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WCDMA (UMTS) Deployment Handbook-Christophe Chevallier 2006-07-11 A complete and practical guide to WCDMA/UMTS cellular network deployment. After introducing the network architecture of such a system, the WCDMA (UMTS) Deployment Handbook defines the coverage and capacity concepts associated with the dimensioning and design phases. Progressing to a discussion of the main system parameters associated with network optimization and detailing optimization techniques for the main services supported by UMTS, and includes the specifics of indoor deployment and HSDPA networks evolution. Covers all stages from planning to optimization with sufficient details as required on a day-to-day basis, and through reference information for the reader who wants to understand the concepts in more detail Relevant for daily tasks: The approach taken in this book is similar to the work flow of network planner and optimization engineers, allowing such personnel to easily find the relevant information Written by the company which made CDMA a household name: QUALCOMM was the first company to use CDMA technology for cellular application and is a technical leader in this domain Based on industry feedback: All the contributors to this book have been working in direct interaction with WCDMA operators, throughout the world, since the early days of WCDMA commercial deployment Looking to the future: This book addresses the next level of challenge that WCDMA operators will face - deployment of indoor systems and HSDPA Providing a complete introduction and reference guide to everything associated with the life cycle of a WCDMA/UMTS cellular network, from initial dimensioning through to the successful deployment of indoor solutions, or migration to HSDPA, this book is a must-have for network planners and optimization engineers as well as Telecommunication Engineering students.

WCDMA (UMTS) Deployment Handbook-Christophe Chevallier 2006-08-25 A complete and practical guide to WCDMA/UMTS cellular network deployment. After introducing the network architecture of such a system, the WCDMA (UMTS) Deployment Handbook defines the coverage and capacity concepts associated with the dimensioning and design phases. Progressing to a discussion of the main system parameters associated with network optimization and detailing optimization techniques for the main services supported by UMTS, and includes the specifics of indoor deployment and HSDPA networks evolution. Covers all stages from planning to optimization with sufficient details as required on a day-to-day basis, and through reference information for the reader who wants to understand the concepts in more detail Relevant for daily tasks: The approach taken in this book is similar to the work flow of network planner and optimization engineers, allowing such personnel to easily find the relevant information Written by the company which made CDMA a household name: QUALCOMM was the first company to use CDMA technology for cellular application and is a technical leader in this domain Based on industry feedback: All the contributors to this book have been working in direct interaction with WCDMA operators, throughout the world, since the early days of WCDMA commercial deployment Looking to the future: This book addresses the next level of challenge that WCDMA operators will face - deployment of indoor systems and HSDPA Providing a complete introduction and reference guide to everything associated with the life cycle of a WCDMA/UMTS cellular network, from initial dimensioning through to the successful deployment of indoor solutions, or migration to HSDPA, this book is a must-have for network planners and optimization engineers as well as Telecommunication Engineering students.

Evolved Cellular Network Planning and Optimization for UMTS and LTE-Lingyang Song 2010-08-24 Most books on network planning and optimization provide limited coverage of either GSM or WCDMA techniques. Few scrape the surface of HSPA, and even fewer deal with TD-SCDMA. Filling this void, Evolved Cellular Network Planning and Optimization for UMTS and LTE presents an accessible introduction to all stages of planning and optimizing UMTS, HSPA,

Radio Network Planning and Optimisation for UMTS-Jaana Laiho 2006-05-01 Radio Network Planning and Optimisation for UMTS, Second Edition, is a comprehensive and fully updated introduction to WCDMA radio access technology used in UMTS, featuring new content on key developments. Written by leading experts at Nokia, the first edition quickly established itself as a best-selling and highly respected book on how to dimension, plan and optimise UMTS networks. This valuable text examines current and future radio network management issues and their impact on network performance as well as the relevant capacity and coverage enhancement methods. In addition to coverage of WCDMA radio access technology used in UMTS, and the planning and optimisation of such a system, the service control and management concept in WCDMA and GPRS networks are also introduced. This is an excellent source of information for those considering future cellular networks where Quality of Service (QoS) is of paramount importance. Key features of the Second Edition include: High-Speed Downlink Packet Access (HSDPA) - physical layer, dimensioning and radio resource management Quality of Service (QoS) mechanisms in network for service differentiation Multiple Input - Multiple Output (MIMO) technology Practical network optimisation examples Service optimisation for UMTS and GPRS/EDGE capacity optimisation The 'hot topic' of service control and management in WCDMA and GPRS networks, that has evolved since the first edition Companion website includes: Figures Static radio network simulator implemented in MATLAB® This text will have instant appeal to wireless operators and network and terminal manufacturers. It will also be essential reading for undergraduate and postgraduate students, frequency regulation bodies and all those interested in radio network planning and optimisation, particularly RF network systems engineering professionals.

