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Multiwavelength Optical Networks

The key technology to delivering maximum bandwidth over networks is Dense Wave-length Division Multiplexing (DWDM). Describes in detail how DWDM works and how to implement a range of transmission protocols. Covers device considerations, the pros and cons of various network layer protocols, and quality of service (QoS) issues. The authors are leading experts in this field and provide real-world implementation examples. First book to describe the interplay between the physical and IP (Internet Protocol) layers in optical networks.

FTTx Networks

This book constitutes the refereed proceedings of the 11th International Conference on Telecommunications, ICT 2004, held in Fortaleza, Brazil in August 2004. The 188 revised full papers presented were carefully reviewed and selected from 430 submissions. The papers are organized in topical sections on multimedia services, antennas, transmission technologies and wireless networks, communication theory, telecommunication pricing and billing, network performance and telecommunication services, active network and mobile agents, optical photonic techniques, optical networks, ad-hoc networks, signal processing, network performance and MPLS, traffic engineering, SIP, QoS and switches, network operation management, mobility and broadband wireless, cellular system evolution, personal communication, satellites, mobility management, network reliability, ATM and Web services, security, switching and routing, next generation systems, wireless access, Internet, etc.

Optical Network Design and Modeling

Provides a comprehensive and updated account of WDM optical network systems. Optical networking has advanced considerably since 2010. A host of new technologies and applications has brought a significant change in optical networks, migrating it towards an all-optical network. This book places great emphasis on the network concepts, technology, and methodologies that will stand the test of time and also help in understanding and developing advanced optical network systems. The first part of *Optical WDM Networks: From Static to Elastic Networks* provides a qualitative foundation for what follows—presenting an overview of optical networking, the different network architectures, basic concepts, and a high-level view of the different network structures considered in subsequent chapters. It offers a survey of enabling technologies and the hardware devices in the physical layer, followed by a more detailed picture of the network in the remaining chapters. The next sections give an in-depth study of the three basic network structures: the static broadcast networks, wavelength routed networks, and the electronic/optical logically routed networks, covering the characteristics of the optical networks in the access, metropolitan area, and long-haul reach. It discusses the networking picture; network control and management, impairment management and survivability. The last section of the book covers the upcoming technologies of flex-grid and software defined optical networking. Provides concise, updated, and comprehensive coverage of WDM optical networks. Features numerous examples and exercise problems for the student to practice. Covers, in detail, important topics, such as, access, local area, metropolitan, wide area all-optical and elastic networks. Includes protocols, design, and analysis along with the control and management of the networks. Offers exclusive chapters on advance topics to cover the present and future technological trends, such as, software defined optical networking and the flexible grid optical networks. *Optical WDM Networks: From Static to Elastic Networks* is an excellent book for under and post graduate students in electrical/communication engineering. It will also be very useful to practicing professionals in communications, networking, and optical systems.

Telecommunications And Networking - ICT 2004

This hands-on, practical new resource provides optical network designers with basic but necessary information about radio systems air interface and radio access network architecture, protocols, and interfaces, using 5G use cases as relevant example. The book introduces mobile network designers to the transmission modeling techniques for the design of a radio access optical network. The main linear and non-linear propagation effects in optical fiber are covered. The book introduces mobile network designers to the optical technologies used in digital and analog radio access networks, such as optical amplifiers and transmitters, and describes different deployment scenarios, including point-to-point fiber systems, wavelength-division multiplexing systems, and passive optical networks. New integrated photonic technologies for optical switching are also discussed. The book illustrates the principles of optical beamforming and explains how optical technologies can be used to provide accurate phase and frequency control of antenna elements. The new architecture of the optical transport network, driven by the new, challenging requirements that 5G poses in terms of high capacity, high

energy efficiency, low latency and low cost is discussed. The use of photonic devices to perform tasks as radio-frequency generation and beamforming, with improved accuracy and cost compared to traditional electronic systems, especially when moving to mm-waves is also explored. Readers also learn the replacement of electric interconnect systems with higher speed and more energy efficient optical lines to perform more effectively computationally demanding baseband processing in 5G. All presented propagation models can be implemented in a spreadsheet, in order to provide the designer with simple rules of thumbs for network planning.

