Introduction to Special Issue “Intelligent Telecommunication Infrastructures and Beyond”

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The development of services and applications require increasingly levels of performance, quality of service and sophistication from the telecommunication infrastructures. New types of communications, technologies and services indicate that there will be a need for significant innovation in the telecommunication infrastructures of today. There are signs that a critical level of usage and complexity has been already reached which is putting pressure for changes on the existing infrastructures. We witness the development and proposals for new intelligent network solutions, next generation access and overlay networks, virtual infrastructures, cloud technologies, network convergence, etc. All this was a motivation to try to raise a discussion among the research community to highlight the state of the art and future tendencies in the development of intelligent and next generation telecommunication systems and infrastructures.

This special issue is mainly composed of the extended versions of selected papers presented at the 1st Center of TeleInFrastructure—South-East Europe (CTIF SEE) Workshop I2B: “Intelligent Infrastructures and Beyond”, 16 September 2013, Sofia, Bulgaria (www.ctif.aau.dk). Nevertheless in the issue are also included selected papers from academia, research and industry contributing advances and ideas on this topic.

Several papers in this special issue are related to future heterogeneous cellular network deployments and software defined networks where topics such as resource management, design scenarios and deployment solutions are considered. An approach for resource management for Heterogeneous Networks (HetNets) based on dynamic user association and a characteristic model of the servicing properties of a HetNet access point is proposed in the

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paper *Resource Management based on Dynamic Users Association for Future Heterogeneous Telecommunication Access Infrastructures*. In the paper *Small Cells in Cellular Networks—Challenges of Future HetNets* the need for small cell deployments is justified, some solutions and scenarios are proposed, analyzed and simulated in respect to self-organizing features, interference coordination, energy and spectrum efficiency. Software defined networking (SDN) is a new networking architecture paradigm that holds great promise to overcome many of mentioned limitations and provides required improvements in performance by decoupling control functions from the underlying physical infrastructure. In the paper *SDN based mobile networks: concepts and benefits* the key reasons for transition to SDN based mobile networks are explained and several scenarios proposed.

Analyses and surveys related to cooperative spectrum sensing, performance enhancement, channel modelling, channel estimation in future wireless networks and network architectures are also on the focus in this special issue. The contribution *Optimal Cooperative Spectrum Sensing under Faded and Bandwidth Limited Control Channels* proposes a novel cooperative spectrum sensing framework that mitigates the imperfect control channel features, like the limited control channel bandwidth and error proneness, and achieves the detection performances of cooperative spectrum sensing under an ideal control channel. *Considerations on CDMA-OFDM system performances in different channel environments for different modulation and coding scenarios* is a paper presenting results related to the performance of CDMA-OFDM systems under different modulation schemes, multiple access techniques, spreading codes types and lengths, convolutional codes rates, different number of users and types of channels.

New emerging technologies in telecommunications that have the potentials to alter the telecommunication infrastructure landscape in the near future are also on the focus of this issue. The contribution *Disruptive Innovations as a Driving Force for the Change of Wireless Telecommunication Infrastructures* is related to the potential of some novel technologies to become a driving force for fundamental changes and development of future generation telecommunication networks. The potentials of an innovative technology such as visible light communications (VLC) are on the focus in the paper *Visible Light Communications for Ambient Assisted Living* related to proposing a scenario for integrating VLC into the smart home to support very dense low and high data rate connectivity while enabling the deployment of secure-sensitive indoor applications, including indoor tracking and localization.

Among the contributions in this issue are also the selected titles *Comparison and Extension of Existing 3D Propagation Models with Real-world Effects Based on Ray-tracing*, *New Developments in Vertical Handover based on Media Independent Handover Standard*, *Self-Localization Framework for Future Wireless Networks*, *Intelligent End-to-End Cloud-Based Monitoring System*, *Combination of Multiple Measurement Cues for Visual Face Tracking*, *Smartphone with Augmented Gateway Functionality as Opportunistic WSN Gateway Device*.

We hope that this special issue contributes to the various aspects of research in the field of telecommunications and its future development, that the issue gives the beginning of a discussion on the related topics, that it will motivate and will inspire the readers and research community to continue their work and to publish the results achieved.

Finally, we would like to thank all the authors for their contributions, the reviewers for their valuable time and effort, the members of the editorial team of the journal for their constructive help and Professor Ramjee Prasad, Editor-in-Chief, "Personal Wireless Communications" for his support. We are fully aware that without the joint effort of all of us this issue could not be prepared.

From the Guest Editors:

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