

Epc And 4g Packet Networks Second Edition

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DENNIS RIVAS

LTE for 4G Mobile Broadband Academic Press

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. *em style="mso-bidi-font-style: normal;"*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 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.

Mobile Network Forensics: Emerging Research and Opportunities John Wiley & Sons

LTE (long-term evolution) mobile communication system is offering high bitrates in IP communications. Fourth Generation Mobile Communications/LTE describes various aspects of LTE as well as the change of paradigm, which it is bringing to mobile communications. The book is a vital resource for the entire mobile communication community. Coverage includes: LTE standards and architecture, Radio access sub-system, Signaling on the radio path, Macrocells, microcells, femtocells, SIM card and security, SIM card description, GPS driven applications, The Apple model, and much more more.

LTE Signaling John Wiley & Sons

Future mobile access networks will require upgraded telecommunications networks; 3G LTE/ SAE is the next step, allowing data rates above 100 Mbps. Telecommunications engineers will need to understand the new SAE/ EPC architecture and its tendency towards automatic configuration, but the complexity, length and dryness of the standards documents make it difficult for them to find the information they need and work out how to apply it to their daily product and network development. This book - a new edition of SAE and the Evolved Packet Core - provides clear, concise and comprehensive coverage of the entire

SAE/ EPC architecture, explaining concepts and standards and how they are used in commercial service settings. More than just a précis of the standards, it gives real insight into their development and the real-world scenarios in which they have been used since the publication of the first edition. This second edition places more emphasis on key aspects such as mobile systems and protocols (Diameter, GTP, S1-AP), and includes new coverage of femtocells, SIPTO, LIPA, LTE relay and LTE Advanced. Up-to-date coverage of SAE including the latest standards development Easily accessible overview of the architecture and concepts defined by SAE Thorough description of the Evolved Packet Core for LTE, fixed and other wireless accesses Comprehensive explanation of SAE key concepts, security and Quality-of-Service Covers potential service and operator scenarios including interworking with existing 3GPP and 3GPP2 systems Detailed walkthrough of network entities, protocols and procedures Written by established experts in the SAE standardization process, all of whom have extensive experience and understanding of its goals, history and vision **Evolution to 5G** EPC and 4G Packet NetworksDriving the Mobile Broadband Revolution

This book explains the evolutions of architecture for mobiles andsummarizes the different technologies: - 2G: the GSM (Global System for Mobile) network, the GPRS(General Packet Radio Service) network and the EDGE (Enhanced Datafor Global Evolution) evolution; - 3G: the UMTS (Universal Mobile Telecommunications System)network and the HSPA (High Speed Packet Access) evolutions: - HSDPA (High Speed Downlink Packet Access), - HSUPA (High Speed Uplink Packet Access), - HSPA+; - 4G: the EPS (Evolved Packet System) network. The telephone service and data transmission are the two mainservices provided by these networks. The evolutions arefundamentally dictated by the increase in the rate of datatransmission across the radio interface between the network andmobiles. This book is intended as a readily understandable support to helpstudents and professionals wishing to quickly acquire the mainconcepts of networks for mobiles understand the technologiesdeployed.

LTE-Advanced Academic Press

This book provides a clear, concise, complete and authoritative introduction to System Architecture Evolution (SAE) standardization work and its main outcome: the Evolved Packet Core (EPC), including potential services and operational scenarios. After providing an insightful overview of SAE's historical development, the book gives detailed explanations of the EPC architecture and key concepts as an introduction. In-depth technical descriptions of EPC follow, including thorough functional accounts of the different components of EPC, protocols, network entities and procedures. Case studies of deployment scenarios show how the functions described within EPC are placed within a

live network context, while a description of the services that are predicted to be used shows what EPC as a core network can enable. This book is an essential resource for professionals and students who need to understand the latest developments in SAE and EPC, the 'engine' that connects broadband access to the internet. All of the authors have from their positions with Ericsson been actively involved in GPRS, SAE and 3GPP from a business and technical perspective for many years. Several of the authors have also been actively driving the standardization efforts within 3GPP. "There is no doubt that this book, which appears just when the mobile industry starts its transition away from legacy GSM/GPRS and UMTS networks into the future will become the reference work on SAE/LTE. There are no better qualified persons than the authors of this book to provide both communication professionals and an interested general public with insights into the inner workings of SAE/LTE. Not only are they associated with one of the largest mobile network equipment vendors in the world, they have all actively contributed to and, in some cases, been the driving forces behind the development of SAE/LTE within 3GPP." - from the foreword by Dr. Ulf Nilsson, TeliaSonera R&D, Mobility Core and Connectivity "The authors have done an excellent job in writing this book. Their familiarity with the requirements, concepts and solution alternatives, as well as the standardization work allows them to present the material in a way that provides easy communication between Architecture and Standards groups and Planning/ Operational groups within service provider organizations." - from the foreword by Dr. Kalyani Bogineni, Principal Architect, Verizon Up-to-date coverage of SAE including the latest standards development Easily accessible overview of the architecture and concepts defined by SAE Thorough description of the Evolved Packet Core for LTE, fixed and other wireless accesses Comprehensive explanation of SAE key concepts, security and Quality-of-Service Covers potential service and operator scenarios including interworking with existing 3GPP and 3GPP2 systems Detailed walkthrough of network entities, protocols and procedures Written by established experts in the SAE standardization process, all of whom have extensive experience and understanding of its goals, history and vision