E-Business and Distributed Systems Handbook

Fibre-to-the-Home networks constitute a fundamental telecom segment with the required potential to match the huge capacity of transport networks with the new user communication demands. Huge investments in access network infrastructure are expected for the next decade, with many initiatives already launched around the globe recently, driven by the new broadband service demands and the necessity by operators to deploy a future-proof infrastructure in the field. Dense FTTH Passive Optical Networks (PONs) is a cost-efficient way to build fibre access, and international standards (G/E-PON) have been already launched, leading to new set of telecom products for mass deployment. However, these systems only make use of less than 1% of the optical bandwidth; thus, relevant research is taking place to maximize the capacity of these systems, with the latest opto-electronic technologies, demonstrating that the huge bandwidth available through the fibre access can be exploited in a cost-efficient and reliable manner. Next-Generation FTTH Passive Optical Networks gathers and analyzes the most relevant techniques developed recently on technologies for the next generation FTTH networks, trying to answer the question: what's after G/E-PONs?

Photonic Applications for Radio Systems Networks

bull; Master advanced optical network design and management strategies bull;
Learn from real-world case-studies that feature the Cisco Systems ONS product line
bull; A must-have reference for any IT professional involved in Optical networks

Information Security and Auditing in the Digital Age

A guide to light-based networks. Advantages of optical nets include greater bandwidth and speed. Covers architecture, design, and monitoring/management issues.

IP over WDM

Provides a comprehensive and updated account of WDM optical network systems
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qualitative foundation for what follows—presenting an overview of optical networking, the different network architectures, basic concepts, and a high-level view of the different network structures considered in subsequent chapters. It offers a survey of enabling technologies and the hardware devices in the physical layer, followed by a more detailed picture of the network in the remaining chapters. The next sections give an in-depth study of the three basic network structures: the static broadcast networks, wavelength routed networks, and the electronic/optical logically routed networks, covering the characteristics of the optical networks in the access, metropolitan area, and long-haul reach. It discusses the networking picture; network control and management, impairment management and survivability. The last section of the book covers the upcoming technologies of flex-grid and software defined optical networking. Provides concise, updated, and comprehensive coverage of WDM optical networks Features numerous examples and exercise problems for the student to practice Covers, in detail, important topics, such as, access, local area, metropolitan, wide area all-optical and elastic networks Includes protocols, design, and analysis along with the control and management of the networks Offers exclusive chapters on advance topics to cover the present and future technological trends, such as, software defined optical networking and the flexible grid optical networks Optical WDM Networks: From Static to Elastic Networks is an excellent book for under and post graduate students in electrical/communication engineering. It will also be very useful to practicing professionals in communications, networking, and optical systems.

Optical Network Design and Implementation

The last two years have seen significant developments in the standardization of GMPLS and its implementation in optical and other networks. GMPLS: Architecture and Applications brings you completely up to date, providing the practical information you need to put the growing set of GMPLS-supported services to work and manage them effectively. This book begins by defining GMPLS's place in a transport network, leveraging your knowledge of MPLS to give you an understanding of this radically new control plane technology. An overview of GMPLS protocols follows, but the real focus is on what comes afterwards: in-depth examinations of the architectures underpinning GMPLS in real-world network environments and current and emerging GMPLS applications. This one-of-a-kind resource delivers immensely useful information for software architects, designers and programmers, hardware developers, system testers, and network operators--and also for managers and other decision-makers. Written by two industry researchers at the forefront of the development of GMPLS. Provides a practical look at GMPLS protocols for signaling, routing, link and resource management, and traffic engineering. Delves deep into the world of GMPLS applications, including traffic engineering, path computation, layer one VPNs, point-to-multipoint connectivity, service management, and resource protection. Explores three distinct GMPLS control plane architectures: peer, overlay, and hybrid, and explains the GMPLS UNI and NNIs. Explains how provisioning challenges can be met in multi-region networks and details the provisioning systems and tools relied on by the GMPLS control plane, along with the standard MIB modules used to manage a GMPLS system.

