabil Alrajeh model the basic and enhanced parameters of reactive routing protocols, including AODV, DSR, and DYMO. By tuning of the route discovery and route maintenance parameters, this paper can efficiently reduce the broadcast cost and routing latencies. For analytical comparison of selected protocols, this paper simulates default and enhanced versions of these protocols with three performance metrics, including throughput, normalised routing load, and end-to-end delay using NS-2. Finally, simulation results show the high performance of modified protocols as compared to default ones.

Jang-Ping Sheu, Chih-Yin Lee, and Chuang Ma propose a network coding with limited buffer routing protocol based on two network models: single packet network model and multiple packets network model. When a buffer of a node is full, two packets in the buffer are chosen randomly and encoded linearly together into a packet to save buffer space, improving the performance in many-to-one communications. This paper also applies the network coding to the packets that are from multiple sources which are generated in the same period of time. Moreover, in the transmitting stage of the proposed protocol, the authors propose two efficient approaches which can enhance the efficiency of information exchange and packets transmission in communications of delay tolerant networks.

Dariush Zolfaghari, Hassan Taheri, Amir Hossein Rezaie, and Mohsen Rezaei design an efficient routing algorithm based on the multi-hop neighbour information to overcome the considerable noise in industrial environments. The proposed routing algorithm (RRMI) is an on-demand algorithm that performs the precautionary routing with the least packet loss ratio. RRMI has a balancing energy scheme as well as a significant reduction in the retransmission number in an ARQ scheme that leads to improvement in the lifetime of the network.

Fei Song, Yige Zhang, Zhaoxu An, Huachun Zhou, and Ilsun You propose several analytical schemes to study the correlation of parameters inside four tuples, including source IP, source port, destination IP, and destination port. They explore the connection characteristics based on the real traces extracted in packet level from a campus access network. No sampling method is added to maintain the full information. The mutual relationships of parameters within four tuples are analysed in detail. Two key properties of tuples, i.e., duration time and packets volume, are also investigated in depth with the consideration of service type.

Control messages produced in the gateway discovery process degrade the performance of hybrid mobile ad hoc networks. Thus, Huaqiang Xu, Xiaojun Cai, Lei Ju, and Zhiping Jia propose a novel adaptive gateway discovery scheme to improve the performance. In the scheme, active regions, which are delineated by gateway pheromone, are defined to optimise the propagation of control messages. To adapt to dynamic network topology, active regions are adjusted periodically to keep their availability by adaptive maintenance operations. Moreover, a link robustness evaluation model based on signal strength is integrated into the scheme to help build stable routes. Finally, the control overhead can be further reduced because the messages generated due to the link breakages can be avoided.

Chih-Cheng Tseng, Kuo-Chang Ting, Hwang-Cheng Wang, Fang-Chang Kuo, and Li-Hsun Chang first explain the fact that the multi-hop transmission is better than the long-distance transmission in terms of the received power and the total consumed energy. After that, this paper applies the concept of relative neighbourhood graph (RNG) to convert the original physical network to an RNG-based network so that the connecting link between nodes is short and the energy required for transmission is reduced. Then, a Green Clustering Algorithm (GCA) is proposed to reorganise the RNG-based network into a clustered architecture in which the number of control messages is further reduced. Moreover, a first-order energy consumption model is applied to analyse the energy consumption in exchanging control messages and transmitting/receiving data packets. Finally, extensive experiments have been conducted to evaluate the effectiveness of the proposed scheme in different scenarios. The results show that the proposed scheme outperforms the existing gateway discovery mechanisms especially in terms of control overhead reduction.

Yu-Feng Hsu and Chih-Lin Hu exploit the erasure coding-based model that has recently attracted lots of research attentions from the aspect of coding-based message forwarding in intermittently connected networks. The contribution of this research effort provides several new observations and examinations regarding the usage of considerable factors in erasure coding, including the number of divided data blocks for an original message, the number of coded blocks by replication, and the node density in networks. The positive effect of using erasure coding-based routing is more prominent for the case of multiple destinations in contrast with the case of a single destination.

Hung-Chin Jang and Pei-Hsuan Lee employ social network analysis techniques to analyse the relationship among users to timely select appropriate node for data forwarding. The proposed Ego-Centric Social Network Routing (ECSNR) stems from the concept of ego network. ECSNR considers those neighbour nodes of either social aware or non-social aware nodes within its communication range for data forwarding. ECSNR efficiently uses degree centrality, betweenness centrality,

interest similarity, and friend diversity to accelerate data transmission and enhance successful data delivery.

Lun-Ping Hung proposes a mechanism that includes a hybrid algorithm combining location fingerprint and k-nearest neighbour (KNN) algorithm and active RFID using RSSI transmission method to build a safer rooming-in environment. RFID technology is used in providing a seamlessly ubiquitous and constant medical care. This mechanism can effectively avoid the situation, like a stolen or switched baby, and be up to the standard certified by Baby-Friendly Hospital Initiative (BFHI).

We believe that, in all cases, the selected papers are definitely important ones for this special issue on Emerging Technologies for Ubiquitous Communications, Computing and Applications in Ad-hoc Networks. We would like to express our sincere gratitude to everyone who has contributed to this special issue including the authors, the reviewers, the Editor-in-Chief Professor Yuh-Shyan Chen. Without their help, this special issue would not be possible.