

Introduction To 4g Le Communications

This book gives a broad look at both fundamental networking technology and new areas that support it and use it. It is a concise introduction to the most prominent, recent technological topics in computer networking. Topics include network technology such as wired and wireless networks, enabling technologies such as data centers, software defined networking, cloud and grid computing and applications such as networks on chips, space networking and network security. The accessible writing style and non-mathematical treatment makes this a useful book for the student, network and communications engineer, computer scientist and IT professional.

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

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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.

This timely book provides an overview of technologies for Public Safety Networks (PSNs). Including real-life examples of network application and services, it introduces readers to the many public safety network technologies and covers the historical developments as well as emerging trends in PSNs such as today's 4G and tomorrow's 5G cellular network related solutions. Public Safety Networks from LTE to 5G explores the gradual changes and transformation in the PSNs from the traditional approaches in communications, and examines the new technologies that have permeated this realm, as well as their advantages. It gives readers a look at the challenges public safety networks face by developing solutions for data rates such as introducing

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broadband data services into safer communication. Topics covered include: TETRA and TETRAPOL; Digital Mobile Radio (DMR), Next-Generation Digital Narrowband (NXDN), Digital Private Mobile Radio (dPMR); and Professional Digital Trunking (PDT). The book also presents information on FirstNet, ESN, and Safenet; Satellite Communications in EMS (Emergency Management) and Public Protection and Disaster Relief (PPDR); Wi-Fi in Ambulances; Technology in Patrol Communications; and more.

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

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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.

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.

The upcoming 5G specifications from 3GPP, to be available in 2018, will include LTE-Advanced Pro as well

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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

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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

According to the UN Conference on Trade and Development, Thailand has been among eight priority destinations for foreign investment since 2012. Factors weighing on growth in 2016 will include an ongoing economic slowdown, weakening global demand for Thai exports and growing levels of consumer debt. The government's investment promotion agenda, while perhaps more complicated than in previous years, also addresses the dual challenge of labour shortages and the middle-income trap through promotion of both labour-intensive and high-tech industries, while potential membership in two major trade blocs could see regional and international exports soar in the coming years. Although the near-term forecast is dampened by global volatility, weakening demand and the impact of China's slowdown, trade in Thailand will remain on an upwards trajectory in 2016, and investment, though unlikely to meet government targets, is nonetheless expected to bounce back from a challenging 2015.

This book is a timely document of state-of-the art analytical techniques in the domain of stream cipher design and analysis with a specific cipher, named ZUC. It links new research to brief contextual literature review in the domain of complex LFSR-based stream ciphers. A snapshot of how stream ciphers are deployed in the mobile telephony architecture, one of the most well-known topics for more than five decades in the domain of

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computer and communication sciences, is presented in this book. The book provides an in-depth study on design and cryptanalysis of ZUC as well as relevant research results in this field with directions towards future analysis of this cipher.

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

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technical and practical point of view by leading experts in the field

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

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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

Why is high performance indoor wireless service needed, and how is it best implemented? As the challenge of providing better service and higher data speeds and quality for mobile applications intensifies, ensuring adequate in-building and tunnel coverage and capacity is increasingly important. A unique, single-source reference on the theoretical and practical knowledge behind indoor and tunnel radio planning, this book provides a detailed overview of mobile networks systems, coverage and capacity solutions with 2G, 3G and 4G cellular system technologies as a backdrop.

This timely book provides broad coverage of security and privacy issues in the macro and micro perspective. In macroperspective, the system and algorithm fundamentals of next-generation wireless networks are discussed. In micro-perspective, this book focuses on the key secure and privacy techniques in different emerging networks from the interconnection view of human and cyber-physical world. This book includes 7 chapters from prominent international researchers