Optical Network Control

This study of all-optical networking consists of 44 papers on topics such as network elements and performance modelling, multiplexing strategies, access networks and local area networks.

Optical Networks

Lo, soul! seest thou not God's purpose from the first? The earth to be spann'd, connected by net-work From Passage to India! Walt Whitman, "Leaves of Grass", 1900. The Internet is growing at a tremendous rate today. New services, such as telephony and multimedia, are being added to the pure data-delivery framework of yesterday. Such high demands on capacity could lead to a "bandwidth-crunch" at the core wide-area network resulting in degradation of service quality.

Fortunately, technological innovations have emerged which can provide relief to the end-user to overcome the Internet's well-known delay and bandwidth limitations. At the physical layer, a major overhaul of existing networks has been envisaged from electronic media (such as twisted-pair and cable) to optical fibers - in the wide area, in the metropolitan area, and even in the local area settings. In order to exploit the immense bandwidth potential of the optical fiber, interesting multiplexing techniques have been developed over the years. Wavelength division multiplexing (WDM) is such a promising technique in which multiple channels are operated along a single fiber simultaneously, each on a different wavelength. These channels can be independently modulated to accommodate dissimilar bit rates and data formats, if so desired. Thus, WDM carves up the huge bandwidth of an optical fiber into channels whose bandwidths (1-10 Gbps) are compatible with peak electronic processing speed.

Emerging Optical Network Technologies

This book presents advances in the field of optical networks - specifically on research and applications in elastic optical networks (EON). The material reflects the authors' extensive research and industrial activities and includes contributions from preeminent researchers and practitioners in optical networking. The authors discuss the new research and applications that address the issue of increased bandwidth demand due to disruptive, high bandwidth applications, e.g., video and cloud applications. The book also discusses issues with traffic not only increasing but becoming much more dynamic, both in time and direction, and posits immediate, medium, and long-term solutions throughout the text. The book is intended to provide a reference for network architecture and planning, communication systems, and control and management approaches that are expected to steer the evolution of EONs.

IP over WDM

Ethernet Passive Optical Networks is the IEEE's (Institute of Electrical and Electronics Engineers) approved architecture of choice for the next generation of broadband access. Written by an author of the IEEE 802.3ah standard, this is the first book to explain the EPON architecture, analyze its performance, and annotate

the standard. For any engineer or graduate student building equipment for broadband access or service provider offering such service, this will serve as the "authorized" guide to EPON.

Broadband Communications Networks

Provides the most thorough examination of Internet technologies and applications for researchers in a variety of related fields. For the average Internet consumer, as well as for experts in the field of networking and Internet technologies.

Advances in Optical Fiber Technology

A thorough knowledge of modern connection-oriented networks is essential to understanding the current and near-future state of networking. This book provides a complete overview of connection-oriented networks, discussing both packet-switched and circuit-switched networks, which, though seemingly different, share common networking principles. It details the history and development of such networks, and defines their terminology and architecture, before progressing to aspects such as signaling and standards. There is inclusive coverage of SONET/SDH, ATM networks, Multi-Protocol Label Switching (MPLS), optical networks, access networks and voice over ATM and MPLS. Connection-oriented Networks: * Provides in-depth, systematic coverage of several connection-oriented networks in a single volume * Explains topics such as the Generic Framing Procedure, Label Distribution Protocols, Wavelength Routing Optical Networks, Optical Burst Switching, and Access Networks in detail * Illustrates all concepts with problems and simulation projects to test and deepen your understanding * Includes an accompanying website with solutions manual and complete set of PowerPoint presentations for each chapter Senior undergraduate and graduate students in telecommunication and networking courses, as well as networking engineers, will find this comprehensive guide to connection-oriented packet-switched and circuit-switched networks useful for their training. The book presents tried and tested material based on an existing, successful course.

