Guest Editorial: Special Issue "SM 85-Wireless and Mobile Computing, Networking and Communications"

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This special issue of the MONET journal presents the state of the art research results on the recent advances in Wireless and Mobile Communications. The special issue is dedicated to selected papers from the fourth IEEE International Conference on Wireless and Mobile Computing, Networking and Communications (WIMOB 2008) held in Avignon, France, on October 12–14, 2008. A total of 19 papers have been fast tracked and only 9 papers have been accepted. Each of the submitted manuscripts is an extended version of the original WIMOB paper; each submitted paper has been reviewed by at least three reviewers, experts in their fields, and has gone through two cycle of revisions.

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To avoid the single point of failure for the certificate authority (CA) in MANET, Abderrezak Rachedi and Abderrahim Benslimane propose a decentralized solution in which nodes are grouped into different clusters. They proposed the Dynamic Demilitarized Zone (DDMZ) a solution for protecting the CA node against potential attacks. In addition, a RA selection algorithm is proposed in this paper such that nodes are selected based on a predefined selection criteria function and location (i.e., using directional antenna). Such a model is known as moderate. Based on the security risk, more RA nodes must be added to formalize a robust DDMZ. The authors considered the tradeoff between security and resource consumption by formulating the problem as a nonzero-sum noncooperative game between the CA and attacker. Finally, empirical results are provided to support the solutions.

In this paper, Takeshi Matsuda et al. proposed a gateway (GW) selection protocol in hybrid Mobile Ad hoc Networks (MANETs). The paper is focused on the situation that occurs when specialized, sensitive data is sent to the Internet from MANET nodes. Due to the risk of forwarding special data through an unmaintained GW, the authors proposed a routing protocol which allows a source node to have sensitive data forwarded to the Internet through a trusted GW. To achieve this desirable performance, the authors improved an existing routing protocol, Dynamic MANET On-demand (DYMO), which works in consideration of application data. Through simulations, the authors evaluated the proposed protocol in comparison with the conventional DYMO protocol.

The paper "Directional Sensor Placement with Optimal Sensing Range, Field of View and Orientation" by Yahya Osais, Marc St-Hilaire and Fei R. Yu, introduces the new Optimal Sensor Configuration (OSC) problem where the goal

is to find an optimal subset of locations where directional sensors and base stations are installed in order to minimize the total network cost while satisfying the requirements of coverage and connectivity.

The optimal configuration of each sensor is determined by three parameters which are sensing range, field of view and orientation. An integer linear programming formulation of the OSC problem is provided.

The paper of *Philippe Le-Huy and Sébastien Roy* deals with low-power MAC operation in wireless sensor networks (WSNs). It studies the feasibility of building a sub-50 microwatt wake-up radio which interrupts the micro-controller upon receiving a wakeup signal. Because of its ultra low-power nature, this simple radio could be left on all the time, removing the need for complex synchronized or delay-hungry preamble sampling solutions. The originality of this work resides in the fact that simple address filtering is done by the radio itself and not the microcontroller (through PWM modulation), reducing the probability of unnecessarily wake-ups caused by e.g. noise. The hardware simulation-based study concludes that using such a secondary radio makes sense. This paper shows that PWM modulation, which has been somewhat abandoned because of its spectral inefficiency, makes sense for a low-power low-throughput wake-up signal. The conducted analysis is well accomplished, rigorous and is clearly a strength of this paper.

The success of the Mobile Web is driven by the combination of novel Web-based services with the diffusion of advanced mobile devices that require personalization, location awareness and content adaptation. To avoid performance bottlenecks that can limit the performance of future Mobile Web, *Claudia Canali, Michele Colajanni and Riccardo Lancellotti* propose and evaluate in this paper resource management strategies that address computational requirements through a pre-adaptation of the most popular resources even in presence of irregular access patterns and short resource lifespan that will characterize the future Mobile Web. They investigate a large space of alternative workload scenarios. Their analysis allows to identify when the proposed resource management strategies are able to satisfy the computational requirements of future Mobile Web, and even some conditions where further research is necessary.

In this paper, Jad El-Najjar, et al. considered routing and scheduling in a WiMAX-based mesh network. The authors modeled the joint routing and scheduling as an optimization problem whose objective is either to determine a minimum length schedule by maximizing spectrum spatial reuse or to maximize the network lifetime by routing around the less stable RF-links, while still satisfying a set of (uplink/downlink) end-to-end demands. While solving the problem with the two objectives, the authors studied the tradeoffs between these two objectives. In addition, they showed that maximizing the network stability or lifetime yields the selection of different routing trees and slot assignments which do not necessarily result in shorter schedule length.

Anand Dersingh et al. introduce a context management system that uses a semantic web approach as an underlying mechanism to model and represent semantics of the contexts. The system stores current contexts in a semantic knowledge base which is used by a semantic access control system in order to form access control policies and evaluate policies at run time. The approach is validated by the authors through a proof of concept implementation that includes performance results of the context management system as it responds to a change of the situation.

