

Title: The Next Generation Broadband Wireless communication network : 3GPP-LTE-(Advanced)

Abstract:

The Next Generation Broadband Wireless Communication (3G & 4G) Cellular Networks use completely new physical layer signalling techniques. Some of the most important techniques introduced are Orthogonal Frequency Division Multiplexing (OFDM) based multiple access in Down-Link (DL) and Single Carrier-Frequency Division Multiplexing based multiple access in Up-Link (UL) as used in 3GPP-Long Term Evolution (LTE). The access bandwidth is scalable from 1.4 MHz up to 20 MHz. Use of advanced Multiple Input Multiple Output (MIMO) antenna signalling procedures are also key features of Beyond 3G systems. The fundamental aspects of these technologies will be covered in the tutorial.

Several advanced cross layer design of Physical (PHY) and Medium Access Layer (MAC) of future Broadband Wireless Systems mainly for 3GPP-LTE and WIMAX will be explored. The design methods exploit channel knowledge dynamically to increase the data rate of future systems. Channel aware time-frequency domain fast link adaptation such as adaptive modulation and coding scheme selection is one of the key such techniques used in future systems.

This tutorial will cover details of bit and power loading algorithms as well as fundamentals necessary for designing systems which will use Link Adaptation techniques, principles of time-frequency domain resource allocation/packet scheduling for multi-user scheduling. Future broadband wireless cellular systems depend heavily on such schemes in order to achieve very high data rates as well as support Quality of Service (QoS) requirements.

Some aspects of advanced MIMO signalling schemes as well as Multi-User MIMO (MU-MIMO) scheme which increase the supportable data rates several folds will be touched upon.

Some new schemes open for further investigation such as adaptive sub-carrier bandwidth and algorithms to implement adaptive guard interval may be discussed.

Bio:

Suvra Sekhar Das obtained his B.Eng. degree in Electronics and Communication Engineering from Birla Institute of Technology, Mesra, Ranchi, India. He joined Tata Consultancy Services (TCS), India in June 2000 soon after graduating. He was involved with the multi media group where he was involved with building simulators for interactive video televisions. He joined the embedded systems group in TCS Kolkata in the year 2001 where he was engaged in developing several digital signal processing applications and wireless LAN IEEE 802.11a receiver front end algorithms. Between September 2003-2007, he was at the Wireless Networking (WING) Group at Aalborg University (AAU) as a Researcher from TCS where he later started pursuing his PhD studies. Currently he is working as an assistant professor in the G.S.Sanyal School of Telecommunications and Dept. of E&ECE at IIT Kharagpur. His current research interest is in optimization for wireless systems at the physical and medium access control layer for multi user cellular networks such as 3GPP-LTE-(A).