European Optical Communications and Networks: Papers on networks

Includes recently approved adopted and implemented standards for versatile switches, routers and multi-service provisioning platforms. Numerous illustrative examples showing actual situations or cases implemented. Covers the activities of all the major optical networking standards bodies and forums (ITU-T, IETF, MEF, and OIF).

Optical Networking Standards: A Comprehensive Guide for Professionals

The book Optical Fiber and Wireless Communications provides a platform for practicing researchers, academics, PhD students, and other scientists to review, plan, design, analyze, evaluate, intend, process, and implement diversiform issues of optical fiber and wireless systems and networks, optical technology

components, optical signal processing, and security. The 17 chapters of the book demonstrate capabilities and potentialities of optical communication to solve scientific and engineering problems with varied degrees of complexity.

Network Infrastructure and Architecture

Optical networks have moved from laboratory settings and theoretical research to real-world deployment and service-oriented explorations. New technologies such as Ethernet PON, traffic grooming, regional and metropolitan network architectures and optical packet switching are being explored, and the landscape is continuously and rapidly evolving. Some of the important issues involving these new technologies involve the architectural, protocol, and performance related issues. This book addresses many of these issues and presents a birds eye view of some of the more promising technologies. Researchers and those pursuing advanced degrees in this field will be able to see where progress is being made and new technologies are emerging. Emerging Optical Network Technologies: Architectures, Protocols and Performance provides state-of-the-art material written by the most prominent professionals in their respective areas.

WDM Systems and Networks

"This is overview of an extensive handbook that systematically discusses how to translate e-business strategies to working solutions by using the latest distributed computing technologies. This module of the handbook paints the big picture of the Next Generation Real-time Enterprises with numerous case studies to highlight the key points. "

All-optical Networking

This is the first book to focus on IP over WDM optical networks. It not only summarizes the fundamental mechanisms and the recent development and deployment of WDM optical networks but it also details both the network and the software architectures needed to implement WDM enabled optical networks designed to transport IP traffic. The next generation network employing IP over optical networks is quickly emerging not only in the backbone but also in metro and access networks. Fiber optics revolutionizes the telecom and networking industry by offering enormous network capacity to sustain the next generation Internet growth. IP provides the only convergence layer in a global and ubiquitous Internet. So integrating IP and WDM to transport IP traffic over WDM enabled optical networks efficiently and effectively is an urgent yet important task. * Covers hot areas like traffic engineering, MPLS, peer-to-peer computing, IPv6. * Comprehensive overview of history, background and research. * Presents all requirements for a WDM optical network (enabling technologies, optical components, software architecture, management, etc.). * Performance studies and descriptions of experimental WDM optical networks guarantee the practical approach of the book. Technical engineers and network practitioners, designers and analysts, network managers and technical management personnel as well as first year graduate students or senior undergraduate students majoring in networking and/or network control and management will all find this indispensable.

Ethernet Passive Optical Networks

The third edition of Optical Networks continues to be the authoritative source for information on optical networking technologies and techniques. Componentry and transmission are discussed in detail with emphasis on practical networking issues that affect organizations as they evaluate, deploy, or develop optical networks. New updates in this rapidly changing technology are introduced. These updates include sections on pluggable optical transceivers, ROADM (reconfigurable optical add/drop multiplexer), and electronic dispersion compensation. Current standards updates such as G.709 OTN, as well as, those for GPON, EPON, and BPON are featured. Expanded discussions on multimode fiber with additional sections on photonic crystal and plastic fibers, as well as expanded coverage of Ethernet and Multiprotocol Label Switching (MPLS). This book clearly explains all the hard-to-find information on architecture, control and management. It serves as your guide at every step of optical networking-- from planning to implementation through ongoing maintenance. This book is your key to thoroughly understanding practical optical networks. In-depth coverage of optimization, design, and management of the components and transmission of optical networks. Filled with examples, figures, and problem sets to aid in development of dependable, speedy networks. Focuses on practical, networking-specific issues: everything you need to know to implement currently available optical solutions.