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working in this subject area. This book serves as a useful reference for researchers, graduate students, and practitioners seeking solutions to wireless security and privacy related issues. Recent advances in wireless communication technologies have enabled the large-scale deployment of next-generation wireless networks, and many other wireless applications are emerging. The next generation of mobile networks continues to transform the way people communicate and access information. As a matter of fact, next-generation emerging networks are exploiting their numerous applications in both military and civil fields. For most applications, it is important to guarantee high security of the deployed network in order to defend against attacks from adversaries, as well as the privacy intrusion. The key target in the development of next-generation wireless networks is to promote the integration of the human, cyber, and physical worlds. Previous work in Cyber Physical Systems (CPS) considered the connection between the cyber world and the physical world. In the recent studies, human involvement brings new channels and initiatives in this interconnection. In this integration process, security and privacy are critical issues to many wireless network applications, and it is a paramount concern for the growth of next-generation wireless networks. This is due to the open nature of wireless communication and the involvement of humans. New opportunities for tackling these security and privacy issues in next-generation wireless networks will be achieved by leveraging the properties of interaction among human, computers and things.

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This second edition introduces new material for the current state of the industry, such as 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. --

Anyone who has ever shopped for a new smart phone, laptop, or other tech gadget knows that staying connected is crucial. There is a lot of discussion over which service provider offers the best coverage—enabling devices to work anywhere and at any time—with 4G and LTE becoming a pervasive part of our everyday language. The Handbook of Research on Next Generation Mobile Communication Systems offers solutions for optimal connection of mobile devices. From satellite signals to cloud technologies, this handbook focuses on the ways communication is being revolutionized, providing a crucial reference source for consumers, researchers, and business professionals who want to be on the frontline of the next big development in wireless technologies. This publication

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features a wide variety of research-based articles that discuss the future of topics such as bandwidth, energy-efficient power, device-to-device communication, network security and privacy, predictions for 5G communication systems, spectrum sharing and connectivity, and many other relevant issues that will influence our everyday use of technology.

Long Term Evolution (LTE) was originally an internal 3GPP name for a program to enhance the capabilities of 3G radio access networks. The nickname has now evolved to become synonymous with 4G. This book concentrates on 4G systems, also known as LTE-Advanced. Telecommunications engineers and students are provided with a history of these systems, along with an overview of a mobile telecommunications system. The overview addresses the components in the system as well as their function. This resource guides telecommunications engineers through many important aspects of 4G including the air interface physical layer, Radio Access Networks, and 3GPP standardization, to name a few.

This book introduces the technical foundations and tools for estimating the power consumption of internet networks and services, including a detailed description of how these models are constructed and applied. Modeling the Power Consumption and Energy Efficiency of Telecommunications Networks can be used to gain insight into the construction of mathematical models that provide realistic estimates of the power consumption of internet networks and services. This knowledge enables forecasting the energy footprint of future networks and services to integrate sustainability and environmental considerations into network planning and design. FEATURES Provides the motivation for developing mathematical models for telecommunications network and

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service power consumption and energy efficiency modeling Presents factors impacting overall network and service power consumption Discusses the types of network equipment and their power consumption profiles Reviews the basics of power modeling, including network segmentation, traffic forecasting, top-down and bottom-up models, wired and wireless networks, data centers and servers Explores the application of energy efficiency metrics for equipment, networks, and services This book is aimed at students and technologists as well as technology managers and policy makers. This book will be of value to any organization that wishes to estimate the energy footprint of the use of information and communications technologies. This book can also be integrated into a course on the sustainability of information and communications technologies.

This volume of Advances in Intelligent and Soft Computing contains accepted papers presented at SOCO 2013, CISIS 2013 and ICEUTE 2013, all conferences held in the beautiful and historic city of Salamanca (Spain), in September 2013. Soft computing represents a collection or set of computational techniques in machine learning, computer science and some engineering disciplines, which investigate, simulate, and analyze very complex issues and phenomena. After a through peer-review process, the 8th SOCO 2013 International Program Committee selected 40 papers which are published in these conference proceedings, and represents an acceptance rate of 41%. In this relevant edition a special emphasis was put on the organization of special sessions. Four special sessions were organized related to relevant topics as: Systems, Man, and Cybernetics, Data Mining for Industrial and Environmental Applications, Soft Computing Methods in Bioinformatics, and Soft Computing Methods, Modelling and Simulation in Electrical Engineer. The aim of the 6th CISIS 2013 conference is to offer a

