

## 3gpp Network Slicing letf

A comprehensive guide to 5G technology, applications and potential for the future 5G brings new technology solutions to the 5G mobile networks including new spectrum options, new antenna structures, new physical layer and protocols designs and new network architectures. 5G Technology: 3GPP New Radio is a comprehensive resource that offers explanations of 5G specifications, performance evaluations, aspects of device design, practical deployment considerations and illustrative examples from field experiences. With contributions from a panel of international experts on the topic, the book presents the main new technology components in 5G and describes the physical layer, radio protocols and network performance. The authors review the deployment aspects such as site density and transport network and explore the 5G performance aspects including data rates and coverage and latency. The book also contains illustrative examples of practical field measurement. In addition, the book includes the most recent developments in 4G LTE evolution and offers an outlook for the future of the evolution of 5G. This important book: Offers an introduction to 5G technology and its applications Contains contributions from international experts on the topic Reviews the main technology components in 5G Includes information on the optimisation of the Internet of things Presents illustrative examples of practical field measurements Written for students and scientists interested in 5G technology, 5G Technology: 3GPP New Radio provides a clear understanding of the underlying 5G technology that promotes the opportunity to take full benefit of new capabilities.

This thoroughly revised textbook provides a description of current networking technologies and protocols as well as important new tools for network performance analysis based on queuing theory. The third edition adds topics such as network virtualization and new related architectures, novel satellite systems (such as Space X, OneWeb), jitter and its impact on streaming services, packet level FEC techniques and network coding, new Markovian models, and advanced details on M/G/1 queuing models. The author also adds new selected exercises throughout the chapters and a new version of the slides and the solution manual. The book maintains its organization with networking technologies and protocols in Part I and then theory and exercises with applications to the different technologies and protocols in Part II. This book is intended as a textbook for master level courses in networking and telecommunications sectors.

In the ever-evolving telecommunication industry, smart mobile computing devices have become increasingly affordable and powerful, leading to significant growth in the number of advanced mobile users and their bandwidth demands. Due to this increasing need, the next generation of wireless networks needs to enable solutions to bring together broadband, broadcast, and cellular technologies for global consumers. Paving the Way for 5G Through the Convergence of Wireless Systems provides innovative insights into wireless networks and cellular coexisting solutions that aim at paving the way towards 5G. Through examining data offloading, cellular technologies, and multi-edge computing, it addresses coexistence problems at different levels (i.e., physical characteristics, open access, technology-neutrality, economic characteristics, healthcare, education, energy, etc.), influencing networks to provide solutions for next generation wireless networks. Bridging research and practical solutions, this comprehensive reference source is ideally designed for graduate-level students, IT professionals and technicians, engineers, academicians, and researchers.

CELLULAR V2X FOR CONNECTED AUTOMATED DRIVING A unique examination of cellular communication technologies for connected automated driving, combining expert insights from telecom and automotive industries as well as technical and scientific knowledge from

industry and academia Cellular vehicle-to-everything (C-V2X) technologies enable vehicles to communicate both with the network, with each other, and with other road users using reliable, responsive, secure, and high-capacity communication links. Cellular V2X for Connected Automated Driving provides an up-to-date view of the role of C-V2X technologies in connected automated driving (CAD) and connected road user (CRU) services, such as advanced driving support, improved road safety, infotainment, over-the-air software updates, remote driving, and traffic efficiency services enabling the future large-scale transition to self-driving vehicles. This timely book discusses where C-V2X technology is situated within the increasingly interconnected ecosystems of the mobile communications and automotive industries. An expert contributor team from both industry and academia explore potential applications, business models, standardization, spectrum and channel modelling, network enhancements, security and privacy, and more. Broadly divided into two parts—introductory and advanced material—the text first introduces C-V2X technology and introduces a variety of use cases and opportunities, requiring no prerequisite technical knowledge. The second part of the book assumes a basic understanding of the field of telecommunications, presenting technical descriptions of the radio, system aspects, and network design for the previously discussed applications. This up-to-date resource: Provides technical details from the finding of the European Commission H2020 5G PPP 5GCAR project, a collaborative research initiative between the telecommunications and automotive industries and academic researchers Elaborates on use cases, business models, and a technology roadmap for those seeking to shape a start-up in the area of automated and autonomous driving Provides up to date descriptions of standard specifications, standardization and industry organizations and important regulatory aspects for connected vehicles Provides technical insights and solutions for the air interface, network architecture, positioning and security to support vehicles at different automation levels Includes detailed tables, plots, and equations to clarify concepts, accompanied by online tutorial slides for use in teaching and seminars Thanks to its mix of introductory content and technical information, Cellular V2X for Connected Automated Driving is a must-have for industry and academic researchers, telecom and automotive industry practitioners, leaders, policymakers, and regulators, and university-level instructors and students.