Optical WDM Networks

This book is a compilation of works presenting recent developments and practical applications in optical fiber technology. It contains 13 chapters from various institutions that represent global research in various topics such as scattering, dispersion, polarization interference, fuse phenomena and optical manipulation, optical fiber laser and sensor applications, passive optical network (PON) and plastic optical fiber (POF) technology. It provides the reader with a broad overview and sampling of the innovative research on optical fiber technologies.

Optical WDM Networks

Renowned wireless veteran Stern teams with industry innovator Bala to deliver a comprehensive framework for understanding the technology, encompassing the concepts, methodology, and features of lightwave networks. The book is geared toward engineers currently developing and implementing systems.

Encyclopedia of Internet Technologies and Applications

This book constitutes the refereed proceedings of the 23rd International IFIP conference on Optical Network Design and Modeling, ONDM 2019, held in Athens, Greece, in May 2019. The 39 revised full papers were carefully reviewed and selected from 87 submissions. The papers focus on cutting-edge research in established areas of optical networking as well as their adoption in support of a wide variety of new services and applications. This involves the most recent trends in networking including 5G and beyond, big data and network data analytics, cloud/edge computing, autonomic networking, artificial intelligence assisted

networks, secure and resilient networks, that drive the need for increased capacity, efficiency, exibility and adaptability in the functions that the network can perform. In this context new disaggregated optical network architectures were discussed, exploiting and integrating novel multidimensional photonic technology solutions as well as adopting open hardware and software platforms relying on software defined networking (SDN), and network function virtualization (NFV) to allow support of new business models and opportunities.

Traffic Grooming for Optical Networks

Today, networks must evolve and scale faster than ever. You can't manage everything by hand anymore: You need to automate relentlessly. YANG, along with the NETCONF, RESTCONF, or gRPC/gNMI protocols, is the most practical solution, but most implementers have had to learn by trial and error. Now, Network Programmability with YANG gives you complete and reliable guidance for unlocking the full power of network automation using model-driven APIs and protocols. Authored by three YANG pioneers, this plain-spoken book guides you through successfully applying software practices based on YANG data models. The authors focus on the network operations layer, emphasizing model-driven APIs, and underlying transports. Whether you're a network operator, DevOps engineer, software developer, orchestration engineer, NMS/OSS architect, service engineer, or manager, this guide can help you dramatically improve value, agility, and manageability throughout your network. Discover the value of implementing YANG and Data Model-Driven Management in your network Explore the layers and components of a complete working solution Build a business case where value increases as your solution grows Drill down into transport protocols: NETCONF, RESTCONF, and gNMI/gRPC See how telemetry can establish a valuable automated feedback loop Find data models you can build on, and evaluate models with similar functionality Understand models, metadata, and tools from several viewpoints: architect, operator, module author, and application developer Walk through a complete automation journey: business case, service model, service implementation, device integration, and operation Leverage the authors' experience to design successful YANG models and avoid pitfalls

The Emerging Optical Network

A Comprehensive, Thorough Introduction to High-Speed Networking Technologies and Protocols Network Infrastructure and Architecture: Designing High-Availability Networks takes a unique approach to the subject by covering the ideas underlying networks, the architecture of the network elements, and the implementation of these elements in optical and VLSI technologies. Additionally, it focuses on areas not widely covered in existing books: physical transport and switching, the process and technique of building networking hardware, and new technologies being deployed in the marketplace, such as Metro Wave Division Multiplexing (MWD), Resilient Packet Rings (RPR), Optical Ethernet, and more. Divided into five succinct parts, the book covers: Optical transmission Networking protocols VLSI chips Data switching Networking elements and design Complete with case studies, examples, and exercises throughout, the book is complemented with chapter goals, summaries, and lists of key points to aid readers in grasping the material presented. Network Infrastructure and Architecture offers professionals, advanced

undergraduates, and graduate students a fresh view on high-speed networking from the physical layer perspective.

