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Special Issue on "Intelligent Infrastructure"

Selected Topics from the Strategic Workshop, May 21–23, 2013, Marbella, Spain

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The 15th Edition of the closed-door Strategic Workshop was held in Marbella, Spain from the 21st to the 23rd of May, 2013. The focus during the active two-day discussions of the participating major stakeholders, was on Intelligent Infrastructure.

The theme for the Strategic Workshop 2013 (SW'13) was Intelligent Infrastructure: Technology Innovations for Capitalizing on Efficient Critical Infrastructures. Continuous advances in information and communication technology (ICT) provide enormous benefits, services, and opportunities for maximizing the efficiency of existing critical infrastructures. Research and innovation contribute to the prosperity of the society, both for its economy and the individual. Modern infrastructures are large-scale, complex and highly networked systems, whose efficiency, sustainability and protection requires intelligent, interoperable and secure ICT solutions and novel business models. The Intelligent Infrastructure is about capturing data, analysing it to seek out efficiencies, and invoking an autonomic response to instantly capture those efficiencies.

This Special Issue features nine selected papers on the above topic that concentrate on a wide range of problems in the way infrastructures are functioning today and discusses novel advanced, and intelligent methods and tools for the operation and control of existing and future infrastructures including key technologies for standardization.

The first paper, "Infrastructure for Intelligent Automation Services in the Smart Grid", by Rune Hylsberg and Søren Aagard Mikkelsen defines a system architecture that provides

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interoperability between wireless sensors in Home Area networks (HAN) connected over the Internet to a service provider function deployed in a cloud infrastructure.

The second paper, "Smart Cities via Data Aggregation", by Javier Poncela, Panagiotis Vlacheas, Raffaele Giaffreda, Suparna De, Massimo Vecchio, Septimiu Nechifor, Raquel Barco, Mari Carmen Aguayo-Torres, Vera Stavroulaki, Klaus Moessner, and Panagiotis Demestichas presents a resilient, adaptive and social sensing platform for smart cities, in order to address the pressing need for on-time and dependable delivery of data/data-streams in innovative "city-sensing"-driven applications.

The third paper, "Coping With Network Dynamics Using Reinforcement Learning Based Network Optimization In Wireless Networks", by Milos Rovcanin, Eli de Poorter, Ingrid Moerman, and Piet Demester investigates the inherent trade-offs that occur when using reinforcement learning techniques in dynamic networks: the need to keep the network running optimally at the same time whilst at the same time different (suboptimal) network settings need to be continuously investigated to cope with changing network conditions.

The fourth paper, "E-BEB: Enhanced Binary Exponential Backoff Algorithm for Multi-hop Wireless Ad-hoc Networks", by Hui-Hsin Chin, Chun-Cheng Lin, and Der-Juinn Deng proposes simple, efficient, priority provision, and well performed contention resolution algorithm called Enhanced Binary Exponential Backoff (E-BEB) algorithm for impartial channel access in multi-hop wireless ad-hoc networks.

The fifth paper, "Hierarchical Architecture for Multi-Technology Wireless Sensor networks for Critical Infrastructure Protection", by Heikke Karvonen, Jukka Suhonen, Juha Petäjäjärvi, Matti Hämäläinen, Marko Hännikäinen, and Ari Pouttu defines hierarchical wireless sensor network (WSN) architecture and a WSN Open API Gateway (WOAG) that address the convergence and cooperation of heterogeneous sensor network devices.

The sixth paper, "CloudThinking as an Intelligent Infrastructure for Mobile Robotics", by Rui L. Aguiar, Diogo Gomes, João Paulo Barraca, and Nuno Lau presents the CloudThinking architecture applied for intelligent cloud-based robotic operation.

The seventh paper, "Indoor Radio Propagation and Interference in 2.4 GHz Wireless Sensor Networks", by Dragos Mihai Amzucu, Hong R. Li, and Erik Fledderus focuses only on indoor deployments, i.e. in office buildings, for applications such as energy management, lighting control, or fire alarm systems.

The eighth paper, "Need For Broadband Infrastructure In A 2020 Perspective", by Knud Erik Skouby, Morten Falch, Anders Henten, and Reza Tadayoni discusses the needs for broadband access up until 2020 by scrutinizing the different services and applications requiring bandwidth. The bandwidth requirements in question are those of residential users and SMEs. Many larger companies require substantial bandwidths and subscribe to connections of very high speeds. However, the focus here is on the vast majority of users, namely households and SMEs.

