

Epc And 4g Packet Networks Second Edition Driving The Le Broadband Revolution 2nd Edition By Olsson Magnus Mulligan Catherine 2012 Hardcover

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.

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 ...

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

A concise, updated guide to the 3GPP LTE Security Standardization specifications A welcome Revised Edition of the successful LTE Security addressing the security architecture for SAE/LTE, which is based on elements of the security architectures for GSM and 3G, but which needed a major redesign due to the significantly increased complexity, and different architectural and business requirements of fourth generation systems. The authors explain in detail the security mechanisms employed to meet these requirements. These specifications generated by standardization bodies only inform about how to implement the system (and this only to the extent required for interoperability), but almost never inform readers about why things are done the way they are. Furthermore, specifications tend to be readable only for a small group of experts and lack the context of the broader picture. The book fills this gap by providing first hand information from insiders who participated in decisively shaping SAE/LTE security in the relevant standardization body, 3GPP, and can therefore explain the rationale for design decisions in this area. A concise, fully updated guide to the 3GPP LTE Security Standardization specifications Describes the essential elements of LTE and SAE Security, written by leading experts who participated in decisively shaping SAE/LTE security in the relevant standardization body, 3GPP Explains the rationale behind the standards specifications giving readers a broader understanding of the context to these specifications Includes new chapters covering 3GPP work on system enhancements for MTC, plus application layer security in ETSI TC M2M and embedded smart card in ETSI SCP; Security for Machine-type Communication, Relay Node Security, and Future Challenges, including Voice over LTE, MTC, Home base stations, LIPA/SIPTO, and New Cryptographic Algorithms Essential reading for System engineers, developers and people in technical sales working in the area of LTE and LTE security, communication engineers and software developers in mobile communication field.

Las Comunicaciones Móviles, que fueron un privilegio para unos pocos en la década de los 80, han alcanzado ya su nivel de saturación en cotas de penetración en el Mercado. La voz y los mensajes cortos siguen representando un elevado porcentaje del uso de los terminales móviles, pero desde hace unos pocos años están creciendo exponencialmente las cifras de tráfico en servicios de datos, especialmente empujados por la navegación web y el correo electrónico. La introducción primero de la adaptación a GPRS de los sistemas de 2a generación y el posterior despliegue de UMTS, con su ampliación específica para datos de alta velocidad HSPA, han permitido soportar ese incremento durante la primera década de este siglo. Sin embargo, las previsiones de crecimiento actuales hacen necesario el despliegue en muy poco tiempo de nuevas soluciones, por lo que el foro de estandarización europeo 3GPP (3rd Generation Partnership Project) ha continuado evolucionando sus propuestas cerrando a finales de 2008 la primera versión de una nueva generación de redes de acceso radio celular: Long Term Evolution (LTE) y en 2010 la versión avanzada (LTE-A) que la Unión Internacional de Telecomunicaciones ha reconocido ya como estándar de 4a generación. LTE arranca su andadura en el mercado con la intención de ofrecer servicios de datos de gran ancho de banda, multiplicando por más de 10 las tasas binarias ofrecidas en 3G y con infraestructuras de redes más eficientes basadas en una arquitectura de red de acceso simplificada. Además, la flexibilidad en el uso del espectro que se

contempla en el estándar LTE facilita la regulación del uso de distintas bandas de frecuencia y la sustitución progresiva de los anteriores estándares de 2a y 3a generación. Este texto cubre todos los aspectos técnicos relevantes del estándar LTE, desde la descripción de los mecanismos de acceso radio y canales físicos, hasta las consideraciones sobre despliegue y gestión de recursos en redes LTE operativas. En todos y cada uno de los capítulos se ha utilizado una redacción orientada a la comprensión del texto, con las miras puestas en su potencial uso como libro de texto, pero sin dejar de lado ningún detalle significativo del estándar de 3GPP, por lo que el libro puede también considerarse como de referencia para profesionales del sector. Los autores son investigadores españoles de reconocido prestigio en su ámbito que han participado en los últimos años en las propuestas Europeas de estandarización de LTE de forma directa o a través de proyectos de investigación y foros científicos y tecnológicos.