UMTS Network Planning and Development-Chris Braithwaite 2003-12-17 UMTS is the wireless network technology behind the rollout of Third Generation (3G) mobile telecoms networks which will bring video, music and internet services to the cellphone and a range of electronic products. Chris Braithwaite and Mike Scott use their extensive experience of training engineers across Europe, and their backgrounds in working with Nokia, Ericsson and Orange to deliver a uniquely practical guide written from the perspective of the engineer and network planner. This guide is a valuable addition to the literature on UMTS which to date has been dominated by theoretical and reference works. The authors consider each of the key topics of UMTS/WCDMA and 3G rollout in terms of Coverage, Capacity and Quality of Service- the key considerations for all engineers and managers working in 3G telecoms. \*A real-world design guide with cookbook-style instructions and rules of thumb, not another R&D-level book or crib to the standards. \*Covers the hot engineering issues in UMTS planning, design and implementation. \*UMTS is the natural evolutionary choice for operations of GSM networks, currently representing a customer base of more than 747 million end users in over 180 countries and representing over 70% of today's digital wireless market[souce: GSM Association]

HSDPA/HSUPA for UMTS-Harri Holma 2007-01-11 From the editors of the highly successful WCDMA for UMTS, this new book provides a comprehensive and up-to-date reference to High Speed Packet Access (HSPA) technologies for WCDMA. The editors cover both HSDPA and HSUPA, including an in-depth description and explanation of 3GPP standards, and expected performance based on simulations and first measurements. The text also discusses the impact of HSDPA and HSUPA on network dimensioning, covers applications and end-to-end performance in detail, and includes a section on radio frequency requirements and terminal design considerations. The most comprehensive and advanced guide to the HSDPA (High Speed Downlink Packet Access) and HSUPA (High Speed Uplink Packet Access) technologies and standardisation, HSDPA/HSUPA for UMTS: Analyses the impact of HSDPA/HSUPA on network dimensioning, discussing co-existence with R99 (Release 99) and GPRS/EDGE (General Packet Radio Services) Enhanced Data GSM Environment) Contains a section on applications and end-to-end (e2e) performance Includes a chapter on radio frequency (RF) requirements and terminal design considerations, covering different RF bands, multi-band HSDPA and multi-mode HSDPA+EDGE challenges, power consumption Provides numerous illustrations of 3GPP (Third Generation Partnership Project) standards and performance This title provides excellent coverage of the area for system, element and chip designers, network planners, technical managers with vendors, operators and application developers. It is also ideal for postgraduates and researchers in related areas.

UMTS Network Planning, Optimization, and Inter-Operation with GSM-Moe Rahnama 2008-04-15 UMTS Network Planning, Optimization, and Inter-Operation with GSM is an accessible, one-stop reference to help engineers effectively reduce the time and costs involved in UMTS deployment and optimization. Rahnama includes detailed coverage from both a theoretical and practical perspective on the planning and optimization aspects of UMTS, and a number of other new techniques to help operators get the most out of their networks. Provides an end-to-end perspective, from network design to optimization Incorporates the hands-on experiences of numerous researchers Single authorship allows for strong coherency and accessibility Details the complete iteration cycle of radio link budgeting for coverage planning and dimensioning Rahnama demonstrates detailed formulation of radio capacity and coverage in UMTS, and discusses the tradeoffs involved. He presents complete link budgeting and iterative simulations for capacity and coverage planning, along with practical guidelines. UMTS Network Planning contains seventeen cohesive and well-organized chapters which cover numerous topics, including: Radio channel structures, radio channel models, parameters, model tuning Techniques for capacity and coverage enhancements Complete treatment of power control, handoffs and radio resource practical management processes and parameters Detailed coverage of TCP protocol enhancement for operation over wireless links, particularly UMTS Application of GSM measurements to plan and re-engineer for UMTS radio sites Guidelines for site co-location with GSM, the QoS classes, parameters and inter-workings in UMTS AMR voice codecs and tradeoffs, core and access network design, architectural evolution, and protocols Comprehensive discussion and presentation of practical techniques for radio performance analysis, trending, and troubleshooting Perfect for professionals in the field and researchers specializing in network enhancement. Engineers working on other air interfaces and next generation technologies will find many of the techniques introduced helpful in designing and deploying future wireless networks as well. Students and professionals new to the wireless field will also find this book to be a good foundation in network planning, performance analysis, and optimization.

WCDMA for UMTS-Harri Holma 2005-01-14 Highly regarded as the book on the air interface of 3G cellular systems WCDMA for UMTS has again been fully revised and updated. The third edition now covers the key features of 3GPP Release 6 ensuring it remains the leading principal resource in this constantly progressing area. By providing a deep understanding of the WCDMA air interface, the practical approach of this third edition will continue to appeal to operators, network and terminal manufacturers, service providers, university students and frequency regulators. Explains the key parts of the 3GPP/WCDMA standard Presents network dimensioning, coverage and capacity of WCDMA Introduces TDD and discusses its differences from FDD Key third edition updates include: Covers the main 3GPP Release 6 updates Further enhances High Speed Downlink Packet Access (HSDPA) chapter with a number of new simulation results Explains High Speed Uplink Packet Access (HSUPA) study item Introduces the new services including their performance analysis : Push-to-Talk over Cellular (PoC), streaming, Use What I See (SWIS) and multiplayer games Presents a number of new WCDMA field measurement results: capacity, end-to-end performance and handovers Includes completely updated antenna beamforming and multiuser detection sections featuring new simulation results Introduces TD-SCDMA and compares it to Release TDD

Radio Interface System Planning for GSM/GPRS/UMTS-Jukka Lempiäinen 2007-05-08 This broadly applicable book introduces radio system planning, emphasizing theoretical and practical details for the planning of GSM, GPRS and UMTS mobile networks. It explains the key planning parameters for these systems and describes the common tasks in radio system planning.

