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Long Term Evolution in Bullets Apr 25 2020 "Complete text is presented as bullet points, ... content includes both introductory and advanced topics, ... based upon release 8 of the 3GPP specifications"--P. [4] of cover.

LTE Advanced Pro May 27 2020 This book presents LTE evolution towards 5G mobile communication and the emergence of new requirements for MBB, MTC and LLC services. As LTE technologies evolve, LTE Advanced Pro dramatically increases cell capacity and user data rates for the MBB unicast service. Such requirements are obtained using full-dimension MIMO, carrier aggregation (on either licensed or unlicensed frequency bands) and dual connectivity. To improve the efficiency of same-content delivery to multiple users, 3GPP proposes a group communications service over LTE and defines mission critical push-to-talk (MCPTT) for dedicated public safety services. Complementary low-cost and low-power modems with enhanced coverage and massive connectivity are emerging. Thus, this book also discusses the need for LTE to support low-rate transmission and high-latency communication for MTC services.

Mobile Terminal Receiver Design Dec 02 2020 MOBILE TERMINAL RECEIVER DESIGN MOBILE TERMINAL RECEIVER DESIGN LTE and LTE-Advanced India This all-in-one guide addresses the challenges of designing innovative mobile handset solutions that offer smaller size, low power

consumption, low cost, and tremendous flexibility, with improved data rates and higher performance. Readers are introduced to mobile phone system architecture and its basic building blocks, different air interface standards and operating principles, before progressing to hardware anatomy, software and protocols, and circuits for legacy and next-generation smart phones, including various research areas in 4G and 5G systems. Mobile Terminal Receiver Design/p? ulliexplains basic working principles, system architecture and specification details of legacy and possible next-generation mobile systems, from principle to practice to product; covers in detail RF transmitter and receiver blocks, digital baseband processing blocks, receiver and transmitter signal processing, protocol stack, AGC, AFC, ATC, power supply, clocking; features important topics like connectivity and application modules with different design solutions for tradeoff exploration; discusses multi-RAT design requirements, key design attributes such as low power consumption, slim form factors, seamless I-RAT handover, sensitivity, and selectivity. It will help software, hardware, and radio frequency design engineers to understand the evolution of radio access technologies and to design competitive and innovative mobile solutions and devices. Graduates, postgraduate students, and researchers in mobile telecommunications disciplines will also find this book a handy reference.

4G, LTE-Advanced Pro and The Road to 5G Apr 30 2023 The upcoming 5G specifications from 3GPP, to be available in 2018, will include LTE-Advanced Pro as well as a new 5G radio-access technology. This practical and very successful book, written by engineers working closely with 3GPP, gives insight into the

newest technologies and standards adopted by 3GPP, with detailed explanations of the specific solutions chosen and their implementation in LTE, LTE-Advanced, and LTE-Advanced Pro, as well as providing a detailed description of the path to 5G and the associated underlying technologies. This edition has been thoroughly revised and updated to reflect the large extensions to LTE as introduced in 3GPP Releases 12 and 13 and the role of LTE in the upcoming 5G era. New to this edition includes updated content on: 4G and 5G Radio Access Spectrum for 4G and 5G Machine-Type Communication Device-to-Device Communication License-assisted Access Full-dimension MIMO Small-cell enhancements, eIMTA, FDD+TDD aggregation, dual connectivity Requirements on and general structure of 5G wireless access, addressing the existing and new usage scenarios for 5G Technical solutions for the new 5G radio-access technology The authors of this book all work at Ericsson Research and have been deeply involved in 3G and 4G development and standardization. They are leading experts in the field and are today actively contributing to the standardization of 4G and 5G within 3GPP. The leading book on 3GPP specifications for LTE, LTE-Advanced, and LTE-Advanced Pro covering up to and including Release 13, written by Ericsson engineers who are heavily involved in the development of 3GPP specifications Ten new chapters and coverage of all major features introduced with Release 12 and 13 Two completely new chapters on 5G wireless access including a detailed description of the key technology components under development by 3GPP LTE-Advanced Relay Technology and Standardization Oct 12 2021 LTE-Advanced relay technology and standardization

provides a timely reference work for relay technology with the finalizing of LTE Release 10 specifications. LTE-Advanced is quickly becoming the global standard for 4G cellular communications. The relay technology, as one of the key features in LTE-Advanced, helps not only to improve the system coverage and capacity, but also to save the costs of laying wireline backhaul. As a leading researcher in the field of LTE-Advanced standards, the author provides an in-depth description of LTE-A relay technology, and explains in detail the standard specification and design principles. Readers from both academic and industrial fields can find sections of interest to them: Sections 2 & 4 could benefit researchers in academia and those who are engaged in exploratory work, while Sections 3 & 4 are more useful to engineers. Dr. Yifei Yuan is the Technical Director at the Standards Department of ZTE Inc.

LTE-Advanced DRX Mechanism for Power Saving Jun 08 2021
Resource allocation and power optimization is a new challenge in multimedia services in cellular communication systems. To provide a better end-user experience, the fourth generation (4G) standard Long Term Evolution/Long Term Evolution-Advanced (LTE/LTE-Advanced) has been developed for high-bandwidth mobile access to accommodate today's data-heavy applications. LTE/LTE-Advanced has adopted discontinuous reception (DRX) to extend the user equipment's battery lifetime, thereby further supporting various services and large amounts of data transmissions. By introducing the basics of mathematical analysis and performance evaluation of power-saving mechanisms in 3rd generation partnership project (3GPP) LTE and LTE-Advanced networks, the authors of this book aim to

