SIXTH ANNUAL IEEE ONLINEGREENCOMM 2016 CONFERENCE

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From November 14–17, 2016, the IEEE Communications Society (ComSoc) hosted the annual IEEE Online Conference on Green Communications (IEEE Online-GreenComm'16). This sixth IEEE OnlieGreenComm conference served as forum for presenting and discussing novel research and technological developments in the area of green communications, networking, and computing. By keeping the online concept of previous events, IEEE OnlineGreenComm'16 continued in spirit of "energy efficient discussion about energy-efficiency", through the conference virtual communication platform, which offers a unique and unsurpassed networking and interaction experience.

With the international webcasting of the complete conference program, IEEE OnlineGreenComm'16 attendees from industry and academia participated in conference events from the comfort of their own work and/or home environments. This ecological conferencing approach of IEEE OnlineGreenComm'16 contributes to the reduction of greenhouse gas emissions and costs by eliminating the need for conference travel, while providing the participants with time-flexible access to live or recorded OnlineGreenComm'16 events. In this way, the conference format of IEEE OnlineGreenComm'16 offers to presenters a truly worldwide audience, with the ability to answer questions in real time through interaction with session chairs and with the aid of webcast managers.

In the framework of the IEEE OnlineGreenComm'16 program, a number of different technical sessions related to green wireless communications, green optical communications, sustainability of communication systems, and smart cities were organized. The conference hosted four full days of keynotes, invited speeches, regular papers, panel and networking sessions, exploring topics ranging from energy harvesting of sensor ad hoc networks and green communications in fifth generation (5G) networks to energy-efficiency in wired optical networks and improvements in vehicle charging management.

IEEE OnlineGreenComm 2016 officially started on Monday, November 14, with conference chair Michela Meo of Politecnico di Torino in Italy welcoming all attendees to this year's conference. During the opening speech, Michela also presented an overview of the OnlineGreenComm'16 comprehensive program, which included nearly 25 presentations from global contributors representing the following regions: Europe/Middle East/Africa, Asia/Pacific, United States, and Canada. Michela's introduction emphasized the conference's benefits in terms of reduced travel and registration costs accompanied by experimenting with new media and interaction paradigms enabling all conference participants to be in line with a concept of "simply be green".

Following the opening remarks, the first keynote speaker, Louise Krug from British Telkom, UK, was introduced. In her inspiring presentation, Louise offered insights on the topic "High performance, high availability green networks–how far have we come, what remains problematical, and what solutions might be available?" Krug stated that the energy consumption of telecom networks such as the Internet have been identified as both significant and potentially fast growing. She looked back over the past six years at what has been achieved in terms of improving telecom network energy efficiency, and looked at what remains a problem today. The last part of the keynote speech was dedicated to network function virtualization as a solution for improving network energy efficiency, based on the container approach, which enables quick, robust, and adaptable upgrades of network resources in an energy-efficient manner.

The first day's program continued with a technical session on sustainability in communications, chaired by Michela Meo. This first technical session contained one regular paper entitled "Architecture Exploration of Multi-Source Energy Harvester for IoT Nodes", and one invited paper titled "An Assessment of the Impacts of Product Packaging on Overall Reliability and Environmental Performance: A Life Cycle Assessment Approach". The first day of the conference concluded with a green wireless session chaired by Mohammed Bahbahani from the University of Manchester, UK. In this session, two regular papers were presented on the topics "Spectral and Energy-Efficient Transmission over Frequency-Orthogonal Channels", and "Green OFDMA Resource Allocation in Cache-Enabled CRAN".

On the second day, two technical sessions chaired by Paolo Monti, KTH, Sweden, were organized. The first technical session on sustainability highlight research results of two regular papers titled "Lifetime Maximization of Connected Differentiated Target Coverage in Energy Harvesting Directional Sensor Networks", and "Grid Energy Consumption of Mixed-Traffic Cellular Networks with Renewable Energy Sources". The second technical session on green optical networks was devoted to the presentation of one regular paper titled "Asynchronous Delivery Oriented Efficient Resource Allocation in TWDM-PON Enabled Fronthaul", and one invited paper titled "Green Optical Transport Network Design for 5G Mobile Networks".

The extensive program on the second day concluded with an industriy panel discussion on the topic "ICT Industry Experience and Perspectives on the Energy Efficiency Challenges for Today, 2020 and Beyond". Contributions to the panel discussion were given by three prominent panellists, moderated by Julio Montalvo from Telefónica, Spain. Julio opened the panel discussion with comments on the drivers for improving energy efficiency of the telecommunication sector, European Union (EU) targets in energy consumption reductions by 2030, and the role of information and communication technologies (ICT) as a key enabler for improving energy efficiency.

After his remarks, Julio introduced the first panellist, Erik Fernández from Telefónica, Spain, who spoke about the "global energy efficiency program" of mobile telecom operator Telefónica. During his presentation, Erik spoke about energy consumption trends and challenges in reducing telecom operator energy consumption, with implemented projects dedicated to overcoming these challenges. The second panellist, Pål Frenger from Ericsson AB, Sweden, discussed "5G energy performance", pointing to the low load dependence of energy consumption in the newest mobile networks, and the necessity of addressing low traffic cases in future networks through ultra-lean designs based on discontinuing transmission. The last panellist, Azzedine Gati form Orange Labs, France, spoke about "the challenge of energy efficiency in future ICT networks". This presentation

addressed the reasons why green is important for mobile operators, emphasizing the equipment vendor's commitment to increase energy-efficiency x2000 in the next ten years.