Fundamentals of Network Planning and Optimisation 2G/3G/4G-Ajay R. Mishra 2018-11-05 Updated new edition covering all aspects of network planning and optimization This welcome new edition provides comprehensive coverage of all aspects of network planning in all the technologies, from 2G to 5G, in radio, transmission and core aspects. Written by leading experts in the field, it serves as a handbook for anyone engaged in the study, design, deployment and business of cellular networks. It increases basic understanding of the currently deployed, and emerging, technologies, and helps to make evolution plans for future networks. The book also provides an overview of the forthcoming technologies that are expected to make an impact in the future, such as 5G. Fundamentals of Cellular Network Planning and Optimization, Second Edition encompasses all the technologies as well as the planning and implementation details that go with them. It covers 2G (GSM, EGPRS), 3G (WCDMA) and 4G (LTE) networks and introduces 5G. The book also looks at all the sub-systems of the network, focusing on both the practical and theoretical issues. Provides comprehensive coverage of the planning aspects of the full range of today's mobile network systems, covering radio access network, circuit and packet switching, signaling, control, and backhaul/Core transmission networks New elements in book include HSPA, Ethernet, 4G/LTE and 5G Covers areas such as Virtualization, IoT, Artificial Intelligence, Spectrum Management and Cloud By bringing all these concepts under one cover, Fundamentals of Cellular Network Planning and Optimization becomes essential reading for network design engineers working with cellular service vendors or operators, experts/scientists working on end-to-end issues, and undergraduate/post-graduate students.

Understanding UMTS Radio Network Modelling, Planning and Automated Optimisation-Maciej Nawrocki 2006-07-06 This book sets out to provide the theoretical foundations that will enable radio network planners to plan model and optimize radio networks using state-of-the-art findings from around the globe. It adopts a logical approach, beginning with the background to the present status of UMTS radio network technology, before devoting equal coverage to planning, modelling and optimization issues. All key planning areas are covered, including the technical and legal implications of network infrastructure sharing, hierarchical cell structure (HCS) deployment, ultra-high site deployment and the benefits and limitations of using computer-aided design (CAD) software. Theoretical models for UMTS technology are explained as generic system models, stand-alone services and mixed services. Business modelling theory and methods are put forward, taking in propagation calculations, link-level, UMTS static and UMTS dynamic simulations. The challenges and goals of the automated optimization process are explored in depth using cutting-edge cost function and optimization algorithms. This theory-based resource containing prolific illustrative case studies explains the reasons for UMTS radio networks performance issues and how to use this foundational knowledge to model, plan and optimize present and future systems.

The LTE / SAE Deployment Handbook-Jyrki T. J. Penttinen 2011-11-30 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

Advanced Cellular Network Planning and Optimisation-Ajay R. Mishra 2007-01-11 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

UMTS Networks-Heikki Kaaranen 2005-07-08 Building on the success of the first edition, UMTS Networks second edition allows readers to continue their journey through UMTS up to the latest 3GPP standardization phase, Release 5. Containing revised, updated and brand new material, it provides a comprehensive view on the UMTS network architecture and its latest developments. Accompanied by numerous illustrations, the practical approach of the book benefits from the authors' pioneering research and training in this field. Provides a broad yet detailed overview of the latest worldwide developments in UMTS technology. Includes brand new sections on the IP Multimedia Subsystem and High Speed Downlink Packet Access according to 3GPP Release 5 specifications. Contains heavily revised sections on the evolution from GSM to UMTS Multi-access, the UMTS Radio Access Network, the UMTS Core Network and services. Includes updated versions on services in the UMTS environment, security in the UMTS environment and UMTS protocols. Illustrates all points with cutting-edge practical examples gleaned from the authors' research and training at the forefront of UMTS. The illustrative, hands-on approach will appeal to operators, equipment vendors, systems designers, developers and marketing professionals who require comprehensive, practical information on the latest developments in UMTS. This second edition will also benefit students and researchers in the field of mobile networking.

