



THE CHINESE UNIVERSITY OF HONG KONG
 Department of Information Engineering
Seminar

**User Scheduling and Beamformer Design in
 Massive MIMO and mmWave Massive MIMO**
 by
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Time : 11:00am – 12:00noon
Venue : Room 833, Ho Sin Hang Engineering Building
The Chinese University of Hong Kong

Abstract

User scheduling is one of the main issues in wireless cellular networks where a base station serves multiple users in each cell. User scheduling provides multi-user diversity gains to wireless data networks, where arrival of data packets is bursty and certain delay can be tolerated at users, and was widely investigated for 3G high-speed downlink/uplink packet access (HSDPA/HSUPA). Furthermore, 4G cellular networks adopted the multiple-input multiple-output (MIMO) technology, which provides spatial diversity and multiplexing gains based on multiple antennas, and the MIMO technology is further evolving into massive MIMO in the sub-6 GHz band and in the millimeter-wave (mmWave) band for 5G. The introduction of MIMO provides additional degree-of-freedom for user scheduling by simultaneously supporting multiple users in the spatial domain at the same time and frequency.

In this talk, focusing on cellular downlink, we consider multi-user (MU)-MIMO scheduling and introduce recent theoretical and practical advances in MU-MIMO scheduling especially for the 5G key enablers, massive MIMO and mmWave massive MIMO. First, we consider user scheduling for massive MIMO in the sub-6GHz and introduce new scheduling algorithms that are efficient in terms of channel information feedback which is the main hurdle of massive MIMO adopting large antenna arrays. Second, we consider user scheduling in mmWave massive MIMO. The radio propagation characteristics in the mmWave band are distinct from those in the sub-6 GHz band characterized as rich scattering. In the mmWave band, the radio channel experiences severe path loss and has very few multiple paths and the radio channel is often modelled by a sparse channel model. Here, we introduce the latest results in the multi-user diversity gain of the popular beam-training-based user scheduling in mmWave massive MIMO.

Biography

Youngchul Sung received B.S. and M.S. degrees from Seoul National University, Seoul, Korea, in Electronics Engineering in 1993 and 1995, respectively. After working at LG Electronics Ltd., Seoul, Korea, from 1995 to 2000, he joined the Ph.D. program and received the Ph.D. degree in Electrical and Computer Engineering from Cornell University, Ithaca, NY in 2005. From 2005 until 2007, he was a senior engineer in the Corporate R & D Center of Qualcomm, Inc., San Diego, CA, and participated in design of Qualcomm's 3GPP R6 WCDMA basestation modem. Since 2007 he has been on the faculty of the School of Electrical Engineering in KAIST, Daejeon, Korea and he is currently a tenured associate professor at KAIST.

Dr. Sung's research interests include wireless communication, statistical signal processing and inference, and asymptotic statistics with applications to wireless communications and related areas. Dr. Sung is currently a senior member of IEEE, chair of IEEE Communications Society, Asia Pacific Board (IEEE ComSoc APB), Membership Development Committee (MDC). Dr. Sung served in various technical committees: IEEE Communications Society, Signal Processing and Communications Electronics (IEEE ComSoc SPCE) Technical Committee, IEEE Signal Processing Society (IEEE SPS), Signal Processing for Communications and Networking (SPCOM) Technical Committee, Asia-Pacific Signal and Information Processing Association (APSIPA), Signal and Information Processing Theory and Methods (SIPTM) Technical Committee, etc. Dr. Sung served as an associate editor of IEEE Signal Processing Letters from 2012 to 2014, and as a guest editor of the 2012 IEEE JSAC special issue "Theories and Methods for Advanced Wireless Relays".

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