Explore mobile communications and discover how the technology has evolved to 5G This hands-on textbook lays out the foundations of mobile communications—from architecture to function—with a special focus on 5G services, networks, and applications. Written by a stellar team of academics and mobile networking practitioners, End-to-End Mobile Communications: Evolution to 5G clearly explains the latest capabilities, standards, and practices along with background and examples. The book contains a primer on the vast topic of mobile technology security and offers a look toward future trends and emerging technologies. Coverage includes: An introduction to mobile communications Background on mobile network services Evolution of mobile technologies 5G services and applications 5G radio access network architecture 5G core network architecture Security Future evolution of mobile systems

With the increased functionality demand for mobile speed and access in our everyday lives, broadband wireless networks have emerged as the solution in providing high data rate communications systems to meet these growing needs.

Broadband Wireless Access Networks for 4G: Theory, Application, and Experimentation presents the latest trends and research on mobile ad hoc networks, vehicular ad hoc networks, and routing algorithms which occur within various mobile networks. This publication smartly combines knowledge and experience from enthusiastic scholars and expert researchers in the area of wideband and broadband wireless networks. Students, professors, researchers, and other professionals in the field will benefit from this book's practical applications and relevant studies.

Sections 1-2. Keyword Index.--Section 3. Personal author index.--Section 4. Corporate author index.-- Section 5. Contract/grant number index, NTIS order/report number index 1-E.--Section 6. NTIS order/report number index F-Z. 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

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

Abstract: Existing mobility protocols adopt centralized gateways to provide session continuity for mobile users. The centralized nature and the absence of effective selective traffic offload mechanism lead to inefficient data forwarding plane problem that congests 4G Evolved Packet Core (EPC). Despite the endless efforts of 3GPP, IETF, vendors, and researchers, these problems persist and restrict operators' offering for residential/enterprise indoor services and session continuity in wide area motion as train or cars crossing cities' boundaries. Existing mobility protocols, that struggle when connecting mobile users to static locations, can never satisfy the requirements of Internet of Things (IoT) for real time

collaborative interactions between moving users and terminals attached to 5G edges as drones, robots, smart vehicles ...etc. New mobility paradigm becomes a key enabler for collaborative interactions in IoT real time cognitive services as self-driving car, drones, remote health monitoring, smart homes/offices/farms ...etc. The research provides a novel mobility framework based on Software Defined Network (SDN) to solve existing mobility problems, satisfy IoT collaborative interactions, and extend mobility coverage cross service providers under Service Level Agreements (SLAs) while ensuring the security of involved entities. Mobility is achieved through dynamic establishment of SDN overlay network that can cross any type of LAN/WAN/Cellular topology. The framework is fully aligned to Next Generation Network (NGN) where mobility is offered as a service and provides smooth integration to existing infrastructure. The mobility scope incorporates both intra-domain and inter-domain mobility. The former refers to mobility within a single SDN administrative domain while the later refers to that between multiple SDN domains. Intra-domain mobility scope targets existing mobility challenges as core network congestion problem, unified access in campus and enterprise for wireless/wired networks, and session continuity in standard and wide area motion for 3G/4G/5G mobile operators. Inter-domain mobility scope addresses three main challenges. The first is extension of indoor services for residential/enterprise using any type of communication as DSL/cable without enforcing Distributed Antenna System (DAS) or any small cell setup while ensuring the security of involved entities. The second is extending WiFi mobility cross enterprises with optimized usage of communicating WAN links while ensuring unified access to both wireless and wired networks regardless of overlapping configurations as IP subnets/VLAN that can exist in their intranets. The third is facilitating collaborative communication between static/moving users, servers, and terminals when joining from different carriers under Service Level Agreements (SLA).

A cellular network or mobile network is a wireless network distributed over land areas called cells, each served by at least one fixed-location transceiver, known as a cell site or base station. In a cellular network, each cell uses a different set of frequencies from neighboring cells, to avoid interference and provide guaranteed bandwidth within each cell. When joined together these cells provide radio coverage over a wide geographic area. This enables a large number of portable transceivers (e.g., mobile phones, pagers, etc.) to communicate with each other and with fixed transceivers and telephones anywhere in the network, via base stations, even if some of the transceivers are moving through more than one cell during transmission. Cellular networks offer a number of desirable features: More capacity than a single large transmitter, since the same frequency can be used for multiple links as long as they are in different cells Mobile devices use less power than with a single transmitter or satellite since the cell towers are closer Larger coverage area than a single terrestrial transmitter, since additional cell towers can be added indefinitely and are not limited by the horizon Major telecommunications providers have deployed voice and data cellular networks over most of the inhabited land area of the Earth. This allows mobile phones and mobile computing devices to be connected to the public switched telephone network and public Internet. Private cellular networks can be used for research or for large organizations and fleets, such as dispatch for local public safety agencies or a taxicab company.