Design of Optical WDM Networks

Research and development on optical wavelength-division multiplexing (WDM) networks have matured considerably. While optics and electronics should be used appropriately for transmission and switching hardware, note that "intelligence" in any network comes from "software," for network control, management, signaling, traffic engineering, network planning, etc. The role of software in creating powerful network architectures for optical WDM networks is emphasized. Optical WDM Networks is a textbook for graduate level courses. Its focus is on the networking aspects of optical networking, but it also includes coverage of physical layers in optical networks. The author introduces WDM and its enabling technologies and discusses WDM local, access, metro, and long-haul network architectures. Each chapter is self-contained, has problems at the end of each chapter, and the material is organized for self study as well as classroom use. The material is the most recent and timely in capturing the state-of-the-art in the fast-moving field of optical WDM networking.

Network Programmability with YANG

& • Combines information generally obtained from ITU, ANSI and Bellcore specs and the IETF - all in one place. & & • Demonstrates the essentials of IP to optical professionals - and teaches IP professionals the essentials of optical. & & • Authors are recognized as the absolute best in this field.

Optical Networks

Modeling, Simulation, Design and Engineering of WDM Systems and Networks provides readers with the basic skills, concepts, and design techniques used to begin design and engineering of optical communication systems and networks at various layers. The latest semi-analytical system simulation techniques are applied to optical WDM systems and networks, and a review of the various current areas of optical communications is presented. Simulation is mixed with experimental verification and engineering to present the industry as well as state-of-the-art research. This contributed volume is divided into three parts, accommodating different readers interested in various types of networks and applications. The first part of the book presents modeling approaches and simulation tools mainly for the physical layer including transmission effects, devices, subsystems, and systems), whereas the second part features more engineering/design issues for various types of optical systems including ULH, access, and in-building systems. The third part of the book covers networking issues related to the design of provisioning and survivability algorithms for impairment-aware and multi-domain networks. Intended for professional scientists, company engineers, and university researchers, the text demonstrates the effectiveness of computer-aided design when it comes to network engineering and prototyping.

GMPLS

Designed to help readers understand the very latest optical developments, technologies, architectures, and market trends driving the next-generation network, this comprehensive report of all-optical networks (AON) is a critical resource for any communications company that hopes to tackle today's optical networking challenge. The future of the AON remains uncertain, but the next-generation optical network promises to provide the bandwidth flexibility, reliability, and network-management functions required to enable end-to-end wavelength services.

Elastic Optical Networks

The rapid growth in communications and internet has changed our way of life, and our requirement for communication bandwidth. Optical networks can enable us to meet the continued demands for this bandwidth, although conventional optical networks struggle in achieving this, due to the limitation of the electrical bandwidth barrier. Flexgrid technology is a promising solution for future high-speed network design. To promote an efficient and scalable implementation of elastic optical technology in the telecommunications infrastructure, many challenging issues related to routing and spectrum allocation (RSA), resource utilization, fault management and quality of service provisioning must be addressed. This book reviews the development of elastic optical networks (EONs), and addresses RSA problems with spectrum fragment issues, which degrade the quality of service provisioning. The book starts with a brief introduction to optical fiber transmission system, and then provides an overview of the wavelength division multiplexing (WDM), and WDM optical networks. It discusses the limitations of conventional WDM optical networks, and discusses how EONs overcome these limitations. It presents the architecture of the EONs and its operation principle. To complete the discussion of network architecture, this book focuses on the different node architectures, and compares their performance in terms of scalability and flexibility. It reviews and classifies different RSA approaches, including their pros and cons. It focuses on different aspects related to RSA. The spectrum fragmentation is a serious issue in EONs, which needs to be managed. The book explains the fragmentation problem in EONs, discusses, and analyzes the major conventional spectrum allocation policies in terms of the fragmentation effect in a network. The taxonomies of the fragmentation management approaches are presented along with different node architectures. State-of-the-art fragmentation management approaches are looked at. A useful feature of this book is that it provides mathematical modeling and analyzes theoretical computational complexity for different problems in elastic optical networks. Finally, this book addresses the research challenges and open issues in EONs and provides future directions for future research.

