Foreword to the special issue on wireless network: from home to backbone

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The rapid growth of home high-speed broadband access technologies (e.g. xDSL), combined with the democratization of wireless technologies (e.g. IEEE 802.11, IEEE 802.16), created a whole of new home services integrating data, voice and video, with new quality of services constraint and need. This generated a considerable enthusiasm from the networking researchers community and many efforts have been conducted in order to support these new services on these new technologies. This special issue, entitled “Wireless network: from the home to the backbone”, comprising of eight papers is focused on the various aspects of the wireless network technologies impacting on the future home services. Papers were selected on the basis of fundamental ideas/concepts. The papers are organized as follows:

This special issue starts with a first paper focusing on the Power Line Communications inside the home. More specifically, the first paper proposes and adaptive pulse-shared orthogonal frequency division multiplexing (OFDM) scheme. The basic idea is to adapt the guard interval and roll-off factor to maximize capacity of the system. The authors show that this approach provides a notable gain compared to the case of using fixed interval guards and roll-off factors.

After this first study on the optimization of the capacity of the PLC physical layer, the second paper tackle the

problem of how we should exploit this capacity. The later one proposes a new Home Network architecture that aims to manage the coexistence of both CPL and wireless technologies such as IEEE 802.11. The main idea is to use Agent based solution that create and change very quickly the routing protocol behavior inside the home in order to guarantee the traffic's Quality of Services.

The third paper focuses on the wireless resource allocation problem due to the multiplicity of wireless access radio technologies combined to the availability of multi-radio devices. The authors propose a cooperative game theoretic approach. This approach aims to increase the utilization of the available bandwidth in addition of reducing the call blocking probability. The main idea is to use a cooperative game, where the network technologies cooperate with each other to attain the ultimate goal of user satisfaction. The authors use the Bankruptcy model and apply *Kalai-Smorodinsky Bargaining* solution to find the distribution rule that best fits the objective of simultaneous resource allocation for channel requests.

Another consequence of home high speed Internet access growth is an increase of the number of PCs in the home. This has a direct impact on the energy consumption, which growing increasingly. The fourth paper focus on this issue and reveals the potential of energy saving in future home environment, by sharing the computing resources of idling home devices to substantially decrease the total energy consumption. The proposed approach relies on self-organization and self-management in a decentralized way.

The fifth and the seventh papers focused on the planning problem in wireless networks. More precisely, the first one focuses on the coverage planning for UMTS networks and develops a mathematical modeling and optimization approaches for non-uniform common pilot channel power allocation. The authors start by modeling and resolving the al-

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location problem using an Integer Linear Programming approach. Then, in order to propose a scalable solution, they proposed a local search algorithm. On the other hand, the second paper focuses on the planning problem in wireless mesh networks. The authors start by considering the impact of tuning the transmission power and rate of the wireless links on the efficiency of the channel assignment. Then, they present a new channel, power and rate assignment heuristic.

Finally, the sixth and the eight papers focus on radio resource allocation problem in case of IEEE 802.16 technology. The first one studies this problem in case mobile WiMAX and proposes new QoS-oriented resource allocation

strategy. The main objective is that, in case of bad radio conditions, the streaming flows are allocated more sub-carriers so as to keep their bit rate constant. This allocation strategy is coupled with call admission control mechanisms that guarantee that both streaming and elastic flows will receive their QoS. On the other hand, the last paper concentrates on the fixed WiMAX by proposing a joint priority-based bandwidth sharing strategy coupled with a Guaranteed Minima CAC Policy. Their choice was motivated by the fact that the system performances could be derived analytically. The authors show that the performances of the system are very close to those obtained by an optimal CAC policy computed using a CSMDP Framework.