

Tutorial Track 2: B3G Cellular Systems

MIMO and Multi-carrier Transmission Technologies toward IMT-Advanced

Author & Affiliation

Toshinori Suzuki, Ph.D. (Senior Manager),
KDDI R&D Laboratories, Inc., Japan

Short Tutorial Description

MIMO-OFDMA has become one of the most promising technologies that significantly boost the capacity of wireless broadband access schemes. This tutorial focuses on MIMO-OFDMA and introduces its principles, latest research status and some examples of its applications.

In recently established and ongoing specifications for advanced cellular systems such as E-UTRA (evolved universal terrestrial radio access) or LTE (Long Term Evolution) in 3GPP, UMB (Universal Mobile Broadband) in 3GPP2 and WiMAX or IEEE802.16e/m by IEEE, MIMO-OFDMA has been adopted as the key technology to enable the bit rate of no less than 100 Mbps with 20 MHz bandwidth.

On the other hand, as shown in the “van diagram” on the ITU-R recommendation M.1645, IMT-Advanced aims at up to 1Gbps around and related studies are going on. Considering that the WRC-07 (World Radio communication Conference 2007) has identified the spectrum for IMT the efforts to meet the high data rate of IMT-Advanced with the identified spectrum will gain momentum, therefore, this tutorial also gives a brief view over them.

The following topics will be covered: (a) OFDM principles, including OFDM modulation and OFDMA processing and OFDM channel design, (b) OFDMA scheduling, (c) MIMO principle, including SU(Single User)-MIMO, MU(Multi User)-MIMO and MIMO algorithms (d) MIMO channels, including measurement results, (e) Standardization path towards IMT-Advanced, including some examples of standardized MIMO-OFDMA systems.

Speakers Biography

Toshinori Suzuki, Ph.D.



Toshinori Suzuki received B.E., M.E. and Ph.D. in electrical engineering from Tohoku University, Sendai, Japan, in 1987, 1989 and 2005, respectively. He joined Kokusai Denshin Denwa Co. Ltd. (now KDDI Corp.) in 1989. He was also a visiting scholar at UCSD (University of California, San Diego) in 2000. Since 1991, he has been engaged in research and development of digital radio communication systems and authentication systems. He is currently a senior manager of the Wireless Communications System Laboratory of KDDI R&D Laboratories, Inc. He received the Young Researchers' Award and Best Paper Award from IEICE in 1997 and 2005, respectively.