Elastic Optical Networks

Transport networks evolved from DCS (Digital Cross-connect Systems)-based mesh architectures, to SONET/SDH (Synchronous Optical Networking/Synchronous Digital Hierarchy) ring architectures in the 1990's. In the past few years, technological advancements in optical transport switches have allowed service providers to support the same fast recovery in mesh networks previously available in ring networks while achieving better capacity efficiency and resulting in lower capital

cost. Optical transport networks today not only provide trunking capacity to higher-layer networks, such as inter-router connectivity in an IP-centric infrastructure, but also support efficient routing and fast failure recovery of high-bandwidth services. This is possible due to the emergence of optical network elements that have the intelligence required to efficiently control the network. Optical mesh networks will enable a variety of dynamic services such as bandwidth-on-demand, Just-In-Time bandwidth, bandwidth scheduling, bandwidth brokering, and optical virtual private networks that open up new opportunities for service providers and their customers alike. Path Routing in Mesh Optical Networks combines both theoretical as well as practical aspects of routing and dimensioning for mesh optical networks. All authors have worked as technical leaders for the equipment vendor Tellium who implemented such capabilities in its product, and whose product was deployed in service provider networks. Path Routing in Mesh Optical Networks Presents an in-depth treatment of a specific class of optical networks, i.e. path-oriented mesh optical networks. Focuses on routing and recovery, dimensioning, performance analysis and availability in mesh optical networks. Explains and analyses routing specifically associated with Dedicated Backup Path Protection (DBPP) and Shared Backup Path Protection (SBPP) recovery architectures. As most of the core backbone networks evolve to mesh topologies utilizing intelligent network elements for provisioning and recovery of services, Path Routing in Mesh Optical Networks will be an invaluable tool for both researchers and engineers in the industry who are responsible for designing, developing, deploying and maintaining mesh optical networks. It will also be a useful reference book for graduate students and university professors who are interested in optical networks or telecommunications networking. With a foreword by Professor Wayne D. Grover, author of the book Mesh-Based Survivable Networks.

Towards an Optical Internet

This book presents the practical motivation, theoretical description, and extant techniques for traffic grooming in optical networks. The description of the various topics of research will be authored by leading researchers in this area, and will contain comprehensive description of related literature for each area. This book is intended to be a definitive reference and text for traffic grooming both for the practitioner in industry and the student in academia.

Next-Generation FTTH Passive Optical Networks

In these exciting times of quotidianly progressing developments in communication techniques, where more than ever in the history of a technological progress, society's reliance on communication networks for medicine, education, data transfer, commerce, and many other endeavours dominates the human's everyday life, the optical networks are certainly one of the most promising and challenging networking options. Since their commercial arrival in the nineties, they have fundamentally changed the way of dealing with traffic engineering by removing bandwidth bottlenecks and eliminating delays. Today, after the revolutionary bandwidth expansion, the networking functionality migrates more and more to the optical layer, and the need to establish fast wavelength circuits and capacity-on-demand for the higher-layer networks, in particular data networks based on Internet Protocol (IP), has become one of the central networking issues for the new

century. The unifying trends toward configurable all-optical network infrastructure open up a wide range of new network engineering and design choices dealing with networks' interoperability and common platforms for control and management. The Fifth Working Conference on Optical Network Design and Modelling, held in the Austrian capital Vienna, February 5-7, 2001, aims at presenting the most recent progress in optical communication techniques, new technologies, standardisation process, emerging markets and carriers. A short look at the Table of Contents of this book tells us, in fact, that this year's conference program reflects the current state of the art precisely.

