Optical Networks: A Practical Perspective, 2nd Edition

Rajiv Ramaswami and Kumar N. Sivarajan

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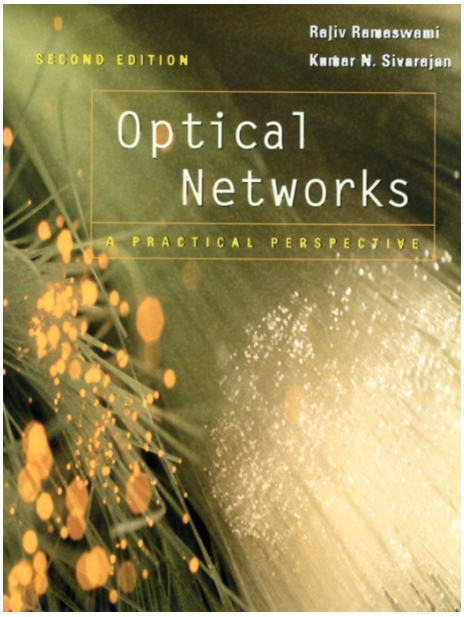
Bandwidth demand has grown in the past few years in response to widespread Internet access and mobile telephone use. With the eventual emergence of new kinds of on-line services supported by rich multimedia-oriented applications, this demand will not slow in the near future. Optical networks seem to be the only technology capable of coping with this huge demand for bandwidth.

The enormous potential bandwidth of optical fiber was already identified back in the 1970s. For the past twenty years, optical links have been deployed interconnecting electrical nodes, mainly synchronous optical network and synchronous digital hierarchy (SONET/SDH) nodes, solving the transmission problem in the optical layer and leaving the routing and survivability problem to the electrical domain. However, this situation has been changing as the electrical nodes reach their limits in terms of speed, size, complexity, and cost. Indeed, the appearance of multiwavelength optical links together with optical routing nodes seems to be the answer to the increasing demand of transmission and routing capabilities. This new paradigm



presents a great challenge for everyone in this field in light of the uncommon mixture of physics, network architecture, and engineering expertise required.

In 1998 Ramaswami and Sivaraja, in the first edition of *Optical Networks: A Practical Perspective*, did a great job of assembling into a single book the main physics and network concepts required for serious professionals in this new field.

Now, four years later in the second edition, the book has been updated with the more recent advances

in this field, and the more promising optical networking technologies are emphasized.

Keeping the same structure of the first edition, the authors devote half the book to the technology problem. The authors discuss light propagation in optical fibers, paying particular attention to the treatment of nonlinear effects. The primary optical and electro-optical components are revised; details are given about eminent topics such as Raman amplification, large optical switches with micro-electro-mechanical systems (MEMS), and all-optical wavelength converters. This first part of the book ends with treatment of the more relevant engineering aspects of high-speed point-to-point optical links. Topics such as modulation and demodulation formats, error detection and correction codes, and linear and nonlinear transmission impairment mitigation are covered in detail.

The second part of the book is devoted to networking aspects. Extensive treatment is given to the first-generation networks paradigm, in which optical links interconnect electrical nodes. Afterward, the architectural aspects of the all-optical nodes are examined in detail, and the second-generation network paradigm is introduced. These discussions lay the foundation for the remainder of the book, in which the authors examine all-optical network design, control and management, survivability, and deployment aspects.

The book finishes with a set of appendices and an extensive bibliography list, which could be useful for providing background information that the reader may lack or that the reader wants to clarify.

Overall, *Optical Networks* provides an excellent introduction to optical networking; it is well organized, and the important concepts are examined in a clear manner.

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