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Program

Registration

Opening Ceremony

Welcome from the General Chairs - Prof. Hassan Artail
Summary of the Technical Program by the TPC Chairs - Prof. Youssef Nasser
Welcome from AUB - Dean Makram Suidan
Welcome Message - Status of the Telecom Sector in Lebanon - H.E. Mr. Nicolas Sehnaoui - Minister of Telecommunications in Lebanon
Challenges in Mobile Broadband Evolution - Mr. Ziad Zorkot, Network Audit and Quality Manager, MTC-Touch

Coffee Break

K1: Keynote 1: ROADMAP TO 4G AND BEYOND: LTE-A AND SMALL CELLS

In order to meet the ever-growing need for wireless data and services, LTE Advanced and beyond 4G (B4G) cellular systems are advocating fundamental advances in both utilizing the radio access spectrum efficiently and providing efficient data and service delivery through new system architectures. A wide spectrum of advanced communication techniques comprising, among others, carrier aggregation, advanced MIMO, cooperative communication, or self-organizing networks, are currently being investigated and standardized. However, historic data regarding capacity improvements in wireless networks show that the largest gains ever obtained come mainly from the use of smaller cells. These can provide more than three orders of magnitude increase in network capacity. For this reason, the paradigm of Heterogeneous Cellular Networks (HetNet), comprised of a macrocell network underlaid by one or several tiers of small cells, has become a key element in the envisioned future cellular system of every wireless carrier across the world. A tremendous activity on small cells has been conducted in recent years by standardization bodies including 3GPP, 3GPP2 and the WiMAX forum. Similarly, world-wide academic research and industry efforts, which include leading service providers and equipment manufacturers, have embraced small-cell technology as a key element for future wireless cellular systems. Although in order to fully exploit the potential of this technology, a number of technical challenges still need to be solved, a varied range of small cell solutions for cellular systems have already been adopted and deployed.

K2: Keynote 2: HOW TO DENSIFY: MASSIVE (MIMO) OR SMALL (CELLS)

Wireless networks are inherently limited by their own interference. Therefore, a lot of research focuses on interference reduction techniques, such as mutiuser MIMO, interference alignment, interference coordination or multi-cell processing. Although these techniques might lead to considerable performance gains, it is unlikely that they will be able to meet the demand for wireless data traffic in the future. Therefore, a significant network densification, i.e., increasing the number of antennas per unit area, is inevitable. One way of densifying the network consists in cell-size shrinking, such as the deployment of femto or small cells, which comes at the cost of additional equipments and increased interference. Another much simpler, but also less efficient, option is the use of massively more antennas at each base station (BS). In this talk, we will discuss the challenges of small cell versus massive MIMO networks and show how Random Matrices provides the ideal framework to model, design and optimize beyond LTE (Long Term Evolution) networks.

Lunch

Tut1: Tutorial 1: Energy Efficiency in Wireless Communication Networks

The environmental and energy efficiency issues became more obvious to a larger audience in the last. Recently, increasing maturity of mobile technology in combination with the growing amount of equipment deployed each year has woken up the need of innovating in the field of energy efficient communications.

In the last decade telecommunication has experienced a tremendous success causing proliferation and demand for ubiquitous heterogeneous broadband mobile wireless communications. Up to now, innovation has mainly targeted to improve wireless networks coverage and capacity while meeting the QoS for users admitted in the system. Nowadays, the number of mobile subscribers equals more than half the global population. Forecast on telecommunication market assume an increase in subscribers, per subscriber's data rate and, the roll out of additional base stations for next generation mobile networks.

The undesired consequence is the growth of wireless network's energy consumption which will cause an increase of the global carbon dioxide (CO2) emissions and, impose more and more challenging operational cost for operators. Communication energy efficiency represents indeed an alarming bottleneck in the telecommunication growth paradigm.