The ninth paper, "The Sensing Business Model", by Peter Lindgren shows different levels and attempt of sensing business models and shows these in reference of a definition and framework of a sensing business model (BM). 5 different businesses–working with different sensing BM's and sensor technology—are presented. The use cases show combination of biological and mechanical sensors together with physical and digital sensors. In combination the sensoring BM could lead businesses into a new area of business modeling.

Ramjee Prasad is currently the Director of Center for Teleinfrastruktur (CTIF), and holds the chair of wireless information and multimedia communications. He has published over 700 technical papers, contributed to several books, and has authored, coauthored, and edited over twenty books. His latest book is "Introduction to Ultra Wideband for Wireless Communications". Prof. Prasad has served as a member of the advisory and program committees of several IEEE international conferences. He has also presented keynote speeches, and delivered papers and tutorials on WPMC at various universities, technical institutions, and IEEE conferences. He was the founder and chairman of the IEEE Vehicular Technology/Communications Society Joint Chapter, Benelux Section, and is now the honorary chairman. In addition, Prof. Prasad is the founder of the IEEE Symposium on Communications and Vehicular Technology (SCVT) in the Benelux, and he was the symposium chairman of SCVT'93. Presently, he is the Chairman of IEEE Vehicular Technology/Communications/Information Theory/Aerospace and Electronics Systems/Society Joint Chapter, Denmark Section.In addition, Prof. Prasad is the coordinating editor and editor-in-chief of the Springer International Journal on Wireless Personal Communications. He was the technical program chairman of the PIMRC'94 International Symposium held in The Hague, The Netherlands, from September 19–23, 1994 and also of the Third Communication Theory Mini-Conference in Conjunction with GLOBECOM'94, held in San Francisco, California, from November 27–30, 1994. He was the conference chairman of the fiftieth IEEE Vehicular Technology Conference and the steering committee chairman of the second International Symposium WPMC, both held in Amsterdam, The Netherlands, from September 19–23, 1999. He was the general chairman of WPMC'01 which was held in Aalborg, Denmark, from September 9–12, 2001, and of the first International Wireless Summit (IWS 2005) held also in Aalborg, Denmark on September 17–22, 2005. He was the General Chair of the First International Conference on Wireless Communication, Vehicular Technology, Information Theory and Aerospace & Electronic Systems Technology (Wireless VITAE) held on May 17–20, 2009 in Aalborg. Prof. Prasad was also the founding chairman of the European Center of Excellence in Telecommunications, known as HERMES and now he is the honorary chairman. He is a fellow of IEEE, a fellow of IETE, a fellow of IET, a member of The Netherlands Electronics and Radio Society (NERG), and a member of IDA (Engineering Society in Denmark). Prof. Prasad is advisor to several multinational companies. He has received several international academic, industrial and governmental awards of which the most recent is the Ridder in the Order of Dannebrog (2010), a distinction awarded by the Queen of Denmark.

Marina Ruggieri was with FACE-ITT and GTC-ITT (Roanoke, VA) in the High Frequency Division (1985–1986); Research and Teaching Assistant at the University of Roma Tor Vergata (1986–1991); Associate Professor in Telecommunications at Univ. of L'Aquila (1991–1994) and at Tor Vergata (1994-2000). Since November 2000 she is Full Professor in Telecommunications at Tor Vergata.Since 2003 she directs a Master in "Advanced Satellite Communications and Navigation Systems" at Tor Vergata. Her research focuses on space communications and navigation systems, integrated systems, mobile and multimedia networks, ICT for biotechnology, energy and disaster ahead management. In 2004–2006 she was in the Technical-Scientific Committee of the Italian Space Agency (ASI). In 2007–2008 she has been Vice-President of the ASI Technical-Scientific Committee. Since December 2007 she belongs to the Italian Superior Council of Telecommunications as Expert. Since March 2010 she is member of the Committee of Experts for the Research Policy (CEPR) of the Ministry of University and Research (MIUR). She was President of the IEEE Aerospace and Electronic Systems (AES) Society (2010–2011). She is Chair of the AESS Nominations and Appointments Committee (2012–2013) and Member of the IEEE TAB (Technical Activity Board) Strategic Planning Committee (2011–2013). She has been elected IEEE Division IX Director-Elect (2013) and will be IEEE Division IX Director in 2014–2015. Since December 2006 she is Vice President of the AFCEA Rome Chapter. She is Director of CTIF_Italy, the Italian branch of the Center for Teleinfrastruktur (CTIF) in Aalborg (Danimarca), opened at the University of Roma Tor VergataShe is Editor of the IEEE Transactions on AES for Space Systems. She was awarded the 1990 Piero Fanti International Prize and she had a nomination for the Harry M.Mimmo Award in 1996 and the Cristoforo Colombo Award in 2002. She received the 2009 Pisa Donna

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