

# Preface

The demand for more and better applications for telecommunications networks has always driven the need for more bandwidth from these networks. At the same time, as the bandwidth has steadily increased over the last few decades, more applications have emerged that utilize this bandwidth. And so the “cycle” continues.

Fiber-optic networks have been in the forefront of the effort to provide the users with more bandwidth, enabling them to run a number of new applications that span the whole spectrum of human interaction, including day-to-day activities, entertainment, and business, among others. Optical systems and networks have seen an incredibly rapid evolution. Only a few decades separate the invention of the laser and the low-loss fiber from the wide usage of wavelength-division-multiplexed (WDM) fiber-optic communication systems in the current telecom networks. These systems are now in every part of the telecom infrastructure including undersea, backbone, metropolitan area, as well as access networks, reaching all the way into our homes and businesses. Although some parts of the network still include networking functions such as switching and regeneration in the electronic domain, the direction is more and more toward networks that are transparent to signal rate, protocol, and format, where the signal stays in the optical domain as long as possible.

This book provides the latest developments in the ever-expanding field of optical communication system and network design and engineering. It presents the industry, as well as current research, in state-of-the-art architectures of WDM optical systems and networks and takes a vertically layered (across the network layers) approach to system/network modeling, design, and engineering. Modeling and simulation techniques, in conjunction with experimental verification and engineering, are presented for different systems and networks. This book is different from a number of other books on optical systems and networks that are either general textbooks on optical networks or focus exclusively on the technology and point-to-point transmission. This contributed volume looks at both networking and system design issues, and focuses on the latest research developments in a number of areas including ultra long haul (ULH), metro, and access networks, as well as enabling technologies. It can be a very good supplement to

any of the general optical networks/technology books for those interested in probing and understanding this area further. The aim of the editors is to present a body of work in this book that can provide the research scientist, company engineer, as well as the university professor/researcher with a better understanding of how to more efficiently design and engineer optical communication systems and networks. The intention is to demonstrate the effectiveness of computer-aided design when it comes to network engineering and prototyping.

This book is divided into three parts that can appeal to different readers, who are interested in different types of networks and different applications. The first part of the book ([Chaps. 2–5](#)) presents modeling approaches and simulation tools mainly for the physical layer (including transmission effects, devices, subsystems, and systems), whereas the second part ([Chaps. 6–11](#)), presents more engineering/design issues for various types of optical systems (including ULH, access, and in-building systems). The third part of the book ([Chaps. 12–13](#)) presents mostly networking issues related to the design of provisioning and survivability algorithms for impairment-aware and multi-domain networks. Finally, [Chaps. 1](#) and [14](#) provide some introductory remarks and future directions respectively.

WDM Systems and Networks

Modeling, Simulation, Design and Engineering

Antoniades, N.N.; Ellinas, G.; Roudas, I. (Eds.)

2012, XVI, 532 p., Hardcover

ISBN: 978-1-4614-1092-8