
Lte Radio Access Network Planning Guide

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From GSM to LTE-Advanced Pro and 5G Evolved Cellular Network Planning and Optimization for UMTS and LTE 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.

John Wiley & Sons

C-RAN and virtualized Small Cell technology poses several major research challenges. These include dynamic resource allocation, self-configuration in the baseband pool, high latency in data transfer between radio unit and baseband unit, the cost of data delivery, high volume of data in the network, software networking aspects, potential energy savings, security concerns, privacy of user's personal data at a remote place, limitations of virtualized environment, etc. This book provides deeper insights into the next generation RAN architecture and surveys the coexistence of SDN, C-RAN and Small Cells solutions proposed in the literature at different levels.

LTE Optimization and Mobile Network

Virtualization CRC Press

Essential reference providing best practice of LTE-A, VoLTE, and IoT

Design/deployment/Performance and evolution towards 5G This book is a practical guide to the design, deployment, and performance of LTE-A, VoLTE/IMS and IoT. A comprehensive practical performance analysis for VoLTE is conducted based on field measurement results from live LTE networks. Also, it provides a comprehensive introduction to IoT and 5G evolutions. Practical aspects and best practice of LTE-A/IMS/VoLTE/IoT are presented. Practical aspects of LTE-Advanced features are presented. In addition, LTE/LTE-A network capacity dimensioning and analysis are demonstrated based on live LTE/LTE-A networks KPIs. A comprehensive foundation for 5G technologies is

provided including massive MIMO, eMBB, URLLC, mMTC, NGCN and network slicing, cloudification, virtualization and SDN. Practical Guide to LTE-A, VoLTE and IoT: Paving the Way Towards 5G can be used as a practical comprehensive guide for best practices in LTE/LTE-A/VoLTE/IoT design, deployment, performance analysis and network architecture and dimensioning. It offers tutorial introduction on LTE-A/IoT/5G networks, enabling the reader to use this advanced book without the need to refer to more introductory texts. Offers a complete overview of LTE and LTE-A, IMS, VoLTE and IoT and 5G Introduces readers to IP Multimedia Subsystems (IMS) Performs a comprehensive evaluation of VoLTE/CSFB Provides LTE/LTE-A network capacity and dimensioning Examines IoT and 5G evolutions towards a super connected world Introduce 3GPP NB-IoT evolution for low power wide area (LPWA) network Provide a comprehensive introduction for 5G evolution including eMBB, URLLC, mMTC, network slicing, cloudification, virtualization, SDN and orchestration Practical Guide to LTE-A, VoLTE and IoT will appeal to all deployment and service engineers, network designers, and planning and optimization engineers working in mobile communications. Also, it is a practical guide for R&D and standardization experts to evolve the LTE/LTE-A, VoLTE and IoT towards 5G evolution.

Recent Trends in Data Science and Soft Computing
CRC Press

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.

The Dark Side of 5G IGI Global
With the current explosion in network traffic, and mounting pressure on operators' business case, Self-Organizing Networks (SON) play a crucial role. They are conceived to minimize human intervention in engineering processes and at the same time improve system performance to maximize Return-on-Investment (ROI) and secure customer loyalty. Written by leading experts in the planning and optimization of Multi-Technology and Multi-Vendor wireless networks, this book describes the architecture of Multi-Technology SON for GSM, UMTS and LTE, along with the enabling technologies for SON planning, optimization and healing. This is presented mainly from a technology point of view, but also covers some critical business aspects, such as the ROI of the proposed SON functionalities and Use Cases. Key features: Follows a truly Multi-Technology approach: covering not only LTE, but also GSM and UMTS, including architectural considerations of deploying SON in today's GSM and UMTS networks Features detailed discussions about the relevant trade-offs in each Use Case Includes field results of today's GSM and UMTS SON implementations in live networks Addresses the calculation of ROI for Multi-Technology SON, contributing to a more complete and strategic view of the SON paradigm This book will appeal to network planners, optimization engineers, technical/strategy managers with operators and R&D/system engineers at infrastructure and software vendors. It will also be a useful resource for postgraduate students and researchers in automated wireless network planning and optimization.