LTE-Long Term Evolution was proposed in Release 8 by Third Generation Partnership Project (3GPP) with a new Radio Access Network (RAN) and an Evolved Packet Core (EPC) Network to provide a smooth migration to 4G network. The number of mobile subscribers and data usage have increased exponentially since the roll-out of LTE because of new higher capacity LTE air-interface. This has created new challenges for the network operators to provide a satisfactory quality of service to the mobile users especially in indoor scenarios. One solution to provide better indoor user experience in a cost effective manner is use of femtocells which were introduced in 3GPP LTE, Release 8. Femtocells are short ranged indoor small cells, which share the same spectrum with macrocell and could have a limited user access. Higher data rate, improved indoor coverage, QoS and longer battery life could be achieved with the deployment of femtocells. Nonetheless, the plug-and-play capability and lower cost of these small cells pose huge interference problems in uplink and downlink when installed in dense urban areas and in an unplanned way. Interference management and handover are two important factors to be considered while implementing LTE network with femtocells. The use of hard handover in 3GPP LTE and LTE-A systems coupled with the absence of a direct signaling interface between macrocell and femtocell may cause call drops and delay in mobility management. The objective of this research is to address the challenges posed by handover performance and interference mitigation in LTE system with femtocells. In this work, a speed based handover algorithm is proposed, simulated in LTE-SIM and optimized by introducing Almost Blank Sub-Frames (ABSF) and Cell Range Expansion (CRE) interference coordination schemes. Simulation results show that, better user experience can be achieved in terms of delay, fairness, reduced number of call-drops while maximizing the throughput. 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.

A practical guide to LTE design, test and measurement, this new edition has been updated to include the latest developments. This book presents the latest details on LTE from a practical and technical perspective. Written by Agilent's measurement experts, it offers a valuable insight into LTE technology and its design and test challenges. Chapters cover the upper layer signaling and system architecture evolution (SAE). Basic concepts such as MIMO and SC-FDMA, the new uplink modulation scheme, are introduced and explained, and the authors look into the challenges of verifying the designs of the receivers, transmitters and protocols of LTE systems. The latest information on RF and signaling conformance testing is delivered by authors participating in the LTE 3GPP standards committees. This second edition has been considerably revised to reflect the most recent developments of the technologies and standards. Particularly important updates include an increased focus on LTE-Advanced as well as the latest testing specifications. Fully updated to include the latest information on LTE 3GPP standards. Chapters on conformance testing have been majorly revised and there is an increased focus on LTE-Advanced. Includes new sections on testing challenges as well as over the air MIMO testing, protocol testing and the most up-to-date test capabilities of instruments. Written from both a technical and practical point of view by leading experts in the field.

This book presents a detailed pedagogical description of the 5G commercial wireless communication system design, from an end to end perspective. It compares and contrasts NR with LTE, and gives a concise and highly accessible description of the key technologies in the 5G physical layer, radio access network layer protocols and procedures. This book also illustrates how the 5G core and EPC is integrated into the radio access network, how virtualization and edge computer fundamentally change the way users interact with the network, as well as 5G spectrum issues. This book is structured into six chapters. The first chapter reviews the use cases, requirements, and standardization organization and activities for 5G. These are 5G requirements and not NR specifically, as technology that meets the requirements, may be submitted to the ITU as 5G technology. This includes a set of Radio Access Technologies (RATs), consisting of NR and LTE; with each RAT meeting different aspects of the requirements. The second chapter describes the air interface of NR and LTE side by side. The basic aspects of LTE that NR builds upon are first described, followed by sections on the NR specific technologies, such as carrier/channel, spectrum/duplexing (including SUL), LTE/NR co-existence and new physical layer technologies (including waveform, Polar/LDPC codes, MIMO, and URLLC/mMTC). In all cases the enhancements made relative to LTE are made apparent. The third chapter contains descriptions of NR procedures (IAM/Beam Management/Power control/HARQ), protocols (CP/UP/mobility, including grant-free), and RAN architecture. The fourth chapter includes a detailed discussion related to end-to-end system architecture, and the 5G Core (5GC), network slicing, service continuity, relation to EPC, network virtualization, and edge computing. The fifth and major chapter describes the ITU submission and how NR and LTE meet the 5G requirements in significant detail, from the rapporteur responsible for leading the preparation and evaluation, as well as some field trial results. Engineers, computer scientists and professionals with a passing knowledge of 4G LTE and a comprehensive understanding of the end to end 5G commercial wireless system will find this book to be a valuable asset. Advanced-level students and researchers studying and working in communication engineering, who want to gain an understanding of the 5G system (as well as methodologies to evaluate features and technologies intended to supplement 5G) will also find this book to be a valuable resource.

