Editorial

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Biographical notes: Damla Turgut is an Associate Professor at the Department of Electrical Engineering and Computer Science of University of Central Florida. She received her BS, MS, and PhD degrees from the Computer Science and Engineering Department of University of Texas at Arlington. Her research interests include ad hoc and sensor networks, with considerations of stealth and value of information. She is also interested in specific applications such as urban sensing, human mobility models, intruder tracking and underwater sensor networks. She serves on the editorial boards of *IEEE TPDS*, *Journal of Ad Hoc Networks* and served as TPC Co-Chair of IEEE LCN'12.

Chun Tung Chou is an Associate Professor at the School of Computer Science and Engineering, University of New South Wales, Sydney, Australia. He received his BA in Engineering Science from the University of Oxford, UK and his PhD in Control Engineering from the University of Cambridge, UK. He has published over 100 articles in leading journals and conferences. He is an editor of *Journal of Internet Engineering*. He was the General Chair of IEEE LCN'11 and has served as TPC Chair for many international conferences. His current research interests are wireless mesh network, wireless sensor networks, compressive sensing and network optimisation.

Tom Pfeifer is an independent Senior Science and Research Consultant in Ireland, following an appointment as Director of research in Ubiquitous and Pervasive Computing at Waterford Institute of Technology, 2004–2011. In 1992–2003 he was Senior Researcher, Industry Consultant and Lecturer in the Fraunhofer Institute FOKUS, the GMD labs, and the Technical University of Berlin, Germany. He holds a Dr.-Ing. (PhD) in Computer Science (TU Berlin), and a Dipl.-Ing. (Masters) in Electronics (TU Dresden), Germany. He has published numerous technical papers, is member of the editorial boards and programme committees, and co-edited several books. He fulfilled chairing roles in many IEEE conferences and was General Chair of IEEE LCN'12.

Anura P. Jayasumana is a Professor of Electrical and Computer Engineering at Colorado State University, where he also holds a joint appointment as Professor of computer science. He founded the Computer Networking Research Laboratory at CSU, and is a member of NSF Engineering Research Center for Collaborative Adaptive Sensing of the Atmosphere. At CSU, he has supervised over 20 PhD and 50 MS theses, and taught courses ranging from freshmen undergraduate courses to specialised graduate courses in Electrical and Computer Engineering. He has published over 200 research papers and a book. He has served as a consultant to numerous companies ranging from start-ups to Fortune 100 companies.

Wireless and mobile computing technologies have advanced significantly in the last decade, providing novel communication possibilities for mobile elements in networks without a pre-existing infrastructure. It is therefore possible to overcome deficiencies of many techniques and algorithms developed for traditional stationary sensor networks, such as the decreasing probability of successful packet delivery with the increase in the number of hops from source to sink, bottlenecks near the sink and resulting non-uniform depletion of energy resources from the network. Networks with one or more mobile elements also have architectural requirements different from the ones with static sinks. Novel methods are needed to accommodate many challenges posed by such networks, including dealing with dynamic communication topologies resulting from mobility, the need for storing packets locally at nodes until communication topology allows them to be communicated, and dealing with a broader range of heterogeneity.

The significant property of a mobile element is that connectivity to the backbone network may not be available at all times. A mobile element is able to receive data from a set of sensor nodes before returning to an access point to transfer all the data and empty its buffers. The likelihood of a greater latency in packet delivery increases in such a situation, and it also results in intermittent connections among nodes. The nodes must benefit from contact opportunities whenever possible and the applications must better tolerate delays. Therefore, techniques for making applications tolerant to disruptions and/or high delays are required. The opportunistic and delay-tolerant networks yield to more realistic scenarios than the legacy mobile ad hoc networks.