LTE - The UMTS Long Term Evolution-Stefania Sesia 2011-08-29 "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, femto 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, Deployment and Performance of 4G-LTE Networks-Ayman ElNashar 2014-03-13 This book provides an insight into the key practical aspects and best practice of 4G-LTE network design, performance, and deployment Design, Deployment and Performance of 4G-LTE Networks addresses the key practical aspects and best practice of 4G networks design, performance, and deployment. In addition, the book focuses on the end-to-end aspects of the LTE network architecture and different deployment scenarios of commercial LTE networks. It describes the air interface of LTE focusing on the access stratum protocol layers: PDPC, RLC, MAC, and Physical Layer. The air interface described in this book covers the concepts of LTE frame structure, downlink and uplink scheduling, and detailed illustrations of the data flow across the protocol layers. It describes the details of the optimization process including performance measurements and troubleshooting mechanisms in addition to demonstrating common issues and case studies based on actual field results. The book provides detailed performance analysis of key features/enhancements such as C-DRX for Smartphones battery saving, CSFB solution to support voice calls with LTE, and MIMO techniques. The book presents analysis of LTE coverage and link budgets alongside a detailed comparative analysis with HSPA+. Practical link budget examples are provided for data and VoLTE scenarios. Furthermore, the reader is provided with a detailed explanation of capacity dimensioning of the LTE systems. The LTE capacity analysis in this book is presented in a comparative manner with reference to the HSPA+ network to benchmark the LTE network capacity. The book describes the voice options for LTE including VoIP protocol stack, IMS Single Radio Voice Call Continuity (SRVCC). In addition, key VoLTE features are presented: Semi-persistent scheduling (SPS), TTI bundling, Quality of Service (QoS), VoIP with C-DRX, Robust Header Compression (RoHC), and VoLTE Vocoders and De-Jitter buffer. The book describes several LTE and LTE-A advanced features in the evolution from Release 8 to 10 including SON, eCIIC, CA, CoMP, HetNet, Enhanced MIMO, Relays, and LBS. This book can be used as a reference for best practices in LTE networks design and deployment, performance analysis, and evolution strategy. Conveys the theoretical background of 4G-LTE networks Presents key aspects and best practice of 4G-LTE networks design and deployment Includes a realistic roadmap for evolution of deployed 3G/4G networks Addresses the practical aspects for designing and deploying commercial LTE networks. Analyzes LTE coverage and link budgets, including a detailed comparative analysis with HSPA+. References the best practices in LTE networks design and deployment, performance analysis, and evolution strategy Covers infrastructure-sharing scenarios for CAPEX and OPEX saving. Provides key practical aspects for supporting voice services over LTE, Written for all 4G engineers/designers working in network design for operators, network deployment engineers, R&D engineers, telecom consulting firms, measurement/performance tools firms, deployment subcontractors, senior undergraduate students and graduate students interested in understanding the practical aspects of 4G-LTE networks as part of their classes, research, or projects.

UMTS Signaling-Ralf Kreher 2012-04-27 This completely revised and updated edition of the highlysuccessful UMTS Signaling provides a deep insight into allaspects of UMTS signaling. The chapter structure has been reworkedfor improved "usability" for readers, as well asincluding many new features and updates. The successful trial, deployment, operation and troubleshootingof 3G or UMTS infrastructures and applications is the biggestchallenge facing today's mobile communications. Networkelement instability, network element and multi-vendorinteroperability, configuration and network planning faults arejust a few of the challenges affecting performance andprofitability that need to be addressed. This book is an invaluableguide to resolving such problems. Highlights of the Second Edition: Includes new information and scenarios on HSPA / HSDPA / HSUPA and IMS Covers not only WCDMA, but also TD-SCDMA issues Contains up-to-date information on releases 5 and 6, andincludes a new chapter on the future releases 7 and 8 Provides crucial information for network operators andequipment suppliers keen to understand how to handle and analyseUMTS signaling procedures in order to get the network interoperation, detect errors and troubleshoot faults Uses first hand, real world information to explain issues whicheare unclear in the standards Includes comprehensive descriptions and documentation of UMTSreference scenarios for different UMTS procedures The unified comprehensive approach taken by the authors makesthis book essential reading for engineers in network operators,integrators or system suppliers who need to be at the cutting edgeof this technology. It will also be an invaluable resource forpostgraduates on telecommunications courses, especially those with focus on signal analysis.

Fundamentals of Cellular Network Planning and Optimisation-Ajay R. Mishra 2004-11-19 "By 2008, some 2 billion people will be using mobile phones and devices, in many cases to access advanced data services. Against this backdrop, the need for efficient and effective network design will be critical to the success of increasingly complex mobile networks." Simon Beresford-Wylie (SVP, Nokia Networks) With the complexity of the cellular networks increasing day by day, a deeper understanding of the design and performance of end-to-end cellular networks is required. Moreover, all the types of networks from 2G-2.5G-3G seem to co-exist. Fundamentals of Cellular Network Planning and Optimisation covers end-to-end network planning and optimisation aspects from second generation GSM to third generation WCDMA networks including GPRS and EDGE networks. All the sub-systems of the network i.e. radio network, transmission network and core network have been covered with focus on both practical and theoretical issues. By bringing all these concepts under one cover, this book becomes essential reading for the network design engineers working either with cellular service vendors or operators, experts/scientists working on end-to-end issues and undergraduate/post-graduate students. Key Highlights: Distinctly divided into four parts: 2G (GSM), 2.5G (GPRS & EDGE), 3G (WCDMA) and introduction to 4G (OFDM, ALL-IP, WLAN Overview) respectively Each part focuses on the radio, transmission and core networks. Concentrates on cellular network planning process and explains the underlying principles behind the planning and optimizing of the cellular networks. The text will serve as a handbook for anyone engaged in the study, design, deployment and business of cellular networks.

