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September 18 - 20. 2013

21st International Conference on Software
Telecommunications & Computer Networks

University of Split

21st International Conference on Software, Telecommunications and Computer Networks - SoftCOM 2013
September, 18 – 20, 2013, Split, Primosten, Croatia

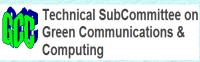*Proceedings of the 4th Special session on green networking and computing*

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Technical SubCommittee on Green Communications & Computing

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SESSION INFORMATION

COMMITTEE

PROGRAM

TRACKS

AUTHORS

MESSAGE FROM THE SPECIAL SESSION ORGANIZERS

Foreword

Energy consumption is a major factor in the performance and deployment of modern Information and communication technology (ICT) systems. In order to achieve as minimal energy consumption as possible while maintaining satisfactory level of service quality in existing and future communication networks, it is necessary to develop energy-efficient systems with the capability to adapt dynamically to energy availability and usage. This proceedings solicits works on all aspects of enabling technologies for green networking and computing presented during the fourth Special session dedicated to this topic.

The forth Special session on green networking and computing was organized in the frame of the 21st International Conference on Software, Telecommunications and Computer Networks (SoftCOM 2013). The SoftCOM 2013 conference was held in attractive ambience of the Zora hotel, Primosten, Croatia, September 18 to 20, 2013. 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 fourth Special session on green networking and computing are University of Split, FESB and Politecnico di Milano university, Department of electronics and informatics (DEI). The Special session is organized in cooperation with the IEEE ComSoc Technical Subcommittee on Green Communications and Computing (TSCGCC).

In the frame of Special session on green networking and computing, one half-day tutorial focused on energy-efficient core and content distribution networks was organized. In addition, eight accepted papers have been presented in the technical program of the two Special sessions on green networking (SS3/I and SS3/II). Also, one accepted paper was presented in the special session on Smart environment technologies (SS4) and one additional paper in session dedicated to Mobile and wireless communications (S2).

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 Special session and to all presenters who give their presentations which significantly contribute to international affirmation of this Special session. Finally, we express our gratitude to all reviewers for their comments and valuable feedback on the submitted articles.

Atonio Capone   *Special session Co-chairs*   *Josip Lorincz*

PROCEEDINGS INFORMATION

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

SPECIAL SESSION PROGRAM

Tutorial presentation: Energy effient core and content distribution networks
Prof. Jaafar Elmirghani, Ph. D., University of Leeds, United Kingdom
September 18, 2013, 14:30 – 18:00, Conference room Piano Hall, (Hotel Zora, Primosten, Croatia)

SS3/I - Special session on green networking
Session chair: Josip Lorincz, Ph. D., University of Split, Croatia
September 19, 2013, 09:00 – 10:30, Conference room Penkala II, (Hotel Zora, Primosten, Croatia)

SS3/II - Special session on green networking
Session chair: Josip Lorincz, Ph. D., University of Split, Croatia
September 19, 2013, 15:30 – 17:00, Conference room Zlarin, (Hotel Zora, Primosten, Croatia)

Papers on green networking presented in:
S2 - Mobile and Wireless Communications
Session Chair: Piotr Tyczka, Ph. D., Poznan University of Technology, Poland
September 18, 2013, 09:00 – 10:30, Conference room Penkala I, (Hotel Zora, Primosten, Croatia)

SS4 - Special Session on Smart Environment Technologies
Session Chair: Mladen Russo, Ph. D., Maja Stella, Ph. D., University of Split, Croatia
September 19, 2013, 09:00 – 10:30, Conference room Penkala I, (Hotel Zora, Primosten, Croatia)

Tracks

- ❑ *Tutorial*

- ❑ *SS3/I - Special Session on Green Networking*

- ❑ *SS3/II - Special Session on Green Networking*

- ❑ *S2 - Mobile and Wireless Communications*

- ❑ *SS4 - Special Session on Smart Environment Technologies*

Tutorial

Jaafar Elmirghani, *University of Leeds, United Kingdom*
Tuesday, September 18, 2013, 14:30-18:00 (PIANO HALL)