describe novel algorithms which could have better performance capabilities than previous methods. Chapter 1 gives the basic theory description of the 3GPP LTE network and 3GPP DRX power saving mechanism, empirical measurements of LTE network traffic and an overview of the basic LTE DRX model in the field of power saving techniques. Chapter 2 provides steps for deriving a 2-state analytical model up to a 4-state DRX model. The third and final chapter summarizes alternative methods for the implementation of LTE DRX. Contents 1. Basic Theory. 2. Analytical Semi-Markov Power-Saving Models. 3. Other Approaches for LTE Power Saving. About the Authors Scott A. Fowler is Associate Professor at Linköping University, Sweden, working with the Mobile Telecommunication (MT) group. He has served on several IEEE conferences/workshops as TPC to Chair, including Special Interest Groups coordinator for IEEE Communications Software (CommSoft) Technical Committee since 2012. His research interests include Quality of Service (QoS) support over heterogeneous networks, computer networks (wired, wireless), energy management, mobile computing, pervasive/ubiquitous, performance evaluation of networks and security. Abdelhamid Mellouk is Full Professor at the University of Paris-Est Créteil VdM (UPEC, ex. Paris 12), Networks & Telecommunications (N&T) Department (IUT C/V) and LiSSi Laboratory in France. He is a founder of the Network Control Research activity with extensive international academic and industrial collaborations. His general area of research is in adaptive real-time control for high-speed new generation dynamic wired/wireless networking in order to maintain acceptable Quality of Service/Experience for added-value

services. Naomi Yamada is a research associate at Linköping University, Sweden.

Beyond 3G - Bringing Networks, Terminals and the Web Together Aug 22 2022 Giving a sound technical introduction to 3GPP LTE and SAE, this book explains the decisions taken during standardization while also examining the likely competition for LTE such as HSPA+ and WiMAX. As well as looking at next generation network technologies, Beyond 3G - Bringing Networks, Terminals and the Web Together describes the latest mobile device developments, voice and multimedia services and the mobile web 2.0. It considers not only how the systems, devices and software work but also the reasons behind why they are designed in this particular way. How these elements strongly influence each other is discussed as well as how network capabilities, available bandwidth, mobile device capabilities and new application concepts will shape the way we communicate in the future. This book gives an end to end introduction to wireless, from mobile software architecture to core networks, making it a valuable resource for anyone working in the industry. Examines current and next-generation network technologies such as UMTS, HSPA+, WiMAX, LTE and Wifi Analyses and explains performance and capacity in practice as well as future capacity requirements and how they can be fulfilled Introduces the reader to the current cellular telephony architecture and to voice over IP architectures such as SIP, IMS and TISPA Looks at mobile device hardware and mobile operating system evolution Encompasses all major global wireless standards for application development and the latest state of the mobile web 2.0

Understanding LTE and its Performance May 19 2022 The aim

of this book is to provide comprehensive coverage of current state of the art theoretical and technological aspects of broadband mobile and wireless networks focusing on Long Term Evolution Network. The presentation starts from basic principles, and proceeds to the most advanced topics. Provided schemes are developed and oriented in the context of actual closed standards of the IEEE working groups and the 3 GPP LTE. Also this book will focus on the understanding of the LTE technology as well as the study of its performance in terms of mobility, quality of service, security, resource allocation.

LTE-Advanced and Next Generation Wireless Networks Dec 22 2019 LTE- A and Next Generation Wireless Networks: Channel Modeling and Performance describes recent advances in propagation and channel modeling necessary for simulating next generation wireless systems. Due to the radio spectrum scarcity, two fundamental changes are anticipated compared to the current status. Firstly, the strict reservation of a specific band for a unique standard could evolve toward a priority policy allowing the co-existence of secondary users in a band allocated to a primary system. Secondly, a huge increase of the number of cells is expected by combining outdoor base stations with smaller cells such as pico/femto cells and relays. This evolution is accompanied with the emergence of cognitive radio that becomes a reality intermingled together with the development of self-organization capabilities and distributed cooperative behaviors. The book is divided into three parts: Part I addresses the fundamentals (e.g. technologies, channel modeling principles etc.) Part II addresses propagation and modeling discussing topics such as indoor propagation, outdoor propagation, etc. Part

III explores system performance and applications (e.g. MIMO Over-the-air testing, electromagnetic safety, etc).

Design, Deployment and Performance of 4G-LTE Networks Feb 28 2023 This book provides an insight into the key practical aspects and best practice of 4G-LTE network design, performance, and deployment Design, Deployment and Performance of 4G-LTE Networks addresses the key practical aspects and best practice of 4G networks design, performance, and deployment. In addition, the book focuses on the end-to-end aspects of the LTE network architecture and different deployment scenarios of commercial LTE networks. It describes the air interface of LTE focusing on the access stratum protocol layers: PDCP, RLC, MAC, and Physical Layer. The air interface described in this book covers the concepts of LTE frame structure, downlink and uplink scheduling, and detailed illustrations of the data flow across the protocol layers. It describes the details of the optimization process including performance measurements and troubleshooting mechanisms in addition to demonstrating common issues and case studies based on actual field results. The book provides detailed performance analysis of key features/enhancements such as C-DRX for Smartphones battery saving, CSFB solution to support voice calls with LTE, and MIMO techniques. The book presents analysis of LTE coverage and link budgets alongside a detailed comparative analysis with HSPA+. Practical link budget examples are provided for data and VoLTE scenarios. Furthermore, the reader is provided with a detailed explanation of capacity dimensioning of the LTE systems. The LTE capacity analysis in this book is presented in a comparative manner with reference to

