DYNAMIC RESOURCE ALLOCATION FOR 5G GREEN HETNET

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This talk jointly addresses two major issues which are supposed to remain the main concerns of the worldwide research community for at least a decade; (1) Optimization of energy consumption to save the limited energy resources and cope with its increasing demand as well as reducing the worldwide CO2 emission, (2) The need for next generation (5G) mobile communications due to the tremendous trend in increase of data traffic.

Technically speaking, 5G mission is to develop a spectrum- and energy-efficient network which is capable of reaching speeds of 10 Gbps. Specifically, its capability to minimize the energy requirements of web devices and network infrastructure is of utmost importance due to recent concerns for energy consumption in ICT industry. With the rapid growth in the mobile communications sector, the carbon footprint of the ICT sector will grow up to 1.43 Giga-tons by 2020 and mobile communications sector is responsible for 201 Mega-tons of emissions by 2020 (14% of the whole ICT sector). Already, EU targets a 20% reduction in the energy consumption of IT industry by 2020. At the beginning of this talk, we discuss what we have achieved so far by four generations of wireless networks and what we may expect from the upcoming 5G. The newest state-of-the-art proposals and specifications discussed by leading international wireless R&D companies for 5G will then be presented. Later, we introduce the energy-efficiency (EE) issue for wireless communications and infrastructure from different perspectives. These techniques brighten the horizon for 5G system design. In fact, during last decade most researchers have focused on spectrum-efficiency (SE), and EE was not considered by 3GPP as an important performance indicator until very recently. As a result recent wireless standards such as LTE have near optimal SE, with the aid of some advanced techniques such as turbo coding, while they ignore the EE issue. The main problem is how to balance EE and SE metrics in radio resource management (RRM), because they are usually not consistent and sometimes conflict with each other. Finally, we will present some recent energy-efficient RRM modules for 5G Heterogeneous Networks (HetNet). Interference management is one of the main issues of concern in 5G HetNet and RRM module design and will be discussed accordingly.

Abolfazl Mehbodniya received his Ph.D degree from the National Institute of Scientific Research-Energy, Materials, and Telecommunications (INRS-EMT), University of Quebec, Montreal, QC, Canada in 2010. From 2010 to 2012 he was the Japan Society for Promotion of Science (JSPS) postdoctoral fellow and since January 2013 an Assistant Professor at graduate school of engineering, Tohoku university. Dr. Mehbodniya, was a visiting fellow at National Taiwan University (NTU), Taiwan and RWTH Aachen University, Germany in 2009 and 2010, respectively. He has over 40 published conference and journal papers in the areas of radio resource management, sparse channel estimation, interference mitigation, short-range communications, 4G/5G design, OFDM, heterogeneous networks, Artificial Neural Networks (ANNs) and fuzzy logic techniques with applications to algorithm and protocol design in wireless communications. Dr. Mehbodniya is the recipient of several grants and fellowships from Natural Science and Engineering Research Council of Canada (NSERC), Quebec Research fund on Natural Science and Engineering (FQRNT), JSPS, KDDI foundation, Luxembourg Ministry of Culture, Higher Education and Research and National Institute of Information and Communications Technology (NICT).