

An Introduction To Lte Lte Lte Advanced Sae And 4g Mobile Communications

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MILA RAMOS

LTE and LTE Advanced John Wiley & Sons

An introduction to technical details related to the Physical Layer of the LTE standard with MATLAB® The LTE (Long Term Evolution) and LTE-Advanced are among the latest mobile communications standards, designed to realize the dream of a truly global, fast, all-IP-based, secure broadband mobile access technology. This book examines the Physical Layer (PHY) of the LTE standards by incorporating three conceptual elements: an overview of the theory behind key enabling technologies; a concise discussion regarding standard specifications; and the MATLAB® algorithms needed to simulate the standard. The use of MATLAB®, a widely used technical computing language, is one of the distinguishing features of this book. Through a series of MATLAB® programs, the author explores each of the enabling technologies, pedagogically synthesizes an LTE PHY system model, and evaluates system performance at each stage.

Following this step-by-step process, readers will achieve deeper understanding of LTE concepts and specifications through simulations. Key Features: • Accessible, intuitive, and progressive; one of the few books to focus primarily on the modeling, simulation, and implementation of the LTE PHY standard • Includes case studies and testbenches in MATLAB®, which build knowledge gradually and incrementally until a functional specification for the LTE PHY is attained •

Accompanying Web site includes all MATLAB® programs, together with PowerPoint slides and other illustrative examples Dr Houman Zarrinkoub has served as a development manager and now as a senior product manager with MathWorks, based in Massachusetts, USA. Within his 12 years at MathWorks, he has been responsible for multiple signal processing and communications software tools. Prior to MathWorks, he was a research scientist in the Wireless Group at Nortel Networks, where he contributed to multiple standardization projects for 3G mobile technologies. He has been awarded multiple patents on topics related to computer simulations. He holds a BSc degree in Electrical Engineering from McGill University and MSc and PhD degrees in Telecommunications from the Institut Nationale de la Recherche Scientifique, in Canada. www.wiley.com/go/zarrinkoub *Practical Guide to LTE-A, VoLTE and IoT* John Wiley & Sons

This practical hands-on new resource presents LTE technologies from end-to-end, including network planning and the optimization tradeoff process. This book examines the features of LTE-Advanced and LTE-Advanced Pro and how they integrate into existing LTE networks. Professionals find in-depth coverage of how the air interface is structured at the physical layer and how the related link level protocols are designed and work. This resource highlights potential 5G solutions as considered in releases 14 and beyond, the migration paths, and the challenges involved with the latest updates and standardization process. Moreover, the book covers performance analysis and results, as well as SON specifications and realization. Readers learn about OFDMA, and how DFT is used to implement it. Link budgeting, parameter estimations, and network planning and sizing is explained. Insight into core network architecture is provided, including the protocols and signaling used for both data and voice services. The book also presents a detailed chapter on the end-to-end data transfer optimization mechanisms based on the TCP protocol. This book provides the tools needed for network planning and optimization while addressing the challenges of LTE and LTE-advanced networks.

From GSM to LTE-Advanced John Wiley & Sons

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

4G: LTE/LTE-Advanced for Mobile Broadband John Wiley & Sons

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

LTE-Advanced Air Interface Technology John Wiley & Sons

The aim of the book is to educate government agencies, operators, vendors and other regulatory institutions how LTE can be deployed to serve public safety market and offer regulatory / public safety features. It is written in such a way that it can be understood by both technical and non-technical personnel with just introductory knowledge in wireless communication. Some sections and chapters about public safety services offered by LTE network are intended to be understood by anyone with no knowledge in wireless communication.

An Introduction to LTE LTE, LTE-advanced, SAE, VoLTE and 4G Mobile Communications Artech House

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.

Essentials of LTE and LTE-A John Wiley & Sons

A comprehensive and approachable introduction to 5G Written by a noted expert on the subject, An Introduction to 5G: The New Radio, 5G Network and Beyond offers an introductory system-level guide to 5G. The material covered includes: The use cases and requirements of the 5G system The architecture of the next generation radio access network and the 5G core The principles of radio transmission, millimetre waves and MIMO antennas The architecture and detailed design of the 5G new radio The implementation of HTTP/2 on the service-based interfaces of the 5G core The signalling procedures that govern the end-to-end-operation of the system The new features that are introduced in Releases 16 and 17 An Introduction to 5G is written for engineering professionals in mobile telecommunications, for those in non-technical roles such as management, marketing and intellectual property, and for students. It requires no more than a basic understanding of mobile communications, and includes detailed references to the underlying 3GPP specifications for 5G. The book's approach provides a comprehensive, end-to-end overview of the 5G standard,

which enables readers to move on with confidence to the more specialized texts and to the specifications themselves.