The 'A Survey on Energy Efficiency in Wireless Communication Networks' tutorial presents and analyzes the most significant technical proposals in the field of green communications for wireless networks. A key objective of our tutorial is to go beyond the current state of the art and provide a view into a potential holistic analysis that combines and extends the current set of energy saving techniques. With this tutorial, we first present the specific challenges for green communications. Then, after presenting the current proposed solutions, approaches and trends, we set the technical framework introducing currently investigated metrics, topologies and architectures for wireless networks' energy efficiency. In a second part of the tutorial we present limitations and costs of hardware devices. In the thirds part of the tutorial we discuss on energy efficient protocol and network management solutions, ranging from coding and modulation scaling to interference management, resource allocation, multi-RAT, cognitive radio and discontinuous transmission techniques. In the end, this tutorial will present some future visionary network design, their possible backward capability with current standards and summarize some open problems on critical energy-efficient design issues.

Targeted audiences for the 'A Survey on Energy Efficiency in Wireless Communication Networks' tutorial are academia, industry, research institutes, PhD students and project managers.

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Aleksi Marttinen (Aalto University & School of Electrical Engineering, Finland); Shekar Nethi (Aalto University, Finland); Risto Järvinen (Aalto University, Finland); Riku Jäntti (Aalto University School of Electrical Engineering, Finland)

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Majd Ghareeb (Univ, France); Soufiane Rouibia (TMG, France); Benoit Parrein (University of Nantes, France); Mohamad Raad (LIU- Lebanese International University, Lebanon); Cedric Thareau (TMG, France)

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Sukaina Al-Nasrawi (Beirut Arab University & United Nations Economic and Social Commission for Western Asia, Lebanon); Maysoun Ibrahim (Beirut Arab University, Lebanon)

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Hela Masmoudi (Telecom, France); Imed Boughzala (Telecom Ecole de Management & Institut Mines-Telecom, France)

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Reception at AUB - Charles Hostler Center

K3: Keynote 3: SMART GRID COMMUNICATIONS

Smart Grid systems intelligently monitor and control energy flows in order to improve efficiency and reliability of power delivery. A local utility would receive customer load profiles from smart meters, and adjust power generation and energy distribution accordingly. Smart meters could transmit usage data over powerline or wireless links once per minute.
Smart Grid communication over outdoor power lines is attractive because it uses existing infrastructure. However, it is limited by the strong impulsive noise, esp. from power electronics and wireless signals, within the 3-500 kHz transmission band.

In improving reliability of outdoor powerline communication (PLC), we derive impulsive noise models using field measurements, develop receiver methods to mitigate the noise, and implement those methods in our real-time testbed. One of our impulsive noise models has been adopted by the IEEE 1901.2 PLC standard.

This research is supported by National Instruments, as well as SRC GRC ICSS Task 1836.063 with sponsors Freescale Semiconductor, IBM and Texas Instruments.

Coffee Break

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Alaa Atassi (American University of Beirut, Lebanon); Imad Sarji (American University of Beirut, Lebanon); Imad H Elhajj (American University of Beirut, Lebanon); Ali Chehab (American University of Beirut, Lebanon); Ayman Kayssi (American University of Beirut, Lebanon)
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Tut2: Tutorial 2: Mobile Cloud Computing

Together with an explosive growth of the mobile applications and the usefulness of the cloud computing concepts, mobile cloud computing has emerged as a potential enabling technology for future generation mobile services and applications. Mobile cloud computing integrates the cloud computing concepts into the mobile environment and overcomes obstacles related to the performance improvement of mobile computing systems (e.g., battery life, bandwidth, and capacity), networking environment (e.g., heterogeneity, scalability, and availability), and mobile system security (e.g., reliability and privacy).

In this tutorial, an exposition to mobile cloud computing will be provided. Starting with the motivations of mobile cloud computing, the basics of the relevant technologies including mobile and wireless services, grid and utility computing, and cloud computing will be discussed. Then, the details of a mobile computing architecture and its components will be described. In particular, an overview of the concepts such as data center, Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS) will be given. Next, a variety of applications which use mobile cloud computing will be discussed. Then, the research issues and challenges in mobile cloud services, and different approaches proposed in the literature to solve these challenges will be discussed. In this context, two optimization models developed for mobility-aware offloading and admission control of mobile cloud users in mobile cloud computing environment will be presented. To this end, we will outline several major research directions in mobile cloud computing which include power management and quality-of-service support for mobile devices, standard interface for data exchange, service pricing and revenue management for service providers, and service convergence for application developers.

