

UNDERSTANDING UMTS RADIO NETWORK MODELLING, PLANNING AND AUTOMATED OPTIMIZATION, THEORY AND PRACTICE

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There are many books covering UMTS issues. However, there are only a few particularly devoted to 3G radio network planning and optimization. Although at first sight one might not see the reason for another study on similar issues, this book really fills a gap among existing ones. It extends system understanding and operation, its configuration and parameters relations in general, not only for specific cases as often met in other books. Looking through the book's contents, it seems to be a good technical handbook, providing engineers interested in planning and optimization issues with fairly generic mathematical tools. It enables understanding the key wide-band code-division multiple access (WCDMA) issues, thus allowing engineers to knowingly design and optimize a network. Moreover, the book explains a very novel approach to radio network optimization: process automation.

The book is composed of four parts. The first one gives an introduction to the Universal Mobile Telecommunications System (UMTS) terrestrial radio access (UTRA) frequency-division duplex (FDD) radio interface and service aspects. These are well-known issues also widely discussed in other similar publications. However, this part is quite compressed, and the focus is mainly on issues related to the main topic of the book. The introduction supplements, Chapters 3 and 4, give an in-depth view of spectrum aspects, including future spectrum requirements as well as an overview of upcoming technologies extending UTRA and the third generation (3G).

Part II deals with modeling. In particular, propagation (Chapter 5), system and network (Chapter 6), and business (Chapter 7) modeling related issues are considered. Several deterministic and empirical propagation models are described, including their physical background to better understand them. They are considered in the application for pico-, micro-, and macrocell planning. Additionally, the calibration of propagation models is

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mentioned. The UMTS system and network modeling includes antenna and link-level-related assumptions that are crucial for simulation purposes. Both static and dynamic system level modeling are highlighted in reference to the link modeling idea. The following link level issues are discussed: link requirements, propagation phenomena, equipment limitations, system procedures such as power control and soft handover, as well as mobility and traffic models. Moreover, theoretical capacity considerations are presented in Chapter 6. This chapter's material is well systematized and reflects the current state of the art in UMTS system modeling, barely met in other books.

Chapter 7 is strictly related to Chapter 8 that begins the third part of the book, "Planning." Planning considerations start from the business perspective. The above mentioned chapters deal with business modeling and planning processes, such as market analysis and forecasting. The technical approach to network planning issues begins in Chapter 9, which gives some fundamentals of network characteristics related to power and capacity. Chapter 10 addresses practical issues of radio access network (RAN) design. All the important input parameters for network dimensioning and planning are explained and their values given. Network dimensioning and detailed planning issues are discussed in the context of the coverage and capacity trade-off. The coexistence of UTRAN with other systems as well as intrasystem cross-hierarchy-layer and cross-operator relations are described in Chapter

11. UMTS compatibility is considered with a focus on minimizing mutual interference and maximizing system performance. Chapter 12 deals with some specialized aspects of radio network design, such as infrastructure sharing, adjacent channel interference control, and the usage of ultra high sites (UHS).

The last part, "Optimization," gathers issues related to improving effectiveness of the network in operation, or, in other words, enhancing its performance. As an introduction, Chapter 13 defines the most important concepts related to this topic. In Chapter 14 the algorithms for automated network optimization are thoroughly described together with appropriate quality measures and optimization parameters. Chapter 14 is unique and provides a complete study of current research on UMTS optimization not available in other books. Chapter 15 presents detailed case studies based on real UMTS networks with different optimization approaches and extensive design understanding. Online network control schemes and automated tuning of radio resource management parameters are studied in Chapter 16. The remainder of the book, gathered in Chapter 17, is devoted to UTRAN infrastructure planning and optimization with respect to all the other cooperating technologies that are part of the UMTS architecture, including leased lines, point-to-point microwave links, and point-to-multipoint systems (LMDS and WiMAX).

The development of technologies and systems is still important, but many people also need to learn how to deploy and efficiently use them. This new book certainly contributes to that task. It is a very good book on UMTS planning and optimization with equal balance on theory and practice, interesting and worth recommendation. It is very comprehensive and exhaustively treats the topic. Its very large scope is probably the reason the publisher used very small fonts, which makes reading somewhat difficult. However, on the other hand, we have a very impressive source of knowledge in a tight study. Each chapter is supplemented with an adequate, usually large, list of references, including the latest research results. It really helps the reader understand the WCDMA network, which may further determine its good design and utilization.