

## TITLES OF PROPOSED RESEARCH TOPICS FOR COOPERATION WITH OTHER INSTITUTIONS

### UNIVERSITY OF FIRENZE

1. Wide are coverage and high mobility access systems for 4G:  
Our effort and competence is devoted to link adaptation techniques and QoS driven scheduling techniques at the MAC layer, while the reference scenarios would be cellular networks (with high mobility support) and WMAN (IEEE 802.16) with nomadic support.
2. Pervasive wireless access for 4G:  
In this area our competence is in sensor and ad-hoc networks. The topics of interests are cross-layer techniques as well as MAC layer optimization with a particular attention to multimedia traffic. The reference scenarios are IEEE 802.15.x (see UWB physical layer and low-rate networks) as well as IEEE 802.11 WLAN.

### TECHNICAL UNIVERSITY OF CLUJ-NAPOCA

1. Wide are coverage and high mobility access systems for 4G:  
Coding Schemes for the Adaptive Modulation Schemes Employed in the Downlink Connection of the 4G. We could also study the coding schemes for the uplink connection, provided that prof. Svensson delivers a modulation scheme.
2. Pervasive wireless access for 4G:  
We made some preliminary studies of coded MIMO schemes. If Prof. Wittneben considers that coding could be linked to his research regarding the Frame Relay, we would try to elaborate a coding scheme.
3. Software Defined Radio:  
Implementation Algorithms of the LDPC codes, RS codes, BCH codes and concatenated codes derived.  
We have also experience in digital implementation of various modulation schemes, if prof. Pijoan and prof. Imre require it.

### UNIVERSITY OF CARLOS III, MADRID

1. Wide are coverage and high mobility access systems for 4G:  
We are collaborating with Prof. Arne Svensson in the topic: "Channel prediction and feedback information for adaptive modulation in wide area networks"
2. Pervasive wireless access for 4G:  
We would like to collaborate in some topic related to MIMO, but we have not defined it yet. We can fit in if somebody else proposes a research topic.

## UPC, BARCELONA

### 1. Software defined radio:

Flexible radio equipment based on software abstraction layers: It is devoted to explore the advantages and limitations of implementing the radio lower layers (especially PHY and MAC) on programmable and/or reconfigurable digital processing platforms through the use of hardware abstraction layers and software middleware as execution and management environments.

From the STSM hold in Barcelona October 2004, it seems that La Salle (Spain), BUTE (Hungary) and TU Kosice (Slovakia) could be interested in the cooperation, but this should be confirmed.

## TECHNICAL UNIVERSITY OF KOSICE

### 1. Wide area coverage and high mobility access systems for 4G.

Research interests of TUKE are focused on the design of new structures of adaptive single-user and multi-user receivers for the different multi-access methods based on advanced digital signal processing methods. Our effort will be devoted also to application of residual number systems for the design of novel multi-access transmission systems.

### 2. Software defined radio.

Research interests of TUKE are focused on implementation and optimization of selected parts of OFDM receivers on FPGA circuits and standard digital signal processors.

## ARISTOTLE UNIVERSITY OF THESSALONIKI

1. Multiuser OFDM and MC-CDMA
2. Space-Time Block Coding for Fading Channels
3. Cooperative Diversity and Distributed Space-Time Coding

## DLR

1. Wide area coverage and high mobility access systems for 4G: OFDMA/MC-CDMA for cellular environments

## UNIVERSITY OF MANCHESTER

1. Research interests are concerned with link enhancement techniques for maximizing the capacity of future wireless cellular networks. This includes investigating novel receiver algorithms and architectures as well as multiple access interference reduction/cancellation techniques.
2. Certain aspects of the MAC and Network layers, such as, scheduling algorithms, metric resource management and cell planning are also of great interest.

## HACETTEPE UNIVERSITY

1. Wide are coverage and high mobility access systems for 4G:

Use of adaptive MIMO systems in 4G-downlinks. Investigation of multiplexing and diversity techniques and a scheme to switch between these techniques. (in cooperation with Prof. M. Sternad from Uppsala University)

2. Pervasive wireless access for 4G:  
Cooperative diversity techniques (in cooperation with ETH Zurich)
3. Software defined radio:  
Real-time implementation of a 3GPP M-PSK modulated and turbo-coded system in Rayleigh fading channel on a TMS320C6416 DSP.

#### RAMON LLULL UNIVERSITY

1. Wide are coverage and high mobility access systems for 4G  
The downlink proposal from Chalmers is based on an OFDM system. From the study of the published papers related to this proposal we have concluded that the reduction of the Peak-to-Average Power Ratio (PAPR) has not been investigated. Our aim is to find appropriate solutions to reduce the PAPR of the proposed downlink from Chalmers. We are aware that this downlink system has been designed to attain high spectral efficiency with low bit error rate and, hence, we understand that the physical layer must not be changed. Therefore, we will use only those methods for the PAPR reduction that match the system requirements without modifying the current proposal.
2. Software Defined Radio  
Implementation of critical aspects of an OFDM receiver will be studied using the P-HAL (Hardware Abstraction Layer) developed by UPC. I must say that, during some weeks after the STSM, some work was done but at the moment the cooperation is not active any more. I think we should talk about this topic during next MCM.

#### UNIVERSITY OF NOVI SAD

1. Pilot sequences optimization and multilevel sequences optimization criteria for fading channels
2. Low-power consuming simple suboptimal adaptive FEC techniques with possible application to wireless sensor networks
3. Design and convergence analysis of advanced coding schemes based on LDPC codes and BP decoding
4. Multi-user information theory with applications to coding scenarios in networks: network coding, distributed source compression, rateless (fountain) codes for reliable multicast