
Editorial

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Biographical notes: Hesham El-Sayed is currently an Associate Professor in the College of IT at the United Arab Emirates University (UAEU). Before joining UAEU, he held several industrial positions at Nortel Networks, Wind River Systems (acquired by Intel), and Paragon Networks (acquired by Turin Networks). During his tenure in the industry, he led several projects focused on performance optimisation of network protocols and architectures. His contributions in these areas had tangible impact on the performance of real commercial products, which led to winning several prestigious awards, including Nortel Networks, President's award of Excellence in Leadership, and Paragon Networks' CEO award of Excellence.

Mohamed Younis is currently an Associate Professor in the CSEE Department at the University of Maryland Baltimore County (UMBC). Before joining UMBC, he was with Honeywell International Inc. where he led multiple projects for building integrated fault tolerant avionics that have been incorporated in multiple products and received worldwide recognition. His technical interests include network architectures and protocols, wireless sensor networks, fault tolerant computing and distributed real-time systems. He has five granted and two pending patents. He has served on the organising and technical committees of numerous conferences and published over 100 technical papers in refereed conferences and journals.

Recent advances in networking and wireless communications, coupled with the proliferation of a variety of smart wireless devices, have resulted in a new generation of wireless applications and services, ranging from multimedia streaming and content sharing to inter-vehicular communications, emergency response and disaster recovery. Addressing the needs of these emerging services and applications calls for new network architectures, protocols and methodologies to deal not only with the need for higher scalability and robustness, but also to efficiently address the unique challenges of wireless networks brought up by mobility and energy limitations.

This special issue includes six selected papers covering different key aspects in networking technologies, along with original contributions for the development of efficient architectures and protocols for content distribution and information sharing in large-scale, peer-to-peer networks. The preliminary results of the reported research were presented at the *5th International Conference on Innovations in Information Technology (Innovations'08)*, which was held at the college of Information Technology

campus at the United Arab Emirates University, Al-Ain, on 16–18 December, 2008.

The first paper in this special issue proposes a new scheme for supporting efficient range queries in spatial databases over peer-to-peer (P2P) networks, while balancing the storage load to decrease the number of overloaded nodes in the system and, thus, improving the query execution time. They propose a rotating token scheme to balance the storage load and utilise an order-preserving mapping function to map keys to nodes in an order-preserving manner. Simulation experiments show significant gain in storage load balancing and the performance of the range queries over Chord.

In the second paper, the authors present a routing mechanism for resource discovery in tuple-based pervasive environments based on social peer-to-peer (S2P) networks. The proposed mechanism imitates human behaviours in social interactions to find resources. Instead of broadcasting a request tuple for a resource to all peers in the system, the paper suggests to consult a local cache and other peers before passing the request to a single peer who has had the

resource previously. Consequently, unnecessary queries in the space were avoided. Experiment results demonstrate 53% improvement in query processing response time compared to that of the same system running a default routing mechanism in LIME.

The third paper discusses a new model for handoff decisions in a multi-access environment consisting of heterogeneous networking technologies to enable ubiquitous network access for mobile end-users. The proposed architecture implements network selection by considering several handoff metrics, including user preferences, costs of network service, minimum QoS requirements of active applications, and the QoS offered by the available networks. The effectiveness of the implementation is illustrated using various network configuration scenarios and user preferences conducted over a real network testbed.

In the fourth paper, Oka and Higaki investigate efficient packet routing in Vehicular Ad-Hoc Networks. These networks are characterised by increased node mobility and the lack of direct links between communicating vehicles. The paper exploits geographical routing at the street level and utilises the passing vehicles in a certain direction as data carriers from one hop to another along the path. The validation results show that such an approach achieves a high transmission ratio and a short end-to-end transmission delay, even for networks with a low density of nodes and a high node mobility pattern.

The fifth paper studies the effect of the propagation model of the radio signal on the performance of ad-hoc

network routing protocols. Two different environments are considered; namely, an open area where obstacles are limited and urban area like a city where the signal suffers major attenuation effects due to the presence of high buildings. The authors also factor in the random shadowing effect and multipath fading loss. The study uses the OLSR routing protocol as a sample and assesses the impact of the signal propagation model on the network throughput and the average delay.

Finally, the sixth paper opts to address the network longevity goal of wireless sensor networks. These networks are characterised by the presence of a large population of miniaturised nodes that are battery operated. These nodes form a network in an ad-hoc manner and function as an autonomous unit. Such features make centralised control unfavourable and require energy-aware management strategies in order to extend the lifetime of the individual nodes. The authors propose a cross-layer distributed approach for the formation of the data routes and medium access schedule. The validation results confirm the positive impact on the network's lifetime as well as other contemporary performance metrics.

We hope that you find the special issue beneficial. We also would like to thank the authors for their contribution and diligence in addressing the reviewers' comments.