

Special Issue: Recent Advances in Wireless Communication Systems

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It gives us great pleasure to introduce this special issue, devoted to a set of selected papers on algorithmic advances & analytical insights in wireless communications systems. In particular, this special issue focuses on innovations in wireless communications at the PHY and MAC layers, designed to provide significant improvements in the spectrum efficiency, capacity and interference-resistance of next-generation broadband wireless systems. Broadband wireless networks remains one of the most promising areas of wireless communication, with several techniques such as MIMO, beamforming & cooperative scheduling already providing dramatic increases in wireless bandwidth and reductions in transmission power requirements.

This special issue comprises a selected set of five papers whose preliminary versions appeared in the Sixth International Symposium on Wireless Communication Systems 2009 (ISWCS'09). Five out of the original accepted papers were specially selected for their superior quality and potential high impact and their authors were solicited for submissions to this special issue. Each of the submitted papers was required to have significant extensions over the preliminary conference version, and was then subjected to an independent and comprehensive review by three or more expert reviewers. At the end of this process, we are very pleased to present to you five papers that provide insights into several novel areas of

future communication systems, including the design of antenna beamforming algorithms, cooperative forwarding, distributed power control and cooperative scheduling for energy-efficient wireless MAC protocols.

Our set of five papers can be classified into two broad categories—three papers focus on “distributed power control” for next-generation CDMA system, while two papers tackle issues related to supporting wireless communication with significant resource constraints (energy or poor feedback channels). Under the broad theme of distributed power control, the paper, “Joint Power Allocation and Interference Mitigation Techniques for Cooperative Spread Spectrum Systems with Multiple Relays”, by Rodrigo Lamare, focuses on cooperative forwarding for spread spectrum systems, and derives techniques for optimally distributing the transmit power non-uniformly over the primary transmitter and relay nodes, so as to maximize receiver throughput. The paper, “Decoupled power allocation through pricing on a CDMA reverse link shared by energy-constrained and energy-sufficient data terminals”, by Virgilio Rodriguez, Friedrich Jondral and Rudolf Mathar studies two situations: pricing for maximal network revenue and social benefit. The socially-optimal price is common to all terminals of a given energy class, and an energy-constrained terminal pays in proportion to the square of its power fraction. By contrast, the revenue-maximizing network sets for each terminal an individual price that drives the terminal to the “revenue per Watt” maximizer. Furthermore, the paper “Effects of Nodes Geometry and Power Allocation in Space-Time Coded Cooperative Wireless Systems” by Luca Zuari, Andrea Conti and Velio Tralli investigates the effects of relay position and power allocation strategy in cooperative communications employing space-time codes.

In the other category, the paper, “Zero-Feedback, Collaborative Beamforming for Emergency Radio: Asymptotic Analysis”, by Aggelos Bletsas, Andy Lippman and John N. Sahalos studies the case of collaborative beamforming among

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a group of terminals that are unable to synchronize their transmissions or utilize receiver-feedback to adjust their transmission phases. The authors show that collaborative beamforming is still possible in such harsh radio environments (potentially encountered in emergency scenarios), enabling non-zero transmission capacity over very weak transmitter-receiver links. The final paper of our special issue, “Taking Advantage of Overhearing in Low Power Listening WSNs: A Performance Analysis of the LWT-MAC Protocol”, by Cristina Cano, Boris Bellalta, Jaume Barcelo, Miquel Oliver and Anna Sfairopoulou, presents an analysis of LWT-MAC, a MAC protocol for WSNs that avoids the need for long preambles by requiring all nodes that hear an ongoing transmission to stay awake for a specified duration at the end of a transmission; elimination of such preambles for transmission of small packets of sensor data is shown to result in significant energy savings.

In conclusion, we would like to thank the journal’s editor-in-chief, Imrich Chlamtac, for his encouragement of and support for this special issue, and the journal support staff, especially Sara Fruner, for her diligent reminders and assistance with the logistics of the preparation of this issue. We are especially grateful to all the reviewers, who persevered with us through the long iterative cycle of reviews and revised manuscript versions—we are confident that the resulting improvement in manuscript quality has been substantial and will benefit both the authors and the readers. At our end, we have greatly enjoyed the experience of curating these manuscripts. We sincerely hope that you will find this issue informative and useful!



Falko Dressler is an assistant professor leading the Autonomic Networking Group at the Department of Computer Science, University of Erlangen. He received his M.Sc. and Ph.D. degree from the Dept. of Computer Science, University of Erlangen in 1998 and 2003, respectively. In 2003, he joined the Computer Networks and Internet group at the Wilhelm-Schickard-Institute for Computer Science, University of Tuebingen. Since 2004, he is with the Computer Networks and Com-

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IFIP WONS 2011. Besides chairing a number of workshops associated to high-level conferences, he regularly acts in the TPC of leading networking conferences such as IEEE INFOCOM, IEEE ICC, IEEE Globecom, IEEE WCNC, and IEEE MASS. Among other, Dr. Dressler wrote the textbooks Self-Organization in Sensor and Actor Networks, published by Wiley in 2007. Dr. Dressler is an IEEE Distinguished Lecturer in the fields of inter-vehicular communication, self-organization, and bio-inspired networking. Dr. Dressler is a Senior Member of the IEEE (COMSOC, CS, VTS) as well as a Senior Member of ACM (SIGMOBILE), and member of GI (KuVS). He is actively participating in the IETF standardization. His research activities are focused on adaptive wireless networking and self-organization methods addressing issues in wireless ad hoc and sensor networks, inter-vehicular communication systems, bio-inspired networking, and adaptive network security techniques.



Archan Misra is currently an Associate Professor of Information Systems, and the Deputy Director of the recently established Living Analytics Research Center, at Singapore Management University (SMU). In his prior jobs, he has been a Research Staff Member for 7 years at the IBM TJ Watson Research Center, Hawthorne, NY, and a Senior Scientist for 2 years with Telcordia Technologies, Piscataway, NJ. Archan’s current research interests include mobile computing,

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book titled "Mobile, Wireless and Sensor Networks: Technology, Applications and Future Directions" published by John Wiley, US in March 2006. Dr. Shorey serves as the General Chair or the Technical Program Committee Chair of several international conferences. He is the Steering Committee Chair of COMSNETS conference that has now become one of the leading conferences in India in the area of Networks and Communications. Dr. Shorey has given numerous talks, tutorials and seminars in industry and academia all over the world. For his contributions in the area of Communication Networks, Dr. Shorey was elected Fellow of the Indian National Academy of Engineering in 2007. He is a Fellow of the Institution of Electronics and Telecommunication Engineers, India.