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meeting opportunity for academic and industry-related researchers belonging to the various, vast communities of Computational Intelligence, Information Security, and Data Mining. The need for intelligent, flexible behaviour by large, complex systems, especially in mission-critical domains, is intended to be the catalyst and the aggregation stimulus for the overall event. After a thorough peer-review process, the CISIS 2013 International Program Committee selected 23 papers which are published in these conference proceedings achieving an acceptance rate of 39%. In the case of 4th ICEUTE 2013, the International Program Committee selected 11 papers which are published in these conference proceedings. The selection of papers was extremely rigorous in order to maintain the high quality of the conference and we would like to thank the members of the Program Committees for their hard work in the reviewing process. This is a crucial process to the creation of a high standard conference and the SOCO, CISIS and ICEUTE conferences would not exist without their help.

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

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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 Vocoders 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

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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.

This book constitutes the refereed post-conference proceedings of the Fourth International Conference on Future Access Enablers for Ubiquitous and Intelligent Infrastructures, FABULOUS 2019, held in Sofia, Bulgaria, in March 2019. This year's conference topic covers Globalization through Advanced Digital Technologies – as the digitalization in all spheres of life has an impressive influence on communication and daily life in general. The 39 revised full papers were carefully reviewed and selected from 54 submissions. The main topics deal with: healthcare/wellness applications; IoT and sensor networks; IoT security in the digital transformation era; wireless communications and networks; virtual engineering and simulations.

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

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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

This revised edition of Communication Systems from GSM to LTE: An Introduction to Mobile Networks and Mobile Broadband Second Edition (Wiley 2010) contains not only a technical description of the different wireless systems available today, but also explains the rationale behind the different mechanisms and implementations; not only the 'how' but also the 'why'. In this way, the advantages and also limitations of each technology become apparent. Offering a solid introduction to major global wireless standards and comparisons of the different wireless technologies and their applications, this edition has been updated to provide the latest directions and activities in 3GPP standardization up to Release 12, and importantly includes a new chapter on Voice over LTE (VoLTE). There are new sections on Building Blocks of a Voice Centric Device, Building Blocks of a Smart Phone, Fast Dormancy, IMS and High-Speed Downlink Packet Access, and Wi-Fi-Protected

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Setup. Other sections have been considerably updated in places reflecting the current state of the technology. • Describes the different systems based on the standards, their practical implementation and design assumptions, and the performance and capacity of each system in practice is analyzed and explained • Questions at the end of each chapter and answers on the accompanying website make this book ideal for self-study or as course material

"This 10-volume compilation of authoritative, research-based articles contributed by thousands of researchers and experts from all over the world emphasized modern issues and the presentation of potential opportunities, prospective solutions, and future directions in the field of information science and technology"--Provided by publisher.

An Introduction to 5G Wireless Networks book is for students, engineers, managers and for marketing/sales executives, to develop a good understanding of the 5G technology. This book covers the 5G architecture, 5G New Radio (NR), 5G Next Generation Core (NG-Core), Network Slicing, Virtualization of 5G Components, Multi-access Edge Computing (MEC) and the various 5G use cases. This book provides details on the evolution of the wireless networks from 1G to 5G, status of 5G deployments and the 5G marketplace (standard bodies, open source communities and vendors). After reading this book, you will be able to have discussions with customers, interviewers and other stakeholders on the 5G concepts, ecosystem and use-cases.

The Next Generation: Wireless Communications for Multimedia and Beyond From both a technical and a practical point of view, there is much to examine,

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evaluate and understand in the new 3GPP LTE cellular technology before its projected deployment in 2010. This book, written by Agilent engineers in collaboration with Anite engineers and LTE expert Dr K. F. Tsang, offers valuable insight into the LTE air interface at the physical layer. Chapters also cover the upper layer signalling 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 dig into the challenges of verifying the designs of the receivers, transmitters and protocols of LTE systems. The latest information on RF and signalling conformance testing is delivered by authors participating in the 3GPP standards committees. This book discusses antenna designs for handheld devices as well as base stations. The book serves as a reference and a handy guide for graduate students and PhD students involved in the field of millimeter wave antenna design. It also gives insights to designers and practicing engineers who are actively engaged in design of antennas for future 5G devices. It offers an in-depth study, performance analysis and extensive characterization of novel antennas for 5G applications. The reader will learn about basic design methodology and techniques to develop antennas for 5G applications including concepts of path loss compensation, co-design of commercial 4G antennas with millimeter wave 5G antennas and antennas used in phase array and pattern diversity modules. Practical examples included in the book will help readers to build high performance antennas for 5G subsystems/systems using low cost