the HSPA+ network to benchmark the LTE network capacity. The book describes the voice options for LTE including VoIP protocol stack, IMS Single Radio Voice Call Continuity (SRVCC). In addition, key VoLTE features are presented: Semi-persistent scheduling (SPS), TTI bundling, Quality of Service (QoS), VoIP with C-DRX, Robust Header Compression (RoHC), and VoLTE Vcoders and De-Jitter buffer. The book describes several LTE and LTE-A advanced features in the evolution from Release 8 to 10 including SON, eICIC, CA, CoMP, HetNet, Enhanced MIMO, Relays, and LBS. This book can be used as a reference for best practices in LTE networks design and deployment, performance analysis, and evolution strategy. Conveys the theoretical background of 4G-LTE networks Presents key aspects and best practice of 4G-LTE networks design and deployment Includes a realistic roadmap for evolution of deployed 3G/4G networks Addresses the practical aspects for designing and deploying commercial LTE networks. Analyzes LTE coverage and link budgets, including a detailed comparative analysis with HSPA+. References the best practices in LTE networks design and deployment, performance analysis, and evolution strategy Covers infrastructure-sharing scenarios for CAPEX and OPEX saving. Provides key practical aspects for supporting voice services over LTE, Written for all 4G engineers/designers working in networks design for operators, network deployment engineers, R&D engineers, telecom consulting firms, measurement/performance tools firms, deployment subcontractors, senior undergraduate students and graduate students interested in understanding the practical aspects of 4G-LTE networks as part of their classes, research, or

projects.

Long Term Evolution Jul 09 2021 This book focus on Long Term Evolution (LTE) and beyond. The chapters describe different aspects of research and development in LTE, LTE-Advanced (4G systems) and LTE-450 MHz such as telecommunications regulatory framework, voice over LTE, link adaptation, power control, interference mitigation mechanisms, performance evaluation for different types of antennas, cognitive mesh network, integration of LTE network and satellite, test environment, power amplifiers and so on. It is useful for researchers in the field of mobile communications.

LTE-A Cellular Networks Sep 11 2021 In this book, three different methods are presented to enhance the capacity and coverage area in LTE-A cellular networks. The scope involves the evaluation of the effect of the RN location in terms of capacity and the determination of the optimum location of the relay that provides maximum achievable data rate for users with limited interference at the cell boundaries. This book presents a new model to enhance both capacity and coverage area in LTE-A cellular network by determining the optimum location for the RN with limited interference. The new model is designed to enhance the capacity of the relay link by employing two antennas in RN. This design enables the relay link to absorb more users at cell edge regions. An algorithm called the Balance Power Algorithm (BPA) is developed to reduce MR power consumption. The book pertains to postgraduate students and researchers in wireless & mobile communications.

An Introduction to LTE Apr 18 2022 An Introduction to LTE explains the technology used by 3GPP Long Term Evolution. The

book covers the whole of LTE, both the techniques used for radio communication between the base station and the mobile phone, and the techniques used for signalling communication and data transport in the evolved packet core. It avoids unnecessary detail, focussing instead on conveying a sound understanding of the entire system. The book is aimed at mobile telecommunication professionals, who want to understand what LTE is and how it works. It is invaluable for engineers who are working on LTE, notably those who are transferring from other technologies such as UMTS and cdma2000, those who are experts in one part of LTE but who want to understand the system as a whole, and those who are new to mobile telecommunications altogether. It is also relevant to those working in non technical roles, such as project managers, marketing executives and intellectual property consultants. On completing the book, the reader will have a clear understanding of LTE, and will be able to tackle the more specialised books and the 3GPP specifications with confidence. Key features - Covers the latest developments in release 10 of the 3GPP specifications, including the new capabilities of LTE-Advanced Includes references to individual sections of the 3GPP specifications, to help readers understand the principles of each topic before going to the specifications for more detailed information Requires no previous knowledge of mobile telecommunications, or of the mathematical techniques that LTE uses for radio transmission and reception

LTE and the Evolution to 4G Wireless Aug 10 2021

Practical LTE based security forces PMR networks Sep 30 2020

Security forces PMR networks are moving from proprietary

technologies for their Mission Critical Push-To-Talk basic service, and their data services which must provide large bandwidth real-time access, to the databases. LTE Based is adopted with backup access to public MNOs to complement their own radio coverage. Specific technologies such as multicasting of video are required so the MCPTT works within a restricted bandwidth. The need to be able to change the main MNOs to provide resilient coverage requires specific choices of SIM cards, with OTT security domains. Practical LTE Based Security Forces PMR Networks assumes that the reader has a basic knowledge of the 4G network architecture and services, and the book focusses on the specific features and choices required to fulfill the need of security forces PMR networks. These include tactical and centralized, including LTE based voice services VoLTE and IMS. It can be used as a reference or textbook, with many detailed call flows and traces being included. The author, who has also a long teaching career in Operations Research, provides mathematical models for the optimization of tactical network federations, multicast coverage and allocation of preemptive priorities to PMR group members. He is a pioneer in the area of Virtual Roaming, an application of graph theory and telecommunications to provide roaming without direct relations, having previously published books on SMS Hubs, SS7 Hubs, Diameter Hubs, GTP Hubs. The use of M2M (monitoring devices) for security forces with mobility is covered in detail in the book, including the new LoRa virtual roaming which goes beyond the scope of PMR.

VoLTE and ViLTE Jan 23 2020 This book presents the architecture of two networks that make up the backbone of the

telephone service VoLTE and video service ViLTE. The 4G mobile network makes it possible to construct bearers through which IP packets, containing either telephone signals (SIP, SDP) or voice or video media (RTP stream), are transported. The IMS network performs the processing of the telephone signal to provide VoLTE and ViLTE services, including call routing and the provision of additional services. Different procedures are described: the set-up and termination of a session, interconnection with third-party networks, roaming and intra-system handover. The inter-system handover PS-CS is a special case that occurs when the mobile loses 4G network coverage over the course of a session. The e-SRVCC mechanism enables continuity of the service during the switch of the telephone communication to the 2G or 3G networks. The SMS service for short messages, which is a special telephone service in itself, is provided by two structures, one relying on the IMS network, and a second on the CSFB functionality.

