
Open Forum

Program Guide

April 8, 2011

Advanced Institutes of
Convergence Technology
Seoul National University



2011 Open Forum – Seoul

SEOUL, KOREA • APRIL 8, 2011

Open Forum Agenda

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|--------------------|---|--------------------------|
| 12:00-13:30 | Lunch | <i>Private Cafeteria</i> |
| 13:30-15:20 | Open Forum I | <i>A101</i> |
| 13:30-13:50 | Gee Rittenhouse, GreenTouch Chair & Vice President of Bells Labs Research, Alcatel-Lucent <i>Introduction</i> | |
| 13:50-14:20 | Dr. Yuan-Kuang Tu, President of Telecommunication Laboratories of Chunghwa Telecom <i>Green Telecom and the Applications of IoT – Experiences from Chunghwa Telecom</i> | |
| 14:20-14:50 | Rod Tucker, Director of the Centre for Energy-Efficient Telecommunications, University of Melbourne <i>Energy Limitations in Optical Data Transport and Switching</i> | |
| 14:50-15:20 | Gregory Wright, Member of Technical Staff, Bell Labs <i>GreenTouch's Large Scale Antenna System Demonstrator</i> | |
| 15:20-15:30 | Break | <i>Lobby</i> |
| 15:30-17:30 | Open Forum II | <i>A101</i> |
| 15:30-16:00 | Professor Zhisheng Niu, Deputy Dean of the Department of Electronic Engineering, School of Information Science and Technology, Tsinghua University <i>TANGO: Traffic-Aware Network planning and Green Operation</i> | |
| 16:00-16:30 | Professor Yung Yi, Korea Advanced Institute of Science and Technology (KAIST) <i>Cellular Greening via Efficient BS Control: Topology, On-off and Transmission Power</i> | |
| 16:30-17:00 | Laurent Herault, Director of Strategic Telecommunication Programs, CEA-LETI Applied Research Institute for Microelectronics <i>Earth Project Overview and First Technical Results</i> | |
| 17:00-17:30 | Yan Chen, Senior Research Engineer, Huawei Technologies <i>GREAT Project Overview</i> | |



Open Forum I

13:30-15:20

Gee Rittenhouse

Chairman of GreenTouch
Vice President of Bell Labs Research, Alcatel-Lucent

13:30-13:50

Introduction

About Gee Rittenhouse

Gee Rittenhouse is Chairman of the Board of the GreenTouch™ Consortium, a global research initiative dedicated to dramatically improving the energy efficiency of information and communications technology (ICT) networks. As Vice President of Bell Labs Research, he oversees all of Alcatel-Lucent's research in physics, computer science, mathematics, optics, access, networking and applications.

Prior to leading research, Rittenhouse was Vice President of Bell Labs' Technology Integration Group, with the primary mission of taking Bell Labs' innovations and driving them into Alcatel-Lucent's products and services. Previously, he was Vice President, Bell Labs Wireless Research.

Rittenhouse joined Bell Laboratories as a member of technical staff in 1993 where he worked on high-speed circuits using X-ray lithography for optical networking applications. Rittenhouse later joined the Wireless Research Laboratory at Bell Laboratories where his research focused on RF front-end radio architectures and cellular system engineering. In 2000, Rittenhouse was promoted to Director of the Wireless Technology Research Department and led several projects, including MIMO system development, cellular network optimization, wireless IP networks and fourth-generation wireless systems. He received the Bell Labs Fellow Award in 2002, and also has numerous publications and patents in the areas of communications and circuits.

Rittenhouse received his Bachelor of Science degree in physics from the University of California, Los Angeles, and he received his Ph.D. degree in electrical engineering and computer science from the Massachusetts Institute of Technology.

Dr. Yuan-Kuang Tu

President of Telecommunication Laboratories, Chunghwa Telecom

13:50-14:20

Green Telecom and the Applications of IoT – Experiences from Chunghwa Telecom

As Internet of Things (IoT) is apparently becoming the focus in many countries, it has been indicated in a recent study that the traffic volume of IoT will be 30-fold of that of Internet. Since the transmission of such generated information will consume significant network resource, an effective IoT application system framework aiming at features of IoT applications will not only greatly increase effectiveness of network usage, but also reduce energy consumption, thereby meeting the objective of green ICT. In the aspect of IoT, Chunghwa Telecom (CHT) has been providing services in the areas of intelligent surveillance, intelligent transportation, intelligent disaster notification and intelligent energy saving.

Being green as well as the nature of the applications will become key concerns of system architects and network engineers. This talk will present the examples in which green technologies can be applied to reduce power consumption and furthermore to reduce the global carbon footprint produced by the IoT applications; in particular, those services that have been set up by CHT. Finally, we will point out the directions to make our effort in the research on the green issues of IoT applications in GT. We believe such consideration will redefine current communications and business models with a new paradigm shift.