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technology. Key Features Provides simple design methodology of different antennas for handheld devices as well as base stations for 5G applications. Concept of path loss compensation introduced. Co-design of commercial 4G antennas with millimetre wave 5G antennas presented. Comparison of phased array versus pattern diversity modules discussed in detail. Fabrication and Measurement challenges at mmWaves and Research Avenues in antenna designs for 5G and beyond presented. Shibani Kishen Koul is an emeritus professor at the Centre for Applied Research in Electronics at the Indian Institute of Technology Delhi. He served as the chairman of Astra Microwave Products Limited, Hyderabad from 2009-2018. He is a Life Fellow of the Institution of Electrical and Electronics Engineering (IEEE), USA, a Fellow of the Indian National Academy of Engineering (INAE), and a Fellow of the Institution of Electronics and Telecommunication Engineers (IETE). Karthikeya G S worked as an assistant professor in Visvesvaraya technological university from 2013 to 2016 and completed his PhD from the Centre for Applied Research in Electronics at the Indian Institute of Technology Delhi in Dec.2019. He is a member of IEEE-Antenna Propagation Society and Antenna Test and Measurement society.

Kuwait accounts for approximately 6.1% of the world's proven oil reserves, with hydrocarbons revenues comprising more than 65% of the country's GDP and 95% of total exports in 2013. Cautious budgetary decisions have resulted in large surpluses, creating a solid base for public expenditure programmes such as

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the National Development Plan, which is set to diversify the economy and boost employment. Although tapering the US Federal Reserve's quantitative easing programme is likely to affect global liquidity and play a key part in growth prospects for 2014/15, the GCC economy is still forecast to expand by 4.1% for the year, and in Kuwait, where a handful of new PPP plans and deals are slated for 2014, there are promising signs that the year could be a landmark for economic growth and expansion.

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

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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

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

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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.

As telecommunications operators and network engineers understand, specific operational requirements drive early network architectural and design decisions for 4G networks. But they also know that because technology, standards, usage practices, and regulatory regimes change on a continuous basis, so do best practices. 4G: Deployment Strategies and Operational Implications

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helps you stay up to date by providing the latest innovative and strategic thinking on 4G and LTE deployments. It evaluates specific design and deployment options in depth and offers roadmap evolution strategies for LTE network business development. Fortunately, as you'll discover in this book, LTE is a robust and flexible standard for 4G communications. Operators developing 4G deployment strategies have many options, but they must consider the tradeoffs among them in order to maximize the return on investment for LTE networks. This book will show operators how to develop detailed but flexible deployment road maps incorporating business requirements while allowing the agility that expected and unexpected network evolution require. Such road maps help you avoid costly redeployment while leveraging profitable traffic. Telecommunications experts and authors Trichy Venkataraman Krishnamurthy and Rajaneesh Shetty examine various architectural options provided by the flexibility of LTE and their effect on the general current and future capability of the designed network. They examine specific features of the network, while covering specific architectural deployment strategies through example and then assessing their implications on both near- and long-term operations as well as potential evolutionary paths. Besides helping you understand and communicate network upgrade and architectural

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evolution road maps (with options), you will learn:

- How to plan for accessibility, retainability, integrity, availability, and mobility
- How to balance loads effectively
- How to manage the constraints arising from regulation and standardization
- How to manage the many disruptive factors affecting LTE networks

4G: Deployment Strategies and Operational Implications also outlines specific network strategies, which network features and deployment strategies support those strategies, and the trade-offs in business models depending on the strategies chosen. Best of all you will learn a process for proactive management of network road map evolution, ensuring that your network—and your skills—remain robust and relevant as the telecommunications landscape changes.