The UMTS Network and Radio Access Technology-Jonathan P. Castro 2001-04-18 The UMTS Network and Radio Access Technology covers all the key aspects of UMTS and its implementation from both the engineering design and the operator and service providers' point of view. It addresses the essential tasks involved in UMTS network deployment in new regions and within existing 2G networks. Presenting solutions for the integration and coexistence of 2G and 3G systems it discusses the seamless interoperability functions between GSM and UMTS. Looking forward, it also covers the critical issues of Release 2000 in order to prepare for the transition towards the wider and deeper utilisation of IP platforms. By providing one integrated source for those interested in UMTS and its applications in networking and services, The UMTS Network and Radio Access Technology will be the key text for design engineers, operator and service providers. Researchers, postgraduates and senior undergraduates will also find it an indispensable source. \* Covers the pragmatic evolution of 2G to 3G systems e.g. GSM to UMTS \* Addresses the entire UMTS air interface specification i.e. FDD and TDD modes \* Introduces the integrated (circuit packet switching) UMTS core network architecture \* Presents the performance and management issues of UMTS \* Provides the network deployment and coverage aspects of 3G networks

HSPA+ Evolution to Release 12-Harri Holma 2014-07-08 A comprehensive reference book codifying the variousstandards releases for High Speed Packet Access (HSPA) wireless technology HSPA evolution has maintained its prominence through Releases7-11 but the evolution is coming to an end with Release 12, withthe focus moving to LTE. However, HSPA network and terminal saleswill continue for many years; HSPA is expected to remain as thenumber one radio access technology from the sales point of view farbeyond 2015. This timely book examines the complete HSPA evolution and will be the ultimate long term reference for HSPAevolution. Headed by the successful editing team of Holma, Toskala andTapi, industry experts look at HSPA evolution including completeRelease 11 and the main additions in Release 12. They describe 3GPPDefinitions, field measurement, expected performance, practicaloptimization guidelines and the implications to the devices and tothe networks. The book also covers MIMO antenna solutions andmulticarrier evolution to provide higher data rates. Dedicatedchapters include Continuous Packet Connectivity and High SpeedCommon Channels which provide major improvement to the smartphonecapacity, end user performance and power consumption. The bookassumes basic understanding of mobile communications yet thematerial is presented in an understandable way which can be enjoyedwithout any pre-information about MIMO or other technologyolutions. A comprehensive reference book codifying the various standardsreleases for High Speed Packet Access (HSPA) wireless technology Leading editor and contributor team focusing their expertise on3GPP features and performance, including Self Organizing Networks,LTE Interworking, Smartphone Optimization and Voice Evolution Dedicated chapter covering VoIP over HSPA, recognizing thattelephony will continue to bring most of the revenues to mobileoperators in the near future Includes tables, figures and plots Illustrating the concepts orsimulation results, to aid readers' understanding of thotopic An essential resource for R&D engineers by network, terminaland chip set vendors, network engineers with operators, applicationdevelopers, regulators.

Introduction to 3G Mobile Communications-Juha Korhonen 2003 This newly revised edition of an Artech House bestseller provides you with an up-to-date introduction to third generation (3G) mobile communication system principles, concepts, and applications. The book clearly presents the basics of UMTS systems in one comprehensive volume, without bogging you down with advanced mathematics. The second edition includes an even more thorough treatment of potential 3G applications and descriptions of new, emerging technologies such as 3G System Release number 5, HSDPA, and Multimedia Broadcast/Multicast Service (MBMS). It also features discussions on both 3GPP and 3GPP2 evolution paths, the specification process, and future 3G upgrades.

UMTS Performance Measurement-Ralf Kreher 2006-07-11 UMTS Performance Measurement is a practical guide that explains how to identify and measure the main problems seen in today's UMTS live networks and will make performance measurement results gathered in the UTRAN environment understandable for the reader. It provides a fundamental background for daily work in the field or lab, covering a wide range of performance measurements that help to troubleshoot and optimize the UTRAN environment. The content goes far beyond what has been defined by international standard bodies like 3GPP and closes the gap between international standards and definitions of network equipment manufacturers (NEM) and network operators. The emphasis is on definition of Key Performance Indicators (KPIs) and measurements that are not described in 3GPP standard documents, such as throughput measurements and the success/failure analysis of all possible handover types. Includes clear coverage of the fundamentals of performance measurement software architecture and ways to collect and present statistical data Contains numerous call flow diagrams, conversion tables, protocol message examples and sample measurement results that can be used as reference for daily work in the field or lab Explains measurement limitations and how tolerances provide valuable information for validation and evaluation of measurement results Provides an overview of how performance measurement software works as well as information on how data streams are captured and analyzed, and how analysis results are aggregated and presented in graphic user interfaces and reports Providing a gateway into the world of UMTS-specific measurement scenarios and a general overview of what can be defined and measured at an in-depth technical level, this book will appeal to those involved in network operation, planning, configuration and deployment, as well as consulting and training companies, students, technical journalists and measurement equipment manufacturers.