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The first comprehensive guide to the design and implementation of security in 5G wireless networks and devices Security models for 3G and 4G networks based on Universal SIM cards worked very well. But they are not fully applicable to the unique security requirements of 5G networks. 5G will face additional challenges due to increased user privacy concerns, new trust and service models and requirements to support IoT and mission-critical applications. While multiple books already exist on 5G, this is the first to focus exclusively on security for the emerging 5G ecosystem. 5G networks are not only expected to be faster, but provide a backbone for many new services, such as IoT and the Industrial Internet. Those services will provide connectivity for everything from autonomous cars and UAVs to remote health monitoring through body-attached sensors, smart logistics through item tracking to remote diagnostics and preventive maintenance of equipment. Most services will be integrated with Cloud computing and novel concepts, such as mobile edge computing, which will require smooth and transparent communications between user devices, data centers and operator networks. Featuring contributions from an international team of experts at the forefront of 5G system design and security, this book: Provides priceless insights into the current and future threats to mobile networks and mechanisms to protect it Covers critical lifecycle functions and stages of 5G security and how to build an effective security architecture for 5G based mobile networks Addresses mobile network security based on network-centricity, device-centricity, information-centricity and people-centricity views Explores security considerations for all relative stakeholders of mobile networks, including mobile

network operators, mobile network virtual operators, mobile users, wireless users, Internet-of things, and cybersecurity experts Providing a comprehensive guide to state-of-the-art in 5G security theory and practice, A Comprehensive Guide to 5G Security is an important working resource for researchers, engineers and business professionals working on 5G development and deployment.

As technology advances, the emergence of 5G has become an essential discussion moving forward as its applications and benefits are expected to enhance many areas of life. The introduction of 5G technology to society will improve communication speed, the efficiency of information transfer, and end-user experience to name only a few of many future improvements. These new opportunities offered by 5G networks will spread across industry, government, business, and personal user experiences leading to widespread innovation and technological advancement. What stands at the very core of 5G becoming an integral part of society is the very fact that it is expected to enrich society in a multifaceted way, enhancing connectivity and efficiency in just about every sector including healthcare, agriculture, business, and more. Therefore, it has been a critical topic of research to explore the implications of this technology, how it functions, what industries it will impact, and the challenges and solutions of its implementation into modern society. Research Anthology on Developing and Optimizing 5G Networks and the Impact on Society is a critical reference source that analyzes the use of 5G technology from the standpoint of its design and technological development to its applications in a multitude of industries. This overall view of the aspects of 5G networks creates a comprehensive book for all stages of the implementation of 5G, from early conception to application in various sectors. Topics highlighted include smart cities, wireless and mobile networks, radio access technology, internet of things, and more. This all-encompassing book is ideal for network experts, IT specialists, technologists, academicians, researchers, and students.

This book will help readers comprehend technical and policy elements of telecommunication particularly in the context of 5G. It first presents an overview of the current research and standardization practices and lays down the global frequency spectrum allocation process. It further lists solutions to accommodate 5G spectrum requirements. The readers will find a considerable amount of information on 4G (LTE-Advanced), LTE-Advance Pro, 5G NR (New Radio); transport network technologies, 5G NGC (Next Generation Core), OSS (Operations Support Systems), network deployment and end-to-end 5G network architecture. Some details on multiple network elements (end products) such as 5G base station/small cells and the role of semiconductors in telecommunication are also provided. Keeping trends in mind, service delivery mechanisms along with state-of-the-art services such as MFS (mobile financial services), mHealth (mobile health) and IoT (Internet-of-Things) are covered at length. At the end, telecom sector's burning challenges and best practices are explained which may be looked into for today's and tomorrow's networks. The book concludes with certain high level suggestions for the growth of telecommunication, particularly on the importance of basic research, departure from ten-year evolution cycle and having a 20–30 year plan. Explains the conceivable six phases of mobile telecommunication's ecosystem that includes R&D, standardization, product/network/device & application development, and burning challenges and best practices Provides an overview of research and standardization on 5G Discusses solutions to address 5G spectrum requirements while describing the global frequency spectrum allocation process Presents various case studies and policies Provides details on multiple network elements and the role of semiconductors in telecommunication Presents service delivery mechanisms with special focus on IoT



