

Sustainable Digital Cities

Presentations Day

Telecom Bretagne and IEEE Student Branch

July 11, 2014

1 Announcement

DEAR all, Telecom Bretagne and IEEE Student Branch would like to invite you for a presentations day on Friday, July 11th, 2014. The presentations will be dedicated to the topic of Sustainable Digital Cities. All talks will be given in room B04, in the newly-built Meridienne wing of Telecom campus in Brest.

2 Programme of the Day

8:45– 9:30 Coffee/Networking time
9:30–10:45 Prof Trevor Hall's talk
10:45–12:00 Prof Loutfi Nuaymi's talk
12:00–12:15 IEEE student branch presentation

3 Talk Abstracts

3.1 ICT for Sustainable Smart Cities

Prof Trevor Hall, University of Ottawa, Fellow of Telecom Bretagne

A city consists of interconnected systems of infrastructure, services, processes and people. How then do we define a “Smart City”? While the Internet offers a myriad of definitions, perhaps the most appropriate one is: A Smart City embraces information and communication technologies (ICT) to improve efficiencies in sustainable resource utilization that will ultimately result in cost savings, improved security and quality of life, better service delivery and reduced environmental footprint, all of which support innovation and a low carbon economy. In addition to the physical resources provided by cities, the performance of today's cities depends on social infrastructure and high-quality knowledge communication. Cities all over the world, irrespective of size, are enthusiastically embracing Smart City concepts.

The economic importance of ICT infrastructure is widely recognized. Since 2008, over 50% of the world's population live in cities and this proportion is expected to rise to 80% by 2020 to reach 6.4 billion by 2050. In Canada, 85% of Ontarians already live in urban areas. Urban planners envisage Smart Cities predicated on ubiquitous broadband wireless and cloud computing access to improve the efficiency and effectiveness of all city operations. The Smart City anticipates the “Internet of Everything” to provide ambient intelligence and augmented realities beyond our current ability to absorb information. While urban ecologists assume technology can be implemented, engineers must first surmount economic and technical hurdles, e.g., ICT energy consumption is responsible for 3% of global energy consumption and is growing unsustainably, thus raising issues around costs and greenhouse gas emissions.

The University of Ottawa is advancing a research agenda integrating technological and social aspects to develop in partnership with industry low-energy consumption fully instrumented, networked and cloud-hosted consumption infrastructure to collect, process, and analyze data for performance management of Smart City applications. Based on the collective expertise and experience of the team, the focus is:

- (i) low energy consumption wireless & wired access networks offering the high density of access points and bandwidth envisaged in a smart city scenario;
- (ii) low energy consumption data centre interconnect and networking;
- (iii) big data analytics and business performance management with a focus on energy management (to ensure sustainability) and public health (to ensure quality of life);
- (iv) privacy & ownership of smart city data;

This presentation will outline the vision of the Smart City and highlighting significant issues, challenges and potential roadblocks that confront its realisation. The university campus is advanced as an ideal laboratory to test smart city concepts. Approaches to energy consumption reduction of wireless and wired networks and data centres are described. Healthcare provides an example of the benefits that big data analytics and business performance management applications can provide.

3.2 Research activity for High energy efficiency cellular networks **Prof Loutfi Nuaymi**

The wireless traffic data rate is expected to continue to increase rapidly in the following years. On the other hand, the density of base stations is very high in urban areas. It is also very difficult to add new BS sites in these areas. Energy consumption of wireless networks is a very active research topic and several research teams worldwide are proposing solutions for the green wireless networks, i.e. energy-efficient wireless networks. In this presentation, we propose a tutorial of green cellular networks research activity at Telecom-Bretagne—IRISA/D2 Dept. The context of heterogeneous access is first introduced. Then a highlight of major research programs is presented. We then address the models used in these studies and some simulation tools. We finally present some research approaches before conclusion.

