

Tutorial Proposal for the International Conference on Source and Channel Coding 2010

1. Title

Point to multipoint MIMO-OFDMA: Principles, Limits, and Standardization for LTE

2. Instructor's Affiliation

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3. Abstract

We will start with a description of performance targets for IMT-Advanced or 3GPP LTE-Advanced, respectively, and will demonstrate that advanced MIMO is an indispensable ingredient in order to meet those targets even under perfect conditions. We will then explain the principles of MIMO modes in LTE with a focus on closed-loop schemes. The baseline in LTE is single-user MIMO, i.e. users are separated by means of OFDMA and TDMA but not by spatial separation. However, LTE includes already a very simple form of Multiuser (MU) MIMO where SDMA is possible. In the uplink this is mainly a scheduling problem. However, in the downlink the precoder has to take care of inter-user interference. Therefore, we focus on MU-MIMO for the downlink. We will explain the potential benefits of MU-MIMO over SU-MIMO and describe the solution which is included in LTE. The relatively poor performance of this solution will be demonstrated and explained mainly by the too small feedback of channel state information.

This motivates to look for better MU-MIMO solutions. We will now give an introduction to information theoretic limits in order to demonstrate the potential of MU-MIMO. We will present the principles of non-linear MU-MIMO algorithms which aim at performance close to those limits.

Finally, we will consider linear MU-MIMO. We will particularly focus on limited feedback schemes including precoder or channel vector quantization codebook design. This is motivated by the fact that the amount of feedback bits is a major restriction in commercial systems.