Long Term Evolution in Bullets John Wiley & Sons
This book is intended to describe how to leverage emerging technologies big data analytics and SDN, to address challenges specific to LTE and IP network performance and fault management data in order to more efficiently manage and operate an LTE wireless networks. The proposed integrated solutions permit the LTE network service provider to operate entire integrated network, from RAN to Core, from UE to application service, as one unified system and correspondingly collect and align disparate key metrics and data, using an integrated and holistic approach to network analysis. The LTE wireless network performance and fault involves the network performance and management of network elements in EUTRAN, EPC and IP transport components, not only as individual components, but also as nuances of interworking of these components. The key metrics for EUTRAN include radio access network accessibility, retainability, integrity, availability and mobility. The key metrics for EPC include MME accessibility, mobility and capacity, SGW, PGW capacity and connectivity. In the first parts of the book, the authors describe fundamental analytics techniques, and various key network partitions - RAN, Backhaul, Metro and Core of a typical LTE Wireless Service Provider Network. The second part of the book develops more advanced analytic techniques that can be used to solve complex wireless network problems. The second part of this book also describes practical and novel solutions for LTE service network performance and fault management systems using big data engineering. Self-organizing network (SON) architecture is presented as a way to utilize network performance and fault analytics to enable network automation. SON can significantly improve operational efficiencies and speed up network deployment. This book provides various ways to leverage data science to more intelligently and reliably to automate and manage a wireless network. The contents of the book should be useful to professional engineers and networking experts involved in LTE network operations and management. The content will also be of interest to researchers, academic and corporate, interested in the developments in fault analytics in LTE networks.
LTE Advanced Springer

Provides an introduction to the technical and business aspects of mobile telecommunications, exploring the complete eco-system of the industry with the key segments and how they interact with each other. This industry has seen rapid technical advancements in recent years, yet the basics of providing coverage and capacity to the end users have not changed. The authors introduce these technical basics to the reader and then show how a network is deployed. Technical innovation has been pivotal to the rapid advancement of this industry and the book details some of the main innovations over the years. The book highlights some of the current challenges the industry is facing and how innovation is driven by these challenges. Mobile operators business structures are examined, from the purchasing spectrum to deploying the network and attracting and retaining customers. The role of the regulator is not overlooked, and its role in ensuring a competitive market where consumers have sufficient choice. The authors detail current challenges faced by the operators and how they are using business innovation to overcome these challenges. In describing the changing face of mobile telecoms, the book covers business challenges as well as the technological challenges faced today by the industry. The advent of the Smart phones, which support multiple technologies that compliment and sometimes compete with mobile cellular technology has had a profound impact on the industry, sometimes challenging the role of the mobile operator. A discussion of these yet-unanswered challenges provides some insight into where the industry is heading. The technical aspects of this book are pitched at undergraduate first year mathematics and physics subject levels, making it easily comprehensible to the undergraduate students studying relevant fields. As the title denotes, this book will be at an introductory level, giving a broad coverage to many of the significant technical and business aspects of the industry.

Design, Deployment and Performance of 4G-LTE Networks 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

The LTE / SAE Deployment Handbook
John Wiley & Sons

The aim of this book is to enable network planners to realize and maintain cost efficient LTE backhaul networks, which meet the necessary performance requirements. Through an introduction to the technology background, the economical

modelling, the dimensioning theory, planning and optimization processes and relevant network management aspects, the reader shall obtain all relevant information to achieve good backhaul results in their own network environment. It is aimed at network planners and other experts with responsibilities for LTE IP network dimensioning, LTE network planning, providing and managing leased lines, business management, LTE IP network operation and optimization.

Future Mobile Communications John Wiley & Sons

Reporting the findings of COST 2100, a major European intergovernmental project, this volume offers system designers a good source of guidelines based on channel characterization and measurement-based modeling, as well as worthwhile ideas for future research.

A Systems Approach to Understanding IEEE 802.16m Radio Access Technology John Wiley & Sons

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. Network Management Automation for Operational Efficiency Academic Press 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-Advanced and Next Generation Wireless Networks John Wiley & Sons Covering the key functional areas of LTE Self-Organising Networks (SON), this book introduces the topic at an advanced level before examining the state-of-the-art concepts. The required background on LTE network scenarios, technologies and general SON concepts is first given to allow readers with basic knowledge of mobile networks to understand the detailed discussion of key SON functional areas (self-configuration, -optimisation, -healing). Later, the book provides details and references for advanced readers familiar with LTE and SON, including the latest status of 3GPP standardisation. Based on the defined next generation mobile networks (NGMN) and 3GPP SON use cases, the book elaborates to give the full picture of a SON-enabled system including its enabling technologies, architecture and operation.

" Heterogeneous networks " including different cell hierarchy levels and multiple radio access technologies as a new driver for SON are also discussed. Introduces the functional areas of LTE SON (self-optimisation, -configuration and – healing) and its standardisation, also giving NGMN and 3GPP use cases Explains the drivers, requirements, challenges, enabling technologies and architectures for a SON-enabled system Covers multi-technology

(2G/3G) aspects as well as core network and end-to-end operational aspects. Written by experts who have been contributing to the development and standardisation of the LTE self-organising networks concept since its inception. Examines the impact of new network architectures (“ Heterogeneous Networks ”) to network operation, for example multiple cell layers and radio access technologies.

