THE UNIVERSITY ⬥ OF HONG KONG

Institute of Mathematical Research
Department of Mathematics

PROBABILITY AND INFORMATION THEORY SEMINAR

High-Speed Railway Wireless Communications: Efficiency, Fairness and Users' QoS

Professor Pingyi Fan

Department of Electronic Engineering, Tsinghua University, Beijing, China

Abstract

High-speed railways (HSRs) have been widely deployed all over the world in recent years. Different from traditional cellular communications, the high mobility of HSR communication makes it more easily to get a good tradeoff among the system efficiency, system fairness in time domain and users' Quality of Service (QOS) by using power control or power allocation (PA) along time. In this talk, we mainly consider the two-hop transmission system, one is the information transmission between base station (BS) and access point (AP) installed on the roof of train, and one is the information transmission between AP and passengers on the train. Here we are focusing on that between AP and Base stations. The main question is how to do the power allocation to achieve these different requirement targets from information theoretic viewpoint. Based on the predictable feature of the distance between the high speed moving train and base stations along the railway, we discuss three related key problems. (1) What is the relationship between the system transmission efficiency and fairness in time domain? (2) For two types of user information flows, time-delay sensitive and time-delay-insensitive, how to implement it? What is the inherent relationship between their corresponding achievable rates? (3) How to further minimize the total energy consumption of the whole system? Through this discussion, some important results are obtained, which may be very useful in the future system design of high speed railway communications. Another key point is that it provides some examples on how to use the information theory view point to solve the engineering problems.

About the Speaker:

Pingyi Fan received the B.S and M.S. degrees from the Department of Mathematics of Hebei University in 1985 and Nankai University in 1990, respectively, received his Ph.D degree from the Department of Electronic Engineering, Tsinghua University, Beijing, China in 1994. He is a professor of department of EE of Tsinghua University currently. From Aug. 1997 to March 1998, he visited Hong Kong University of Science and Technology as Research Associate. From May 1998 to Oct. 1999, he visited University of Delaware, USA, as research fellow. In March 2005, he visited NICT of Japan as visiting Professor. From June 2005 to May 2014, he visited Hong Kong University of Science and Technology for many times and From July 2011 to Sept. 2011 and April, 2012 to June. 2012, he is a visiting professor of Institute of Network Coding, Chinese University of Hong Kong.

Prof. Fan is a senior member of IEEE and an oversea member of IEICE. He has attended to organize many international conferences including as General co-Chair of IEEE HMWC2014, TPC co-Chair of IEEE International Conference on Wireless Communications, Networking and Information Security (WCNIS 2010) and TPC member of IEEE ICC, Globecom, WCNC, VTC, Inforcom etc. He has served as an editor of IEEE TRANSACTIONS ON WIRELESS COMMUNICATIONS, Inderscience International Journal of Ad Hoc and Ubiquitous Computing and Wiley Journal of Wireless Communication and Mobile Computing. He is also a reviewer of more than 24 international journals including 12 IEEE journals and 8 Europe journals. He has received some academic awards, including the IEEE WCNC'08 Best Paper Award, ACM IWCMC'10 Best Paper Award and IEEE ComSoc Excellent Editor Award for IEEE Transactions on Wireless Communications in 2009. His main research interests include Network Coding, Network Information Theory and Cross Layer Design as well as B4G in wireless communications etc.

Date:	May 19, 2014 (Monday)
Time:	4:00 – 5:00pm
Place:	Room 206, Run Run Shaw Bldg., HKU

All are welcome