From GSM to LTE-Advanced John Wiley & Sons

Get a comprehensive and detailed insight into the Evolved Packet Core (EPC) with this clear, concise and authoritative guide - a fully updated second edition that covers the latest standards and industry developments KEY FEATURES " The only book to describe and explain the entire EPC including architecture, features and protocols, giving you the knowledge and insight to see the potential in EPC, develop EPC products and deploy LTE/EPC mobile broadband Networks " The Second Edition includes 150+ new pages and numerous new illustrations. The content has also

been focused towards the mainstream deployment scenarios " Written by established experts in the 3GPP standardization process, with extensive, in-depth experience of its goals, development and future direction " Case studies of deployment scenarios show how the functions described within EPC are placed within a live network context " Forewords written by Dr. Kalyani Bogineni and Dr. Ulf Nilsson DESCRIPTION " The latest additions to the Evolved Packet System (EPS) including e.g. Positioning, User Data Management, eMBMS, SRVCC, VoLTE, CSFB " A detailed description of the nuts and bolts of EPC that are required to really get services up and running on a variety of operator networks " An in-depth overview of the EPC architecture and its connections to the wide variety of network accesses, including LTE, LTE-Advanced, WCDMA/HSPA, GSM, WiFi, etc." The most common operator scenarios of EPS and the common issues faced in their design " The reasoning behind many of the design decisions taken in EPC, in order to understand the full details and background of the all-IP core NEW CONTENT TO THIS EDITION " 150+ New pages, new illustrations and call flows " Covers 3GPP Release 9, 10 and 11 in addition to release 8 " Expanded coverage on Diameter protocol, interface and messages " Architecture overview " Positioning " User Data Management " eMBMS (LTE Broadcasting) " H(e)NodeB/Femto Cells " LIPA/SIPTO/Breakout architectures " Deployment Scenarios " WiFi interworking " VoLTE/MMTel, CS fallback and SRVCC SAE is the core network that supports LTE, the next key stage in development of the UMTS network to provide mobile broadband. It aims to provide an efficient, cost-effective solution for the ever-increasing number of mobile broadband subscribers There is no other book on the market that covers the entire SAE network architecture; this book summarizes the important parts of the standards, but goes be ...

5G for the Connected World Springer Science & Business Media

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.

EPC and 4G Packet Networks Springer

This book is an in-depth, systematic and structured technical reference on 3GPP's LTE-Advanced (Releases 10 and 11), covering theory, technology and implementation, written by an author who has been involved in the inception and development of these technologies for over 20 years. The book not only describes the operation of individual components, but also shows how they fit into the overall system and operate from a systems perspective. Uniquely, this book gives in-depth information on upper protocol layers, implementation and deployment issues, and services, making it suitable for engineers who are implementing the technology into future products and services. Reflecting the author's 25 plus years of experience in signal processing and communication system design, this book is ideal for professional engineers, researchers, and graduate students working in cellular communication systems, radio air-interface technologies, cellular communications protocols, advanced radio access technologies for beyond 4G systems, and broadband cellular standards. An end-to-end description of LTE/LTE-Advanced technologies using a top-down systems approach, providing an in-depth understanding of how the overall system works Detailed algorithmic descriptions of the individual components' operation and inter-connection Strong emphasis on implementation and deployment scenarios, making this a very practical book An in-depth coverage of theoretical and practical aspects of LTE Releases 10 and 11 Clear and concise descriptions of the underlying principles and theoretical concepts to provide a better understanding of the operation of the system's components Covers all essential system functionalities, features, and their inter-connections based on a clear protocol structure,

including detailed signal flow graphs and block diagrams Includes methodologies and results related to link-level and system-level evaluations of LTE-Advanced Provides understanding and insight into the advanced underlying technologies in LTE-Advanced up to and including Release 11: multi-antenna signal processing, OFDM, carrier aggregation, coordinated multi-point transmission and reception, eICIC, multi-radio coexistence, E-MBMS, positioning methods, real-time and non-real-time wireless multimedia applications

Beyond LTE Network Architecture John Wiley & Sons
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.

Air Interface Technologies and Performance "O'Reilly Media, Inc."

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.

From GSM to LTE-Advanced Pro and 5G 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.