We are delighted to present you the seven papers in this issue. Two papers are enhanced versions of papers presented at the IEEE Local Computer Networks (LCN) Conference (2010–2011), a premier conference in networking. They were invited based on the quality of research results and relevance to the topic. Additional three papers are selected from submissions in response to an open call for papers and also have two excellent invited articles specifically related to this special topic. All the papers underwent a thorough review process. The authors of the accepted papers represent countries covering the globe including Australia, Canada, Japan, New Zealand, Sweden, Turkey, and USA.

In the paper entitled ‘On the characterisation of vehicular mobility in a large-scale public transport network’, Shabbir Ahmed and Salil S. Kanhere investigate the characterisation of the spatio-temporal communication graph of large-scale real-world public transport networks. Through statistical analysis, they discovered that several key properties of many people-centric networks also exist in the large-scale networks. Additionally, they present how to use these properties in the design of effective communication protocols in delay tolerant networks.

In ‘Probabilistic data collection protocols for energy harvesting wireless sensor networks’, Masaya Yoshida, Tomoya Kitani, Masaki Bandai, Takashi Watanabe, Pai H. Chou, and Winston K.G. Seah proposed two protocols: the Probabilistic ReTransmission (PRT) and PRT with Collision Consideration (PRT-CC) for data collection in energy harvesting wireless sensor networks. The authors suggest use of acknowledgments for detecting packet loss in the networks. They evaluate the protocols by comparing with the previously used Geographic Routing with Duplicate Detection (GR-DD) and GR-DD with Retransmission (GR-DDRT). The results indicate that the proposed protocols provide significantly better packet delivery ratio.

In ‘Towards augmented connectivity with delay constraints in WSN federation’, Fadi M. Al-Turjman and Hossam S. Hassanein investigate WSN federation problem considering a restricted delay between the federated segments. They propose Connectivity-Based Placement (CBP) and Connectivity-Based Placement with Delay-constraint (CBP-D) strategies for relay node placement to maximise the connectivity of the network. Extensive simulations verify the effectiveness and superiority of the proposed strategies against the existing techniques.

In ‘Connectivity restoration in delay tolerant sensor networks using game theory’, Izzet Senturk, Sabri Yilmaz and Kemal Akkaya propose a distributed heuristic approach for minimising the cost of movement to re-establish network connectivity after failures. Their approach which is based on game theory improves the movement decision process of the network partitions. Through extensive simulation results, the authors show that the heuristic clearly outperforms existing heuristics in terms of movement distance and network coverage.

In ‘Worst-case latency of broadcast in intermittently connected networks’, Mikael Asplund and Simin Nadjm-Tehrani propose a delay expansion metric for connectivity and reachability properties of intermittently connected networks. Furthermore, they derive analytical relationships for worst-case latency of broadcast. Along with theoretical results, they present a method for relating worst-case latency with delay expansion for a mobility scenario.

In ‘Building routing overlays in disrupted networks: inferring contacts in challenged sensor internetworks’, Edward J. Birrane proposes Inference-based Contact Graph Routing (iCGR) as a routing protocol for delay-tolerant networks that have heterogeneous data link and/or network layers and associated addressing domains. Through extensive simulations, the author shows how iCGR approach allows routing-protocol-incompatible networks to join an internetwork with minimal overhead.

In ‘Enabling delay-tolerant communications for partially connected vehicular ad hoc networks’, Kadri Kaan Sevimli and Mujdat Soyturk investigated the delivery of IPv6 packets in a delay-tolerant fashion in partially connected networks. They propose a method to optimise the packet delivery ratio; the analysis and results confirm that for partially connected VANETs the proposed technique increases the packet delivery ratio. The approach can also be easily adopted for the delivery of IPv6/IPv4 packets in a delay-tolerant fashion.

Finally, we would like to express our sincere thanks to all the authors for their valuable contributions and also to the anonymous referees for their hard work in reviewing the papers in efficient and timely manner. Our special thanks and gratitude go to Professor Yuh-Shyan Chen and Professor Han-Chieh Chao, the Editor-in-Chiefs of *IJAHUC*, for their valuable support throughout the preparation of this special issue.