LTE and the Evolution to 4G Wireless Feb 04 2021

4G: LTE/LTE-Advanced for Mobile Broadband Mar 29 2023

This book focuses on LTE with full updates including LTE-Advanced (Release-11) to provide a complete picture of the LTE system. Detailed explanations are given for the latest LTE standards for radio interface architecture, the physical layer, access procedures, broadcast, relaying, spectrum and RF characteristics, and system performance. Key technologies presented include multi-carrier transmission, advanced single-carrier transmission, advanced receivers, OFDM, MIMO and adaptive antenna solutions, radio resource management and protocols, and different radio network architectures. Their role

and use in the context of mobile broadband access in general is explained, giving both a high-level overview and more detailed step-by-step explanations. This book is a must-have resource for engineers and other professionals in the telecommunications industry, working with cellular or wireless broadband technologies, giving an understanding of how to utilize the new technology in order to stay ahead of the competition. New to this edition: In-depth description of CoMP and enhanced multi-antenna transmission including new reference-signal structures and feedback mechanisms Detailed description of the support for heterogeneous deployments provided by the latest 3GPP release Detailed description of new enhanced downlink control-channel structure (EPDDCH) New RF configurations including operation in non-contiguous spectrum, multi-bands base stations and new frequency bands Overview of 5G as a set of well-integrated radio-access technologies, including support for higher frequency bands and flexible spectrum management, massive antenna configurations, and ultra-dense deployments Covers a complete update to the latest 3GPP Release-11 Two new chapters on HetNet, covering small cells/heterogeneous deployments, and CoMP, including Inter-site coordination Overview of current status of LTE release 12 including further enhancements of local-area, CoMP and multi-antenna transmission, Machine-type-communication, Device-to-device communication

Internet of Things for Architects Aug 30 2020 Learn to design, implement and secure your IoT infrastructure Key Features Build a complete IoT system that is the best fit for your organization Learn about different concepts, technologies, and

tradeoffs in the IoT architectural stack Understand the theory, concepts, and implementation of each element that comprises IoT design—from sensors to the cloud Implement best practices to ensure the reliability, scalability, robust communication systems, security, and data analysis in your IoT infrastructure Book Description The Internet of Things (IoT) is the fastest growing technology market. Industries are embracing IoT technologies to improve operational expenses, product life, and people's well-being. An architectural guide is necessary if you want to traverse the spectrum of technologies needed to build a successful IoT system, whether that's a single device or millions of devices. This book encompasses the entire spectrum of IoT solutions, from sensors to the cloud. We start by examining modern sensor systems and focus on their power and functionality. After that, we dive deep into communication theory, paying close attention to near-range PAN, including the new Bluetooth® 5.0 specification and mesh networks. Then, we explore IP-based communication in LAN and WAN, including 802.11ah, 5G LTE cellular, SigFox, and LoRaWAN. Next, we cover edge routing and gateways and their role in fog computing, as well as the messaging protocols of MQTT and CoAP. With the data now in internet form, you'll get an understanding of cloud and fog architectures, including the OpenFog standards. We wrap up the analytics portion of the book with the application of statistical analysis, complex event processing, and deep learning models. Finally, we conclude by providing a holistic view of the IoT security stack and the anatomical details of IoT exploits while countering them with software defined perimeters and blockchains. What you will learn Understand the role and scope of architecting a successful

IoT deployment, from sensors to the cloud Scan the landscape of IoT technologies that span everything from sensors to the cloud and everything in between See the trade-offs in choices of protocols and communications in IoT deployments Build a repertoire of skills and the vernacular necessary to work in the IoT space Broaden your skills in multiple engineering domains necessary for the IoT architect Who this book is for This book is for architects, system designers, technologists, and technology managers who want to understand the IoT ecosystem, various technologies, and tradeoffs and develop a 50,000-foot view of IoT architecture.

3G Evolution Mar 05 2021 This very up-to-date and practical book, written by engineers working closely in 3GPP, gives insight into the newest technologies and standards adopted by 3GPP, with detailed explanations of the specific solutions chosen and their implementation in HSPA and LTE. The key technologies presented include multi-carrier transmission, advanced single-carrier transmission, advanced receivers, OFDM, MIMO and adaptive antenna solutions, advanced radio resource management and protocols, and different radio network architectures. Their role and use in the context of mobile broadband access in general is explained. Both a high-level overview and more detailed step-by-step explanations of HSPA and LTE implementation are given. An overview of other related systems such as TD SCDMA, CDMA2000, and WIMAX is also provided. This is a 'must-have' resource for engineers and other professionals working with cellular or wireless broadband technologies who need to know how to utilize the new technology to stay ahead of the competition. The authors of the book all

*work at Ericsson Research and are deeply involved in 3G development and standardisation since the early days of 3G research. They are leading experts in the field and are today still actively contributing to the standardisation of both HSPA and LTE within 3GPP. * Gives the first explanation of the radio access technologies and key international standards for moving to the next stage of 3G evolution: fully operational mobile broadband * Describes the new technologies selected by the 3GPP to realise High Speed Packet Access (HSPA) and Long Term Evolution (LTE) for mobile broadband * Gives both higher-level overviews and detailed explanations of HSPA and LTE as specified by 3GPP*

