

# Radio Interface System Planning for GSM/GPRS/UMTS

Jukka Lempiäinen  
Matti Manninen



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**Maciej J. Nawrocki, Mischa  
Dohler, Hamid Aghvami**



## **Radio Interface System Planning For Gsm Gprs Umts:**

**Radio Interface System Planning for GSM/GPRS/UMTS** Jukka Lempiäinen, Matti Manninen, 2001-10-31 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 Radio Interface System Planning for GSM/GPRS/UMTS Jukka Lempiäinen, Matti

Manninen, 2007-05-08 Radio network system planning is a comprehensive optimisation task where different planning targets coverage capacity and quality have a direct influence on each other and where optimised solution is a compromise of these planning areas In order to find out the cost effective and high quality radio network plan the well known theoretical details have to be bound with practical radio planning issues like planning phases and planning parameters At the same time the long term network evolution paths and the possible changes of the radio propagation environment have to be well understood Radio Interface System Planning for GSM GPRS UMTS introduces the radio system planning where these theoretical and practical details have both been emphasized and then utilized for the planning of GSM GPRS and UMTS mobile networks The key planning parameters for these systems are explained and the typical values for power budget various margins gains and losses and frequency reuse are given Also the book describes the common tasks in radio system planning The planning methods and phases introduced in the book can also be applied to other mobile communication systems **UMTS Radio Network Planning, Optimization and QoS Management** Jukka Lempiäinen, Matti

Manninen, 2007-05-08 In cellular networks a new generation of CDMA or WCDMA based networks will start operations in most countries in the near future The standardized WCDMA technology generates new challenges in radio network planning optimization and QoS management because of the dynamic nature of its radio interface and various new services and different network operating modes Moreover new and modified radio planning phases as well as new field measurements and emphasized QoS management are needed when UMTS networks are designed and optimized Hence a practical UMTS planning process must be defined in detail from dimensioning to optimization tasks This book follows the UMTS planning process It is organized in three parts Part I UMTS configuration planning Part II UMTS topology planning and Part III UMTS network functionality The first chapter in Part I introduces the UMTS and UTRAN systems and radio network planning strategy and defines a planning process for UMTS In Chapter 2 the UMTS planning process is covered and a detailed description of the UMTS power budget is given with planning threshold examples provided *UMTS Signaling* Ralf Kreher, Torsten Rüdebusch, 2012-04-27 This completely revised and updated edition of the highly successful UMTS Signaling provides a deep insight into all aspects of UMTS signalling The chapter structure has been reworked for improved usability for readers as well as including many new features and updates The successful trial deployment operation and troubleshooting of 3G or UMTS infrastructures and applications is the biggest challenge facing today's mobile

communications Network element instability network element and multi vendor interoperability configuration and network planning faults are just a few of the challenges affecting performance and profitability that need to be addressed This book is an invaluable guide 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 and includes a new chapter on the future releases 7 and 8 Provides crucial information for network operators and equipment suppliers keen to understand how to handle and analyse UMTS signaling procedures in order to get the network into operation detect errors and troubleshoot faults Uses first hand real world information to explain issues which are unclear in the standards Includes comprehensive descriptions and documentation of UMTS reference scenarios for different UMTS procedures The unified comprehensive approach taken by the authors makes this book essential reading for engineers in network operators integrators or system suppliers who need to be at the cutting edge of this technology It will also be an invaluable resource for postgraduates on telecommunications courses especially those with a focus on signal analysis

**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 Ojanper Chief Technology Officer Nokia Networks

**Handbook of Research on Telecommunications Planning and Management for Business** Lee, In, 2009-03-31 This book provides original in depth and innovative articles on telecommunications policy management and business applications Provided by publisher

*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

**Research, Practice, and Educational Advancements in Telecommunications and Networking** Bartolacci, Michael, Powell, Steven R., 2012-01-31 The study of telecommunications and networking allows us to understand existing modes of communication and information transfer while also developing new methods for managing modeling and regulating the exchange of information

