


PROJECT / Coordinated MultiPoint Strategies for Future Wireless Networks

COPWIN

Main Objective:

The main technical objectives of the project are to design, implement and validate techniques exploring BSs collaboration for future wireless systems. The aim is to design and demonstrate practical multicell transmission and reception techniques that improve user's fairness and throughput, namely at the cell-edges. To reach the above main goals, specific research objectives are:

- Design of practical precoders for the downlink of multicell MIMO-OFDM based networks. Initially, we will focus on the intra cluster interference. Two approaches are considered: full centralized, which requires that CSI and data of all UTs are available at the CU; distributed, where the precoding vectors and power allocation are computed in a distributed fashion on each BSs. In the second phase a joint precoding approaches will be designed to remove both intra and inter cluster interference by exploiting the promising concept of IA.
- Design of efficient multiuser detection techniques for the uplink of multicell MIMO SC-FDMA based networks. These receivers will be implemented in the frequency-domain, based on the IB-DFE concept, eventually taking advantage of the channel decoder output. The multiuser decoder will be designed taking into account nonlinear effects in the transmission chain and can involve the estimation and cancellation of those effects.
- Designing of efficient signalling strategies both for the feedback of wireless link information and distribution among the cooperating network elements, aiming to optimize the trade-off between achieved performance and signalling overhead. Moreover, particular emphasis will be placed on inter-cluster feedback and quantization strategies.
- Design and optimization of medium access control protocols for the considered clustered multicell architecture with joint scheduling and dynamic link adaptation. The framework of multi-objective optimization, will be used to find the algorithms that efficiently allocate radio resources (power, carriers) among the different tiers.

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- Assessment and validation of the proposed downlink and uplink algorithms under realistic scenarios, through a system level simulator based on LTE specification.
 - Development of an FPGA based testbed allowing to experimentally show the feasibility of the proposed algorithms. The most promising algorithms (with good complexity/performance trade-off) will be integrated and characterized in this testbed.

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