Network Performance and Fault Analytics for LTE Wireless Service Providers Jun 27 2020 *This book is intended to describe how to leverage emerging technologies big data analytics and SDN, to address challenges specific to LTE and IP network performance and fault management data in order to more efficiently manage and operate an LTE wireless networks. The proposed integrated solutions permit the LTE network service provider to operate entire integrated network, from RAN to Core , from UE to application service, as one unified system and correspondingly collect and align disparate key metrics and data, using an integrated and holistic approach to network analysis. The LTE wireless network performance and fault involves the network performance and management of network elements in EUTRAN, EPC and IP transport components, not only as individual components, but also as nuances of inter-working of these components. The key metrics for EUTRAN include radio access network accessibility, retainability, integrity, availability*

and mobility. The key metrics for EPC include MME accessibility, mobility and capacity, SGW, PGW capacity and connectivity. In the first parts of the book, the authors describe fundamental analytics techniques, and various key network partitions - RAN, Backhaul, Metro and Core of a typical LTE Wireless Service Provider Network. The second part of the book develops more advanced analytic techniques that can be used to solve complex wireless network problems. The second part of this book also describes practical and novel solutions for LTE service network performance and fault management systems using big data engineering. Self-organizing network (SON) architecture is presented as a way to utilize network performance and fault analytics to enable network automation. SON can significantly improve operational efficiencies and speed up network deployment. This book provides various ways to leverage data science to more intelligently and reliably to automate and manage a wireless network. The contents of the book should be useful to professional engineers and networking experts involved in LTE network operations and management. The content will also be of interest to researchers, academic and corporate, interested in the developments in fault analytics in LTE networks.

LTE Signaling May 07 2021 This extensively updated second edition of LTE Signaling, Troubleshooting and Performance Measurement describes the LTE signaling protocols and procedures for the third generation of mobile communications and beyond. It is one of the few books available that explain the LTE signaling messages, procedures and measurements down to the bit & byte level, and all trace examples are taken for a real

lab and field trial traces. This book covers the crucial key performance indicators (KPI) to be measured during field trials and deployment phase of new LTE networks. It describes how statistic values can be aggregated and evaluated, and how the network can be optimized during the first stages of deployment, using dedicated examples to enhance understanding. Written by experts in the field of mobile communications, this book systematically describes the most recent LTE signaling procedures, explaining how to identify and troubleshoot abnormal network behavior and common failure causes, as well as describing the normal signaling procedures. This is a unique feature of the book, allowing readers to understand the root cause analysis of problems related to signaling procedures. This book will be especially useful for network operators and equipment manufacturers; engineers; technicians; network planners; developers; researchers; designers; testing personnel and project managers; consulting and training companies; standardization bodies.

LTE Services Oct 24 2022 LTE (Long Term Evolution) is commonly marketed as 4G. LTE and LTE Advanced have been recognized by ITU-R and ITU-T (International Telecommunications Union – Telecommunications) as the principal solution for the future mobile communication networks standards. They are thus the framework of what the marketing calls 4G and possibly also 5G. This book describes various aspects of LTE as well as the change of paradigm, which it is bringing to mobile communications, focusing on LTE standards and architecture, OFDMA, the Full IP Core Network and LTE security.

Evolved Packet System (EPS) Nov 01 2020 2G/GSM and 3G/UMTS are key mobile communication technologies, chosen by more than 2 billion people around the world. In order to adapt to new services, increasing demand for user bandwidth, quality of service and requirements for network convergence, major evolutions are introduced in 3G network standard. Evolved Packet System (EPS) presents the EPS evolution of the 3G/UMTS standard introduced by the 3rd Generation Partnership Project (3GPP) standard committee. This new topic is looked at from a system perspective, from the radio interface to network and service architecture. Hundreds of documents being issued by Standard organisations are summarised in one book to allow the reader to get an accessible comprehensive view of EPS evolution. Proposes a system view of Evolved UMTS, from the radio to Core and service architecture Gives a comprehensive and global view of the system that technical specifications do not provide Describes the new system as well as the inheritance and migration from 2G/GSM and 3G/UMTS Written by experts in the field who specialise in two complementary but very different technical domains (i.e. "radio interface" and "network architecture") Contains many figures and examples for better understanding. This book is essential for industry professionals in the telecommunication business, telecommunication system architects and designers, product manufacturers and operators and postgraduate students.

5G LTE Narrowband Internet of Things (NB-IoT) Mar 25 2020 This book explains the 3GPP technical specifications for the upcoming 5G Internet of Things (IoT) technology based on latest release which is Release 15. It details the LTE protocol stack of

an IoT device, architecture and framework, how they are functioning and communicate with cellular infrastructure, and supported features and capability. NB-IoT is designed to connect a large number of devices in a wide range of application domains forming so-called Internet of Things (IoT). Connected devices are to communicate through cellular infrastructure. This technology is new within the 3GPP specifications and is part of upcoming new wireless technology known as 5G. Table of Contents Preface. Acknowledgments. Author. List of Abbreviations. 1. Internet of Things. 2. 4G and 5G Systems. 3. Radio Resource Control Sublayer. 4. Packet Data Convergence Protocol Sublayer. 5. Radio Link Control Sublayer. 6. Medium Access Control Sublayer. 7. Physical Sublayer. 8. Quality of Service Architecture. 9. Use Cases and Deployment. References. Index.

5G NR Apr 06 2021 5G NR: The Next Generation Wireless Access Technology, Second Edition, follows the authors' highly celebrated books on 3G and 4G and provides a new level of insight into 5G NR. After background discussion of 5G, including requirements, spectrum aspects, and the standardization timeline, all technology features of the first phase of NR are described in detail. The book covers the NR physical-layer structure and higher-layer protocols, RF and spectrum aspects, and co-existence and interworking with LTE. The book provides a good foundation in NR and different NR technology components, giving insight into why a certain solution has been selected. This second edition is updated to reflect the latest developments in Release 16 and includes brand new chapters on: NR in unlicensed spectrum; NR-U in Rel-16; IAB;