**Research Practice and Educational Advancements in Telecommunications and Networking** offers multidisciplinary perspectives on architectures and systems for effective efficient communication across different types of infrastructures which include online and wireless networks Collecting research on mobile ad hoc networks VoIP and mobile recommendation systems this book provides theoretical discussions as well as practical research on new and emerging developments in telecommunications and networking

**Fundamentals of Network Planning and Optimisation 2G/3G/4G** Ajay R. Mishra, 2018-07-24 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 *Radio Network Planning and Optimisation for UMTS* Jaana Laiho,Achim Wacker,Tomáš Novosad,2002 Radio Network Planning and Optimisation for UMTS comprehensively explains how to dimension plan and optimise UMTS Universal Mobile Telecommunication Systems networks It introduces the properties of the spread spectrum system and provides a general overview of the physical layer of FDD WCDMA The radio network planning process for WCDMA is clearly presented and detailed information on how to dimension plan and rollout a 3G network both theoretically and practically is provided 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 Includes automation examples of radio resource management Focuses on WCDMA FDD and introduces WCDMA TDD GPRS and EDGE and examines their interaction and synergy Provides an excellent source of information for those considering future cellular networks where Quality of Service QoS is of paramount importance Analyses the radio network planning challenges and opportunities for both greenfield and existing operators Includes an accompanying CD ROM featuring a static radio network simulator implemented in MATLAB r Authoritative and instructive this text will have instant appeal to wireless operators and network and terminal manufacturers It will also be essential reading for university students frequency regulation bodies and everyone interested in radio network planning and optimisation especially RF network systems engineering professionals MATLAB r is a registered trademark of The MathWorks Inc **Computational Science and Its Applications - ICCSA 2017** Osvaldo Gervasi,Beniamino Murgante,Sanjay Misra,Giuseppe Borruso,Carmelo M. Torre,Ana Maria A.C. Rocha,David Taniar,Bernady O. Apduhan,Elena Stankova,Alfredo Cuzzocrea,2017-07-14 The six volume set LNCS 10404 10409 constitutes the refereed proceedings of the 17th International Conference on Computational Science and Its Applications ICCSA 2017 held in Trieste Italy in July 2017 The 313 full papers and 12 short papers included in the 6 volume proceedings set were carefully reviewed and selected from 1052 submissions Apart from the general tracks ICCSA 2017 included 43 international workshops in various areas of computational sciences ranging from computational science technologies to specific areas of computational sciences such as computer graphics and virtual reality Furthermore this year ICCSA 2017 hosted the XIV International Workshop On Quantum Reactive Scattering The program also featured 3 keynote speeches and 4 tutorials **Knowledge Discovery Practices and Emerging Applications of Data Mining: Trends and New Domains** Kumar, A.V. Senthil,2010-08-31 Knowledge

Discovery Practices and Emerging Applications of Data Mining Trends and New Domains introduces the reader to recent research activities in the field of data mining This book covers association mining classification mobile marketing opinion mining microarray data mining internet mining and applications of data mining on biological data telecommunication and distributed databases among others while promoting understanding and implementation of data mining techniques in emerging domains

Strategic Innovations and Interdisciplinary Perspectives in Telecommunications and Networking Meghanathan, Natarajan,2019-02-22 The lack of clear communication especially internationally plagues the modern world in a variety of fields Researchers and practitioners within the modern networking and communication industries strive to discover new and innovative ways for humans to better contact one another Strategic Innovations and Interdisciplinary Perspectives in Telecommunications and Networking provides emerging research exploring the theoretical and practical aspects of network management and security as well as applications within computer science mobile and wireless computing and multimedia technology Featuring coverage on a broad range of topics such as coding theory mobile devices and contextual advertising this book is ideal for students researchers social media marketers brand managers networking professionals and engineers seeking current research on cross disciplinary applications of electrical engineering computer science and information technology

