

## **Tutorial T-19: Wi-Fi Data Offloading**

Presenter: Jianwei Huang (The Chinese University of Hong Kong, Hong Kong)

### **Tutorial Overview**

With the proliferation of smartphones and tablets, the demand for mobile data has been growing very rapidly, which is pushing the mobile cellular network to its capacity limit. On the other hand, the Wi-Fi technology is uniquely positioned to complement the cellular technology, due to its unlicensed nature and the worldwide adoption at home and work. In particular, Wi-Fi networks can help to offload the traffic from over-stressed cellular networks, reduce network costs and increase user satisfactions. To achieve a seamless integration of cellular and Wi-Fi technologies, however, demands forward-looking policy reforms, effective economic mechanism designs, and innovative technology solutions.

This tutorial will provide an overview, both in terms of industry practice and academic research, for understanding of opportunities and challenges of designing future mobile broadband networks with integrated offloading capabilities between cellular and Wi-Fi. The target audience of this tutorial will be researchers, engineers, and regulators in the wireless industry, who are interested in understanding the policy-economics-technology interactions of Wi-Fi data offloading.

The tutorial outline is as follows:

#### **Part I: Industry Background and Standardization**

- Global mobile data traffic growth
- Mobile data offloading: femtocell vs. Wi-Fi
- Industry Standards: Hotspot 2.0
- Case studies: AT&T and China Mobile
- Challenges of Wi-Fi data offloading

#### **Part II: Economic and Technological Considerations and Solutions**

- Delay optimal Wi-Fi offloading
- Congestion-aware network selection
- Predictive network selection in offloading
- Bargaining-based Wi-Fi data offloading
- Double auction mechanism for offloading market
- Crowd-sourced Internet connectivity through integrated cellular and Wi-Fi networks

## Presenter Biography

**Jianwei Huang** is currently an Associate Professor and Director of the Master of Science Program in the Department of Information Engineering at the Chinese University of Hong Kong. He received Ph.D. from Northwestern University in 2005, and worked as a Postdoc Research Associate at Princeton University during 2005 - 2007. He is the co-recipient of 7 Best Paper Awards, including IEEE Marconi Prize Paper Award in Wireless Communications in 2011, and Best Paper Awards from IEEE WiOpt 2014 and 2013, IEEE SmartGridComm 2012, WiCON 2011, IEEE GLOBECOM 2010, and APCC 2009. He received the IEEE ComSoc APB Young Researcher Award in 2009. He has co-authored four books: "Wireless Network Pricing," "Monotonic Optimization in Communication and Networking Systems," "Cognitive Mobile Virtual Network Operator Games," and "Social Cognitive Radio Networks".

Dr. Huang has served as the Editor of IEEE Journal on Selected Areas in Communications - Cognitive Radio Series, Editor of IEEE Transactions on Wireless Communications, Guest Editor of IEEE Journal on Selected Areas in Communications special issue on "Economics of Communication Networks and Systems", Lead Guest Editor of IEEE Journal of Selected Areas in Communications special issue on "Game Theory in Communication Systems", Guest Editor of IEEE Transactions on Smart Grid special Issue on "Big Data Analytics for Grid Modernization", Lead Guest Editor of IEEE Communications Magazine Feature Topic on "Communications Network Economics", and Lead Guest Editor of IEEE Network Special Issue on "Smart Data Pricing".

Dr. Huang has served as Associate Editor-in-Chief of IEEE Communications Society Technology News, Chair of IEEE Communications Society Multimedia Communications Technical Committee, Vice Chair of IEEE Communications Society Technical Committee on Cognitive Networks, and a Steering Committee Member of IEEE Transactions on Multimedia. He has served as the TPC Co-Chair of IEEE SDP 2015, NetGCoop 2014, IEEE SmartGridComm Demand Response and Dynamic Pricing Symposium 2014, IEEE GLOBECOM Selected Areas of Communications Symposium 2013, IEEE WiOpt 2012, IEEE ICC Communication Theory and Security Symposium 2012, IEEE GLOBECOM Wireless Communications Symposium 2010, IWCMC Mobile Computing Symposium 2010, and GameNets 2009. He is a senior member of IEEE and a Distinguished Lecturer of IEEE Communications Society.