

Title: Wireless Challenges for Spectrum and Energy Efficient 5G Mobile Communications

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Abstract:

After 35 years from its birth in 1979, wireless mobile communications networks have evolved into 4G. The mobile data traffic volume in 2020 is expected to reach about 1000 times of 2010. Therefore, the spectrum-efficiency is becoming more and more important for 5G. Furthermore, the energy-efficiency will become an important concern. To improve both the spectrum-efficiency and energy-efficiency, mobile communications networks need to be significantly restructured. A promising solution is to introduce small-cell structured networks in order to exploit more the spatial distribution of users. In this talk, we will introduce a virtual user-centric small-cell concept. Then, we will present the recent advances in distributed antenna cooperative signal transmission techniques: the space-time block-coded diversity for improving the signal quality for macro-cell edge users and the spatial multiplexing for improving the sum capacity of users in a good propagation condition. Since higher frequency bands will be used in 5G, the transmit signal peak-to-average power ratio (PAPR) remains as an important concern for power amplifiers of battery operated user terminals. In this talk, PAPR reduction technique will also be presented.

Biography:

Fumi-yuki Adachi received the B.S. and Dr. Eng. degrees in electrical engineering from Tohoku University, Sendai, Japan, in 1973 and 1984, respectively. In April 1973, he joined the Electrical Communications Laboratories of Nippon Telegraph & Telephone Corporation (now NTT) and conducted various researches on digital cellular mobile communications. From July 1992 to December 1999, he was with NTT Mobile Communications Network, Inc. (now NTT DoCoMo, Inc.), where he led a research group on Wideband CDMA for 3G systems. Since January 2000, he has been with Tohoku University, Sendai, Japan. His research interest is in the area of wireless signal processing (multi-access, equalization, antenna diversity, adaptive transmission, channel coding, etc.) and networking.

He is an IEICE Fellow and an IEEE Fellow. He was a recipient of the IEEE Vehicular Technology Society Avant Garde Award 2000, IEICE Achievement Award 2002, Thomson Scientific Research Front Award 2004, Ericsson Telecommunications Award 2008, Telecom System Technology Award 2009, Prime Minister Invention Award 2010, British Royal Academy of Engineering Distinguished Visiting Fellowship 2011, KDDI Foundation Excellent Research Award 2012, VTS Conference Chair Award 2014, C&C Prize 2014, and Rintaro Shida Award 2016. He is listed in Highly Cited Researchers 2001 (<http://hcr.stateofinnovation.thomsonreuters.com/page/archives>).