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.

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This book presents a detailed pedagogical description of the 5G commercial wireless communication system design, from an end to end perspective, by those that were intimate with its development. The exposition only assumes that the reader is passingly familiar with LTE and builds upon that knowledge. By comparing and contrasting NR with LTE, it allows for quick mastering of 5G. As such it gives concise and highly accessible description of the key technologies in the 5G physical layer, radio access network layer protocols and procedures, how the 5G core and EPC is integrated into the radio access network, how virtualization, slicing and edge computer will fundamentally change the way we interact with the network, as well as 5G spectrum issues. The 2nd edition of this book significantly enhances and updates the first edition by adding 5G security and Release-16 developments. Loosely speaking, 5G Release-15 can be characterized as being optimized for the cellular carrier eMBB service while 5G Release-16 is the beginning of the optimization of 5G for the vertical industries. It mainly focused on the support of the vehicular vertical and Industrial Internet of Things. As such, we have significantly altered the first edition to cover the key features standardized in Release-16 including: URLLC, V2X, IIoT, enhanced MIMO, unlicensed access, positioning, power savings and IAB. On the network side, detailed discussion covers NR security as well as the newly standardized access traffic steering, non 3GPP access switching and splitting features, non 3GPP access network support and private networks. Engineers, computer scientists and professionals from those with a passing knowledge of 4G LTE to experts in the field will find this book to be a valuable asset. They will gain a comprehensive understanding of the end to end 5G commercial wireless system. Advanced-level students and researchers studying and working in communication engineering, who want to gain an understanding of the 5G system (as well as methodologies to evaluate features and technologies intended to supplement 5G) will also find this book to be a valuable resource.

Video Telephony is the real time exchange of voice and video between end-users. It is the basis of a wide range of applications (e.g. Multiparty games, distance learning). Quality of service (QoS) enables network performance control for meeting specific applications and/or end-user requirements. It is a differentiating factor for service providers. Evolved Packet Core (EPC) is the new core network for 3GPP 4G networks. Home Subscriber Server (HSS) is the standardized master database of 3GPP next generation networks including video telephony networks and EPC. It contains the subscription related information that is needed to support the network entities when they handle sessions. The constant increase in the number of subscribers is one of the challenges for future mobile networks including video telephony networks and EPC. Virtualization is a technique used to emulate

the physical characteristics of resources. It enables efficiency in resource usage and is a key technology for scalability and elasticity. This thesis proposes an architecture for QoS Enabled video telephony with a Virtualized HSS (VHSS) in a 3GPP 4G environment. It makes two main contributions. Firstly, it proposes a differentiated QoS service delivery platform that relies on EPC. This platform enables the provisioning of a refined differentiated QoS scheme which allows prioritization between different sessions of a same video telephony application running on a same network. This new scheme is a differentiating factor for service providers. Second it proposes a preliminary mechanism for a scalable and elastic HSS in order to cope with the increasing number of subscribers. This is done by decomposing the HSS into three main layers (diameter layer, database computation layer and storage layer). Each of these layers are virtualized and can grow/shrink independently. We have built a proof of concept prototype to demonstrate the feasibility of the proposed architecture. Performance measurements have also been made to evaluate viability. "Provides a holistic view of cutting-edge and up-to-date technology by industry professionals who attend those standards meetings where specifications are decided"--