V2X and sidelink in Rel-16; industrial IoT; IIoT and referring to the URLLC enhancements for PDCCH; RIM/CL; and positioning. Also included are the key radio-related requirements of NR; design principles; technical features of basic NR transmission structure—showing where it was inherited from LTE, where it deviates from it, and the reasons why— NR multi-antenna transmission functionality; detailed description of the signals and functionality of the initial NR access, including signals for synchronization and system information; random access and paging; LTE/NR co-existence in the same spectrum and the benefits of their interworking as one system; and different aspects of mobility in NR. RF requirements for NR are described for BS and UE, the legacy bands, and for the new mm-wave bands. Gives a concise and accessible explanation of the underlying technology and standards for 5G NR radio-access technology Provides detailed description of the NR physical-layer structure and higher-layer protocols, RF and spectrum aspects, and co-existence and interworking with LTE Gives insight not only into the details of the NR specification, but also an understanding of why certain solutions look like they do Includes the key radio-related requirements of NR, design principles, and technical features of basic NR transmission structure

Voice over LTE Feb 16 2022 Voice over LTE (Long Term Evolution) presents the mechanisms put in place in 4G mobile networks for the transportation of IP packets containing voice data and telephone signaling, as well as the technologies used to provide a telephone service in the IMS (IP Multimedia Sub-system) network. Despite the difficulty connected to the

handover of the 4G network to the 2G/3G network, a telephone communication will not be established on the 4G network. This book analyzes the technologies that have been put in place, such as CSFB (Circuit Service FallBack), an interim solution that enables a mobile connected to the 4G network to receive an alert transmitted by the 2G/3G network. The book also goes on to develop the SIP (Session Information Protocol) on which the telephone signaling transferred by the 4G network is based, the IMS network that provides the service and defines the routing, the SRVCC (Single Radio Voice Call Continuity) mechanism that maintains communication and the TAS (Telephony Application Server) that supplies supplementary services. Contents 1. The EPS Network. 2. The LTE Interface. 3. The CSFB Function. 4. SIP and SDP Protocols. 5. The IMS Network. 6. Telephone Services. 7. The SRVCC Function. About the Authors André Perez is a consultant and teacher in networks and telecommunications. He works with industrialists and operators regarding architecture studies and leads training on the 4G and IMS networks for NEXCOM.

LTE Self-Organising Networks (SON) Feb 22 2020 Covering the key functional areas of LTE Self-Organising Networks (SON), this book introduces the topic at an advanced level before examining the state-of-the-art concepts. The required background on LTE network scenarios, technologies and general SON concepts is first given to allow readers with basic knowledge of mobile networks to understand the detailed discussion of key SON functional areas (self-configuration, -optimisation, -healing). Later, the book provides details and references for advanced readers familiar with LTE and SON, including the

latest status of 3GPP standardisation. Based on the defined next generation mobile networks (NGMN) and 3GPP SON use cases, the book elaborates to give the full picture of a SON-enabled system including its enabling technologies, architecture and operation. "Heterogeneous networks" including different cell hierarchy levels and multiple radio access technologies as a new driver for SON are also discussed. Introduces the functional areas of LTE SON (self-optimisation, -configuration and -healing) and its standardisation, also giving NGMN and 3GPP use cases Explains the drivers, requirements, challenges, enabling technologies and architectures for a SON-enabled system Covers multi-technology (2G/3G) aspects as well as core network and end-to-end operational aspects Written by experts who have been contributing to the development and standardisation of the LTE self-organising networks concept since its inception Examines the impact of new network architectures ("Heterogeneous Networks") to network operation, for example multiple cell layers and radio access technologies LTE, WiMAX and WLAN Network Design, Optimization and Performance Analysis Dec 14 2021 A technological overview of LTE and WiMAX LTE, WiMAX and WLAN Network Design, Optimization and Performance Analysis provides a practical guide to LTE and WiMAX technologies introducing various tools and concepts used within. In addition, topics such as traffic modelling of IP-centric networks, RF propagation, fading, mobility, and indoor coverage are explored; new techniques which increase throughput such as MIMO and AAS technology are highlighted; and simulation, network design and performance analysis are also examined. Finally, in the latter

part of the book Korowajczuk gives a step-by-step guide to network design, providing readers with the capability to build reliable and robust data networks. By focusing on LTE and WiMAX this book extends current network planning approaches to next generation wireless systems based on OFDMA, providing an essential resource for engineers and operators of fixed and wireless broadband data access networks. With information presented in a sequential format, LTE, WiMAX and WLAN Network Design, Optimization and Performance Analysis aids a progressive development of knowledge, complementing latter graduate and postgraduate courses while also providing a valuable resource to network designers, equipment vendors, reference material, operators, consultants, and regulators. Key Features: One of the first books to comprehensively explain and evaluate LTE Provides an unique explanation of the basic concepts involved in wireless broadband technologies and their applications in LTE, WiMAX, and WLAN before progressing to the network design Demonstrates the application of network planning for LTE and WiMAX with theoretical and practical approaches Includes all aspects of system design and optimization, such as dynamic traffic simulations, multi-layered traffic analysis, statistical interference analysis, and performance estimations

The LTE-Advanced Deployment Handbook Jan 15 2012 LTE-Advanced is the new Global standard which is expected to create a foundation for the future wireless broadband services. The standard incorporates all the latest technologies recently developed in the field of wireless communications. Presented in a modular style, the book provides an introductory description

for beginners as well as practical guidelines for telecom specialists. It contains an introductory module that is suitable for the initial studies of the technology based on the 3GPP Release 10, 11 and beyond of LTE and SAE. The latter part of the book is suitable for experienced professionals who will benefit from the practical descriptions of the physical core and radio network planning, end-to-end performance measurements, physical network construction and optimization of the system. The focus of the book is in the functioning, planning, construction, measurements and optimization of the radio and core networks of the Release 10 and beyond of the 3GPP LTE and SAE standards. It looks at the practical description of the Advanced version of the LTE/SAE, how to de-mystify the LTE-Advanced functionality and planning, and how to carry out practical measurements of the system. In general, the book describes "how-to-do-it" for the 4G system which is compliant with the ITU-R requirements.