LTE, WiMAX and WLAN Network Design, Optimization and Performance Analysis John Wiley & Sons

The Definitive Guide to LTE Technology Long-Term Evolution (LTE) is the next step in the GSM evolutionary path beyond 3G technology, and it is strongly positioned to be the dominant global standard for 4G cellular networks. LTE also represents the first generation of cellular networks to be based on a flat IP architecture and is designed to seamlessly support a variety of different services, such as broadband data, voice, and multicast video. Its design incorporates many of the key innovations of digital communication, such as MIMO (multiple input multiple output) and OFDMA (orthogonal frequency division multiple access), that mandate new skills to plan, build, and deploy an LTE network. In *Fundamentals of LTE*, four leading experts from academia and industry explain the technical foundations of LTE in a tutorial style—providing a comprehensive overview of the standards. Following the same approach that made their recent *Fundamentals of WiMAX* successful, the authors offer a complete framework for understanding and evaluating LTE. Topics include Cellular wireless history and evolution: Technical advances, market drivers, and foundational networking and communications technologies. Multicarrier modulation theory and practice: OFDM system design, peak-to-average power ratios, and SC-FDE solutions. Frequency Domain Multiple Access: OFDMA downlinks, SC-FDMA uplinks, resource allocation, and LTE-specific implementation. Multiple antenna techniques and tradeoffs: spatial diversity, interference cancellation, spatial multiplexing, and multiuser/networked MIMO. LTE standard overview: air interface

protocol, channel structure, and physical layers. Downlink and uplink transport channel processing: channel encoding, modulation mapping, Hybrid ARQ, multi-antenna processing, and more. Physical/MAC layer procedures and scheduling: channel-aware scheduling, closed/open-loop multi-antenna processing, and more. Packet flow, radio resource, and mobility management: RLC, PDCP, RRM, and LTE radio access network mobility/handoff procedures. Paving the way towards 5G. Artech House. 5G NR: Architecture, Technology, Implementation, and Operation of 3GPP New Radio Standards is an in-depth, systematic, technical reference on 3GPP's New Radio standards (Release 15 and beyond), covering the underlying theory, functional descriptions, practical considerations and implementation of the 5G new radio access technology. The book describes the design and operation of individual components and shows how they are integrated into the overall system and operate from a systems perspective. Uniquely, this book gives detailed information on RAN protocol layers, transport, network architecture and services, as well as practical implementation and deployment issues, making it suitable for researchers and engineers who are designing and developing 5G systems. Reflecting on the author's 30 plus years of experience in signal processing, microelectronics and wireless communication system design, this book is ideal for professional engineers, researchers and graduate students working and researching in cellular communication systems and protocols as well as mobile broadband wireless standards. Strong focus on practical considerations, implementation and deployment issues. Takes a top-down approach to explain system operation and functional interconnection. Covers all functional components, features, and interfaces based on clear protocol structure and block diagrams. Describes RF and transceiver design considerations in sub-6 GHz and mmWave bands. Covers network slicing, SDN/NFV/MEC networks and cloud and virtualized RAN architectures. Comprehensive coverage of NR multi-antenna techniques and beamformed operation. A consistent and integrated coverage reflecting the author's decades of experience in developing 3G, 4G and 5G.

technologies and writing two successful books in these areas

3GPP Solution for IMT-Advanced John Wiley & Sons

A technological overview of LTE and WiMAX LTE, WiMAX and WLAN Network Design, Optimization and Performance Analysis provides a practical guide to LTE and WiMAX technologies introducing various tools and concepts used within. In addition, topics such as traffic modelling of IP-centric networks, RF propagation, fading, mobility, and indoor coverage are explored; new techniques which increase throughput such as MIMO and AAS technology are highlighted; and simulation, network design and performance analysis are also examined. Finally, in the latter part of the book Korowajczuk gives a step-by-step guide to network design, providing readers with the capability to build reliable and robust data networks. By focusing on LTE and WiMAX this book extends current network planning approaches to next generation wireless systems based on OFDMA, providing an essential resource for engineers and operators of fixed and wireless broadband data access networks. With information presented in a sequential format, LTE, WiMAX and WLAN Network Design, Optimization and Performance Analysis aids a progressive development of knowledge, complementing latter graduate and postgraduate courses while also providing a valuable resource to network designers, equipment vendors, reference material, operators, consultants, and regulators. Key Features: One of the first books to comprehensively explain and evaluate LTE Provides an unique explanation of the basic concepts involved