About Dr. Yuan-Kuang Tu

Dr. Yuan-Kuang Tu is the President of Chunghwa Telecommunication Laboratories (TL) of Chunghwa Telecom (CHT) in Taiwan. Prior to taking the current position, he was the Senior Managing Director of the Corporate Planning Department of CHT between 2007 and May 2009. From 1981 to 2007, Dr. Tu served a number of key positions in various R&D tasks and project management in TL, including Vice President of TL. In his capacity he oversees whole CHT strategic technology development including broadband services and infrastructure technologies planning. His areas of technical expertise cover photonics, optical communications, broadband networks, and network evolution architectures.

Dr. Tu received the Distinguished Youth Award of Electronic Devices and Materials Association Taiwan (EDMA) in 1995, and received the Distinguished Electrical Engineer Award of Chinese Institute of Electrical Engineering (CIEE) in 2002. He was awarded the Annual Distinguished Employee in Management Category of CHT in 2008, the highest award in CHT.

He is a senior member of IEEE (Photonics Soc and COM Soc), Chinese Institute of Engineers (CIE), and Chinese Institute of Electrical Engineering (CIEE). He serves as Board Member of CIE, CIEE and EDMA, and also serves as the convener in industrial associations/scientific union, such as Taiwan Charter of Commission C of International Union of Radio Science.

Being active in participating in global telecom activities, Dr. Tu was often invited as a speaker at global telecom conferences in the recent years. He co-chaired the promotion committee of IEEE-ICASSP 2009, and is the representative to coordinate 2 issue groups of Global Business Dialogue on e-commerce (GBDe) on CHT's behalf. He was invited as a distinguished speaker at NOMS 2010, and will co-chair APNOMS 2011 to be held in Taipei.

Rod Tucker

Director of the Centre for Energy-Efficient Telecommunications, University of Melbourne

14:20-14:50

Energy Limitations in Optical Data Transport and Switching

In this presentation, we examine the lower bounds on energy consumption in optical transmission and switching systems. These lower bounds provide an indication of the best energy efficiency that can be achieved in optical communications systems. We show that the lower bound on energy consumption in optical transmission systems is directly related to fundamental parameters, such as the attenuation of optical fiber. High-efficiency transmission generally comes at a cost of low spectral efficiency. We show that it is difficult to determine a fundamental limit on switching energy. However, it is possible to draw some general conclusions about the relative efficiency of optical and electronic switching.

About Rod Tucker

Rod Tucker is a Laureate Professor at the University of Melbourne and Director of the University of Melbourne's multidisciplinary Institute for a Broadband-Enabled Society (IBES). He is also Director of the Centre for Energy-Efficient Telecommunications (CEET). He served as a member of the Australian Federal Government's Panel of Experts tasked with evaluating proposals for Australia's National Broadband Network. Previous to joining the University of Melbourne, Tucker held positions at the University of Queensland, the University of California, Berkeley, Cornell University, Plessey Research, AT&T Bell Laboratories, Hewlett Packard Laboratories, and Agilent Technologies. He is a Fellow of the Australian Academy of Science, the Australian Academy of Technological Sciences and Engineering and the IEEE. He was awarded the Australia Prize in 1997 for his contributions to telecommunications.

GreenTouch's Large Scale Antenna System Demonstrator

The Large Scale Antenna System demonstration is the first concrete step toward meeting GreenTouch's goal of a thousand-fold improvement in the energy efficiency of ICT networks. It shows that as we increase the number of antenna elements, we can decrease the transmitted radio power proportionally: when the number of antenna elements doubles, the radio power is cut in half. This is true not only in the ideal case, but also in a real radio propagation environment.

The principles of the demonstration will be explained, as well as what needs to be done to build a complete system incorporating this improvement. A video will be shown of the system in operation. Finally, the role of the Large Scale Antenna System in the overall GreenTouch mission will be described.

About Gregory Wright

Gregory Wright's professional training was in radio astronomy. He received undergraduate degrees from Harvard University and Cambridge University in physics and mathematics, respectively. His Ph.D. is from Princeton University, where he built an experiment to measure the microwave background radiation from the Big Bang.

After graduating, he joined Bell Labs where he worked on a number of wireless technology efforts, including adaptive antennas and ultra low power radios. In 2001, he left Bell Labs to become chief technology officer of a network test equipment company, and in 2003 he was a founder of Antiope Associates, a radio technology design consultancy. He recently rejoined Bell Labs as Member of Technical Staff, where he works on energy efficient wireless systems.

Open Forum II

15:30-17:30

Professor Zhisheng Niu

15:30-16:00

Deputy Dean of the Department of Electronic Engineering, School of Information Science and Technology, Tsinghua University

TANGO: Traffic-Aware Network planning and Green Operation

The fast-growing ICT industry has emerged as one of the major sources of world energy consumption. In this talk, we will firstly address some potential paradigm shifts of the information networks, in particular the wireless communication networks, from the viewpoint of energy-efficiency, and propose a new network planning and operation framework, called TANGO (Traffic-Aware Network planning and Green Operation). Then, a cell zooming scheme and the corresponding cell planning algorithm will be explained. Theoretical modeling and simulation studies have shown that the TANGO framework can greatly improve the energy-efficiency of the wireless networks, while the quality-of-service of users can be kept at a satisfactory level.

