Broadband Wireless Communications

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Marco Luise and Silvano Pupolin (Eds)

Broadband Wireless Communications

Transmission, Access and Services

With 243 Figures

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Preface

ANYONE *who has ever tried to do some serious business on the Internet with a telephone-line modem and a PC, has exactly the feeling of what* narrowband access *means. The extenuating dripping of bits through* narrowband *crowded lines is everyday experience for net surfers, and raise their hands those who have never angrily invoked a reliable, relaxing, and hopefully cheap real* broadband *access network !*

This short story is just a paradigm to introduce the topic of this book, namely, the development and design of equipments and architectures for the new class of forthcoming wideband services.

Broadly speaking, the appearance and widespread diffusion of multimedia in the last few years ushered a host of new applications concerning broadband audio, data, graphics, and video processing and communications. Also, the convergence of computing and telecommunications into a general-purpose high-speed ubiquitous digital network (think for instance of today's Internet, and tomorrow's ATM) pushed further the natural trend of service/network integration. The end-user of the next decade, be it residential or business, is supposed to require all of the multimedia services above, possibly through a unique network interface and, consequently, via a unique network provider. Here the additional feature of radio *access dealt with in this book comes into play.*

Needless to say, wireless digital radio has until now been synonym of either low-capacity nomadic communications (essentially, cellular telephony), or one-to-many broadcasting (terrestrial or satellite). Vice-versa, broadband services have mainly relied on wire-based infrastructures (copper, fiber and possibly twisted pairs). We intend here to show that this vision will have to be updated very soon.

Firstly, the relentless performance increase and cost decrease of VLSI circuits gives portable user terminals more and more advanced computing and communication capabilities. This means that broadband wireless multimedia terminals will soon become a reality. Secondly, market deregulation and enhanced competition will give new opportunities to new service providers. An appealing alternative to cut the deployment cost of a wired fixed network is to develop and employ wideband access techniques based on microwave or millimeter-wave radio with much lower cost and greater flexibility.

With this in mind, when choosing the topic for the 9th Tyrrhenian Workshop on Digital Communications, whose contributions are collected in this book, we aimed at providing a prospect on the state of the art and the perspectives of broadband radio access, with a sufficiently wide focus to cover technological, architectural, and regulatory issues.

Although by no means exhaustive, we believe that the material presented in this book represents a timely and high-level outlook on the field, and we hope it may be considered as a helpful tool to inform and to promote further investigation in this highly challenging area. Emphasis is given to those advances of digital signal processing techniques, microwave monolithic integrated circuits, and smart antennas, that will allow the design of efficient low-cost user terminals with advanced capabilities. Specific attention is also devoted to the protocols those new terminals will use to access the radio medium, as well as to the criteria to deploy an efficient and economic multimedia broadband radio network, and to the kind of services that will be eventually provided in the near future.

We take the occasion to express our sincere appreciation to all the authors and organizers who have contributed to the Workshop. A special thank goes to Filippo Giannetti from the University of Pisa whose help in the collection, processing and editing of all of the manuscripts was invaluable.

Marco Luise Silvano Pupolin

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