

# Introduction

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## 1 The Evolution of Telecommunication Networks

We are nowadays spectators of a deep and rapid change in the world of communications which is mainly driven by two factors: the evolution of wireless technology and the amazing success of IP based applications.

The offer of wireless technology is vast and always increasing both with different standards and proprietary solutions. In this scenario, the end user equipment is often geared with multiple wireless network interface and consequently one has the choice on which technology to use as a gateway for connectivity.

Such freedom from cables and classical networking infrastructures is pushing the end user demand for connectivity anywhere at anytime and with the very same services required in a wired infrastructure.

As the technology diversity and complexity explode, the management of such a heterogeneous environment becomes crucial for the network designers, who have to cope with problems like users mobility, technology convergence and inter-operation, Quality- of-Service (QoS) provisioning, etc. . .

This new environment makes obsolete the methods and tools currently available and forces the scientific community to develop new design, planning, dimensioning, and management principles and tools. These require to investigate new multi-technology architectures for providing a seamless end-to-end connectivity and environment diversity to service developers and users.

## 2 The EuroNGI Project

The mission of the Euro NGI Network of Excellence is to put together the the most prominent European research centers in engineering with the specific target of supporting the European Information Society in the design of the Next Generation Internet.

In this field, the two main issues addressed by the NoE are:

- mastering the technology diversity (vertical and horizontal integration) for the design of efficient and flexible NGI architectures
- providing required innovative traffic engineering architectures adapted to the new requirements and developing the corresponding appropriate quantitative methods

Besides the research activities on specific technical topics, at the EuroNGI Networks endorses also integration and spreading of excellence activities, the former with the purpose of fostering cooperation among centers of excellence, the latter devoted to the technological transfer of the research products.

### 3 About This Book

The present book collects twenty papers out of those presented the second EuroNGI workshops on "Wireless and Mobility" and on "New Trends in Network Services and Architectures" organized by the EuroNGI Community as an integration activity at Villa Vigoni, Italy in July 2005.

The two workshops were organized in parallel with the specific purpose of putting together different networking expertise, thus fostering collaborations among different European research groups even working in different fields of networking. The joint workshops covered three days of scientific program including 26 talks and brainstorming sessions on the topics addressed during the talks.

The twenty accepted papers of this volume have been organized in four subsections:

- Wireless Solutions: from from Wireless LANs to Ad Hoc and Sensor Networks
- Cellular Systems: Models and Algorithms
- QoS Support in Next Generation Networks
- Peer To Peer Architectures and Algorithms

The section on *Wireless Connectivity Solutions* comprises the first six contributions. In their paper *Optimizing routing schemes for fast moving users in MST-based networks* De Greve et al. gives models and algorithm to determine minimal sets of spanning trees in Multiple Spanning Trees based networks, for optimizing routing in the case of fast moving wireless users like trains. The paper *Receiver Oriented Trajectory Based Forwarding* by Capone et al. proposes a packet forwarding method for ad hoc networks based on the definition of spatial trajectories towards the final destination. In the following paper *Power-Controlled Directional Medium Access Control for Wireless Mesh Network* Capone et al. propose effective access algorithms for wireless mesh networks adopting directional antennas. Garoppo et al. present an enhancement to the IEEE 802.11 DCF access scheme in the paper *Achieving flow isolation in 802.11 networks with the DTT scheduler*, while Lopez et al. in *Subnet Formation and Address Allocation Approach for a Routing with Subnets Scheme in MANETs* discuss the issue of IP addresses organization in ad hoc networks. The last paper of the section is an invited contribution by Melodia et al. which completes the technology scenario by addressing the issued of sensors networks.

The following section on *Cellular Systems* is devoted to the analysis of effective algorithms for call admission control and channel estimation in cellular systems. Iversen proposes effective models to describe cellular systems with

restricted accessibility in the paper *Modelling restricted accessibility for multi-service traffic*. The paper *A Low Computation Cost Algorithm to Solve Cellular Systems with Retrials Accurately* by Domenech-Benlloch et al. provides an approximated method to solve cellular systems with retrials, whilst the following two papers by Gimenez-Guzman et al. address the issue of designing effective admission control strategies (*An Afterstates Reinforcement Learning Approach to Optimize Admission Control in Mobile Cellular Networks* and *Hierarchical Admission Control in Mobile Cellular Networks Using Adaptive Bandwidth Reservation*). Finally, Maeder et al. aims at optimizing the HSDPA service of the UMTS by estimating the perceived interference in *Interference Estimation for the HSDPA Service in Heterogeneous UMTS Networks*.

In the section on "QoS Support in Next Generation Networks" the focus is on the design and optimization of QoS provisioning. Pereira gives a framework to negotiate service level agreement in future generation networks based on differentiated services. The paper *MIPv6 Binding Authentication for B3G Networks* by Celentano et al. proposes an authentication solution for next generation networks based on mobile IP version 6. Capone et al. propose in *Distributed Dynamic Resource Management in Quality of Service Networks* a novel routing solution with QoS support.

The last section of this volume is on *Peer To Peer Architectures and Algorithms*. The first two papers within this section *A P2P-based framework for distributed network management* by A. Binzenhofer et al. and *Time-Discrete Analysis of the Crawling Strategy in an Optimized Mobile P2P Architecture* by Hossfeld propose effective network architectures for the support of peer to peer services. Hoyou et al. focuses on the problem of supporting peer to peer services in heterogeneous wireless scenarios where multiple wireless networks may cooperate. The following two contributions by Fiedler et al. *The Throughput Utility Function: Assessing Network Impact on Mobile Services* and Chevul et al. *Measurement of Application-Perceived Throughput of an E2E VPN Connection Using a GPRS Network* address the delicate issue of finding consistent figures to measure the performances of given services. Finally, the last paper *A Seamless Mobile Community Support System* by Klein et al. discusses the design of a completely integrated system to support mobile services.