and monitoring in large scale testbeds.

5G for the Connected WorldWiley

A comprehensive text to an understanding the next generation mobile broadband and wireless Internet of Things (IoT) technologies 5G Verticals brings together in one comprehensive volume a group of visionaries and technical experts from academia and industry. The expert authors discuss the applications and technologies that comprise 5G verticals. The earlier network generations (2G to 4G) were designed as on-size-fits-all, general-purpose connectivity platforms with limited differentiation capabilities. 5G networks have the capability to demand customizable mobile networks and create an ecosystem for technical and business innovation involving vertical markets such as automotive, healthcare, manufacturing, energy, food and agriculture, city management, government, public transportation, media and more. 5G will serve a large portfolio of applications with various requirements ranging from high reliability to ultra-low latency going through high bandwidth and mobility. In this book, the authors explore applications and usages of various 5G verticals including a set of key metrics for these uses and their corresponding target requirements. The book also examines the potential network architectures and enabling technologies to meet the requirements of 5G verticals. This important book: Offers a comprehensive resource to the promise of 5G Verticals Provides a set of key metrics for the uses and target requirements Contains illustrative examples of the technology and applications Includes contributions from experts in the field and professionals that developed the 5G standards Provides an analysis of specific vertical industries which have the potential to be among the first industries to use 5G Written for industry practitioners, engineers and researchers, 5G Verticals discusses the technology that enables the 5G system to be flexibly deployed and scaled.

Over past few years, technologies have experienced boundaries getting blurred and concept of convergence to gain prominence. Harnessing from this, two main tracks for information processing management and communication are held, covering both research and application works of information management, intelligent information processing, interaction management, networking/ telecommunications, and social interaction. This book creates unique opportunity for research convergence among truly diverse technology domains of computer science. Leveraging from this diversity of topics, researchers get to generate novel research ideas by seeking application of their research in a different technology domain. This volume represents the collection of papers presented at the 13th International Conference on Ubiquitous Information Management and Communication (IMCOM 2019), held on 4-6 January 2019 in Phuket, Thailand. Out of 228 papers submitted from all around the world 88 papers were accepted for presentations. The 88 contributions to this volume are organized into 5 chapters: Chapter 1. Network Evolution, Chapter 2. Intelligent and Secure Network, Chapter 3. Image and Video Processing, Chapter 4. Information Technology and Society, and Chapter 5. Data Mining and Learning. Our editors wish readers to find this volume informative and enjoyable.

Discover how the Internet of Things will change the information and communication technology industry in the next decade The Intelligent Internet of Things explores a unique type of Internet of Things (IoT) architecture, for example, the Web of Things (WoT) with its open character that breaks the barriers among various IoT vertical applications. The authors—noted experts on the

topic—examine and compare key technologies from physical to platform level, especially the Narrow Band Internet of Things (NB-IoT) technology. They discuss applications with different data transmission requirements that are typical to IoT. The text also describes the requirements of WoT applications on 5G and includes detailed information on WoT technologies. The Intelligent Internet of Things examines three typical WoT applications: the monitoring application of south-to-north water diversion projects; smart driving applications; and network optimization applications. In addition, the text explores testing and authentication of IoT key technologies, with the required equipment, platform, and outdoor environment development. This important book: Provides information on what IoT/WoT is, when to use it, how to provide IoT services with certain technologies, and more Discusses restful architecture, main protocols (ZigBee, 6lowpan, CoAP, HTML5) Explores key technologies on different layers (sensing, gathering, application) Examines how IoT will change the information and communication technology industry Written for professionals working in IoT development, management and big data analytics, Intelligent Internet of Things offers an overview of IoT architecture, key technology, current applications and future development of the technology.