LTE Security Jan 03 2021 A concise, updated guide to the 3GPP LTE Security Standardization specifications A welcome Revised Edition of the successful LTE Security addressing the security architecture for SAE/LTE, which is based on elements of the security architectures for GSM and 3G, but which needed a major redesign due to the significantly increased complexity, and different architectural and business requirements of fourth generation systems. The authors explain in detail the security mechanisms employed to meet these requirements.

These specifications generated by standardization bodies only inform about how to implement the system (and this only to the extent required for interoperability), but almost never inform

readers about why things are done the way they are. Furthermore, specifications tend to be readable only for a small group of experts and lack the context of the broader picture. The book fills this gap by providing first hand information from insiders who participated in decisively shaping SAE/LTE security in the relevant standardization body, 3GPP, and can therefore explain the rationale for design decisions in this area. A concise, fully updated guide to the 3GPP LTE Security Standardization specifications Describes the essential elements of LTE and SAE Security, written by leading experts who participated in decisively shaping SAE/LTE security in the relevant standardization body, 3GPP Explains the rationale behind the standards specifications giving readers a broader understanding of the context to these specifications Includes new chapters covering 3GPP work on system enhancements for MTC, plus application layer security in ETSI TC M2M and embedded smart card in ETSI SCP; Security for Machine-type Communication, Relay Node Security, and Future Challenges, including Voice over LTE, MTC, Home base stations, LIPA/SIPTO, and New Cryptographic Algorithms Essential reading for System engineers, developers and people in technical sales working in the area of LTE and LTE security, communication engineers and software developers in mobile communication field.

LTE for 4G Mobile Broadband Jan 27 2023 Understand the new technologies of the LTE standard and their impact on system performance improvements with this practical guide.

Fundamentals of LTE Jul 21 2022 The Definitive Guide to LTE Technology Long-Term Evolution (LTE) is the next step in the GSM evolutionary path beyond 3G technology, and it is strongly

positioned to be the dominant global standard for 4G cellular networks. LTE also represents the first generation of cellular networks to be based on a flat IP architecture and is designed to seamlessly support a variety of different services, such as broadband data, voice, and multicast video. Its design incorporates many of the key innovations of digital communication, such as MIMO (multiple input multiple output) and OFDMA (orthogonal frequency division multiple access), that mandate new skills to plan, build, and deploy an LTE network. In Fundamentals of LTE, four leading experts from academia and industry explain the technical foundations of LTE in a tutorial style—providing a comprehensive overview of the standards. Following the same approach that made their recent Fundamentals of WiMAX successful, the authors offer a complete framework for understanding and evaluating LTE. Topics include Cellular wireless history and evolution: Technical advances, market drivers, and foundational networking and communications technologies Multicarrier modulation theory and practice: OFDM system design, peak-to-average power ratios, and SC-FDE solutions Frequency Domain Multiple Access: OFDMA downlinks, SC-FDMA uplinks, resource allocation, and LTE-specific implementation Multiple antenna techniques and tradeoffs: spatial diversity, interference cancellation, spatial multiplexing, and multiuser/networked MIMO LTE standard overview: air interface protocol, channel structure, and physical layers Downlink and uplink transport channel processing: channel encoding, modulation mapping, Hybrid ARQ, multi-antenna processing, and more Physical/MAC layer procedures and scheduling: channel-aware scheduling,

closed/open-loop multi-antenna processing, and more Packet flow, radio resource, and mobility management: RLC, PDCP, RRM, and LTE radio access network mobility/handoff procedures

LTE Signaling Mar 17 2022 A comprehensive reference on the call procedures of 4G RAN and Core networks, LTE Signaling, Troubleshooting and Optimization describes the protocols and procedures of LTE. It explains essential topics from basic performance measurement counters, radio quality and user plane quality to the standards, architecture, objectives and functions of the different interfaces. The first section gives an overview of LTE/EPC network architecture, reference points, protocol stacks, information elements and elementary procedures. The proceeding parts target more advanced topics to cover LTE/EPC signalling and radio quality analysis. This book supplements the information provided in the 3GPP standards by giving readers access to a universal LTE/EPC protocol sequence to ensure they have a clear understanding of the issues involved. It describes the normal signaling procedures as well as explaining how to identify and troubleshoot abnormal network behavior and common failure causes. Enables the reader to understand the signaling procedures and parameters that need to be analyzed when monitoring UMTS networks Covers the essential facts on signaling procedures by providing first hand information taken from real LTE/EPC traces A useful reference on the topic, also providing sufficient details for test and measurement experts who need to analyze LTE/EPC signaling procedures and measurements at the most detailed level Contains a description of LTE air interface monitoring

scenarios as well as other key topics up to an advanced level LTE Signaling, Troubleshooting and Optimization is the Long Term Evolution successor to the previous Wiley books UMTS Signaling and UMTS Performance Measurement.

Mobility Management in LTE Heterogeneous Networks Nov 13 2021 This book is the first of its kind, compiling information on the Long-Term Evolution (LTE) standards, which are enhanced to address new mobility-related challenges in Heterogeneous Networks (HetNets). It identifies the related challenges and discusses solutions and the simulation methodology for modeling HetNet mobility – cutting-edge information that was previously accessible only in the form of 3GPP specifications and documents, and research papers. The book reviews the current LTE mobility framework and discusses some of the changes for enhancing mobility management in HetNets. It describes the measurement procedures, handover (HO) mechanisms and HO success/failure scenarios. HetNets are intended to provide very high spectral efficiency while ensuring seamless coverage by deploying low-power nodes within the umbrella macrocell network. While mobility management in homogeneous networks is well understood, LTE standards are being enhanced to address the HetNet-specific mobility management challenges emerging. The book addresses these aspects in a succinct and understandable form, offering a valuable resource for researchers and professionals working in the area of HetNet mobility and a ready reference guide for practicing engineers and researchers.

