Enhanced Wireless Communication Systems Employing Cooperative Diversity

The project aimed at researching, developing and validating radio technologies exploiting channels diversity and cooperation between users, targeting three major goals: enabling high bit rates in the broadband component of future wireless system, improving the power and spectrum efficiencies of existing wireless systems, improving and extending coverage and fairness. The project targeted the evolution of cellular networks and WMAN’s.

MOTIVATION

Wireless systems are one of the key components for enabling the information society. Wireless networks and related services will become as pervasive as microprocessors are today. Therefore it is expected that the demand for wireless services will continue to increase in the near and medium term, calling for more capacity and putting more and more pressure on the usage of radio resources. From a high-level perspective, the shape of the future wireless and mobile area will be dictated by the interaction of four different types of forces and constraints: The market demand sets the general goals and requirements which are constrained by the OPEX/CAPEX issues, regulations and also the public concerns about some aspects of the technology. The innovation and research activities have to provide solutions that efficiently combine the conflicting trade-offs between goals and constraints.

The main motivation of the work was to provide an efficient answer to these requirements, which may be conflicting. The objectives were therefore to develop and optimize combinations of physical and network techniques based on intercell and wireless intracell cooperation in a cellular enhanced architecture to increase network capacity and coverage, improve flexibility, robustness and fairness, and demonstrate their feasibility.

ACHIEVEMENTS

Achievements are classified in several categories and summarized as follows:

System Concept: a clear definition of scenarios and system model to augment a cellular system through cooperative relaying.

Algorithmic development: several competitive algorithms were developed and evaluated.

In the physical layer, after completion of the studies on algorithms to be integrated in the demonstrator, advanced studies addressing cooperative communications with distributed coding, LDPC, MIMO, channel estimation, synchronization and precoding, proposed, and evaluated. Those algorithms led to three patents.

PROJECT WEBPAGE URL

http://www.it.pt/project_detail_p.asp?ID=1055
www.ict-codiv.eu