Today, network technology is ubiquitous. Whether at home or on the move, at work or at play, the modern data network is a part of our daily lives. Streaming video, social media and web browsing are just a few of the popular applications that rely on the network, and this list will continue to grow with autonomous vehicles, virtual reality and others, each with their own unique needs. To address the challenges of the demand for these services, the network must continually evolve with new technologies. However, determining which technologies are worth focusing on today is difficult, and the issues which they represent, and address are often complex. In Network Horizons Emerging Technologies and Applications 2018 - 2019 Edition, the author highlights key areas of interest for network technology, helping the reader to identify those of the highest importance by explaining the what, why and when of each of these important areas of development to make sure they and their business are prepared for the future.

This book constitutes the revised selected papers of the scientific satellite events that were held in conjunction with the 16th International Conference on Service-Oriented Computing, ICSOC 2018, held in Hangzhou, China, in November 2018. The ICSOC 2018 workshop track consisted of six workshops on a wide range of topics that fall into the general area of service computing. A special focus this year was on Internet of Things, Data Analytics, and Smart Services: First International Workshop on Data-Driven Business Services (DDBS) First International Workshop on Networked Learning Systems for Secured IoT Services and Its Applications (NLS4IoT) 8th International Workshop on Context-Aware and IoT Services (CloTS) Third International Workshop on Adaptive Service-oriented and Cloud Applications (ASOCA2018) Third International Workshop on IoT Systems for Context-aware Computing (ISyCC) First International Workshop on AI and Data Mining for Services (ADMS)

This book constitutes the refereed proceedings of the 21st International Conference on Innovations for Community Services, I4CS 2021, held in Bamberg, Germany, in May 2021 as a hybrid event. The 14 full papers and 2 short papers presented in this volume were carefully reviewed and selected from 43 submissions. One short invited paper is also included. The papers focus on topics such as services for critical infrastructure; network architecture for communities; applications and services supporting work and

life; community data and visualization; technology empowers industry processes; and future community support.

From the Section Editor's Foreword by Dr. Madhusanka Liyanage, University College Dublin, Ireland. The Wiley 5G Ref: Security offers a stellar collection of articles selected from the online-only Work, The Wiley 5G Reference. It aims to provide a solid educational foundation for researchers and practitioners in the field of 5G Security and Privacy to expand their knowledge base by including the latest developments in these disciplines. The book introduces the security landscape of 5G, and significant security and privacy risks associated with the 5G networks. Then, the security solutions for different segments of the 5G network, i.e., radio network, edge network, access network, and core network, are discussed. Since 5G is developed based on network softwarization, security threats associated with key network softwarization technologies such as SDN, NFV, NS, and MEC are also presented in detail. Then, the security issues related to the new 5G and IoT services are delivered. Finally, a detailed discussion on the privacy of 5G networks is presented by considering Datafied Society. Written by leading experts in security and privacy for the telecommunication network, this book is intended to provide additional learning opportunities for a wide range of readers, from graduate-level students to seasoned engineering professionals. We are confident that this book and the entire collection of selected articles will continue Wiley's tradition of excellence in technical publishing and provide a lasting and positive contribution to the teaching and practice of security and privacy of 5G and beyond networks.

Discover how the NG-RAN architecture is, and isn't, ready for the challenges introduced by 5G 5G Radio Access Network Architecture: The Dark Side of 5G explores foundational and advanced topics in Radio Access Network (RAN) architecture and why a re-thinking of that architecture is necessary to support new 5G requirements. The distinguished engineer and editor Sasha Sirotkin has included numerous works written by industry insiders with state of the art research at their disposal. The book explains the relevant standards and technologies from an academic perspective, but also explains why particular standards decisions were made and how a variety of NG-RAN architecture options could be deployed in real-life networks. All major standards and technologies associated with the NG-RAN architecture are discussed in this book, including 3GPP, O-RAN, Small Cell Forum, IEEE, and IETF. Readers will learn about how a re-design of the RAN architecture would ensure that 5G networks can deliver their promised throughput and low latency KPIs consistently and sustainably. The book is structured as follows: An overview of the market drivers of the NG-RAN architecture, like spectrum models, 5G-relevant regulatory considerations, and 5G radio interface technical requirements An overview of the 5G System, from the core network, to the RAN, to the radio interface protocols and physical layer, with emphasis on how these are different compared to 4G Release-15 RAN architectures defined in 3GPP, O-RAN, and Small Cell Forum RAN architecture evolution in Release-16 and Release-17 Enabling technologies, like virtualization, open source technologies, multi-access edge (MEC) computing, and operations, administration, and management (OAM) NG-RAN deployment considerations, objectives, and challenges, like costs, spectrum and radio propagation

