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Interference Mitigation in Heterogeneous and Small Cell Networks

by

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Time: 4:30 p.m. – 5:30 p.m.

Venue: Room 121, Ho Sin Hang Engineering Building, CUHK

Abstract

Heterogeneous and small cell networks (HetSNets), utilizing a mix of macrocells, remote radio heads (RRH), picocells, femtocells, and relays, have gained the attentions of wireless industry and research community. Even with many accomplishments in HetSNets recently, many technical challenges still remain.

In this talk, we focus on the inter-cell interference issues in HetSNet. First, we introduce a time-division duplex (TDD) and the frequency-division duplex (FDD) coexisting system, in which TDD small cells reuse the uplink spectrum of the FDD macrocellular system. A joint beamforming and scheduling technique is proposed to mitigate the inter-cell interference between TDD small cells and the FDD macrocell. Secondly, an interference-aware cluster technique for the cloud-based radio access network (C-RAN) is discussed, which can effectively reduce the inter-cell interference and inter-cluster interference. Thirdly, we discuss the cell density issue from the both aspects of throughput and energy efficiency. Based on stochastic geometry analysis, we find the optimal cell size for small cells in the interference-limited environment. To conclude this talk, we highlight some potential research issues for HetSNet in the next generation mobile network.

Biography of the Speaker

Li-Chun Wang (M'96 -- SM'06 -- F'11) received the B.S. degree from National Chiao Tung University, Taiwan, R. O. C. in 1986, the M.S. degree from National Taiwan University in 1988, and the Ms. Sci. and Ph. D. degrees from the Georgia Institute of Technology, Atlanta, in 1995, and 1996, respectively, all in electrical engineering.

From 1990 to 1992, he was with the Telecommunications Laboratories of Chunghwa Telecom Co. In 1995, he was affiliated with Bell Northern Research of Northern Telecom, Inc., Richardson, TX. From 1996 to 2000, he was with AT&T Laboratories, where he was a Senior Technical Staff Member in the Wireless Communications Research Department. Since August 2000, he has joined the Department of Electrical and Computer Engineering of National Chiao Tung University in Taiwan and is the current Chairman of the same department. His current research interests are in the areas of radio resource management and cross-layer optimization techniques for wireless systems, heterogeneous wireless network design, and cloud computing for mobile applications.

Dr. Wang won the Distinguished Research Award of National Science Council, Taiwan in 2012, and was elected to the IEEE Fellow grade in 2011 for his contributions to cellular architectures and radio resource management in wireless networks. He was a co-recipient (with Gordon L. Stuber and Chin-Tau Lea) of the 1997 IEEE Jack Neubauer Best Paper Award for his paper "Architecture Design, Frequency Planning, and Performance Analysis for a Microcell/Macrocell Overlaying System," IEEE Transactions on Vehicular Technology, vol. 46, no. 4, pp. 836-848, 1997. He has published over 200 journal and international conference papers. He served as an Associate Editor for the IEEE Trans. on Wireless Communications from 2001 to 2005, the Guest Editor of Special Issue on "Mobile Computing and Networking" for IEEE Journal on Selected Areas in Communications in 2005, "Radio Resource Management and Protocol Engineering in Future Broadband Networks" for IEEE Wireless Communications Magazine in 2006, and "Networking Challenges in Cloud Computing Systems and Applications," for IEEE Journal on Selected Areas in Communications in 2013, respectively. He is holding 10 US patents.

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