Multiple Access Protocols for Mobile Communications Alex Brand,Hamid Aghvami,2002-04-12 A comprehensive discussion of multiple access protocols for cellular systems and the consideration of the specific constraints and capabilities of second and third generation systems regarding the multiple access protocols Beginning by introducing the cellular concept and discussing second and third generation cellular communication systems including the evolution from these systems to IP based systems the authors then identify the requirements for and problems related to multiple access In accordance with ETSI and 3GPP standards a split is made into basic multiple access schemes such as CDMA TDMA and FDMA and multiple access protocols The pros and cons of CDMA and TDMA for third generation systems are discussed as well as medium access in GSM GPRS and UMTS essentially based on R ALOHA protocols in all these systems Data access delay and voice dropping performance is assessed and the different UTRA modes are considered Provides an accessible text for individuals with little prior knowledge of cellular communication systems or multiple access protocols Provides an overview of existing material on cellular communications multiple access protocols and a combination of the two Presents extensive research carried out by the authors including extended packet reservation multiple access protocols for TDMA CDMA and hybrid CDMA TDMA air interfaces protocol enhancements and modelling of the physical layer A valuable reference resource for researchers and engineers in the field of cellular communications and packet based communications as well as postgraduate and research students in this rapidly evolving field

**Comunicaciones Móviles. Sistemas GSM, UMTS y LTE** José Manuel Huidobro Moya,2012-02-21 El libro presenta los aspectos m s destacados de las Comunicaciones M viles con especial dedicaci n a los tres sistemas m s importantes a lo largo de su historia el GSM el UMTS

y el LTE cada uno representativo de una generaci n Hace un repaso por las tecnolog as b sicas FDMA TDMA CDMA OFDMA presenta el concepto celular trata los protocolos que se utilizan los terminales cada una de las redes y servicios existentes tanto privados como p blicos as como sus aplicaciones abarcando todos los aspectos relacionados con las comunicaciones de voz y de datos con especial dedicaci n a las comunicaciones de banda ancha para el acceso a Internet y a las intranets empresariales Se explican los sistemas actualmente en uso de 2 3 y 4 Generaci n GSM UMTS y LTE y otros de aplicaci n en entornos privados como TETRA con datos relativos a su normalizaci n implantaci n en el mercado r gimen de licencias interconexi n utilizaci n del espectro acceso a contenidos de Internet etc Adem s se comentan algunas de las aplicaciones m s importantes como es la comunicaci n M2M el pago a trav s del m vil las antenas inteligentes etc as como otros aspectos relacionados con el despliegue de las redes m viles Todo ello se explica desde una perspectiva actual de una manera clara y sencilla pero a la vez rigurosa de tal modo que el lector sin necesidad de conocimientos previos pueda seguirlo y entenderlo lo que se espera conseguir en base a la experiencia profesional que el autor acumula como escritor y docente a lo largo de muchos a os En el Ap ndice se incluye informaci n sobre las emisiones electromagn ticas y su influencia en la salud Tambi n se incluye la normativa en vigor al respecto Para finalizar se tiene un amplio glosario de t rminos y una extensa lista de referencias bibliogr ficas que constituyen una gran ayuda para el lector interesado en ampliar sus conocimientos sobre un mundo tan apasionante como es el de las comunicaciones m viles

Understanding UMTS Radio Network Modelling, Planning and Automated Optimisation Maciej J. Nawrocki, Mischa Dohler, Hamid Aghvami, 2006-06-16 Sets out to provide the theoretical foundations that enables radio network planners to plan model and optimize radio networks using state of the art findings from around the globe This book includes illustrative case studies and explains the reasons for UMTS radio networks performance issues

