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with WCDMA coding and multiplexing / essentials -- 2.4 Channels in the WCDMA radio interface -- 2.5 Modulation -- 2.6 Signal reception techniques -- 2.7 Radio resource management in the UMTS system -- 2.8 High-speed packet data transmission -- 2.9 Services -- 3 Long-Term Evolution -- 3.1 Introduction -- 3.2 System architecture -- 3.3 Transmission techniques in the LTE system -- 3.4 Channels in the radio interface of the LTE system -- 3.5 Radio resource management in LTE -- Part II Teletraffic Engineering for Mobile Networks -- 4 Basic Definitions and Terminology -- 4.1 Introduction -- 4.2 Call stream -- 4.3 Service stream -- 4.4 Markov processes -- 4.5 The concept of traffic -- 4.6 Quality of service in telecommunication systems -- 5 Basic Elements of Traffic Engineering used in Mobile Networks -- 5.1 Introduction -- 5.2 Erlang model -- 5.3 Engset model -- 5.4 Comments -- 6 Modeling of Systems with Single-Rate Overflow Traffic -- 6.1 Introduction -- 6.2 Basic information on overflow systems -- 6.3 Models of alternative groups -- 6.4 Equivalent groups -- 6.5 Modeling of overflow traffic in systems with finite number of traffic sources -- 6.6 Comments -- 7 Models of Links Carrying Multi-Service Traffic -- 7.1 Introduction -- 7.2 Multi-dimensional Erlang distribution -- 7.3 Full-availability group with multi-rate traffic -- 7.4 State-dependent systems -- 7.5 Systems with finite and infinite number of traffic sources -- 7.6 Limited-availability group. 7.7 Full-availability group with reservation -- 7.8 Full-availability group with threshold mechanism -- 7.9 Full-availability group with compression mechanism -- 7.10 Full-availability group with priorities -- 8 Modeling of Systems with Multi-Rate Overflow Traffic -- 8.1 Introduction -- 8.2 Single-service model of the group with overflow traffic -- 8.3 Dimensioning of alternative groups with multi-rate traffic -- 8.4 Multi-service model of the group with overflow traffic -- 8.5 Comments -- 9 Equivalent Bandwidth -- 9.1 ON/OFF Source -- 9.2 Markov Modulated Poisson Process -- 9.3 Interrupted Bernoulli Process -- 9.4 Comments -- 9.5 Self-similar traffic -- 9.6 Exemplary methods for determining equivalent bandwidth -- 9.7 Bandwidth discretization -- 10 Models of the Nodes in the Packet Network -- 10.1 Introduction -- 10.2 Little's law -- 10.3 Model of the M/M/1 system -- 10.4 Model of the M/M/1/N-1 system -- 10.5 Model of the M/M/m system -- 10.6 Model of the M/M/m/N system -- 10.7 Model of the M/G/1 system -- 10.8 M/D/1 system -- 10.9 Queueing systems with one service station and non-preemptive priorities -- 10.10 Model M/G/R PS -- Part III Application of Analytical Models for Mobile Networks -- 11 Modeling and Dimensioning of the Radio Interface -- 11.1 Modeling of resource allocations in the radio interface of mobile cellular networks -- 11.2 Cellular system with hard capacity carrying single-service traffic -- 11.3 Cellular system with soft capacity carrying single-service traffic -- 11.4 Cellular system with hard and soft capacity carrying a mixture of multiservice traffic streams -- 11.5 HSPA traffic in the radio interface of the UMTS network -- 11.6 Comments -- 12 Modeling and Dimensioning of the Iub interface -- 12.1 Introduction -- 12.2 Exemplary architecture of the Iub interface -- 12.3 Modeling of the Iub interface -- 12.4 Comments -- 13 Application of Multi-Rate Models for Modeling UMTS Networks -- 13.1 Introduction -- 13.2 Models of group of cells carrying multi-rate traffic. 13.3 Models of traffic overflow -- 13.4 Handover mechanisms -- 13.5 Comments -- Conclusion -- Appendix A -- Index.

Sommario/riassunto

This book is a must-read for all network planners and other professionals wishing to improve the quality and cost efficiency of 3G and LTE networks. In this book, the authors address the architecture of the 2/3G network and the Long Term Evolution (LTE) network. The

book proposes analytical models that make the analysis and dimensioning of the most important interfaces, i.e. WCDMA or Iub, possible. Furthermore, the authors include descriptions of fundamental technological issues in 2/3 G networks, basic traffic engineering models and frequent examples of the application of analytical models in the analysis and dimensioning of the interface of cellular networks. The specific knowledge included in the content will enable the reader to understand and then to prepare appropriate programming softwares that will allow them to evaluate quality parameters of cellular networks, i.e. blocking probabilities or call losses. Additionally, the book presents models for the analysis and dimensioning of the Wideband Code Division Multiple Access (WCDMA) radio interface and the Iub interface, both carrying a mixture of Release 99 traffic (R99) and High-Speed Packet Access (HSPA) traffic streams. Finally, the analytical models presented in the book can be also used in the process of modeling and optimization of LTE networks.

Key Features:

- Describes the architecture and the modes of operation of the cellular 2/3/4G systems and the LTE network.
- Covers the traffic theory and engineering within the context of mobile networks.
- Presents original analytical methods that enable their users to dimension selected interfaces of cellular networks.
- Discusses models for the analysis and dimensioning of the Wideband Code Division Multiple Access (WCDMA) radio interface and the Iub interface, both carrying a mixture of Release 99 traffic (R99) and High-Speed Packet Access (HSPA) traffic streams.
- Includes problems as well as an accompanying website containing solutions, software tools and interactive flash animations (<http://wiley.teletraffic.pl/>)

This book will be an invaluable guide for professional engineers (radio planning engineers, optimization engineers, transmission engineers, core network engineers, Service Management engineers) working in the areas of mobile wireless networks technology, not only in optimization process, but also in profitability assessment of newly implemented services (i.e. in NPV - Net Present Value analysis), and researchers and scientists. Advanced students in the fields of mobile communications networks and systems will also find this book insightful.