Energy Efficient Core and Content Distribution Networks

Abstract: Energy efficiency is increasingly becoming a key priority for Information and Communication Technology (ICT) organizations given the ecological and economic drivers. In this tutorial we will introduce and discuss a number of measures that can be used to reduce the power consumption in the Internet and will introduce methods for the optimum use of renewable energy in core networks to reduce the Internet's carbon footprint at a given power consumption level. We will introduce network optimization through the use of mixed integer linear programming (MILP) giving a short tutorial on MILP and build on this and heuristics inspired by it to explore a number of energy and carbon footprint reduction measures including (i) Optimum use of time varying renewable energy in core networks; (ii) Optimum resource allocation and green network design with data centres; (iii) Dynamic energy-efficient content caching for video on demand, YouTube type content and IPTV (iv) Energy-efficiency through data compression; (v) Energy-efficient peer-to-peer content distribution (vi) Physical topology design considering operational and embodied energies. We finish by outlining future directions and open research issues. This tutorial will be of particular benefit to researchers and practicing engineers interested in energy efficient designs applied to the Internet and broadly.

Biography: *Jaafar Elmirghani is a Fellow of the IET, Fellow of the Institute of Physics and is the Director of the Institute of Integrated Information Systems and Professor of Communication Networks and Systems within the School of Electronic and Electrical Engineering, University of Leeds, UK. He was Chairman of the IEEE UK and RI Communications Chapter and was Chairman of IEEE Comsoc Transmission Access and Optical Systems Committee and is and has been on the technical program committee of 29 IEEE ICC/GLOBECOM conferences between 1995 and 2012 including ten times as Symposium Chair. Prof. Elmirghani was founding Chair of the first IEEE Comsoc Green Communications track at GLOBECOM 2011. He received the IEEE Communications Society 2005 Hal Sobol award and the 2005 Chapter Achievement award, the University of Wales Swansea inaugural 'Outstanding Research Achievement Award', 2006 and the IEEE Communications Society Signal Processing and Communication Electronics outstanding service award, 2009. He is currently an editor of IET Optoelectronics, Co-Chair of the GreenTouch® Wired, Core and Access Networks Working Group. He has published over 350 technical papers, co-edited "Photonic Switching Technology- Systems and Networks", IEEE Press 1998, and has research interests in communication networks, and optical communication systems.*

Special Session on Green Networking

Special Session Organizers: *Antonio Capone, Politecnico di Milano, Italy; Josip Lorincz, University of Split, Croatia*
Chair: *Josip Lorincz, University of Split, Croatia*

❑ *SS3/I - Special Session on Green Networking*

❑ *SS3/II - Special Session on Green Networking*

SS3/I - Special Session on Green Networking

Special Session Organizers: *Antonio Capone, Politecnico di Milano, Italy; Josip Lorincz, University of Split, Croatia*
Chair: *Josip Lorincz, University of Split, Croatia*

❑ **Increasing Device Lifetime in Backbone Networks with Sleep Modes**
Luca Chiaraviglio (University of Rome Sapienza, Italy); Antonio Cianfrani (University of Roma "La Sapienza", Italy); Angelo Coiro (University of Rome "La Sapienza", Italy); Marco Listanti (University of Rome "La Sapienza", Italy); Josip Lorincz (University of Split, Croatia); Marco Polverini (University "La Sapienza" Roma, Italy)

❑ **Power-aware Optimization Modeling for Cost-Effective LRPON Infrastructure Deployment**
Lin Lin (University of Waterloo, Canada); Bin Lin (Dalian Maritime University, P.R. China); Pin-Han Ho (University of Waterloo, Canada)

❑ **An Optimization Framework for Energy-Efficient Elastic Optical Transmission Systems**
Bo Wang (University of Waterloo, Canada); Pin-Han Ho (University of Waterloo, Canada)

❑ **Energy-efficient and Low Blocking Probability Differentiated Quality of Protection Scheme for Dynamic Elastic Optical Networks**
Jorge López Vizcaíno (Huawei Technologies Duesseldorf GmbH & Technische Universität Dortmund, Germany); Paola Soto (Huawei Technologies Duesseldorf GmbH, Germany); Yabin Ye (Huawei Technologies Duesseldorf GmbH, Germany); Felipe Jiménez (Telefónica I+D, Spain); Peter Krummrich (TU Dortmund & Lehrstuhl fuer Hochfrequenztechnik, Germany)