The Telecommunications Handbook-Jyrki T. J. Penttinen 2015-01-13 This practical handbook and reference provides a complete understanding of the telecommunications field supported by descriptions and case examples throughout Taking a practical approach, The Telecommunications Handbook examines the principles and details of all of the major and modern telecommunications systems currently available to industry and to end-users. It gives essential information about usage, architectures, functioning, planning, construction, measurements and optimisation. The structure of the book is modular, giving both overall descriptions of the architectures and functionality of typical use cases, as well as deeper and practical guidelines for telecom professionals. The focus of the book is on current and future networks, and the most up-to-date functionalities of each network are described in sufficient detail for deployment purposes. The contents include an introduction to each technology, its evolution path, feasibility and utilization, solution and network architecture, and technical functioning of the systems (signalling, coding, different modes for channel delivery and security of core and radio system). The planning of the core and radio networks (system-specific field test measurement guidelines, hands-on network planning advices and suggestions for the parameter adjustments) and future systems are also described. Each chapter covers aspects individually for easy reference, including approaches such as: functional blocks, protocol layers, hardware and software, planning, optimization, use cases, challenges, solutions to potential problems Provides very practical detail on the planning and operation of networks to enable readers to apply the content in real-world deployments Bridges the gap between the communications in the academic context and the practical knowledge and skills needed to work in the telecommunications industry Section divisions include: General theory; Fixed telecommunications; Mobile communications; Space communications; Other and special communications; and Planning and management of telecommunication networks Covers new commercial and enhanced systems deployed, such as IPv6 based networks, LTE-Advanced and GALILEO An essential reference for Technical personnel at telecom operators; equipment and terminal manufacturers; Engineers working for network operators.

Introduction to Mobile Network Engineering: GSM, 3G-WCDMA, LTE and the Road to 5G-Alexander Kukushkin 2018-07-03 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.

Femtocells-Jie Zhang 2011-09-26 This book provides a comprehensive and organized explanation of the femtocell concepts, architecture, air interface technologies, and challenging issues arising from the deployment of femtocells, such as interference, mobility management and self-organization. The book details a system level simulation based methodology addressing the key concerns of femtocell deployment such as interference between femto and macrocells, and the performance of both femto and macrocell layers. In addition, key research topics in interference modeling and mitigation, mobility management and Self-Organizing Network (SON) are highlighted. The authors also introduce HNB/HeNB standardization in 3GPP. Furthermore, access methods (closed, open and hybrid), applications, timing synchronization, health issues, business models and security are discussed. The authors also provide a comparison between femtocells and other indoor coverage techniques such as picocells, repeaters, distributed antenna systems and radio over fiber. Lastly, both CDMA and OFDMA based femtocells are covered. Key Features: Provides a comprehensive reference on femtocells and related topics Offers the latest research results on femtocells based on simulation and measurements Gives an overview of indoor coverage techniques such as picocells, repeaters, distributed antenna systems, radio over fiber and femtocells Includes femtocells in femtocell access network architecture, air interface technologies (GSM, UMTS, HSPA, WiMAX and LTE), femtocell simulation, interference analysis and mitigation in femto/macrocell networks, mobility management in femto/macrocell networks, femtocell self-organization and other key challenges such as timing synchronization and security faced by femtocell deployment Points to over 240 references from 3GPP, The Femto Forum, Journals and conference proceedings This book will be an invaluable guide for RF engineers from operators, R&D engineers from femtocells hardware manufacturers, employees from regulatory bodies, radio network planners, academics and researchers from universities and research organizations. Students undertaking wireless communications courses will also find this book insightful.

Deploying Wireless Networks-Andy Wilton 2008-09-18 Do you want your wireless network to be profitable? Wireless operators will find this practical, hands-on guide to network deployment invaluable. Based on their own extensive experience, the authors describe an end-to-end network planning process to deliver the guaranteed Quality of Service (QoS) that enables today's wireless IP services such as VoIP, WWW and streaming video. The trade-off between enhanced user experience and operator cost is explored in the context of an enhanced business model. Comprehensive examples are provided for: • GSM/GPRS/EDGE • WCDMA-UMTS/HSDPA • OFDM-WiMAX/LTE • mesh WiFi • packet backhaul Topics addressed include: • capacity/peak data rates • service latency • link budgets • lifecycle costs • network optimisation With a focus on practical design, the book is ideal for radio and core network planners, designers, optimisers and business development staff at operators and network equipment manufacturers. Extensive references also make it suitable for graduate and postgraduate students.

Efficient Methods for WCDMA Radio Network Planning and Optimization-Ulrich Türke 2007-12-08 Ulrich Türke introduces innovative models and algorithms for the evaluation of WCDMA/UMTS network performance. He establishes an advanced snapshot analysis method which allows the efficient and accurate analysis of large radio networks. The author develops two statistical evaluation methods which furnish quick approximations of relevant results from snapshot simulations. Finally, he discusses the application of these methods to automatic network optimization. The majority of the developed strategies are successfully applied in a commercial radio network planning and optimization tool.

Introduction to Mobile Network Engineering: GSM, 3G-WCDMA, LTE and the Road to 5G-Alexander Kukushkin 2018-09-04 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.

Indoor Radio Planning-Morten Tolstrup 2015-04-13 Why is high performance indoor wireless service needed, and how is it best implemented? As the challenge of providing better service and higher data speeds and quality for mobile applications intensifies, ensuring adequate in-building and tunnel coverage and capacity is increasingly important. A unique, single-source reference on the theoretical and practical knowledge behind indoor and tunnel radio planning, this book provides a detailed overview of mobile networks systems, coverage and capacity solutions with 2G, 3G and 4G cellular system technologies as a backdrop.

