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Title : On Gigabit Wireless Networks

Speaker: Shiwen Mao

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Organizer: Research Institute of Information Technology (RIIT), Tsinghua University

Biography:

Shiwen Mao received B.E. and M.E. from Tsinghua University, Beijing, P.R. China in 1994 and 1997, respectively, both in Electronic Engineering. He received Ph.D. in Electrical and Computer Engineering from Polytechnic University (now Polytechnic Institute of New York University) in 2004. He was a Research Staff Member with the IBM China Research Lab from 1997 to 1998 and a Postdoctoral Research Associate/Research Scientist at Virginia Tech from 2003 to 2006. Currently, he is an Associate Professor in the Department of Electrical and Computer Engineering, Auburn University, Auburn, AL. Shiwen's research interests include modeling, performance analysis, optimization, and algorithms for wireless networks, with current focus on cognitive radio networks and multimedia communications. He received the National Science Foundation Faculty Early Career Development (CAREER) Award in 2010, and is a co-recipient of the 2004 IEEE Communications Society Leonard G. Abraham Prize in the Field of Communications Systems. Shiwen is on the Editorial Board of IEEE Transactions on Wireless Communications, IEEE Communications Surveys &Tutorials, Elsevier Ad Hoc

Networks Journal, Wiley International Journal of Communication Systems, and ICST Transactions on Mobile Communications and Applications. His homepage is:

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Abstract:

Due to the drastic increase in wireless data traffic, the capacity of existing and future wireless networks will be greatly stressed. Many technologies are being investigated to address this grand challenge, among which increasing the wireless link capacity is particularly effective. In this talk, we consider two types of gigabit wireless networks as solutions to the scalability problem and the space reuse problem, respectively. The first type is free space optics (FSO) networks, where line-of-sight (LOS) point-to-point optical links are used to provide multi-gigabit rates over large distances. We show that the FSO links can be used to construct a wireless backbone for an underlying wireless mesh network, as an effective solution to the scalability problem suffered by wireless access networks. The second type is 60GHz mm Wave wireless personal area networks (WPAN). We develop a frame-based scheduling directional MAC protocol, termed FDMAC, which leverages collision-free, pseudo-wired concurrent transmissions to fully exploit spatial reuse in WPANs. The core of FDMAC is a graph coloring-based scheduling algorithm that can compute near-optimal schedules with respect to the total transmission time with a low computational complexity