

23rd International Conference on Software, Telecommunications and Computer Networks

SoftCOM 2015



**23rd International Conference on Software,
Telecommunications and Computer Networks
- SoftCOM 2015**

September, 16 – 18, 2015, Split – Bol (Island of Brac)
Croatia

**Proceedings of the 6th Symposium
on green networking and computing**

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In cooperation with:



IEEE Technical Committee on
Green Communications &
Computing



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Organisers:



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Foreword

Enhancing Energy efficiency is a worldwide objective towards reducing carbon emissions and strengthening the long term security of energy supply. Information and Communication Technologies (ICT) plays a major role in this endeavour and it is now widely accepted that energy efficiency is a key performance indicator in the next wave of innovations in communication systems. This proceedings solicits works on all aspects of enabling technologies for green networking and computing presented during the sixth in a row Symposium organised on this topic.

The 6th Symposium on green networking and computing (SGNC 2015) was organized in the frame of the 23rd International Conference on Software, Telecommunications and Computer Networks (SoftCOM 2015). The SoftCOM 2015 conference was held in attractive ambience of the Hotel Elaphusa, Bol (Island of Brac), Croatia, September 16 to 18, 2015. The Conference is organized by the University of Split, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture (FESB) under the patronage of the Croatian Ministry of Science, Education and Sports. The Conference has been technically co-sponsored by the IEEE Communications Society (ComSoc). Organizers of the 6th Symposium on green networking and computing are University of Split, FESB and Politecnico di Milano university, Department of electronics, informatics and bioengineering (DEIB). The Symposium is organized in cooperation with the IEEE ComSoc Technical Committee on Green Communications and Computing (TCGCC).

In the frame of 6th Symposium on green networking and computing, four accepted papers have been presented in the technical program of the first part of the Symposium on green networking (SYM1/I). Also, five accepted papers were presented in the technical program of the second part of the Symposium on green networking (SYM1/II). Additionally, in the frame of the conference business forum, one presentation held by expert from company Nokia, Croatia was organized, on the topic related to Nokia solutions for the energy efficiency improvements of radio access networks.

We hope that readers of these proceedings will find the articles and presentations informative and that they will enjoy reading this feature topic devoted to exciting fast-evolving field of green networking and computing. We would like to thank all the authors who submitted articles to this Symposium and to all presenters who give their presentations which significantly contribute to international affirmation of this event, which change its status from Special session to Symposium. Finally, we express our gratitude to all reviewers for their comments and valuable feedback on the submitted articles.



Antonio Capone Symposium Co-chairs



Josip Lorincz

PROCEEDINGS INFORMATION

Proceedings of the 6th Symposium on green networking and computing
2015 International Conference on Software, Telecommunications and Computer Networks

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Ulrich Barth, *Alcatel-Lucent/ Bell Labs, Germany*

SYMPOSIUM PROGRAM

SYM 1/I - Symposium on green networking I

Session chair: *Josip Lorincz, Ph. D., FESB, University of Split, Croatia*

September 16, 2015, 10:30 – 13:00, Conference room Hvar, (Hotel Elaphusa, Bol, Croatia)

SYM 1/II - Symposium on green networking II

Session chair: *Josip Lorincz, Ph. D., FESB, University of Split, Croatia*

September 16, 2015, 15:00 – 16:30, Conference room Hvar, (Hotel Elaphusa, Bol, Croatia)

Business forum:

Single RAN Advanced – Zero Emission

Presenter: *Mr. Darko Giljević, Nokia, d.o.o., Croatia*

September 17, 2015, 09:00 – 10:30, Conference room Šolta, (Hotel Elaphusa, Bol, Croatia)

Tracks

- ❑ *Symposium on Green Networking*
- ❑ *Business forum*

Symposium on Green Networking

Symposium organizers: Josip Lorincz, University of Split, Croatia; Antonio Capone, Politecnico di Milano, Italy
Symposium chair: Josip Lorincz, University of Split, Croatia