LTE for UMTS-Harri Holma 2009-04-01 From the editors of the highly successful WCDMA for UMTS, this new book gives a complete and up-to-date overview of Long Term Evolution (LTE) in a systematic and clear manner. It starts with an in-depth explanation of the background and standardization process before moving on to examine the system architecture evolution (SAE). The basics of air interface modulation choices are introduced and key subjects such as 3GPP LTE physical layer and protocol solutions are described. Mobility aspects and radio resource management together with radio and end-to-end performance are assessed. The voice solution and voice capacity in LTE are also illustrated. Finally, the main differences between LTE TDD and FDD modes are examined and HSPA evolution in 3GPP Releases 7 and 8 is described. LTE for UMTS is one of the first books to provide a comprehensive guide to the standards and technologies of LTE. Key features of the book include: Covers all the key aspects of LTE in a systematic manner Presents full description of 3GPP Release 8 LTE Examines the expected performance of LTE Written by experts actively involved in the 3GPP standards and product development.

HSPA Performance and Evolution-Pablo Tapia 2009-03-03 Written from an operator's viewpoint, HSPA Performance and Evolution explores the lessons learned and techniques developed for optimally deploying HSPA (High Speed Packet Access). The essential distinctions between rolling out HSPA compared to earlier UMTS and GSM technologies are explained covering the many issues that must be specifically handled. Areas in standards which have been left open for interpretation, causing significant differences between vendor implementations, are identified and solutions explored. This book is invaluable in enabling wireless operators to extract maximum performance offered by 3GPP's HSPA radio technology, consisting of both downlink (HSDPA) and uplink (HSUPA) elements. It focuses on real-world performance, sharing practical implementation methods and tradeoffs for deploying, optimizing and maintaining networks using the HSPA air interface. Examines algorithms, equipment and performance perspectives to identify and explain HSPA Measures performance and sets network parameters for optimal tradeoffs Presents results from practical and real-world network performances Explores the evolution of HSPA technology into HSPA+ and eventually next generation LTE technologies

Self-Organizing Networks-Juan Ramiro 2011-10-27 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.

Cellular Technologies for Emerging Markets-Ajay R. Mishra 2010-09-29 In this book, the author addresses technologies that are being used in emerging cellular markets. These include GSM/EGPRS and CDMA which are being deployed at a rapid pace, while technologies such as UMTS (3G)/ HSPA (3.5G) which have started to find a place in these high growth markets, are also considered. The book examines other technologies including LTE (3.9G) which have already moved out of research labs into the commercial world. 2G-CDMA is widely used, while further developments, e.g. CDMA2000 are also finding acceptance in the commercial arena. IMS/Convergence is increasingly popular all over the world; UMA, which is deployed mostly in North America; and DVB which is gaining worldwide popularity, especially in South Asia, are all reviewed. Each chapter discusses a different technology and is structured into three parts. The technology is examined at an overview level, first explaining what the technology is and then considering the technical features of the technology. The chapter concludes by looking at the planning/implementation aspects of the technology. Key Features: Useful for all cellular industry professionals as provides an overview of the currently deployed technologies in mass scale, and the forthcoming technologies that are expected to make an impact in the future, such as 4th Generation Cellular Networks. One of the first books on the market to encompass all the major cellular technologies, as well as considering the design and implementation perspective. Wireless Technology will play a key role in uplifting the economies of the Emerging countries globally. Ashok Chandra, Wireless Advisor to Govt. of India

Convergence Technologies for 3G Networks-Jeffrey Bannister 2004-02-13 The merging of voice and data on a single network opens powerful new possibilities in communications. Only a fundamental understanding of both technologies will ensure you are equipped to maximise their full potential. Convergence Technologies for 3G Networks describes the evolution from cellular to a converged network that integrates traditional telecommunications and the technology of the Internet. In particular, the authors address the application of both IP and ATM technologies to a cellular environment, including IP telephony protocols, the use of ATM/AAL2 and the new AAL2 signalling protocol for voice/multimedia and data transport as well as the future of the UMTS network in UMTS Release 5/6 All-IP architecture. Convergence Technologies for 3G Networks: Explains the operation and integration of GSM, GPRS, EDGE, UMTS, CDMA2000, IP, and ATM. Provides practical examples of 3G connection scenarios. Describes signalling flows and protocol stacks. Covers IP and ATM as used in a 3G context. Addresses issues of QoS and real-time application support. Includes IP/SS7 internetworking and IP softswitching. Outlines the architecture of the IP Multimedia Subsystem (IMS) for UMTS. Convergence Technologies for 3G Networks is suited for professionals from the telecommunications, data communications and computer networking industries..