Optical Fiber and Wireless Communications

Optical Network Design and Planning

Optical WDM Networks

Nowadays, the Internet plays a vital role in our lives. It is currently one of the most effective media that is shifting to reach into all areas in today's society. While we move into the next decade, the future of many emerging technologies (IoT, cloud solutions, automation and AI, big data, 5G and mobile technologies, smart cities, etc.) is highly dependent on Internet connectivity and broadband communications. The demand for mobile and faster Internet connectivity is on the rise as the voice, video, and data continue to converge to speed up business operations and to improve every aspect of human life. As a result, the broadband communication networks that connect everything on the Internet are now considered a complete ecosystem routing all Internet traffic and delivering Internet data faster and more flexibly than ever before. This book gives an insight into the latest research and practical aspects of the broadband communication networks in support of many emerging paradigms/applications of global Internet from the traditional architecture to the incorporation of smart applications. This book includes a preface and introduction by the editors, followed by 20 chapters written by leading international researchers, arranged in three parts. This book is recommended for researchers and professionals in the field and may be used as a reference book on broadband communication networks as well as on practical uses of wired/wireless broadband communications. It is also a concise guide for students and readers interested in studying Internet connectivity, mobile/optical broadband networks and concepts/applications of telecommunications engineering.

Path Routing in Mesh Optical Networks

This book takes a pragmatic approach to deploying state-of-the-art optical networking equipment in metro-core and backbone networks. The book is oriented towards practical implementation of optical network design. Algorithms and methodologies related to routing, regeneration, wavelength assignment, sub rate-traffic grooming and protection are presented, with an emphasis on optical-bypass-enabled (or all-optical) networks. The author has emphasized the economics of optical networking, with a full chapter of economic studies that offer guidelines as

to when and how optical-bypass technology should be deployed. This new edition contains: new chapter on dynamic optical networking and a new chapter on flexible/elastic optical networks. Expanded coverage of new physical-layer technology (e.g., coherent detection) and its impact on network design and enhanced coverage of ROADM architectures and properties, including colorless, directionless, contentionless and gridless. Covers 'hot' topics, such as Software Defined Networking and energy efficiency, algorithmic advancements and techniques, especially in the area of impairment-aware routing and wavelength assignment. Provides more illustrative examples of concepts are provided, using three reference networks (the topology files for the networks are provided on a web site, for further studies by the reader). Also exercises have been added at the end of the chapters to enhance the book's utility as a course textbook.

Passive Optical Networks

This book provides a recent and relevant coverage based on a systematic approach. Especially suitable for practitioners and managers, the book has also been classroom tested in IS/IT courses on security. It presents a systematic approach to build total systems solutions that combine policies, procedures, risk analysis, threat assessment through attack trees, honeypots, audits, and commercially available security packages to secure the modern IT assets (applications, databases, hosts, middleware services and platforms) as well as the paths (the wireless plus wired network) to these assets. After covering the security management and technology principles, the book shows how these principles can be used to protect the digital enterprise assets. The emphasis is on modern issues such as e-commerce, e-business and mobile application security; wireless security that includes security of Wi-Fi LANs, cellular networks, satellites, wireless home networks, wireless middleware, and mobile application servers; semantic Web security with a discussion of XML security; Web Services security, SAML (Security Assertion Markup Language) and .NET security; integration of control and audit concepts in establishing a secure environment. Numerous real-life examples and a single case study that is developed throughout the book highlight a case-oriented approach. Complete instructor materials (PowerPoint slides, course outline, project assignments) to support an academic or industrial course are provided. Additional details can be found at the author website (www.amjadumar.com)

Connection-Oriented Networks

FTTX Networks: Technology Implementation and Operation provides an in-depth treatment of the technology and implementation of FTTX networks, discusses the environment that gave rise to FTTX, provides a survey of the available FTTX technologies, and gives users the state-of-the-art knowledge needed for successful deployment of FTTX. The book includes hands-on project planning engineering design and operations checklists, as well as recommended best practices for configuring FTTH systems and the data networks preceding them for IPTV, voice, and data, with case studies of actual FTTH systems and a methodology for predicting the performance of real systems. This book is a must-read for all network engineers, technical businesspeople, and technical specialists engaged in building FTTX networks, from technology selection, to fielding the network in production, to implementation. Compares, contrasts, and explains FTTX

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technologies Provides hands-on project planning, engineering design, and operations checklists, allowing for a quick climb up the network design, deployment, and implementation learning curves Discusses recommended best practices for configuring FTTH systems and the data networks preceding them, for IPTV, voice, and data Includes case studies of actual FTTH systems and their configurations Covers a methodology for predicting the performance of real systems, particularly in the optical domain

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