Describes the technological solutions and standards which will enable the migration of voice and SMS services over to LTE/EPC networks Main drivers for the introduction of Long Term Evolution of UTRAN (LTE) is to provide far better end user experience for mobile broadband services. However, service providers also need to have a clear strategy of how to offer voice and messaging services for consumers and enterprises. The voice service over LTE is becoming increasingly important when the smartphone penetration is increasing rapidly. Smartphones require both good quality voice and high speed broadband data. This book provides the exhaustive view to industry-approved technologies and standards behind the Voice over LTE (VoLTE). Whether a decision maker or technology analyst, this book explains a topic of substantial global market interest. It provides a good introduction to the technology and is useful for operators who may be deploying VoLTE, product managers responsible for VoLTE products and those who work in implementation and standardization of related technologies. Provides a comprehensive overview of industry-approved technologies and standards, providing vital information for decision makers and those working on the technology Written by authors working at the cutting edge of mobile communications technology today, bringing a mix of standards and product background, guaranteeing in-depth practical and standards information Covering the technical and practical elements of VoLTE, explaining the various approaches for providing voice services over LTE

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

- Clear, concise and comprehensive view of IMS and Rich Communication Suite (RCS) for developers
- Shows how to use RCS to create innovative applications for rapid uptake by end-users
- Covers service and operator scenarios for the IMS architecture
- Explains IMS architecture and protocols, from an application developer's perspective

IMS Application Developer's Handbook gives a hands-on view of exactly what needs to be done by IMS application developers to develop an application and take it "live" on an operator's network. It offers practical guidance on building innovative applications using the features and capabilities of the IMS network, and shows how the rapidly changing development environment is impacting on the business models employed in the industry and how existing network solutions can be moved towards IMS. Elaborating on how IMS applies basic VoIP principles and techniques to realize a true multi-access, and multimedia network, this book ensures that developers know how to use IMS most effectively for applications. Written by established experts in the IMS core network and IMS service layer, with roots in ISDN and GSM, with experience from working at Ericsson, who have been active in standardisation and technology development and who have been involved in many customer projects for the implementation of fixed mobile converged IMS network and service. The authors of this book bring their in-depth and extensive knowledge in the organizations involved in the IMS standardization and its architecture. Clear, concise and comprehensive view of the IMS and Rich Communication Suite (RCS) for developers Written by established experts in the IMS services layer, who have been involved in many customer projects for the implementation of fixed mobile converged IMS network and service Covers potential service and operator scenarios for the IMS architecture; it is significantly more than merely a description of the IMS standards

GET A SOLID GROUNDING IN CUTTING-EDGE CELLULAR TECHNOLOGY Gain an overall understanding of the constantly evolving spectrum of wireless technologies, devices, and standards. Completely revised throughout, Wireless Crash Course, Third Edition offers straightforward explanations of all aspects of cellular networks and provides clear information on cellular design and operational concepts. Learn the fundamentals of cell base stations, radio frequency (RF) technologies, microwave radio systems, and 3G and 4G / LTE technologies, and discover practical new applications and mobile data technologies. Examples, photos, and illustrations from the field are included in this practical guide. COVERAGE INCLUDES: Cellular radio history and development The cell base station Basic cellular network design and operation Radio frequency (RF) operation and technologies Antennas, RF power, and sectorization Distributed antenna systems (DAS) Base station elements and RF signal flow 2G and 3G digital wireless technologies Cellular generations overview 4G and Long Term Evolution (LTE) Microwave radio systems Cell site to MTSO network connections The MTSO, core network, and network operations center (NOC) Personal communication services (PCS) and current marketplace Towers Capacity management, propagation models, and drive testing Interconnection to the landline

public switched telephone network (PSTN) Roaming and intercarrier networking Mobile data technologies The business side of wireless Mobile applications

LTE (Long Term Evolution) is the 3GPP's (3rd Generation Partnership Project) new standard and accompanying technologies that mobile network operators such as ATT, Verizon and TeliaSonera are adopting for their networks. To move to higher-speed networks that can cater to customer demand for mobile broadband multimedia applications, the 3GPP has developed the latest LTE-Advanced (LTE Release 10) standard, which will be fixed in December 2010. This book focuses on LTE and LTE-Advanced, and provides engineers with real insight and understanding into the why and how of the standard and its related technologies. This book is written by engineers from Ericsson--the world's leading telecommunications supplier--who was heavily involved in the development of the standard. Follow-up to the very successful 3G Evolution, now focusing on LTE and LTE Advanced standard and its accompanying technologies Complete and clear explanation of LTE Advanced by the people who played a leading role in its development, which will enable engineers to quickly grasp the latest 3GPP Release 10 standard and implement it in their products Not a contributed book as most others on this topic are: this book gives an integrated introduction to the technologies and the standard