SS3/ II - Special Session on Green Networking

Special Session Organizers: *Antonio Capone, Politecnico di Milano, Italy; Josip Lorincz, University of Split, Croatia*
Chair: *Josip Lorincz, University of Split, Croatia*

❑ **Performance of mobile relay assisted networks**
Tamas Patocskai (Budapest University of Technology and Economics, Hungary); Peter Fazekas (Budapest University of Technology and Economics, Hungary)

❑ **Green Distributed Antenna Systems: Optimized Design and Upper Bound for Energy Efficiency**
Mikhail Popov (Acreo AB, Sweden); David Peinado (Royal Institute of Technology, Sweden); Mats Nilson (Royal Institute of Technology KTH, Sweden); Anders Västberg (Royal Institute of Technology (KTH), Sweden); Tord Sjölund (MIC Nordic AB, Sweden)

❑ **Communication Network-Centric Smart Grid Services**
Heiko Lehmann (Deutsche Telekom Labs, Germany); Christoph Lange (Deutsche Telekom AG, Germany); Ralph Schlenk (Alcatel-Lucent, Germany); David Prantl (JouleX GmbH, Germany); Michael Schlosser (Fraunhofer-Institute for Telecommunications Heinrich-Hertz-Institut, Germany); Tobias Jungel (EICT GmbH, Germany)

❑ **A Hybrid Green Policy for Admission Control in Web-based Applications**
Fawaz AL-Hazemi (Korea Advanced Institute of Science and Technology, Korea)

S2 – Mobile and Wireless Communications

Session Chair: Piotr Tyczka (Poznan University of Technology, Poland)

❑ **D2D for Energy Efficient Communications in Disaster and Emergency Situations**
Mythri Hunukumbure (Fujitsu Labs of Europe Ltd, United Kingdom); Tim Moulsley (Fujitsu Laboratories of Europe, United Kingdom); Ade Oyawoye (University of Surrey, United Kingdom); Sunil Vadgama (Fujitsu Laboratories of Europe Ltd, United Kingdom); Mick Wilson (Fujitsu Lab. of Europe, United Kingdom)

SS4 - Special Session on Smart Environment Technologies

Special Session organizers: Mladen Russo, Maja Stella, University of Split, Croatia
Co-chairs : Mladen Russo, Maja Stella, University of Split, Croatia

❑ **A Power Efficient Pedestrian Touring Scheme based on Sensor-assisted Positioning and Prioritized Caching for Smart Mobile Devices**
Chung-Ming Huang (National Cheng Kung University, Taiwan); Chao-Hsien Lee (National Taipei University of Technology, Taiwan); Wei-Shuang Chen (National Cheng Kung University, Taiwan)

Authors

A B C D E F G H I

J K L M N O P Q R

S T U V W Z X Y

A

AL-Hazemi, Fawaz

B

C

Chen, Wei-Shuang

Chiaraviglio, Luca

Cianfrani, Antonio

Coiro, Angelo

D

E

F

Fazekas, Peter

G

H

Ho, Pin-Han

Huang, Chung-Ming

Hunukumbure, Mythri

I

J

Jiménez, Felipe

Jungel, Tobias

K

Krummrich, Peter

L

Lange, Christoph

Lee, Chao-Hsien

Lehmann, Heiko

Lin, Bin

Lin, Lin

Listanti, Marco

Lorincz, Josip

M

Moulsley, Tim

N

Nilson, Mats

O

Oyawoye, Ade

P

Patocskai, Tamas

Peinado, David

Polverini, Marco

Popov, Mikhail

Prantl, David

Q

R

S

Schlenk, Ralph

Schlosser, Michael

Soto, Paola

Sjölund, Tord

T

U

V

Vadgama, Sunil

Västberg, Anders

Vizcaíno, Jorge López

W

Wang, Bo

Wilson, Mick

Y

Ye, Yabin

Z

A

AL-Hazemi, Fawaz
A Hybrid Green Policy for Admission Control in Web-based Applications