considerations, and coverage Perfect for network designers and operators who require a solid understanding of the NG-RAN architecture, 5G Radio Access Network Architecture also belongs on the bookshelves of network engineers who aim to increase their understanding of the standards and technologies relevant to the NG-RAN architecture.

A comprehensive resource on multimedia communications. Covers recent trends and standardization activities in multimedia communications, such as layered structures, underlying theories and the current best design techniques. Describes the convergence of various technologies including communications, broadcasting, information technology, and home electronics, and emerging new communication services and applications resulting from the growth of the Internet and wireless technologies. Please go to [www-ee.uta.edu/dip](http://www-ee.uta.edu/dip) for additional information.

Learn about the latest in cognitive and autonomous network management Towards Cognitive Autonomous Networks: Network Management Automation for 5G and Beyond delivers a comprehensive understanding of the current state-of-the-art in cognitive and autonomous network operation. Authors Mwanje and Bell fully describe today's capabilities while explaining the future potential of these powerful technologies. This book advocates for autonomy in new 5G networks, arguing that the virtualization of network functions render autonomy an absolute necessity. Following that, the authors move on to comprehensively explain the background and history of large networks, and how we come to find ourselves in the place we're in now. Towards Cognitive Autonomous Networks describes several novel techniques and applications of cognition and autonomy required for end-to-end cognition including:

- Configuration of autonomous networks
- Operation of autonomous networks
- Optimization of autonomous networks
- Self-healing autonomous networks

The book concludes with an examination of the extensive challenges facing completely autonomous networks now and in the future.

Operators are introducing mobile television and digital video content services globally. The Handbook of Mobile Broadcasting addresses all aspects of these services, providing a comprehensive reference on DVB-H, DMB, ISDB-T, and MediaFLO. Featuring contributions from experts in the field, the text presents technical standards and distribution proto

This book constitutes the refereed proceedings of the 6th Annual Smart City 360° Summit. Due to COVID-19 pandemic the conference was held virtually. The volume combines selected papers of seven conferences, namely AISCOVID 2020 - International Conference on AI-assisted Solutions for COVID-19 and Biomedical Applications in Smart-Cities; EdgeloT 2020 - International Conference on Intelligent Edge Processing in the IoT Era; IC4S 2020 - International Conference on Cognitive Computing and Cyber Physical Systems; CiCom 2020 - International Conference on Computational Intelligence and Communications; S-Cube 2020 - International Conference on Sensor Systems and Software; SmartGov

2020 - International Conference on Smart Governance for Sustainable Smart Cities; and finally, the Urb-IOT 2020 -International Conference on IoT in Urban Space.

This excellent reference provides detailed analysis and optimization aspects of live 3G mobile communication networks. Video and Multimedia Transmissions over Cellular Networks describes the state-of-the-art in the transmission of multimedia over cellular networks, evaluates the performance of the running system based on the measurements and monitoring of live networks, and finally presents concepts and methods for improving of the quality in such systems. Key Features: Addresses the transmission of different media over cellular networks, with a focus on evolving UMTS transmission systems Provides in-depth coverage of UMTS network architecture, and an overview of 3GPP video services Describes the characteristics of the link layer errors in the UMTS Terrestrial radio Access Network (UTRAN), obtained by extensive measurements in live UMTS networks Covers video encoding and decoding, introducing H.264/AVC video codec, as well as addressing various novel concepts for increased error resilience Discusses the real-time capable algorithms that are suitable for implementation in power and size limited terminals Presents the methods for monitoring quality, as well as analyzing and modelling traffic evolution in the cellular mobile network This book provides a valuable reference for researchers and students working in the field of multimedia transmission over wireless networks. Industry experts and professionals working within the field will also find this book of interest.

