

IEEE Communications Society Distinguished Lecturer Tour

NA and EMEA Regions in May 2017

Prof. Jianwei Huang

As an IEEE Communications Society (ComSoc) Distinguished Lecturer, I was honored to be invited to give five lectures at IEEE ComSoc Atlanta/Seattle/Ireland/Paris Chapters in May 2017.

The five talks are based on my recent research of two streams, with the talk abstracts listed below:

Theme 1: Communications Network Economics

Abstract: Today's communication networks are highly complex, carry heterogeneous traffic in diverse environments, and are often owned by multiple profit-making entities. To successfully maintain, optimize, and upgrade such large distributed networks, it is important to design new economic incentive mechanisms as well as develop new technologies. The market deregulation of the telecommunication industry in many countries makes such economic consideration even more urgent, as there are often conflicting goals between the regulators and the commercial operators. We will first illustrate how economics can help us better understand the networking industry reality, predict user behaviors, envision new network services, and provide policy recommendations. Then we will focus on the case study of incentive mechanisms for user-provided networks (UPNs). UPNs is a new communication paradigm, which enables users to improve their communications experiences by exploiting the diverse communication needs and resources of other users. The success of UPNs, however, relies on carefully designed incentive mechanisms that effectively encourage users' voluntary participations and cooperations. We will introduce a new paradigm of cooperative video streaming based on the concept of UPN, where mobile users crowdsource their Internet connectivities and adaptively choose video downloading sequences and streaming qualities. We will introduce a multi-dimensional auction framework, which effectively incentivizes users to cooperate in a distributed fashion.

Stream 2: Economics of Wi-Fi Networks

Abstract: Stable and high-quality Wi-Fi networks play an important role in supporting fast-growing wireless data demands. According to the forecast by the Cisco Visual Networking Index, global Wi-Fi networks will carry 54% of the smartphones traffic and 70% of the tablets traffic by 2019. Comparing with cellular networks, Wi-Fi network equipments are often low-cost, easy to install and manage, and can offer high transmission rates. However, the operation of large-scale Wi-Fi networks often faces several challenges, such as the limited coverage of each Wi-Fi access

point and the customers' unwillingness to pay for public Wi-Fi access. In this talk, we will present several economic mechanisms to address these challenges. The first mechanism aims at achieving a large network coverage by incentivizing the sharing of private Wi-Fi hotspots. The second mechanism increases the Wi-Fi operator's revenue through an advertisement-sponsored differential Wi-Fi pricing scheme. Both mechanisms will encourage more investment and better utilization of the Wi-Fi networks.

1. Atlanta

My first stop was ComSoc Atlanta Chapter, where I attended IEEE INFOCOM. I gave the DL talk in Georgia Institute of Technology (GIT) on May 3, hosted by Chapter Chair Dr. David A. Lips. Other Chapter officers and some colleagues and students from GIT joined the gathering. We started with a quick lunch from 11:30 to noon, followed by my talk during noon to 1pm on the topic of "Communications Network Economics". The discussions lasted until 1:30pm, and I received many good questions and suggestions regarding the implementation issues of the user-provided networks that I talked about. Since Dr. Lips works in the area of power grid, we also talked about the economics issues of smart grid.

2. Seattle

My second stop was ComSoc Seattle Chapter, where I visited University of Washington and Microsoft. I gave the DL talk on Microsoft Research Redmond campus on May 9, hosted by Chapter Chair Dr. Titus Lo. My talk on "Communications Network Economics" started around 6pm, and about 20-30 people joined the talk, many coming from the industry. After the talk, I had the dinner with Dr. Titus Lo and Prof. Sumit Roy from University of Washington. Sumit is a world-leading expert on wireless communications, especially on cognitive radio. We had some interactions in the past through the committee work of IEEE ComSoc Technical Committee on Cognitive Networks. I also visited University of Washington during the weekend, and understood the operation and research of the energy group in the ECE department.

3. Dublin

My third stop was ComSoc Dublin Chapter, where I visited Trinity College Dublin. My host were Prof. Georgios Iosifidis and Prof. Douglas Leith. Georgios and I have been long-term collaborators, and we have published many papers together in leading venues, on topics related to mobile data offloading and user-provided networks. I had a full day schedule on May 12. I first met Prof. Siobhan Clarke, who has been leading a large scale smart city project in Ireland. Then I met Prof. Hamed Ahmadi, who is an expert on wireless networking. I gave my talk on "Communications Network Economics" at 12pm, and many colleagues and researchers from within and outside

Trinity College attended the talk. After the lunch, I further discussed with Prof. Georgios Iosifidis and Prof. Douglas Leith about various research topics related to network economics and network privacy.