Information Networking Hyun-Kook Kahng, 2003-10-24 This book constitutes the thoroughly refereed post proceedings of the International Conference on Information Networking ICOIN 2003 held at Cheju Island Korea in February 2003 The 100 revised full papers presented were carefully selected during two rounds of reviewing and revision The papers are organized in topical sections on high speed network technologies enhanced Internet protocols QoS in the Internet mobile Internet network security network management and network performance

Indoor Radio Planning Morten Tolstrup, 2011-08-22 Why is indoor coverage needed and how it is best implemented As the challenge of providing 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 Indoor Radio Planning Second Edition provides an overview of mobile networks systems and coverage solutions with GSM UMTS HSPA and LTE cellular systems technologies as a backdrop All of the available solutions from basic passive distributed antenna systems DAS through to advanced fiber optic systems supporting MIMO and LTE are discussed in detail to give the reader a good understanding In addition there is a section covering multi operator systems as



this becomes a more and more utilized approach Systematically moving from the basic considerations through to advanced indoor planning aspects such as upgrading passive DAS from 2G to 3G noise analysis link budgets traffic calculations and software tools that can be used to help create in building designs are also covered Femtocells outdoor DAS and tunnel radio planning are newly included in this edition A new version of the bestseller updated with an introduction to LTE and treatments of modulation principle DAS systems for MIMO LTE designing repeater systems and elevator coverage Addresses the challenge of providing coverage inside train and high speed rail Outlines the key parameters and metrics for designing DAS for GSM DCS UMTS HSPA LTE Essential reading for engineering and planning personnel at mobile operators also giving a sound grounding in indoor radio planning for equipment manufacturers Written by a leading practitioner in the field with more than 20 years of practical experience      Practical Radio Resource Management in Wireless Systems Sofoklis A. Kyriazakos, George T. Karetsos, 2004 Despite frustrating customers and loss of revenue for telecommunications providers cellular network congestion has remained a problem for which few solutions have been found Covering GSM GPRS UMTS and beyond 3G systems this practical book breaks new ground by providing you with proven techniques for decreasing blocking and dropped call rate due to network congestion Using real measurements this book clearly shows you that the maximum traffic that can be accommodated in a wireless network is not a constant value and varies significantly      **GSM, GPRS and EDGE Performance** Timo Halonen, Javier Romero, Juan Melero, 2004-04-02 GSM GPRS and EDGE Performance Second Edition provides a complete overview of the entire GSM system GSM Global System for Mobile Communications is the digital transmission technique widely adopted in Europe and supported in North America It features comprehensive descriptions of GSM s main evolutionary milestones GPRS General Packet Radio Services is a packet based wireless communication service that promises data rates from 56 up to 114 Kbps and continuous connection to the Internet for mobile phone and computer users AMR and EDGE Enhanced Data GSM Environment and such developments have now positioned GERAN GSM EDGE Radio Access Network as a full 3G radio standard The radio network performance and capabilities of GSM GPRS AMR and EDGE solutions are studied in depth by using revealing simulations and field trials Cellular operators must now roll out new 3G technologies capable of delivering wireless Internet based multimedia services in a competitive and cost effective way and this volume divided into three parts helps to explain how 1 Provides an introduction to the complete evolution of GSM towards a radio access network that efficiently supports UMTS services GERAN 2 Features a comprehensive study of system performance with simulations and field trials Covers all the major features such as basic GSM GPRS EDGE and AMR and the full capability of the GERAN radio interface for 3G service support is envisaged 3 Discusses different 3G radio technologies and the position of GERAN within such technologies Featuring fully revised and updated chapters throughout the second edition contains 90 pages of new material and features the following new sections enabling this reference to remain as a leading text in the area Expanded material on GPRS Includes IMS architecture Rel 5 and

GERAN Rel 6 features Presents field trial results for AMR and narrowband Provides EGPRS deployment guidelines Features a new chapter on Service Performance An invaluable reference for Engineering Professionals Research and Development Engineers Business Development Managers Technical Managers and Technical Specialists working for cellular operators

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