in wireless broadband technologies and their applications in LTE, WiMAX, and WLAN before progressing to the network design Demonstrates the application of network planning for LTE and WiMAX with theoretical and practical approaches Includes all aspects of system design and optimization, such as dynamic traffic simulations, multi-layered traffic analysis, statistical interference analysis, and performance estimations Evolution to 5G John Wiley & Sons LTE-Advanced is the new Global standard which is expected to create a foundation for the future wireless broadband services. The standard incorporates all the latest technologies recently developed in the field of wireless communications. Presented in a modular style, the book provides an introductory description for beginners as well as practical guidelines for telecom specialists. It contains an introductory module that is suitable for the initial studies of the technology based on the 3GPP Release 10, 11 and beyond of LTE and SAE. The latter part of the book is suitable for experienced professionals who will benefit from the practical descriptions of the physical core and radio network planning, end-to-end performance measurements, physical network construction and optimization of the system. The focus of the book is in the functioning, planning, construction, measurements and optimization of the radio and core networks of the Release 10 and beyond of the 3GPP LTE and SAE standards. It looks at the practical description of the Advanced version of the LTE/SAE, how to de-mystify the LTE-Advanced functionality and planning, and how to carry out practical measurements of the system. In general, the book describes "how-to-do-it" for the 4G system which is compliant with the ITU-R requirements.

Proceedings of the 2nd International Conference of Reliable Information and

Communication Technology (IRICT 2017)
Springer Nature

A highly practical guide rooted in theory to include the necessary background for taking the reader through the planning, implementation and management stages for each type of cellular network. Present day cellular networks are a mixture of the technologies like GSM, EGPRS and WCDMA. They even contain features of the technologies that will lead us to the fourth generation networks. Designing and optimising these complex networks requires much deeper understanding. *Advanced Cellular Network Planning and Optimisation* presents radio, transmission and core network planning and optimisation aspects for GSM, EGPRS and WCDMA networks with focus on practical aspects of the field. Experts from each of the domains have brought their experiences under one book making it an essential read for design practitioners, experts, scientists and students working in the cellular industry. Key Highlights Focus on radio, transmission and core network planning and optimisation Covers GSM, EGPRS, WCDMA network planning & optimisation Gives an introduction to the networks/technologies beyond WCDMA, and explores its current status and future potential Examines the full range of potential scenarios and problems faced by those who design cellular networks and provides advice and solutions all backed up with real-world examples This text will serve as a handbook to anyone engaged in the design, deployment, performance and business of Cellular Networks. "Efficient planning and optimization of mobile networks are key to guarantee superior quality of service and user experience. They also form the essential foundation for the

success of future technology development, making this book a valuable read on the road towards 4G." —Tero Ojanperä, Chief Technology Officer, Nokia Networks
Advanced Cellular Network Planning and Optimisation John Wiley & Sons

This book presents the proceedings of the 3rd International Conference of Reliable Information and Communication Technology 2018 (IRICT 2018), which was held in Kuala Lumpur, Malaysia, on July 23 – 24, 2018. The main theme of the conference was “ Data Science, AI and IoT Trends for the Fourth Industrial Revolution. ” A total of 158 papers were submitted to the conference, of which 103 were accepted and considered for publication in this book. Several hot research topics are covered, including Advances in Data Science and Big Data Analytics, Artificial Intelligence and Soft Computing, Business Intelligence, Internet of Things (IoT) Technologies and Applications, Intelligent Communication Systems, Advances in Computer Vision, Health Informatics, Reliable Cloud Computing Environments, Recent Trends in Knowledge Management, Security Issues in the Cyber World, and Advances in Information Systems Research, Theories and Methods.

5G Radio Access Network Architecture
Academic Press

Presenting the new IEEE 802.16m standard, this is the first book to take a systematic, top-down approach to describing Mobile WiMAX and its next generation, giving detailed algorithmic descriptions together with explanations of the principles behind the operation of individual air-interface protocols and network components. Features: A systematic

and detailed, top-down approach to the design of 4G cellular systems based on IEEE 802.16m and 3GPP LTE/LTE-Advanced technologies A systematic approach to understanding IEEE 802.16m radio access network and mobile WiMAX network architecture and protocols The first comprehensive technical reference on the design, development and performance evaluation of IMT-Advanced systems, including the theoretical background and design principles as well as implementation considerations About the author: The author, chief architect and technical lead of the IEEE 802.16m project at Intel Corporation, initiated and masterminded the development of the IEEE 802.16m standard and has been one of the leading technical drivers in its standardization process in IEEE. The author was also a leading technical contributor to the definition and development of requirements and evaluation methodology for the IMT-Advanced systems in ITU-R. Reflecting the author ' s 20+ years expertise and experience, the book provides an in-depth, systematic and structured technical reference for professional engineers, researchers, and graduate students working in cellular communication systems, radio air-interface technologies, cellular communications protocols, advanced radio access technologies for 4G systems, and broadband cellular standards. A systematic and detailed, top-down approach to the design of 4G cellular systems based on IEEE 802.16m and 3GPP LTE/LTE-Advanced technologies A systematic approach to understanding IEEE 802.16m radio access network and mobile WiMAX network architecture and protocols The first comprehensive technical reference on the

design, development and performance evaluation of IMT-Advanced systems, including the theoretical background and design principles as well as implementation considerations