The third day of the conference featured the second keynote speech given by Thas Nirmalathas, Director of Melbourne Networked Society Institute, Australia, on the topic of "Sustainable Growth of Network Services–Accounting the Energy Consumption at a Service Level and Balancing the Use-Phase and Embodied Energy Consumption". In his extraordinary keynote speech, Thas offered a framework for analyzing and understanding energy consumption at the service level, and established the foundation for the development of a sustainable growth model for the Internet. To illustrate how network energy consumption can be linked to consumption at the service level, an approach based on modelling the energy consumption of over-the-top mobile wireless services was presented. In the last part of his presentation, a sustainable growth model balancing the use-phase and embodied energy consumption was discussed.

After this keynote speech, the third day of the technical session proceeded with the second part of the technical session on green optical networks, chaired by Marco Ruffini from Trinity College, Ireland. In the framework of this technical session, one regular paper titled "Electricity Cost and Emissions Reduction in Optical Networks", and two invited papers titled "Light Trail Design for Energy-Efficient Traffic Grooming in Light-trail Optical WDM Networks" and "Energy Efficiency in Future PON", were presented. The content-rich third day of the conference was concluded with the first part of the smart cities technical session chaired by Josip Lorincz form FESB, University of Split, Croatia. This technical session highlighted two regular papers titled "Using IEC 61850 and IEEE WAVE Standards in Ad-Hoc Networks for Electric Vehicle Charging Management" and "Online QoS-Aware Charging Scheduling in Battery Swapping Stations Under Dynamic Energy Pricing".

On the conference's last day, the global audience was again provided with virtual access to two technical sessions and one panel discussion, followed by a virtual happy hour. The second part of the green wireless session was the first technical session of the last day. Within this session, chaired by Chin Keong Ho, from the Institute for Infocomm Research, Singapore, one regular paper titled "User Selection Scheme for Amplify-and-Forward Relaying with Zero Forcing", and two invited papers titled "The 5G Main Building Blocks" and "5G Energy Performance: Challenges and Solutions", were presented. The second part of the smart cites session was the last technical session presented at the conference. This session, chaired by Josip Lorincz, included two regular papers titled "Agent-Based Charging Scheduling of Electric Vehicles" and "Peak Load Reduction of Multiple Water Heaters: Respecting Consumer Comfort and Money Savings".

The last panel discussion on the fourth day was organized by the IEEE Young Professionals community, with the goal of presenting views of "IEEE Young Professionals on the Trends of Green Communications". The panel format included a five minute talk by each of the panellists followed by 30 minutes of discussion moderated by Rentao Gu, from the School of Information and Communication Engineering, Beijing University, China. During the panel discussion, the first panelist, Peerapol Tinnakornsrisuphap from Qualcomm Research, USA, presented expertise in the area of "Smart Home and Smart Energy Management in Qualcomm Research". The second panelist, Xiodong Xu from Beijing University of Posts and Telecommunications, spoke on the topic "Challenges for 5G Green Cellular Networks".

The closing event of IEEE OnlineGreenComm'16 was organized as a virtual happy-hour and moderated by Lola Awoni-yi-Oteri from Qualcomm Research, USA. This was the first time this type of event was offered, providing a completely new and exciting experience to the conference participants in terms of socializing and networking. The virtual happy-hour provided conference participants with an informal atmosphere in which to exchange experiences, ideas, and novel initiatives in the field of green communications. The pleasant ambience of the virtual happy-hour provided industry and academia participants of different generations and backgrounds with the opportunity to establish new research connections and collaborations.

Above all, IEEE OnlineGreenComm'16 was successfully organized in a manner keeping with the tradition of one of the most relevant global events for presenting the newest research results and ideas in the area of energy-efficient communications. The conference organizers handled the huge job of soliciting conference participation, promoting the conference agenda, and scheduling the review process. Gratitude goes to each person involved in organizing IEEE OnlineGreenComm'16. Acknowledgement also goes to all the reviewers who volunteered their time and professional expertise during the process of reviewing submitted papers, of which 31 percent were accepted for publication. In addition, special thanks go to the conference manager David Stankiewicz form IEEE for his great help in conference organization and coordination of all activities. Last but not least, the conference organizers express their gratitude to the keynote speakers, panelists, and contributing authors for sharing their expertise and state-of-the-art research results.

For more information on IEEE OnlineGreenComm 2016, please visit:

http://onlinegreencomm2016.ieee-onlinegreencomm.org/

Visitors to the conference website are encouraged to network with peers and colleagues, discuss IEEE OnlineGreenComm conference events and share their professional experiences through the conference's Linkedin, Twitter, and Facebook pages.

All IEEE OnlineGreenComm 2016 content, including papers, recorded video presentations, and presenter slides, will be available online to registered conference participants on the following virtual platform link:

https://vts.inxpo.com/Launch/Event.htm?ShowKey=34085

New visitors can register for IEEE OnlineGreenComm'16 on-demand access for $US 20 at the following link:

http://www.cvent.com/d/tvq735

On-demand access will provide full access to all conference materials over the conference virtual platform. Access to the conference virtual platform will be available until December 31, 2016. All accepted and presented papers from IEEE OnlineGreenComm'16 are also included in the IEEE Xplore database.

Finally, the IEEE OnlineGreenComm 2016 conference organizers invite all interested professionals to provide their contributions to the upcoming IEEE OnlineGreenComm conference, by proposing novel online conference formats or submitting their latest research results in this exciting and fast evolving field of green communications. All interested professionals seeking information about previous conference editions, ongoing conference updates, and detailed paper submission instructions, are invited to visit

http://www.ieee-greencom.org

Looking forward to meeting you at the next IEEE OnlineGreenComm conference!