For the past couple of years, network automation techniques that include software-defined networking (SDN) and dynamic resource allocation schemes have been the subject of a significant research and development effort. Likewise, network functions virtualization (NFV) and the foreseeable usage of a set of artificial intelligence techniques to facilitate the processing of customers' requirements and the subsequent design, delivery, and operation of the corresponding services are very likely to dramatically distort the conception and the management of networking infrastructures. Some of these techniques are being specified within standards developing organizations while others remain perceived as a "buzz" without any concrete deployment plans disclosed by service providers. An in-depth understanding and analysis of these approaches should be conducted to help internet players in making appropriate design choices that would meet their requirements as well as their customers. This is an important area of research as these new developments and approaches will inevitably reshape the internet and the future of technology. Design Innovation and Network Architecture for the Future Internet sheds light on the foreseeable yet dramatic evolution of internet design principles and offers a comprehensive overview on the recent advances in networking techniques that are likely to shape the future internet. The chapters provide a rigorous in-depth analysis of the promises, pitfalls, and other challenges raised by these initiatives, while avoiding any speculation on their expected outcomes and technical benefits. This book covers essential topics such

as content delivery networks, network functions virtualization, security, cloud computing, automation, and more. This book will be useful for network engineers, software designers, computer networking professionals, practitioners, researchers, academicians, and students looking for a comprehensive research book on the latest advancements in internet design principles and networking techniques.

This document brings together a set of latest data points and publicly available information relevant for Hybrid Cloud Infrastructure Technology. We are very excited to share this content and believe that readers will benefit from this periodic publication immensely.

Provides extensive coverage of standardized QoS technologies for fixed and mobile ultra-broadband networks and services—bringing together technical, regulation, and business aspects The Quality of Service (QoS) has been mandatory for traditional telecommunication services such as telephony (voice) and television (TV) since the first half of the past century, however, with the convergence of telecommunication networks and services onto Internet technologies, the QoS provision remains a big challenge for all ICT services, not only for traditional ones. This book covers the standardized QoS technologies for fixed and mobile ultra-broadband networks and services, including the business aspects and QoS regulation framework, which all will have high impact on the ICTs in the current and the following decade. QoS for Fixed and Mobile Ultra-Broadband starts by introducing readers to the telecommunications field and the technology, and the many aspects of both QoS and QoE (Quality of Experience). The next chapter devotes itself to Internet QoS, starting with an overview of numerous technology protocols and finishing with business and regulatory aspects. The next three chapters look at QoS in NGN and Future Networks, QoS for fixed ultra-broadband, and QoS for mobile ultra-broadband. The book also provides readers with in-depth accounts of services in fixed and mobile ultra-broadband; broadband QoS parameters, KPIs, and measurements; network neutrality; and the QoS regulatory framework. Comprehensively covers every aspect of QoS technology for fixed and mobile ultra-broadband networks and services, including the technology, the many regulations, and their applications in business Explains how the QoS is transiting from the traditional telecom world to an all-IP world Presents all the fundamentals of QoS regulation, as well as SLA regulation QoS for Fixed and Mobile Ultra-Broadband is an excellent resource for managers, engineers, and employees from regulators, ICT government organizations, telecommunication companies (operators, service providers), ICT companies, and industry. It is also a good book for students and professors from academia who are interested in understanding, implementation, and regulation of QoS for fixed and mobile ultra-broadband.

The provision of IP-based multimedia services is one of the most exiting and challenging aspects of next generation wireless networks. A significant evolution has been underway for enabling such multimedia services and for ultimately