T. El Salti and N. Nasser, in their paper, focus on two main design issues: coverage and routing in wireless sensor networks. For coverage issue, they introduce a new approach for obtaining a fully covered network in 3-D environment such that every single point in a region is fully covered by at least one sensor node. This approach is referred to as the Chipset Coverage Model and Algorithm. This is accomplished by using a small number of sensor nodes in order to save up some energy. Based on the coverage approach, they address the routing problem by proposing a new position-based routing protocol referred to as the 3-D Randomized Sensing Spheres routing protocol (3-D RSS). The authors show that the 3-D RSS protocol guarantees packet delivery. Using simulations, they demonstrate that the 3-D RSS has a behaviour close to the behaviour of an existing 3-D progress-based protocol in terms of hop dilation and routing delay, where the delay is de_ned as Quality of Service (QoS) metric. They demonstrate that the 3-D RSS protocol outperforms the existing progress-based protocol in terms of Euclidean and power dilations. Thus, the new protocol reduces the energy consumption of the nodes and, therefore, prolongs the lifetime of the sensing nodes. For partially covered networks, the authors propose a dynamic position-based routing protocol referred to as the 3-D Randomized Sensing Spheres version 1 routing protocol (3-D RSSv1). This protocol increases the chances of delivering packets by moving linearly towards the destinations. It is demonstrated that the 3-D RSSv1 has a remarkable delivery rate compared to an existing progress-based routing protocol.

Orthogonal user pairing (OUP) was proposed for virtual multiple-input multiple-output (V-MIMO) in uplink 3G LTE system. However, its complexity is too high for practical implementation, especially when user population is large. To improve on this, semi-orthogonal user pairing (SUP) was suggested as an alternative. M. Peng, T. Zhou, W. Wang, and H.-H. Chen, in their paper, propose two novel SUP algorithms, namely correlative angle-based SUP (CA-SUP) and Frobenius norm-based SUP (FN-SUP)

algorithms. In view of the fact that ideal power control is difficult to implement, fixed power allocation (FPA) and adaptive power allocation (APA) constraints for the user pairing algorithms are introduced. Ergodic capacities for CA-SUP and FN-SUP algorithms with APA and FPA constraints, in terms of the numbers of users and antennas at Node-B, are evaluated and their capacity upper bounds are derived. Analysis and simulation results show that FN-SUP and CA-SUP algorithms requiring only limited channel state information (CSI) perform well and suit in particular for virtual V-MIMO systems.

Abderrahim Benslimane is IEEE senior member, full Professor of Computer Science and Engineering at the University of Avignon (France) since September 2001. He has been as Associate Professor at the University of Technology of Belfort-Montbéliard since September 1994. He obtained the title to supervise researches (HDR 2000) from the University of Cergy-Pontoise, France. He received the PhD degree (1993), DEA (MS 1989) from the Franche-Comte University of Besançon, and BS (1987) from the University of Nancy, all in Computer Science.

His research and teaching interests are in wireless ad-hoc and sensor networks. Particularly, he works on multicast routing, inter-vehicular communications, Quality of service, energy conservation, localization, intrusion detection and MAC layer performance evaluation. He was also interested in specification and verification of communication protocols, group communication algorithms and multimedia synchronization. He has several refereed international publications (book, journals and conferences) in all those domains.

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He is involved in many national and international projects. He is member of many editorial boards of international journals. He chairs many IEEE international conferences. He participates to the steering and the program committee of many IEEE international conferences. He is member of the CA of the IEEE French section, of the Technical Committee IEEE ComSoc Communications and Information Security (CISTC), Vice-President of the France IEEE student activities and of the SPECIF/France. He was member of the "Conseil National des Universités" 2003–2007 (27th section).

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Chadi M. Assi is an associate professor with the Concordia Institute for Information Systems Engineering at Concordia University, Montreal, Canada. He received his B.Eng. degree from the Lebanese University, Beirut, Lebanon, in 1997 and the Ph.D. degree from the Graduate Center, City University of New York, New York, in April 2003. Before joining Concordia University in August 2003 as an assistant professor, he was a visiting scientist at Nokia Research Center, Boston, working on quality-of-service in optical access networks. Dr. Assi received the prestigious Mina Rees Dissertation Award from the City University of New York in August 2002 for his research on wavelength-division-multiplexing optical networks. He is on the Editorial Board of the *IEEE Communications Surveys and Tutorials*, serves as an Associate Editor for the *IEEE Communications Letters* and also an Associate Editor for Wiley's *Wireless Communications and Mobile Computing*. He served as the Technical Program Chair of the fourth IEEE International Conference on Wireless and Mobile Computing, Networking and Communications (WIMOB 2008), Avignon, France. His current research interests are in the areas of optical networks, multi-hop wireless and ad hoc networks, and security. Dr. Assi is a senior member of the IEEE.

Eitan Altman received the B.Sc. degree in electrical engineering (1984), the B.A. degree in physics (1984) and the Ph.D. degree in electrical engineering (1990), all from the Technion-Israel Institute, Haifa. In (1990) he further received his B.Mus. degree in music composition in Tel-Aviv university. Since 1990, he has been with INRIA (National research institute in informatics and control) in Sophia-Antipolis, France. His current research interests include performance evaluation and control of telecommunication networks and in particular congestion control, wireless communications and networking games. He is in the editorial board of the scientific journals: WINETs, JDEDs and JEDC, and served in the journals Stochastic Models, COMNET, SIAM SICON. He has been the general chairman and the (co)chairman of the program committee of several international conferences and workshops (on game theory, networking games and mobile networks). More information can be found at http://www-sop.inria.fr/maestro/personnel/Eitan.Altman/.

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