From GSM to LTE-Advanced Pro and 5G John Wiley & Sons

A comprehensive summary of theoretical and practical developments in LTE Heterogeneous Networks The last decade has witnessed the proliferation of mobile broadband data and the trend is likely to increase in the coming years. Current cellular networks are ill equipped to deal with this surge in demand. To satisfy user demand and maximize profits, a new paradigm to operate networks is needed. Heterogeneous networks, that deploy an overlay of small cells with limited coverage and transmit power, over a macro coverage area is the solution by providing capacity and coverage where it is needed. This book presents a comprehensive overview of small cell based heterogeneous networks within the framework of 3GPP LTE-Advanced which is the major enabler of current and future heterogeneous networks. The book first establishes the basics of LTE standards 8 -10. Wherever relevant, the underlying theory of wireless communications is explained and the signaling and protocol aspects of LTE Releases 8-10 are presented. Next the book presents a systematic study of the inter cell interference (eICIC and FeICIC) mechanisms that have been standardized in LTE releases 10 and 11 to mitigate the interference arising in heterogeneous networks. From simple blank subframe design and implementation, the book discusses more advanced transceiver signal processing and carrier aggregation (CA) based mechanisms to improve performance. Besides data, control channel enhancements such as enhanced PDCCH (ePDCCH) are also discussed. Subsequently the book discusses the possibility of base stations being allowed to coordinate to manage interference. This technique, called CoMP, has the potential of vastly improving network performance. However several practical challenges first have to be overcome before this potential can be realized. The book presents the different CoMP categories introduced in LTE release 11, the required signal processing and the changes that were introduced in Release-11 for supporting CoMP. The book then presents the state of the art developments in heterogeneous networks that are currently taking place in 3GPP with the initiation of Release 12. A whole array of new technologies have been introduced such as dynamic switching of small cells, new carrier types with reduced control signaling, dynamic reconfiguration of TDD-LTE, joint configuration of TDD and FDD via carrier aggregation and lastly advanced MIMO signal processing with three dimensional beamforming. All these technologies will work in unison leading to efficient operations of small cells. The authors thus comprehensively summarize the advances in heterogeneous networks over the last couple of years as reflected in various LTE releases and then look ahead at what to expect in the future. Fully illustrated throughout and with an accompanying website including Matlab code for simulating heterogeneous networks, LTE channel models, and References to 3GPP specifications, contributions, and updates on recent standardization activities. The authors, being involved in LTE standardization, are well placed to give an excellent view on this topic, including valuable background and design rationale. A comprehensive summary of wireless communications theory and practical developments in LTE heterogeneous networks. Authors are experts in this field and are active members in standardization proceedings, enabling up-to-date coverage of current developments Multiple case studies explain network design optimization of various heterogeneous network deployments. Accompanying website includes Matlab code for simulating heterogeneous networks, LTE channel models, and References to 3GPP specifications, contributions, and updates on recent standardization activities Essential reading for Engineers and practitioners in wireless industry.

Voice over LTE John Wiley & Sons

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 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
LTE-Advanced John Wiley & Sons

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.

The LTE-Advanced Deployment Handbook John Wiley & Sons

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 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.

Long Term Evolution John Wiley & Sons

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.

An Introduction to LTE Cambridge University Press

This practical, one-stop guide will quickly bring you up to speed on LTE and LTE-Advanced. With

everything you need to know about the theory and technology behind the standards, this is a must-have for engineers and managers in the wireless industry. • First book of its kind describing technologies and system performance of LTE-A • Covers the evolution of digital wireless technology, basics of LTE and LTE-A, design of downlink and uplink channels, multi-antenna techniques and heterogeneous networks • Analyzes performance benefits over competing technologies, including WiMAX and 802.16m • Reflects the latest LTE Release-10 standards • Includes numerous examples, including extensive system and link results • Unique approach is accessible to technical and non-technical readers alike
LTE Self-Organising Networks (SON) Cambridge University Press

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.

LTE - The UMTS Long Term Evolution Artech House

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 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, 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.

LTE and the Evolution to 4G Wireless John Wiley & Sons

"Where this book is exceptional is that the reader will not just learn how LTE works but why it works" Adrian Scrase, ETSI Vice-President, International Partnership Projects Following on the success of the first edition, this book is fully updated, covering the latest additions to LTE and the key features of LTE-Advanced. This book builds on the success of its predecessor, offering the same comprehensive system-level understanding built on explanations of the underlying theory, now expanded to include complete coverage of Release 9 and the developing specifications for LTE-Advanced. The book is a collaborative effort of more than 40 key experts representing over 20 companies actively participating in the development of LTE, as well as academia. The book highlights practical implications, illustrates the expected performance, and draws comparisons

with the well-known WCDMA/HSPA standards. The authors not only pay special attention to the physical layer, giving an insight into the fundamental concepts of OFDMA-FDMA and MIMO, but also cover the higher protocol layers and system architecture to enable the reader to gain an overall understanding of the system. Key New Features: Comprehensively updated with the latest changes of the LTE Release 8 specifications, including improved coverage of Radio Resource Management RF aspects and performance requirements Provides detailed coverage of the new LTE Release 9 features, including: eMBMS, dual-layer beamforming, user equipment positioning, home eNodeBs / femtocells and pico cells and self-optimizing networks Evaluates the LTE system performance Introduces LTE-Advanced, explaining its context and motivation, as well as the key new features including: carrier aggregation, relaying, high-order MIMO, and Cooperative Multi-Point transmission (CoMP). Includes an accompanying website containing a complete list of acronyms related to LTE and LTE-Advanced, with a brief description of each (http://www.wiley.com/go/sesia_theumts) This book is an invaluable reference for all research and development engineers involved in implementation of LTE or LTE-Advanced, as well as graduate and PhD students in wireless communications. Network operators, service providers and R&D managers will also find this book insightful.