migrating the Internet to the wireless world. This book examines this evolution, looking at an array of the most up-to-date wireless multimedia technologies and services. The first part focuses on enabling technologies for wireless multimedia, while the second is dedicated to the new wireless multimedia services that are expected to play a key role in the future wireless environment. In addition, the related recent standardization, research and industry activities are addressed. \* Covers a complete range of multimedia hot topics, ranging from audio/video coding techniques to multimedia protocols and applications \* Discusses QoS issues in WLANs, 3G and hybrid 3G/WLAN networks \* Provides in-depth discussion of the most modern multimedia services, such as Push-to-Talk, Instant Messaging, Presence, mobile payments, MMS, WAP, and location-based multimedia services \* Addresses the emerging Multimedia Broadcast/Multicast Service (MBMS) and the key aspects of IP Multimedia Subsystem (IMS) in 3G networks \* Numerous on-line references will assist readers in their quest for the most up-to-date information This comprehensive resource will have instant appeal to students in electrical and computer engineering or IT disciplines. It is also essential reading for engineering managers, engineers in wireless systems and multimedia, and wireless multimedia researchers.

Automation techniques are meant to facilitate the delivery of flexible, agile, customized connectivity services regardless of the nature of the networking environment. New architectures combine advanced forwarding and routing schemes, mobility features, and customer-adapted resource facilities used for operation and delivery of services. Emerging Automation Techniques for the Future Internet is a collection of innovative research on the methods and applications of new architectures for the planning, dynamic delivery, and operation of services. While highlighting topics including policy enforcement, self-architectures, and automated networks, this book is ideally designed for engineers, IT consultants, professionals, researchers, academicians, and students seeking current research on techniques and structures used to enhance experience and services rendered.

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, exhibility 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. Comprehensive Handbook Demystifies 5G for Technical and Business Professionals in Mobile Telecommunication Fields Much is being said regarding the possibilities and capabilities of the emerging 5G technology, as the evolution towards 5G promises to transform entire industries and many aspects of our society. 5G for the Connected World offers a comprehensive technical overview that telecommunication professionals need to understand and take advantage of these developments. The book offers a wide-ranging coverage of the technical aspects of 5G (with special consideration of the 3GPP Release 15 content), how it enables new services and how it differs from LTE. This includes information on potential use cases, aspects of radio and core networks, spectrum considerations and the services primarily driving 5G development and deployment. The text also looks at 5G in relation to the Internet of Things, machine to machine communication and technical enablers such as LTE-M, NB-IoT and EC-GSM. Additional chapters discuss new business models for telecommunication service providers and vertical industries as a result of introducing 5G and strategies for staying ahead of the curve. Other topics include: Key features of the new 5G radio such as descriptions of new waveforms, massive MIMO and beamforming technologies as well as spectrum considerations for 5G radio regarding all possible bands Drivers, motivations and overview of the new 5G system – especially RAN architecture and technology enablers (e.g. service-based architecture, compute-storage split and network exposure) for native cloud deployments Mobile edge computing, Non-3GPP access, Fixed-Mobile Convergence Detailed overview of mobility management, session management and Quality of Service frameworks 5G security vision and architecture Ultra-low latency and high reliability use cases and enablers, challenges and requirements (e.g. remote control, industrial automation, public safety and V2X communication) An outline of the requirements and challenges imposed by massive numbers of devices connected to cellular networks While some familiarity with the basics of 3GPP networks is helpful, 5G for the Connected World is intended for a variety of readers. It will prove a useful guide for telecommunication professionals, standardization experts, network operators, application developers and business analysts (or students working in these fields) as well as infrastructure and device vendors looking to develop and integrate 5G into their products, and to deploy 5G radio and core networks.

This book constitutes the refereed proceedings of two International Workshops held as parallel events of the 16th IFIP WG 12.5 International Conference on Artificial Intelligence Applications and Innovations, AIAI 2020, in Neos Marmaras, Greece, in June 2020: the 9th Mining Humanistic Data Workshop, MHDW 2020, and the 5th Workshop on 5G-Putting Intelligence to the Network Edge, 5G-PINE 2020.\* The 6 full papers and 3 short papers presented at MHDW 2020 were carefully reviewed and selected from 16 submissions; out of the 23 papers submitted to 5G-PINE 2020, 11 were

accepted as full papers and 1 as a short paper. The MHDW papers focus on topics such as recommendation systems, sentiment analysis, pattern recognition, data mining, and time series. The papers presented at 5G-PINE focus on the latest AI applications in the telecommunication industry and deal with topics such as the Internet of Things, intelligence fusion in 5G networks, and 5G media. \*The workshops were held virtually due to the COVID-19 pandemic.

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