4. Osaka

The last stop of my DLT was ComSoc Paris Chapter. Here I attended two conferences, IEEE WiOpt (where I was a TPC Co-Chair) and IEEE ICC (where I gave a tutorial on Fog Computing and Networking with several other colleagues). Besides attending conferences, I visited Université Paris-Sud on May 19 and Huawei France on May 23, and gave two DL talks on “Economics of Wi-Fi Networks” and “Communications Network Economics”.

My talk at Université Paris-Sud was hosted by Prof. Lin Chen and was attended by several of his colleagues. Université Paris-Sud is located in the south of Paris, and is part of a large science and technology campus that includes many universities and research institutions. We had some interesting discussions regarding the difference of French and Hong Kong academia systems.

My talk at Huawei was hosted by Dr. Jeremie Leguay at Huawei research, and around 10 colleagues from the research team attended my talk. During my visit, we also chatted how Huawei France interacts with Huawei headquarter in China, and how the culture difference makes the communications both interesting and sometimes challenging.

Finally, I would like to thank the kind support of all my hosts, the publicity efforts of four ComSoc Chapters, the approval of ComSoc Director Member Services Dr. Zhensheng Zhang, and Carol Cronin from ComSoc for the great administrative support of the DLT tour.

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Speaker Biography:

Jianwei Huang (S'01-M'06-SM'11-F'16) is a Professor and Director of the Network Communications and Economics Lab (ncel.ie.cuhk.edu.hk), 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. His main research interests are in the area of

network economics and games, with applications in wireless communications, networking, and smart grid. He is a Fellow of IEEE, a Distinguished Lecturer of IEEE Communications Society, and a Thomson Reuters Highly Cited Researcher in Computer Science.

Dr. Huang is the co-recipient of 8 Best Paper Awards, including IEEE Marconi Prize Paper Award in Wireless Communications in 2011, and Best (Student) Paper Awards from IEEE WiOpt 2015/2014/2013, IEEE SmartGridComm 2012, WiCON 2011, IEEE GLOBECOM 2010, and APCC 2009. He is also the co-recipient of Best Paper Award Finalist of IEEE INFCOM 2016 and GameNets 2011. He has co-authored six books, "Wireless Network Pricing," "Economics of Database-Assisted Spectrum Sharing," "Monotonic Optimization in Communication and Networking Systems," "Cognitive Mobile Virtual Network Operator Games," "Social Cognitive Radio Networks," and "Cooperative Traffic Off-Loading in Heterogeneous Cellular Networks." He received the CUHK Young Researcher Award in 2014 and IEEE ComSoc Asia-Pacific Outstanding Young Researcher Award in 2009.

Dr. Huang has served as an Editor of IEEE Transactions on Network Science and Engineering (2017-), Editor of IEEE/ACM Transactions on Networking (2016-), Editor of IEEE Transactions on Cognitive Communications and Networking (2015-), Editor of IEEE Transactions on Wireless Communications (2010-2015), Editor of IEEE Journal on Selected Areas in Communications - Cognitive Radio Series (2011-2014), Editor and Associate Editor-in-Chief of IEEE Communications Society Technology News (2012-2014). He has served as a Guest Editor of IEEE Transactions on Smart Grid special issue on "Big Data Analytics for Grid Modernization" (2016), IEEE Network special issue on "Smart Data Pricing" (2016), IEEE Journal on Selected Areas in Communications special issues on "Game Theory for Networks" (2017), "Economics of Communication Networks and Systems" (2012), and "Game Theory in Communication Systems" (2008), and IEEE Communications Magazine feature topic on "Communications Network Economics" (2012). He also serves as a Co-Editor-in-Chief of Wiley Information and Communication Technology Series (2017-), an Area Editor of Springer Encyclopedia of Wireless Networks (2017-), and a Section Editor for Springer Handbook of Cognitive Radio (2016-).

Dr. Huang has served as Chair (2016-2018) and Vice Chair (2014-2016) of IEEE Communications Society Cognitive Network Technical Committee, Chair (2012-2014) and Vice Chair (2010-2012) of IEEE Communications Society Multimedia Communications Technical Committee, a Steering Committee Member of IEEE Transactions on Multimedia (2012-2014) and IEEE International Conference on Multimedia & Expo (2012-2014). He has served as the TPC or Symposium Co-Chair of IEEE WiOpt 2017/2012, IEEE SDP 2017/2016/2015, IEEE ICC 2015/2012, NetGCoop

2014, IEEE SmartGridComm 2014, IEEE GLOBECOM 2017/2013/2010, IWCMC 2010, and GameNets 2009. He will serve as a General Co-Chair of IEEE WiOpt 2018. He is a frequent TPC member of leading networking conferences such as INFOCOM and MobiHoc. He is the recipient of IEEE ComSoc Multimedia Communications Technical Committee Distinguished Service Award in 2015 and IEEE GLOBECOM Outstanding Service Award in 2010.