Mobility Protocols and Handover Optimization-Ashutosh Dutta 2014-03-07 This book provides a common framework for mobility management that considers the theoretical and practical aspects of systems optimization for mobile networks. In this book, the authors show how an optimized system of mobility management can improve the quality of service in existing forms of mobile communication. Furthermore, they provide a theoretical approach to mobility management, as well as developing the model for systems optimization, including practical case studies using network layer and mobility layer protocols in different deployment scenarios. The authors also address the different ways in which the specific mobility protocol can be developed, taking into account numerous factors including security, configuration, authentication, quality of service, and movement patterns of the mobiles. Key Features: Defines and discusses a common set of optimization methodologies and their application to all mobility protocols for both IPv4 and IPv6 networks Applies these technologies in the context of various layers: MAC layer, network layer, transport layer and application layer covering 802.11, LTE, WiMax, CDMA networks and protocols such as SIP, MIP, HIP, VoIP, and many more Provides a thorough analysis of the required steps during a mobility event such as discovery, network selection, configuration, authentication, security association, encryption, binding update, and media direction Includes models and tables illustrating the analysis of mobility management as well as architecture of sample wireless and mobility test beds built by the authors, involving inter-domain and intra-domain mobility scenarios This book is an excellent resource for professionals and systems architects in charge of designing wireless networks for commercial (3G/4G), LTE, IMS, military and Ad Hoc environment. It will be useful deployment guide for the architects wireless service providers. Graduate students, researchers in industry and academia, and systems engineers will also find this book of interest.

3G Networks-Sumit Kasper 2004 In India, the mobile subscribers base is increasing at a phenomenal rate. After the successful adoption of Second Generation (2G) Technology GSM and 2.5G Technology GPRS, the industry is now rapidly moving towards Third Generation (3G) Networks. The book, written by two young engineers, touches almost every imaginable aspect of a 3G Network, spanning across topics such as: UMTS Network Architecture (including Access Network and Core Network), Protocols (including RRC, NBAP, RANAP, MM/GMM, MAP and GTP), Procedures (including UTRAN Procedures, Mobility Management, Call/Session handling and Security Management), and Services (including Supplementary Services and Value-added Services). Also the book covers topics like IP Multimedia Sub-system (IMS) and SIGTRAN. Besides these, the book includes the status of deployment of 3G UMTS Networks across the world and provides a brief introduction to 4G Networks setting the tone for future advancements.

IP Design for Mobile Networks-Mark Grayson 2009-06-11 As the cellular world and the Internet converge, mobile networks are transitioning from circuit to packet and the Internet Protocol (IP) is now recognized as the fundamental building block for all next-generation communication networks. The all-IP vision provides the flexibility to deliver cost-effective services and applications that meet the evolving needs of mobile users. RF engineers, mobile network designers, and system architects will be expected to have an understanding of IP fundamentals and how their role in delivering the end-to-end system is crucial for delivering the all-IP vision that makes the Internet accessible anytime, anywhere. IP Design for Mobile Networks discusses proper IP design theory to effectively plan and implement your next-generation mobile network so that IP integrates all aspects of the network. The book outlines, from both a standards and a design theory perspective, both the current and target state of mobile networks, and the technology enablers that will assist the migration. This IP transition begins with function-specific migrations of specific network domains and ends with an end-to-end IP network for radio, transport, and service delivery. The book introduces many concepts to give you exposure to the key technology trends and decision points affecting today's mobile operators. The book is divided into three parts: Part I provides an overview of how IP is being integrated into mobile systems, including radio systems and cellular networks. Part II provides an overview of IP, the technologies used for transport and connectivity of today's cellular networks, and how the mobile core is evolving to encompass IP technologies. Part III provides an overview of the end-to-end services network based on IP, including context awareness and services. Presents an overview of what mobile networks look like today-including protocols used, transport technologies, and how IP is being used for specific functions in mobile networks Provides an all-inclusive reference manual for IP design theory as related to the broader application of IP for mobile networks Imparts a view of upcoming trends in mobility standards to better prepare a network evolution plan for IP-based mobile networks This book is part of the Networking Technology Series from Cisco Press®, which offers networking professionals valuable information for constructing efficient networks, understanding new technologies, and building successful careers. ciscopress.com

An Introduction to LTE-Christopher Cox 2014-05-12 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.

Wireless Network Evolution-Vijay Kumar Garg 2002 3G networks: architecture, planning, migration, management, and optimization. Network architectures, planning, management, and optimization 3G air interfaces: UTRA/W-CDMA and cdma2000 3G data services: UTRA/W-CDMA, cdma2000, GPRS, and EDGE Evolutionary paths for 2G networks WLL, WAP, and more New 3G systems will trigger an explosion in wireless Internet and data applications by delivering far higher data rates than have ever been possible in wireless systems before. In "Wireless Network Evolution: 2G to 3G," renowned wireless expert Vijay K. Garg covers key 3G standard and every technical issue associated with planning, management, and optimization of 3G systems. Garg reviews the fundamental principles underlying existing 2G systems, then offers specific, practical guidance on migration to 3G. Coverage includes: 3G standards activities 3G European and North American systems 3G data services for UTRA/W-CDMA, cdma2000, GPRS, and EDGE networks Wireless Application Protocol (WAP) and 3G systems Major 3G enhancements for WLL applications New RF optimization techniques for 3G systems "Wireless Network Evolution: 2G to 3G" will be an invaluable resource for every practicing telecommunications engineer and technical decision maker involved in 3G planning, deployment, or management.

Forensic Radio Survey Techniques for Cell Site Analysis-Joseph Hoy 2015-02-23 "This book is intended to serve two purposes: to provide a coherent explanation of the theories and procedures that underpin forensic radio surveying and of the network technologies being surveyed in a form that can be read cover to cover as a text book; but also to act as a reference resource that can be dipped into as needed"--

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