Summarizes and surveys current LTE technical specifications and implementation options for engineers and newly qualified support staff

Concentrating on three mobile communication technologies, GSM, 3G-WCDMA, and LTE—while majorly focusing on Radio Access Network (RAN) technology—this book describes principles of mobile radio technologies that are used in mobile phones and service providers' infrastructure supporting their operation. It introduces some basic concepts of mobile network engineering used in design and rollout of the mobile network. It then follows up with principles, design constraints, and more advanced

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insights into radio interface protocol stack, operation, and dimensioning for three major mobile network technologies: Global System Mobile (GSM) and third (3G) and fourth generation (4G) mobile technologies. The concluding sections of the book are concerned with further developments toward next generation of mobile network (5G). Those include some of the major features of 5G such as a New Radio, NG-RAN distributed architecture, and network slicing. The last section describes some key concepts that may bring significant enhancements in future technology and services experienced by customers. Introduction to Mobile Network Engineering: GSM, 3G-WCDMA, LTE and the Road to 5G covers the types of Mobile Network by Multiple Access Scheme; the cellular system; radio propagation; mobile radio channel; radio network planning; EGPRS - GPRS/EDGE; Third Generation Network (3G), UMTS; High Speed Packet data access (HSPA); 4G-Long Term Evolution (LTE) system; LTE-A; and Release 15 for 5G. Focuses on Radio Access Network technologies which empower communications in current and emerging mobile network systems Presents a mix of introductory and advanced reading, with a generalist view on current mobile network technologies Written at a level that enables readers to understand principles of radio network deployment and operation Based on the author's post-graduate lecture course on Wireless Engineering Fully illustrated with tables,

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figures, photographs, working examples with problems and solutions, and section summaries highlighting the key features of each technology described. Written as a modified and expanded set of lectures on wireless engineering taught by the author, *Introduction to Mobile Network Engineering: GSM, 3G-WCDMA, LTE and the Road to 5G* is an ideal text for post-graduate and graduate students studying wireless engineering, and industry professionals requiring an introduction or refresher to existing technologies.

Today, many businesses and corporations are moving their on premises IT Infrastructure to the Cloud. There are numerous advantages to do doing so, including on-demand service, scalability, and fixed pricing. As a result, the Cloud has become a popular target of cyber-based attacks. Although an ISP is often charged with keeping virtual infrastructure secure, it is not safe to assume this. Back-up measures must be taken. This book explains how to guard against cyber-attacks by adding another layer of protection to the most valuable data in the Cloud: customer information and trade secrets.

This book highlights the latest advances in the field of artificial intelligence and related technologies, with a special focus on sustainable development and environmentally friendly artificial intelligence applications. Discussing theory, applications and

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research, it covers all aspects of artificial intelligence in the context of sustainable development.

A revised edition of the text that offers a comparative introduction to global wireless standards,

technologies, and their applications The revised and updated fourth edition of From GSM to LTE-

Advanced Pro and 5G: An Introduction to Mobile Networks and Mobile Broadband offers an

authoritative guide to the technical descriptions of the various wireless technologies currently in use.

The author—a noted expert on the topic—explains the rationale behind their differing mechanisms and

implementations while exploring the advantages and limitations of each technology. The fourth edition

reflects the significant changes in mobile network technology that have taken place since the third

edition was published. The text offers a new chapter on 5G NR that explores its non-standalone and

standalone architecture. In the Wi-Fi chapter, additional sections focus on the new WPA3

authentication protocol, the new 802.11ax air interface and protocol extensions like 802.11k and

11v for meshed networks. This important book: Presents the various systems based on the

standards, their practical implementation and design assumptions, and their performance and capacity

Provides an in-depth analysis of each system in practice Offers an updated edition of the most

current changes to mobile network technology

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Includes questions at the end of each chapter and answers on the accompanying website that make this book ideal for self-study or as course material. Written for students and professionals of wireless technologies, the revised fourth edition of From GSM to LTE-Advanced Pro and 5G provides an in-depth review and description of the most current mobile networks and broadband.

Understand the new technologies of the LTE standard and their impact on system performance improvements with this practical guide.

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