An Introduction to LTE Nov 25 2022 Following on from the successful first edition (March 2012), this book gives a clear

explanation of what LTE does and how it works. The content is expressed at a systems level, offering readers the opportunity to grasp the key factors that make LTE the hot topic amongst vendors and operators across the globe. The book assumes no more than a basic knowledge of mobile telecommunication systems, and the reader is not expected to have any previous knowledge of the complex mathematical operations that underpin LTE. This second edition introduces new material for the current state of the industry, such as the new features of LTE in Releases 11 and 12, notably coordinated multipoint transmission and proximity services; the main short- and long-term solutions for LTE voice calls, namely circuit switched fallback and the IP multimedia subsystem; and the evolution and current state of the LTE market. It also extends some of the material from the first edition, such as inter-operation with other technologies such as GSM, UMTS, wireless local area networks and cdma2000; additional features of LTE Advanced, notably heterogeneous networks and traffic offloading; data transport in the evolved packet core; coverage and capacity estimation for LTE; and a more rigorous treatment of modulation, demodulation and OFDMA. The author breaks down the system into logical blocks, by initially introducing the architecture of LTE, explaining the techniques used for radio transmission and reception and the overall operation of the system, and concluding with more specialized topics such as LTE voice calls and the later releases of the specifications. This methodical approach enables readers to move on to tackle the specifications and the more advanced texts with confidence.

LTE Optimization Engineering Handbook Jul 29 2020 A

comprehensive resource containing the operating principles and key insights of LTE networks performance optimization LTE Optimization Engineering Handbook is a comprehensive reference that describes the most current technologies and optimization principles for LTE networks. The text offers an introduction to the basics of LTE architecture, services and technologies and includes details on the key principles and methods of LTE optimization and its parameters. In addition, the author clarifies different optimization aspects such as wireless channel optimization, data optimization, CSFB, VoLTE, and video optimization. With the ubiquitous usage and increased development of mobile networks and smart devices, LTE is the 4G network that will be the only mainstream technology in the current mobile communication system and in the near future. Designed for use by researchers, engineers and operators working in the field of mobile communications and written by a noted engineer and experienced researcher, the LTE Optimization Engineering Handbook provides an essential guide that: Discusses the latest optimization engineering technologies of LTE networks and explores their implementation Features the latest and most industrially relevant applications, such as VoLTE and HetNets Includes a wealth of detailed scenarios and optimization real-world case studies Professionals in the field will find the LTE Optimization Engineering Handbook to be their go-to reference that includes a thorough and complete examination of LTE networks, their operating principles, and the most current information to performance optimization.

LTE and LTE Advanced Dec 26 2022 This book presents the technical characteristics of the two radio network interfaces of

mobile 4G, LTE and LTE Advanced, based on Release 8, 9 and 10 of the 3GPP specifications. Points covered include a detailed description of various components of the radio interface. RRC signaling messages used to establish the connection, enabling the security, the paging, the establishment and the release of dedicated and default support and the handover. The PDCP ensures the security of the transmission and allows the recovery during handover and the compression of the headers. The RLC protocol defines the transmission modes with or without acknowledgment. The MAC protocol determines the random access, the data transfer, the timing advance, the scheduling and the discontinuous reception. The physical layer includes a description of the methods of multiplexing (time, frequency and space) and the various signals and physical channels.

*Fundamentals of Network Planning and Optimisation
2G/3G/4G Jun 20 2022 Updated new edition covering all aspects of network planning and optimization This welcome new edition provides comprehensive coverage of all aspects of network planning in all the technologies, from 2G to 5G, in radio, transmission and core aspects. Written by leading experts in the field, it serves as a handbook for anyone engaged in the study, design, deployment and business of cellular networks. It increases basic understanding of the currently deployed, and emerging, technologies, and helps to make evolution plans for future networks. The book also provides an overview of the forthcoming technologies that are expected to make an impact in the future, such as 5G. Fundamentals of Cellular Network Planning and Optimization, Second Edition encompasses all the technologies as well as the planning and implementation details*

that go with them. It covers 2G (GSM, EGPRS), 3G (WCDMA) and 4G (LTE) networks and introduces 5G. The book also looks at all the sub-systems of the network, focusing on both the practical and theoretical issues. Provides comprehensive coverage of the planning aspects of the full range of today's mobile network systems, covering radio access network, circuit and packet switching, signaling, control, and backhaul/Core transmission networks New elements in book include HSPA, Ethernet, 4G/LTE and 5G Covers areas such as Virtualization, IoT, Artificial Intelligence, Spectrum Management and Cloud By bringing all these concepts under one cover, Fundamentals of Cellular Network Planning and Optimization becomes essential reading for network design engineers working with cellular service vendors or operators, experts/scientists working on end-to-end issues, and undergraduate/post-graduate students.

LTE and the Evolution to 4G Wireless Sep 23 2022 A practical guide to LTE design, test and measurement, this new edition has been updated to include the latest developments This book presents the latest details on LTE from a practical and technical perspective. Written by Agilent's measurement experts, it offers a valuable insight into LTE technology and its design and test challenges. Chapters cover the upper layer signaling and system architecture evolution (SAE). Basic concepts such as MIMO and SC-FDMA, the new uplink modulation scheme, are introduced and explained, and the authors look into the challenges of verifying the designs of the receivers, transmitters and protocols of LTE systems. The latest information on RF and signaling conformance testing is delivered by authors participating in the LTE 3GPP standards committees. This second edition has been

considerably revised to reflect the most recent developments of the technologies and standards. Particularly important updates include an increased focus on LTE-Advanced as well as the latest testing specifications. Fully updated to include the latest information on LTE 3GPP standards Chapters on conformance testing have been majorly revised and there is an increased focus on LTE-Advanced Includes new sections on testing challenges as well as over the air MIMO testing, protocol testing and the most up-to-date test capabilities of instruments Written from both a technical and practical point of view by leading experts in the field

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