About Zhisheng Niu

Zhisheng Niu graduated from Northern Jiaotong University, Beijing, China, in 1985, and got his M.E. and D.E. degrees from Toyohashi University of Technology, Toyohashi, Japan, in 1989 and 1992, respectively. After spending two years at Fujitsu Laboratories Ltd., Kawasaki, Japan, he joined with Tsinghua University, Beijing, China, in 1994, where he is now a professor at the Department of Electronic Engineering. He received the Best Paper Awards from the 13th and 15th Asia-Pacific Conference on Communication (APCC) in 2007 and 2009, respectively, and Outstanding Young Researcher Award from Natural Science Foundation of China in 2009. His current research interests include teletraffic theory, mobile Internet, radio resource management of wireless networks, and green communication and networks. Currently, Dr. Niu is a fellow and councilor of the IEICE, Editor of IEEE Wireless Communication Magazine, Director for Conference Publications of IEEE Communication Society, Conference and Technical Seminar Coordinator



of IEEE Region 10, council member of Chinese Institute of Electronics (CIE), and vice chair of the Information and Communication Network Committee of the Chinese Institute of Communications (CIC).

Professor Yung Yi
KAIST

16:00-16:30

Cellular Greening via Efficient BS Control: Topology, On-off, and Transmission Power

In this talk, we discuss how to save significant energy in wireless cellular networks by efficiently managing BS control mechanisms. We classify BS control mechanisms based on different operation time scales, ranging from BS topology management, to BS on/off and finally transmission powers. Using optimization and stochastic tools, we introduce three case problems of approaching this issue, provide some of recent results in these areas and conclude the talk by providing open problems.

About Yung Yi

Yung Yi received his B.S. and the M.S. in the School of Computer Science and Engineering from Seoul National University, South Korea in 1997 and 1999, respectively, and his Ph.D. in the Department of Electrical and Computer Engineering at the University of Texas at Austin in 2006. From 2006 to 2008, he was a post-doctoral research associate in the Department of Electrical Engineering at Princeton University. Now, he is an assistant professor at the Department of Electrical Engineering at KAIST, South Korea. His current research interests include the design and analysis of computer networking and wireless communication systems, especially congestion control, scheduling, and interference management, with applications in wireless ad hoc networks, broadband access networks, economic aspects of communication networks (a.k.a. network economics), and green networking systems. He has authored and co-authored more than 50 papers in the premier conferences and journals and his work has been cited more than 700 times in technical articles and papers of the networking and communication area. He has been serving as a TPC member at various conferences such as ACM Mobihoc, Wicon, WiOpt, IEEE Infocom, ICC, Globecom, ACM CFI, ITC, the local arrangement chair of WiOpt 2009 and CFI 2010, and the networking area track chair of TENCON 2010. He also serves as the the co-chair of the Green Multimedia Communication Interest Group of the IEEE Multimedia Communication Technical Committee.

Laurent Herault

16:30-17:00

Director of Strategic Telecommunication Programs, CEA-LETI Applied Research Institute for Microelectronics

Earth Project Overview and First Technical Results

Yan Chen

17:00-17:30

Senior Research Engineer of the Green Radio Excellence in Architectures & Technologies Project,
Huawei Technologies

GREAT Project Overview

GREAT (Green Radio Excellence in Architectures & Technologies) is a dedicated project inside Huawei on the novel design of energy efficient wireless networks. The goal of the project is to cope with the huge energy demand due to the explosive tigating and proposing novel low energy transmission technologies and architectures, efficient radio resource utilization strategies, as well as dynamic network management schemes, to drastically reduce the energy consumption of the wireless network while still satisfying user's quality of service requirement. The project consists of four parts, namely a fundamental theoretical framework, an energy efficiency evaluation (3E) framework, and the design of novel energy-efficient architectures and technologies. In particular, four fundamental tradeoffs on wireless communications have been identified as the theoretical framework that guides all the innovative designs in the project. In the presentation, brief introduction of its vision, the research framework, as well as the fundamental tradeoffs, will form the content of an overview of the GREAT project.



About Yan Chen

Yan Chen received her B.Sc. degree from Chu Kochen Honored College, Zhejiang University, Hangzhou, China, in 2004 and her Ph.D. degree from the same university in 2009. After graduation, she joined Huawei Technologies (Shanghai) Co., Ltd. and is currently working as a senior research engineer in the Green Radio project called GREAT, which focuses on energy efficient solutions for wireless radio access networks. She is now one of the leaders of the project. Her research interests include green network information theory, energy-efficient network architecture and management, fundamental tradeoffs on green wireless network design, as well as the radio technologies and resource allocation optimization algorithms therein. She is currently coordinating the Architecture discussion in the Mobile WG of GreenTouch and leading the Green Transmission Technologies (GTT) project of GreenTouch.