

Telecommunication Networks

Eugenio Iannone



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Preface

The telecommunication infrastructure is perhaps the most impressive network developed by humankind. Almost all the technical knowledge forming the basic human know-how is exploited in the telecommunication network, from quantum field theory needed to study optical amplifier noise to software architectures adopted to design the control software of the network, from abstract algebra used in error correcting codes and in network design algorithms to thermal and mechanical modeling adopted in the design of telecommunication equipment platforms.

The network is present almost everywhere in the world, allowing seamless communication of sounds and images through a chain of different types of equipment produced by several equipment vendors. Not only is communication carried out smoothly in normal conditions, but its quality is also monitored continuously, allowing it to survive failure of individual components and even to maintain a certain degree of functionality in case of catastrophic events like earthquakes.

The aim of this book is to present the telecommunication network as a whole, adopting a practical approach that examines evidence of not only recent developments and research directions, but also engineering subjects and key market needs that are no less important in guaranteeing the network operation standard.

The great attention to standardization, both in the description of standards and in the bibliography, is functional to part of this strategy.

The only area not covered by this book, out of a generic discussion, is constituted by radio systems. Considering that cellular systems are part of the access area and that radio bridges are used only in emergency situations out of the access area, this mainly impacts the way in which access to the network is performed. It will be the task of a future work to carry out an analysis of the trend toward the integration of mobile and fixed access and its effects.

This book starts with a market analysis of the telecommunication environment needed to individuate trends in services and equipment development. Technical advancements, thus, do not appear as mere improvements, but as answers to precise market needs.

Moreover, attention is devoted throughout the book to issues such as power consumption and real estate, which in some practical cases are more important than engineering key performances like capacity or reach in determining the success of a product.

Quantitative data are provided for all the analyzed systems, inspired by real products and product-level prototypes, to make clear potentialities and limitations of every technology.

Whenever possible, measured data are sustained by mathematical modeling in order to help the reader apply the concepts to his or her own case.

The result of this effort is a book that will help both professionals and advanced students have a global picture of the telecommunication network in order to be able to make the right choices and to always remain updated.

Author



Eugenio Iannone received his university degree (old Italian Laurea) in electronic engineering from Facoltà di Ingegneria, Università La Sapienza, Rome, Italy. He is an executive consultant working mainly for medium and small companies to drive key innovation processes or to transfer technologies born in research institutes and universities to the industrial environment.

Iannone has 15 years of experience in the telecommunication industry and has held several managerial positions. He started his career at Fondazione Ugo Bordoni in Rome as a researcher in the areas of optical transmission systems and optical networks.

He then joined Pirelli Optical Systems in 1997 as a member of the network optical design team in the R&D department. In 2000, Iannone moved to Cisco's DWDM business when Pirelli Optical Systems was acquired by Cisco. He worked as a manager of the network dimensioning group within the marketing and product management department.

Since 2002, Iannone has been a senior vice president of application engineering at Pirelli Labs OI, the Pirelli research and design center for telecommunications, and strategy and marketing director at PGT Photonics, the Pirelli company devoted to telecommunication components and subsystems business.

During the course of his career, Iannone has authored more than 100 papers and several international patents on optical transmission, optical switching, and the architecture of optical networks. In addition, he has published two books for John Wiley & Sons, Inc.: *Coherent Optical Communication Systems* in 1995 and *Nonlinear Optical Networks* in 1998.

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