The LTE / SAE Deployment Handbook John Wiley & Sons

Written by experts actively involved in the 3GPP standards and product development, LTE for UMTS, Second Edition gives a complete and up-to-date overview of Long Term Evolution (LTE) in a systematic and clear manner. Building upon on the success of the first edition, LTE for UMTS, Second Edition has been revised to now contain improved coverage of the Release 8 LTE details, including field performance results, transport network, self optimized networks and also covering the enhancements done in 3GPP Release 9. This new edition also provides an outlook to Release 10, including the overview of Release 10 LTE-Advanced technology components which enable reaching data rates beyond 1 Gbps. Key updates for the second edition of LTE for UMTS are focused on the new topics from Release 9 & 10, and include: LTE-Advanced; Self optimized networks (SON); Transport network dimensioning; Measurement results.

LTE for UMTS John Wiley & Sons

A comparative introduction to major global wireless standards, technologies and their applications From GSM to LTE-Advanced Pro and 5G: An Introduction to Mobile Networks and Mobile Broadband, 3rd Edition provides technical descriptions of the various wireless technologies currently in use. It explains the rationales behind their differing mechanisms and implementations while exploring the advantages and limitations of each technology. This edition has been fully updated and substantially expanded to reflect the significant evolution in mobile network technology occurring over the past several years. The chapter on LTE has been extensively enhanced with new coverage of current implementations of LTE carrier aggregation, mobility management, cell reselection and handover procedures, as well as the latest developments in 5G radio and core networks in 3GPP. It now features additional information on the TD-LTE air interface, IPv6 in mobile networks, Network Function Virtualization (NFV) and Narrowband Internet of Things (NB-IOT). Voice-over-LTE (VoLTE) is now treated extensively in a separate chapter featuring coverage of the VoLTE call establishment process, dedicated bearer setup, header compression, speech codec and bandwidth negotiation, supplementary service configuration and VoLTE emergency calls. In addition, extensive coverage of Voice-over-Wifi and mission critical communication for public safety organizations over LTE has been added. The WLAN chapter now provides coverage of WPA2-Professional with certificates for authentication in large deployments, such as the global Eduroam network and the new WLAN 60 GHz air interface. Bluetooth evolution has been addressed by including a detailed description of Bluetooth Low Energy (BLE) in the chapter devoted to Bluetooth. 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.

From LTE to LTE-Advanced Pro and 5G John Wiley & Sons

Describing the essential aspects that need to be considered during the deployment and operational phases of 3GPP LTE/SAE networks, this book gives a complete picture of LTE systems, as well as providing many examples from operational networks. It demystifies the structure, functioning, planning and measurements of both the radio and core aspects of the evolved 3G system. The content includes an overview of the LTE/SAE environment, architectural and functional descriptions of the radio and core network, functionality of the LTE applications, international

roaming principles, security solutions and network measurement methods. In addition, this book gives essential guidelines and recommendations about the transition from earlier mobile communications systems towards the LTE/SAE era and the next generation of LTE, LTE-Advanced. The book is especially suitable for the operators that face new challenges in the planning and deployment phases of LTE/SAE, and is also useful for network vendors, service providers, telecommunications consultancy companies and technical institutes as it provides practical information about the realities of the system. Presents the complete end-to-end planning and measurement guidelines for the realistic deployment of networks Explains the essential and realistic aspects of commercial LTE systems as well as the future possibilities An essential tool during the development of transition strategies from other network solutions towards LTE/SAE Contains real-world case studies and examples to help readers understand the practical side of the

system

From GSM to LTE-Advanced Pro and 5G CRC Press

A new edition of Wiley's Communication Systems for the Mobile Information Society, from the same author Wireless systems such as GSM, UMTS, LTE, WiMAX, Wi-Fi and Bluetooth offer possibilities to keep people connected while on the move. In this flood of technology, From GSM to LTE: An Introduction to Mobile Networks and Mobile Broadband enables readers to examine and understand each technology, and how to utilise several different systems for the best results. This book 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' is focused on. Thus 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 new edition has been updated to provide the latest directions and activities in 3GPP standardization reaching up to Release 10, and importantly includes a new chapter on LTE. The new LTE chapter covers aspects such as Mobility Management and Power Optimization, Voice over LTE, and Air Interface and Radio Network. Provides readers with an introduction to major global wireless standards and compares the different wireless technologies and their applications The performance and capacity of each system in practice is analyzed and explained, accompanied with practical tips on how to discover the functionality of different networks Offers approximately 25% new material, which includes a major new chapter on LTE and updates to the existing material including Release 4 BICN in relation to GSM Questions at the end of each chapter and answers on the accompanying website (<http://www.wirelessmoves.com>) make this book ideal for self study or as course material