4 Speakers Biographies

4.1 Prof Trevor Hall

Trevor Hall studied general engineering, specialising in electrical sciences, at Christ's College, Cambridge University, UK (1974–1977), where he was elected a scholar in 1976 and was awarded a BA degree in 1977 and MA in 1981. He conducted his postgraduate research in fibre optics at University College London where he was awarded a PhD degree in 1980.

In 1979 he joined Cambridge Consultants Ltd as an optical physicist and then in 1980 joined Queen Elizabeth College London as a lecturer in Physics; moving to King's College London in 1984 following a merger. He was promoted to Reader in Physics in 1990.

In 1993 he transferred to the Electronic Engineering Department of King's College London, to take up a position as Head of the Physical Electronics Research Group, and was subsequently promoted to Professor of Optoelectronics in 1994. He spent the year 1997–98 on sabbatical leave as a visiting professor at Cambridge University Engineering Department where he initiated his research into photonic packet switches. The desire to refocus his career into a research-intensive mode motivated his decision to take up a position of full professor at the University of Ottawa from August 2002.

He has conducted research in the fields of fibre optics; electromagnetic scattering and inverse problems; synthetic aperture radar signal processing, image processing and neural networks; non-linear and diffractive optics; optoelectronic information processing; and optoelectronic circuit and packet switching systems. He has also made contributions to microfabrication and heterojunction bipolar transistor technology. He has over 200 publications including 100 papers in journals. The emphasis of his current research is on photonic networks and packet switches. He is author of five patents on packet switch architecture and allied optoelectronic technology. He has been involved in many national and European-wide industry / academic collaborations both as a technical contributor and as a project manager.

In addition to his research interests, he has made contributions to academic leadership and management particularly in the areas of strategic planning; financial, physical & human resources. From 1993–1996, he was a member of the Executive of the Electronic Engineering Department, King's College London, with responsibility for resources. He was also a member of the College-wide Staffing Policy Committee and Chairman of the Technical Staff Panel. He has served on numerous UK Engineering & Physical Sciences Research Council (EPSRC) and Department of Industry (DTI) committees and panels in the Information Technology & Computer Science; Photonics; and Atomic & Molecular Physics programme areas. He was Chair of the Governing Body of a large locally managed secondary school in London from 1985–2002.

He has acted as a consultant to Plessey (now Marconi), British Petroleum, Standard Telephone Laboratories (now Nortel Harlow UK), Fujitsu, and Qinetiq (formerly DERA & RSRE, Malvern UK). He has acted also as a project monitoring officer on behalf of the DTI, as an advisor to EPSRC on public awareness of science.

He is a chartered engineer (C.Eng.) and a chartered physicist (C.Phys); a corporate member of the UK Institution of Electrical Engineers (MIEE); a member of the Institute of Electrical and Electronics Engineers (IEEE) and a fellow of the UK Institute of Physics (F.Inst.P). He is Professor Emeritus in Optoelectronics, King's College London, University of London.

4.2 Prof Loutfi Nuaymi

Prof Loutfi Nuaymi was born in Beirut in 1970. He is Associate Professor at Telecom Bretagne (previous name: ENST Bretagne), Rennes, France. He got his PhD in Telecommunication from the Ecole Nationale Supérieure des Télécommunications (ENST), now Telecom Paris Tech, Paris, France in 2001. His fields of interest are radio resource management and energy-efficiency in wireless networks: UMTS, WiFi, WiMAX and LTE. He is the author of "WiMAX" published by Wiley (January 2007) and many journal and conference papers.

Sustainable Digital Cities

8:30 - 9:30 : Tea, coffee & chat

9:30 - 10:30 : Prof. Trevor Hall (University of Ottawa)

« **Sustainable Digital Cities** »

10:45 - 11:45 : Dr. Loutfi Nuaymi (Telecom Bretagne)

« **Réseaux cellulaires à haute
efficacité énergétique** »

12:00 - 12:15 : Presentation of the IEEE student branch

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11 July 2014

8:30 - 12:30