Design and Measurement Challenges Elsevier

How prepared are you to build fast and efficient web applications? This eloquent book provides what every web developer should know about the network, from fundamental limitations that affect performance to major innovations for building even more

powerful browser applications—including HTTP 2.0 and XHR improvements, Server-Sent Events (SSE), WebSocket, and WebRTC. Author Ilya Grigorik, a web performance engineer at Google, demonstrates performance optimization best practices for TCP, UDP, and TLS protocols, and explains unique wireless and mobile network optimization requirements. You'll then dive into performance characteristics of technologies such as HTTP 2.0, client-side network scripting with XHR, real-time streaming with SSE and WebSocket, and P2P communication with WebRTC. Deliver superlative TCP, UDP, and TLS performance Speed up network performance over 3G/4G mobile networks Develop fast and energy-efficient mobile applications Address bottlenecks in HTTP 1.x and other browser protocols Plan for and deliver the best HTTP 2.0 performance Enable efficient real-time streaming in the browser Create efficient peer-to-peer videoconferencing and low-latency applications with real-time WebRTC transports

From LTE to LTE-Advanced Pro and 5G 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.

An Introduction to 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

Testbeds and Research Infrastructures, Development of Networks and Communities John Wiley & Sons

EPC and 4G Packet Networks Driving the Mobile Broadband Revolution Academic Press

Fundamentals of Network Planning and Optimisation 2G/3G/4G John Wiley & Sons

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.

LTE, LTE-Advanced, SAE, VoLTE and 4G Mobile Communications
Wiley

Infrastructure for Homeland Security Environments Wireless Sensor Networks helps readers discover the emerging field of low-cost standards-based sensors that promise a high order of spatial and temporal resolution and accuracy in an ever-increasing universe of applications. It shares the latest advances in science and engineering paving the way towards a large plethora of new applications in such areas as infrastructure protection and security, healthcare, energy, food safety, RFID, ZigBee, and processing. Unlike other books on wireless sensor networks that focus on limited topics in the field, this book is a broad introduction that covers all the major technology, standards, and application topics. It contains everything readers need to know to enter this burgeoning field, including current applications and promising research and development; communication and networking protocols; middleware architecture for wireless sensor networks; and security and management. The straightforward and engaging writing style of this book makes even complex concepts and processes easy to follow and understand. In addition, it offers several features that help readers grasp the material and then apply their knowledge in designing their own wireless sensor network systems: * Examples illustrate how concepts are applied to the development and application of * wireless sensor networks * Detailed case studies set forth all the steps of design and implementation needed to solve real-world problems * Chapter conclusions that serve as an excellent review by stressing the chapter's key concepts * References in each chapter guide readers to in-depth discussions of individual topics This book is ideal for networking designers and engineers who want to fully exploit this new technology and for government employees who are concerned about homeland security. With its examples, it is appropriate for use as a coursebook for upper-level undergraduates and graduate students.

A Comprehensive Guide to 5G Security Academic Press

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
The LTE and SAE Evolution of 3G UMTS Artech House
This book explores the challenges and opportunities in exploiting cloud technologies for 5G, ranging from radio access network (RAN) to the evolved packet core (EPC). With a specific focus on cloud RAN and EPC, the text carefully explains the influence of

recent network technologies such as software defined networking (SDN), visualization, and cloud technologies in the evolution of architecture for future mobile networks. The book discusses the causes, benefits and challenges of cloud RAN and its interplay with other evolving technologies for future mobile networks. Researchers and professionals involved in mobile technology or cloud computing will find this book a valuable resource. The text is also suitable for advanced-level students studying all types of networking.

From RAN to EPC John Wiley & Sons

5G Core Networks: Powering Digitalization provides an overview of the 5G Core network architecture, as well as giving descriptions of cloud technologies and the key concepts in the 3GPP rel-15/16 specifications. Written by the authors who are heavily involved in development of the 5G standards and who wrote the successful book on EPC and 4G Packet Networks, this book provides an authoritative reference on the technologies and standards of the 3GPP 5G Core network. Content includes: An overview of the 5G Core Architecture The Stand-Alone and Non-Stand-Alone Architectures Detailed presentation of 5G Core key concepts An overview of 5G Radio and Cloud technologies Learn The differences between the 5G Core network and previous core network generations How the interworking with previous network standards is defined Why certain functionality has been included and what is beyond the scope of 5G Core How the specifications relate to state-of-the-art web-scale concepts and virtualization technologies Details of the protocol and service descriptions Examples of network deployment options Provides a clear, concise and comprehensive view of 5GS/5GC Written by established experts in the 5GS/5GC standardization process, all of whom have extensive experience and understanding of its goals, history and vision Covers potential service and operator scenarios for each architecture Explains the Service Based Architecture, Network Slicing and support of Edge Computing, describing the benefits they will bring Explains what options and parts of the standards will initially be deployed in real networks, along with their migration paths

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