Design Next-Generation Wireless Networks Using the Latest Technologies Fully updated throughout to address current and emerging technologies, standards, and protocols, Wireless Networks, Third Edition, explains wireless system design, high-speed voice and data transmission, internetworking protocols, and 4G convergence. New chapters cover LTE, WiMAX, WiFi, and backhaul. You'll learn how to successfully integrate LTE, WiMAX, UMTS, HSPA, CDMA2000/EVDO, and TD-SCDMA into existing cellular/PCS networks. Configure, manage, and optimize high-performance wireless networks with help from this thoroughly revised, practical guide. Comprehensive coverage includes: Overview of 3G wireless systems UMTS (WCDMA) and HSPA CDMA2000 and EVDO TD-SCDMA and TD-CDMA LTE WiMAX VoIP WiFi Broadband system RF design considerations Network design considerations Backhaul Antenna system selection, including MIMO System design for UMTS, CDMA2000 with EVDO, TD-SCDMA, TD-CDMA, LTE, and WiMAX Communication sites including in-building and colocation guidelines 5G and beyond

This book focus on Long Term Evolution (LTE) and beyond. The chapters describe different aspects of research and development in LTE, LTE-Advanced (4G systems) and LTE-450 MHz such as telecommunications regulatory framework, voice over LTE, link adaptation, power control, interference mitigation mechanisms, performance evaluation for different types of antennas, cognitive mesh network, integration of LTE network and satellite, test environment, power amplifiers and so on. It is useful for researchers in the field of mobile communications. Wireless communication has evolved rapidly in recent years and demand for mobile devices with new and higher services is increasing. The 3G standard, Universal Mobile Telecommunication System (UMTS) is already upgraded with High Speed Packet Access (HSPA) to meet current demands, but this is not sufficient considering the current needs of high speed services. Considering the demand for high speed service, 3rd Generation Partnership Project (3GPP) has come up with a technology called Long Term Evolution (LTE) technology called as 4G with an objective of a radio access technology with higher data rates, lower latencies and packet services such as multimedia and games to offer better quality. LTE is designed with a goal of evolving the radio access technology under the assumption that all services would be packet-switched, rather than following the circuit-switched model of earlier systems. Moreover, LTE is accompanied by an evolution of the non-radio aspects of the complete system, under the term 'System Architecture Evolution (SAE) which includes the Evolved Packet Core (EPC) network. Together, LTE and SAE comprise the Evolved Packed System (EPS), where both the core network and the radio access networks are fully packet-switched. This thesis mainly emphasizes on Physical layer and a proof for the physical layer message sequence. The main purpose of this master thesis is to study, analyze and implement a proof of Physical layer process in control plane of LTE system. The focus is on physical layer between the UE and eNB. Test trials were performed and screenshots for the analysis of call drops were taken and included. Results show the achievable Downlink and Uplink throughput in multi user and single user environment compared with the channel capacity of 10MHz channel. The thesis is mainly based on 3GPP LTE specifications and discussions. The methodology undertaken was divided into five parts. First, the studies part which was mainly based on 3GPP LTE specifications and real time work. Second, the testing part which was performed in a real scenario of LTE system deployed specifically for this test. Third, the analysis part, where the call setup procedure and physical layer message proof is implemented. Also, the call drops incurred during the test and its valid reason is analyzed. Fourth, the results part whereby the Average and Peak Achievable Downlink and Uplink Throughput for LTE is shown meeting the 4G requirements. Last part shows the conclusion that all the specifications mentioned by 3GPP is followed and proven that LTE is one of the best wireless communication technology of recent time.

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 though many important aspects of 4G including the air interface physical layer, Radio Access Networks, and 3GPP standardization, to name a few.

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

This book constitutes the refereed post-conference proceedings of the 9th International Conference on Communication Systems and Networks, COMSNETS 2017, held in Bengaluru, India, in January 2017. The 9 invited and 10 selected best papers have been carefully reviewed and selected from 192 submissions. They cover various topics in networking and communications systems.

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