Editorial

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Biographical notes: Grégoire Danoy received his Industrial Engineering degree in Computer Science from Luxembourg University of Applied Sciences in 2003 and MS in Web Intelligence from Ecole des Mines of Saint-Etienne, France in 2004. He received his PhD in Computer Science in 2008 from the University of Luxembourg and the Ecole des Mines of Saint-Etienne. Since 2008, he is a Scientific Collaborator in the Computer Science and Communications (CSC) Research Unit of the University of Luxembourg. His current research interests include nature inspired algorithms, green computing, vehicular ad hoc networks and multi-agent systems.

Pascal Bouvry received his Undergraduate degree in Economical and Social Sciences and Masters in Computer Science with distinction from the University of Namur, Belgium in 1991. He went on to obtain his PhD in Computer Science with great distinction at the University of Grenoble (INPG), France in 1994. He is currently heading the Computer Science and Communications (CSC) Research Unit of the Faculty of Sciences, Technology

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Samee Ullah Khan received his BS from Ghulam Ishaq Khan Institute of Engineering Sciences and Technology, Topi, Pakistan and PhD from the University of Texas, Arlington, TX, USA in 2007. He is currently an Assistant Professor of Electrical and Computer Engineering at the North Dakota State University, Fargo, ND, USA. He has extensively worked on the general topic of resource allocation in autonomous heterogeneous distributed computing systems. He is the Associate Editor of the *Cluster Computing*, *International Journal of Communication Systems*, and *Security and Communication Networks* journals.

Bernabé Dorronsoro received his degree in Engineering in 2002 and PhD in Computer Science in 2007 from the University of Malaga, Spain. He is currently working as a Scientific Collaborator at the Interdisciplinary Centre for Security, Reliability and Trust of the University of Luxembourg. His main research interests include energy efficient grid and cloud computing, ad hoc networks, the design of new efficient meta-heuristics, and their application for solving complex real-world problems in the domains of logistics, telecommunications, bioinformatics, combinatorial, multiobjective, and global optimisation.

Sébastien Varrette is a Scientific Collaborator at the University of Luxembourg since 2007. He is a former student from the Telecom Department, the Grenoble Institute of Technology (ENSERG/ENSIMAG) where he obtained his Engineering degree in Computer Science together with his Master degree in Cryptology, Security and Information Coding with honours in 2003. He received his PhD in Computer Science in 2007 both from the Grenoble Institute of Technology and the University of Luxembourg. His main research interest focus on the security of distributed systems, both from the practical point of view, i.e., at the system administration level or from the theoretical aspects, typically on integrity and confidentiality issues.

Minimisation of energy consumption has become a central issue in designing distributed systems that range from wireless ad hoc networks to data centres. Because battery technologies have not yet matched advances in hardware and software technologies, saving energy in battery-operated devices is very important for mobile/wireless networks. Similarly, minimising energy consumption in high performance computing centres will, in addition to saving power consumption, require less cooling mechanisms. These new challenges necessitate innovative and effective optimisation solutions for minimising power consumption in distributed systems, such as energy-efficient scheduling algorithms and medium access control (MAC) protocols.

This special issue of the *International Journal of Communication Networks and Distributed Systems* (*IJCNDS*) on Optimisation Issues in Energy Efficient Distributed Systems includes selected extended versions of best papers accepted in the OPTIM 2010 International Workshop as well as selected very high quality submissions. In the end, we accepted six papers in this special issue which cover from energy-efficient MAC protocols for wireless sensor networks to energy-efficient topology management in hybrid networks.

'Analysis of mobile-oriented energy consumption for heterogeneous connections in hybrid wireless networks' proposes an approach for calculating the energy consumption of a mobile station equipped with heterogeneous interfaces in a wireless hybrid network architecture. Thanks to this distance-based mobile-oriented energy consumption analysis, the battery operation time and the amount of data communicated in each of the constituent links of a hybrid network can be calculated.

'Decentralised reinforcement learning for energy-efficient scheduling in wireless sensor networks' presents an approach for scheduling the wake-up cycles of nodes in a wireless sensor network. Nodes independently learn to synchronise their active periods with other nodes to improve message throughput, and to desynchronise with others to reduce communication interference.

'On the improvement of the enhanced distance-based broadcasting algorithm' introduces an energy saving strategy for the well known distance-based broadcasting (EDB) algorithm that aims at minimising the transmission power needed to broadcast a message in the network, analysing different network densities and values for the thresholds. It demonstrates that reducing the transmission power does not impact network connectivity but it can also increase the performance of the dissemination process.

'Fuzzy logic-based transmission power control algorithm for energy efficient MAC protocol in wireless sensor networks' proposes a transmission power control algorithm using fuzzy logic and studies its influence on the wireless sensor network energy consumption and communication performance. Implemented in the MAC layer, this novel TPC performs better than other methods in terms of quality of service aspects like average power and energy efficiency.

'Energy efficient automotive networks: state of the art and challenges ahead' provides a survey on in-vehicle electric/electronic-architectures and their energy efficiency; and outlines new hardware and software approaches that allow an easy and backwards compatible migration strategy.

'Multi-layer hybrid wired-cum-wireless sensor network design' proposes a mixed integer linear programming model of such networks to find the optimal locations of cluster heads and access points based on wired network cost and wireless network power consumption cost. It demonstrates that a hybrid configuration is more cost effective than a wireless one and leads to a longer lifetime at the expense of a more complex design.

Acknowledgements

The editors hope that the readers will appreciate the aforementioned articles and also find them extremely valuable. In case of any further clarifications regarding those articles, the editors would like to encourage the readers to directly contact the corresponding authors.

The editors are very grateful to the anonymous reviewers who helped in selecting the six articles included in this special issue. The editors also would like to gratefully thank the Editors-in-Chief of the *Inderscience International Journal of Communication Networks and Distributed Systems*, Professor Sudip Misra and Professor Isaac Woungang for their continuous support. Finally, the editors would like to thank all the authors for their excellent contributions and their cooperation. This work was performed under the Luxembourg FNR Green-IT project (C09/IS/05).