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香港中文大學
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Institute of Theoretical Computer Science and Communications

ITCSC-INC Joint Seminar

New Results On Interference Channels With Three User Pairs

By
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11:00 a.m. - 12:00 noon
Rm833, 8/F., Ho Sin Han Engineering Building, CUHK

Abstract:
Increasing user demand and spectrum scarcity have forced wireless communication networks to increasingly operate in the interference-limited regime. In this regime, data rates are no longer limited by propagation path loss and thermal noise, but instead, by concurrent communication in the same frequency band. This situation is captured information-theoretically by the interference channel. Its capacity region characterizes the optimal trade-off between simultaneously achievable data rates. While considerable progress in studying the capacity region has been made in the case with two sender-receiver pairs, much less is known for interference channels with three or more user pairs.

In this talk, we make progress in this direction. We consider certain interference channels with three user pairs, and take two different perspectives. In the receiver-centered perspective, we assume the simplest possible channel codes at the transmitters and optimize the receiver structure. The resulting interference decoding scheme yields a first inner bound to the capacity region. On the other hand, the transmitter-centered perspective gives rise to a communication model where one transmitter communicates with his desired receiver while trying not to disturb the other receivers. We define this disturbance-constrained communication problem rigorously and find its optimal coding schemes. Finally, we consolidate the two perspectives and arrive at a new inner bound to the interference channel capacity region.

Biography:
Bernd Bandemer is a postdoctoral researcher in the Information Theory and Applications Center at the University of California in San Diego, USA. He received his Ph.D. degree in Electrical Engineering from Stanford University in January 2012, and his Dipl.-Ing. degree in Electrical and Computer Engineering in 2006 from Ilmenau University of Technology, Ilmenau, Germany. In 2003/04, he was awarded a Fulbright scholarship to study at Purdue University, West Lafayette, IN, USA. His current research interest is centered around network information theory and its applications in wireless communications.

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