**RAN Planning and Optimisation for the IoE and 5G/B5G Era**

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**Abstract**

The Internet of Everything (IoE) represents the next biggest opportunity for mobile operators, network infrastructure vendors, terminal and chip makers and network assurance companies.

The IoE brings people, process, data and things together by network infrastructures that support person-to-person (P2P), person-to-machine (P2M) and machine-to-machine (M2M) communications.

In the IoE and 5G/B5G era, the challenge for the communications that involves people (i.e., P2P, P2M) mainly lies in the built environments that include central business districts (CBDs), campuses, high capacity venues such as stadiums, stations and airports, etc. How to use the data from OMC, O&M, OSS and social networks and demographic data to identify hotspots for the planning and real-time optimisation of small cells in the HetNets is an interesting research topic that needs further attention. In addition, how big data analysis can be used to facilitate proactive network orchestration and optimisation for the SDN (Software Defined Network) core network is also interesting.

The M2M communication in IoE uses diverse technologies, the bulk (3/4) of which is short range and uses wireless technologies such as WiFi, Zigbee and Bluetooth on unlicensed spectrum. Short range communication networks need RF planning due to operating on unlicensed spectrum, limited SON ability and more integration with their operating environments. How to efficiently model the operating environments and radio propagation (e.g., use machine learning) in them is a challenge. In addition, how to use some of these nodes to observe and analyse radio environments for network optimisation is also interesting.

The rest (about ¼) of M2M communications use wide area technologies that are mainly cellular (2G/3G/4G) and cellular IoT technologies on licensed spectrum. Cellular IoT network is optimised for deeper indoor coverage (20dB more link budget), energy saving and lost terminal cost. How to plan and optimise cellular IoT networks that will share the existing cellular network infrastructure and how to evaluate the impact of cellular IoT traffic on core network to provide information for proactive SDN are interesting research topics.

**In his talk, the Prof Jie Zhang will share some of his thoughts on some of the above challenges and some research being undertaken in his teams.**

**时间：2016.5.13 (周五)， 3：00pm**

**地点：南一楼西203**

**邀请人：葛晓虎教授**

**主办方：电子信息与通信学院**

Jie Zhang is a **full professor** and has held the ***Chair in Wireless Systems*** at the EEE Dept., University of Sheffield, UK since Jan. 2011. Prior to Sheffield, he worked with Imperial College London and Oxford University and University of Bedfordshire etc. He and his students have pioneered research in femto/small cell and HetNets and published some of the earliest and most widely cited publications in these topics (3 of top 10 most cited). Including the first technical book on femtocell “Femtocells: Technologies and Deployment” (Wiley, 2009) and "OFDMA femtocells: A roadmap on interference avoidance," *IEEE Comm Mag.*, which was **ranked in 47 of top 100 documents accessed in IEEExplore in Oct. 2009,** and iscurrently the 2nd most cited femtocell paper (citations: 682) apart from a survey paper. His publications have attracted over 5000 citations (Google scholar).

He co-founded RANPLAN Wireless Network Design Ltd. (www.ranplan.co.uk) that produces a suite of world leading in-building DAS, indoor-outdoor small cell/HetNet network design and optimisation tools *iBuildNet®* - Professional, Walk and Cloud, which are being used by Ericsson, Huawei, Cisco, China Mobile, Telenor (Europe), Ooredoo (Middle East) and so on across the globe. Since 2005, he has been awarded over 20 research projects by the EPSRC, the EC FP6/FP7/H2020 and industry, including some of world’s earliest projects on femtocell/HetNets.