K4: Keynote 4: Status & Challenges of Telecommunications Sector in Lebanon

Coffee Break

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Andre Bigand (Universite du Littoral (ULCO), France)
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Mostafa Rizk (Telecom Bretagne & Lebanese University, France); Amer Baghdadi (Télécom Bretagne, France); Michel Jezequel (Telecom Bretagne, France); Mohanna Yasser (LebUni, Lebanon); Youssef Atat (Lebanese University, Lebanon)
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A Novel Stochastic Geometrical Model for Wideband MIMO-V2V Channels
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Tarek Chehade (Lab-STICC UMR CNRS 6285 UBO, France); Philippe Rostaing (University of Brest, France); Ludovic Collin (LEST, CRNS, Brest, France); Emanuel Radoi (University of Brest & CNRS UMR 6285 Lab-STICC, France); Oussama Bazzi (Lebanese University, Lebanon)
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A Bayesian Matching Pursuit Based Scheduling Algorithm for Feedback Reduction in MIMO Broadcast Channels

Hussain J. Shibli (King Abdullah University of Science and Technology, Saudi Arabia); Mohammed Eltayeb (The University of Akron & King Fahd University of Petroleum & Minerals, USA); Tareq Y. Al-Naffouri (King Abdullah University of Science and Technology, USA)

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Tut3: Tutorial 3: Wireless Small Cell Networks

Small cell networks (SCNs) are seen as a promising solution for boosting the capacity of wireless networks, while efficiently offloading data and expanding coverage in a cost-effective manner. In this tutorial, we provide a comprehensive overview on SCNs while highlighting the key challenges, associated techniques, and the future landscape. First, we provide an overview on advanced analytical techniques, such as stochastic geometry, suitable for modeling and analyzing SCNs. We show how these new spatial and random statistical models provide tractable and powerful tools for computing network performance metrics, such as coverage probability and spectral efficiency. Second, we delve into the details of advanced interference management techniques tailored for the unique features of SCNs. In particular, we introduce key concepts such as cell range expansion, cell selection, and adaptive resource partitioning that lie at the heart of next-generation LTE-Advanced systems. Then, we discuss in detail the concept of self-organizing networks (SONs) as it applies to small cell deployment. Here, we focus on novel game-theoretic and reinforcement learning techniques that are seen as a key enabler for deploying self-optimizing and self-configuring heterogeneous and small-cell networks. We conclude the tutorial by providing an in-depth overview of the current and future challenges facing the large-scale deployment of SCNs.

Lunch

F3: SESSION F3: HARDWARE & CIRCUIT DESIGN

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Sahar Hamed (Cairo University, Egypt); Ahmed Khalil (Cairo University, Egypt); Mohamed B Abdelhalim (Arab Academy for Science, Technology & Maritime Transport, Egypt); Hassanein H. Amer (American University in Cairo (AUC), Egypt); Ahmed H. Madian (Egyptian atomic energy authority, NCRRT, Egypt)

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Mohammed Baydoun (American University of Beirut, Lebanon); Adnan Al-Alaoui (American University of Beirut, Lebanon); Rony Ferzli (Microsoft, USA)

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Ali Hayek (University of Kassel, Germany); Josef Boercsoek (University of Kassel, Germany); Sebastian Domes (University of Kassel, Germany)

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Jalal Jomaah (Grenoble, France); Hussam Ayad (Grenoble INP, France)

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Yi Zheng (School of Computer Science National University of Defense Technology, P.R. China); Juan Chen (National University of Defense Technology, P.R. China); Qiang Wu (National University of Defense Technology & School of Computer Science, P.R. China); Tao Tang (National University of Defense Technology, P.R. China)

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Ali Al Ghouwayel (LIU, Lebanon); Hussein Hijazi (Grenoble-INP, GIPSA-Lab, France); Ali Alaeddine (Lebanese University, Lebanon)

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