B

C

Chen, Wei-Shuang
A Power Efficient Pedestrian Touring Scheme based on Sensor-assisted Positioning and Prioritized Caching for Smart Mobile Devices

Chiaraviglio, Luca
Increasing Device Lifetime in Backbone Networks with Sleep Modes

Cianfrani, Antonio
Increasing Device Lifetime in Backbone Networks with Sleep Modes

Coiro, Angelo
Increasing Device Lifetime in Backbone Networks with Sleep Modes

D

E

F

Fazekas, Peter
   Performance of mobile relay assisted networks

G

H

Ho, Pin-Han
   Power-aware Optimization Modeling for Cost-Effective LRPON Infrastructure Deployment
   An Optimization Framework for Energy-Efficient Elastic Optical Transmission Systems

Huang, Chung-Ming
   A Power Efficient Pedestrian Touring Scheme based on Sensor-assisted Positioning and Prioritized Caching for Smart Mobile Devices

Hunukumbure, Mythri
   D2D for Energy Efficient Communications in Disaster and Emergency Situations

I

J

Jiménez, Felipe
Energy-efficient and Low Blocking Probability Differentiated Quality of Protection Scheme for Dynamic Elastic Optical Networks

Jungel, Tobias
Communication Network-Centric Smart Grid Services

K

Krummrich, Peter
Energy-efficient and Low Blocking Probability Differentiated Quality of Protection Scheme for Dynamic Elastic Optical Networks

L

Lange, Christoph
Communication Network-Centric Smart Grid Services

Lee, Chao-Hsien
A Power Efficient Pedestrian Touring Scheme based on Sensor-assisted Positioning and Prioritized Caching for Smart Mobile Devices

Lehmann, Heiko
Communication Network-Centric Smart Grid Services

Lin, Bin
Power-aware Optimization Modeling for Cost-Effective LRPON Infrastructure Deployment

Lin, Lin
Power-aware Optimization Modeling for Cost-Effective LRPON Infrastructure Deployment

Listanti, Marco
Increasing Device Lifetime in Backbone Networks with Sleep Modes

L

Lorincz, Josip
Increasing Device Lifetime in Backbone Networks with Sleep Modes

M

Moulsley, Tim
D2D for Energy Efficient Communications in Disaster and Emergency Situations

N

Nilson, Mats
Green Distributed Antenna Systems: Optimized Design and Upper Bound for Energy Efficiency

O

Oyawoye, Ade
D2D for Energy Efficient Communications in Disaster and Emergency Situations

P

Patocskai, Tamas
Performance of mobile relay assisted networks

Peinado, David
Green Distributed Antenna Systems: Optimized Design and Upper Bound for Energy Efficiency

Polverini, Marco
Increasing Device Lifetime in Backbone Networks with Sleep Modes

P

Popov, Mikhail
    Green Distributed Antenna Systems: Optimized Design and Upper Bound for Energy Efficiency

Prantl, David
    Communication Network-Centric Smart Grid Services

Q

R

S

Schlenk, Ralph
    Communication Network-Centric Smart Grid Services

Schlosser, Michael
    Communication Network-Centric Smart Grid Services

Sjölund, Tord
    Green Distributed Antenna Systems: Optimized Design and Upper Bound for Energy Efficiency

Soto, Paola
    Energy-efficient and Low Blocking Probability Differentiated Quality of Protection Scheme for Dynamic Elastic Optical Networks

T

U

V

Vadgama, Sunil
   D2D for Energy Efficient Communications in Disaster and Emergency Situations

Västberg, Anders
   Green Distributed Antenna Systems: Optimized Design and Upper Bound for Energy Efficiency

Vizcaíno, Jorge López
   Energy-efficient and Low Blocking Probability Differentiated Quality of Protection Scheme for Dynamic Elastic Optical Networks

W

Wang, Bo
   An Optimization Framework for Energy-Efficient Elastic Optical Transmission Systems

Wilson, Mick
   D2D for Energy Efficient Communications in Disaster and Emergency Situations

Y

Ye, Yabin
   Energy-efficient and Low Blocking Probability Differentiated Quality of Protection Scheme for Dynamic Elastic Optical Networks

Z

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