- ❑ ***SYM1/I - Symposium on Green Networking I***
- ❑ ***SYM1/II - Symposium on Green Networking II***

SYM1/I - Symposium on Green Networking I

Symposium organizers: Josip Lorincz, University of Split, Croatia; Antonio Capone, Politecnico di Milano, Italy

Symposium chair: Josip Lorincz, University of Split, Croatia

□ Energy-Efficient Networks under Coordinated and Uncoordinated Sleeping Approaches

Juvencio Manjate (Royal Institute of Technology, Sweden); Markus Hidell (KTH Royal Institute of Technology, Sweden); Peter Sjodin (KTH, Sweden)

□ Energy-Fair Routing in Multi-Domain Green Networks

Tugbagul Altan Akin and Didem Gozupek (Gebze Technical University, Turkey)

□ Low Power Methodology for an ASIC design flow based on High-Level Synthesis

Fahad Bin Muslim, Affaq Qamar and Luciano Lavagno (Politecnico di Torino, Italy)

□ Energy-Aware Multi-layer Flexible Optical Network Operation

Vasileios Gkamas, Kostantinos Christodoulopoulos (University of Patras, Greece) and Emmanouel Varvarigos (University of Patras & Computer Technology Institute, Greece)

SYM1/II - Symposium on Green Networking II

Symposium organizers: Josip Lorincz, University of Split, Croatia; Antonio Capone, Politecnico di Milano, Italy
Symposium chair: Josip Lorincz, University of Split, Croatia

□ File Size-based Small Cell Connection in Phantom Cell Concept Energy Savings Schemes

Emmanuel Ternon and Patrick Agyapong (DOCOMO Euro-Labs, Germany); Armin Dekorsy (University of Bremen, Germany)

□ Effective Management of Green Cloud Data Centers Using Energy Storage Technologies

Amine Barkat and Antonio Capone (Politecnico di Milano, Italy)

□ Transient Departure Process in M/G/1/K-type Queue with Threshold Server's Waking Up

Wojciech M. Kempa and Dariusz Kurzyk (Silesian University of Technology, Poland)

□ Cross-over-net: An Energy-Aware Coordination Algorithm for WANETs based on Software-Defined Networking

Joaquin Aparicio (University of Deusto, Spain); Jon Legarda (Deusto Institute of Technology, Spain); Janire Larranaga (University of Deusto & Deustotech - Deusto Institute of Technology, Spain); Juan Jose Echevarria (University of Deusto, Spain)

□ Modeling Fuzzy Rules for Managing Power Consumption of Ethernet Switch

Alifia Fithritama (University of Lorraine, France); Eric Rondeau and Vincent Bombardier (CRAN, France); Jean-Philippe Georges (University Henri Poincare, Nancy 1, France)

Business forum



Darko Giljević, Nokia d.o.o., Croatia

Thursday, September 17, 2015, 09:00 - 10:30 (Conference room Šolta)

Single RAN Advanced – Zero Emission

Abstract: Nokia vision is 'expand the human possibilities of connected world' in a responsible way means as an example that we design our products more energy efficient than earlier models and that we use in our own operations renewable energy source where available, e.g. in Finland 100% of electricity we use in our premises are from renewable energy sources.

Nokia Networks has enhanced its Single Radio Access Network (SRAN) Advanced portfolio to enable operators to modernize their base station sites to achieve up to a 70% reduction in site energy consumption and CO2 emissions. The portfolio also allows for the first time a broader use of renewable energy sources like solar, wind and fuel cells, making them viable for powering base station sites.

Meanwhile, the cost of solar energy systems has fallen by more than 90% during last ten years. Together, these developments mean that, for the first time, it is affordable for operators to build base station sites with zero CO2 emissions for all electricity grid situations, from good grid to no grid.

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The City of Split



The Municipality of Bol



The county of
Split and Dalmatia



HAKOM
HRVATSKA AGENCIJA ZA POŠTU
I ELEKTRONIČKE KOMUNIKACIJE



Zračna luka Split-Kaštela