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Federated sensor clouds and spatial ambient intelligence

Adnan Al-Anbuky
Auckland University of Technology, New Zealand

Modern enabling technologies like the Internet of Things IoT and Cloud Computing have opened up more doors for emphasizing the importance of the field of wireless Sensor Network. Research and development of concepts related to sensor networks are emphasizing the various modes of communication, including Cognitive networking, Opportunistic connectivity and Machine-to-Machine communication. Areas like data and reality mining, cyber-physical systems and others, with emphasis on spatio-temporal coverage, have started formulating highly complex dynamic systems. With the need for integrating the multiple subspaces and multiple phenomena, these systems are centered round federation of sensor clouds over the internet. These systems are driving towards the smart cities and what has been referred to as the planet nervous system. While elements of the concept have started taking shape, there are significant operational and optimization challenges that need to be addressed. The talk will provide key highlights to the large scale systems organization and the role of key acting elements in facilitating efficient services. The roles of sensor clouds and related big data, the Internet and related IoT architecture and the virtual Cloud and related services will be discussed. Examples taken from the experience of AUT SeNSe research laboratory will be used for demonstrating the various aspects of the system architecture. Furthermore the talk will shed the light on the future directions of these technologies as it contributes to the fabrics of smart cities.

adnan.anbuky@aut.ac.nz

Smart pricing and market formation in hybrid cellular-P2P networks

Aris M Ouksel
University of Illinois at Chicago, USA

Demand for wireless communication services is growing faster than network providers can add capacity. At peak demand, networks must limit service consumption; networks that can support more customers while maintaining quality of service will have an important advantage over their competitors. As a partial solution to this capacity problem, we propose incentivizing cellular network customers to join smaller-scale peer-to-peer WiFi networks. We present a network architecture built around three components: a voluntary participation system that allows switching between the cellular and peer-to-peer networks; our Self-Balancing Supply/Demand protocol for information search and discovery; and a cap-and-trade model for minimizing the total incentives required to support the operation of the peer-to-peer network.

aris@uic.edu