

**INTERNET FOR A MOBILE GENERATION
FROM THE INTERNATIONAL
TELECOMMUNICATION UNION (ITU),
4TH EDITION, GENEVA, SWITZERLAND,
2002, SOFTCOVER OR VIA THE INTERNET,
240 PAGES**

REVIEWER: HARRY RUDIN

What happens when two explosively growing markets meet? During the 1990s, the Internet and mobile communications were the strongest market drivers in the telecommunications industry. These markets meet in the "mobile Internet." If you are concerned about the mixing of these two explosive growth areas, the Internet and mobile communications, you should have this book at your side.

The first and introductory chapter of *Internet for a Mobile Generation* discusses a few preliminary ideas and points out the similar growth patterns of the mobile subscriber and Internet user populations. It also mentions some of the hindrances that must be overcome in order for the mobile Internet to become widespread.

Chapter 2 describes the technologies for the mobile Internet. The reader will learn about first-, second-, and third-generation (1G, 2G, 3G) mobile network standards and the difficult migration path from 2G to 3G. The many wireless LAN standards are covered, as well as topics such as war driving and i-mode. Descriptions of several existing mobile Internet applications are included in this chapter.

Chapter 3 goes on to look at market trends. It is interesting to review the market penetration figures for Internet and mobile users, and to learn that Internet penetration is highest in several northern European countries, while some east Asian countries are at the top of the list for mobile subscriber penetration. One early example of a mobile Internet application is Short Message Service (SMS). In the first quarter of 2002, 24 billion SMS messages were sent worldwide. A surprising number of countries have more mobile than fixed telephone subscribers. Billing models are also discussed in this chapter.

Regulatory and policy aspects are covered in Chapter 4. Topics included are competition policy, international cooperation (roaming), and user rights (consumer protection and access to information). One interesting graph is the cost of 3G licenses as a function of time over the last few years. The various national strategies for licensing are compared. Spam is a significant threat to mobile terminals; several existing

solutions (e.g., that in Japan) are given.

Chapter 5 is entitled "Case Studies" and presents various national approaches and solutions to various regulatory and policy aspects of the mobile Internet. One learns, for example, that Japan and Korea have already deployed 3G systems, and what success they have achieved.

Chapter 6 is last and again discusses various aspects of the mobile Internet in terms of actual experience in different countries.

In addition, there is a statistical annex giving figures from some 200 national situations. Here the reader finds ammunition to help gain the upper hand in almost any argument regarding the mobile Internet. A glossary is also included to define the many mnemonics involved.

An executive summary of the book, itself well worth reading, is available on the ITU's Web site:

<http://itu.int/mobileinternet>

The book may also be ordered through the same site.

This is the fourth in a series of studies written under the supervision of Tim Kelly who writes in a clear and delightful style. The reviewer is pleased to recommend the book most heartily.

QOS IN INTEGRATED 3G NETWORKS

**ROBERT LLOYD-EVANS, ARTECH HOUSE,
2002, ISBN 1-58053-351-5, HARDCOVER,
346 PAGES**

REVIEWER: CLAUD BAUER

Cellular network operators are spending billions of dollars on 3G mobile network infrastructure and licensing fees. The quality of service (QoS) mechanisms necessary for the successful delivery of real-time applications are of critical importance for the commercial success of 3G networks. The book aims to provide an understanding of the factors that influence QoS mechanisms in 3G mobile networks.

The first chapter gives an overview of the development of mobile networks from 1G to 3G. It shows the principal differences between the various 2.5G and 3G technologies, and defines the Universal Mobile Telecommunications Service (UMTS)/wideband code-division multiple access (WCDMA), cdma2000, and General Packet Radio Service (GPRS) technologies as the focus of this book. The author explains the need for QoS support and the influence of the different network parts.

Chapter 2 illustrates the coding schemes used in 3G networks. The mathematical principles of error correc-

tion coding schemes, including block, trellis, convolutional, and concatenation coding, are presented. The use of spreading and scrambling codes to achieve code division is described.

Chapters 3, 4, and 5 outline the radio technologies used in UMTS/WCDMA, cdma2002, and GPRS. After an explanation of the general principles, the technologies deployed at layer 3, at the radio link control (RLC) and/or medium access control (MAC) layer 2, and at the physical layer are illustrated separately. In each chapter, a special section is dedicated to the control of QoS on the radio link. With UMTS, the user sends a detailed QoS request profile, and the resource allocation decision is made by the core network. Early cdma2000 provides less explicit support for QoS distinctions than UMTS. In GPRS, QoS is controlled by an IP bearer service manager in a gateway node and in the terminals. However, the first generation of GPRS terminals only provides basic QoS capabilities.

Chapter 6 summarizes the basic problems of radio frequency planning in 3G networks. First, the basics of cell capacities and the main factors determining signal quality are described. Then the parameters used by the radio planner to calculate the link budget and implement capacity and admission control are explained. In view of the increased capacity demand of 3G networks compared to 2G networks, a special chapter presents ways to add capacity to an existing cellular network.

Chapter 7 covers the dominant network protocols and their means of providing QoS support in 3G networks. IP and/or ATM will be the dominant layer 2/3 technologies in 3G networks. ATM provides inherent QoS support by specifying four QoS classes characterized by specified loss, delay, and jitter characteristics. The generic IPv4 and IPv6 protocols merely provide bits in the header that allow classifying packets into service classes. Explicit QoS support is provided by additional network protocols. The integrated services approach reserves capacities per flow using Resource Reservation Protocol. In contrast, the differentiated services model defines specific per-hop behavior for aggregated traffic classes. The QoS policies are stored in a depository and communicated to the policy enforcement points using the COPS protocol. The functionality of multiprotocol label switching (MPLS) and its interworking with the differentiated services architecture are illustrated. This chapter also describes upper layer protocols that

(Continued on page 16)

BOOK REVIEWS

(Continued from page 14)

support real-time and multimedia applications such as Real Time Protocol (RTP), Session Initiation Protocol (SIP), Streaming Transport Protocol (STCP), Session Description Protocol (SDP), and the H.323 standard. Finally, the various compression algorithms used in 3G networks are summarized.

Chapter 8 introduces the core network architecture for both UMTS and

cdma2000 networks. Both architectural approaches split the core network into a circuit-switched domain for traditional voice calls and a packet-switched domain for applications transported via IP. Special gateways provide interfaces to other network types. UMTS further defines the IP multimedia subsystem that serves as a platform for multimedia and call control on top of the UMTS packet domain.

Chapter 9 treats the concept of ser-

vice classes in 3G networks. UMTS defines four QoS classes of its own, whereas cdma2000 bases its QoS concept on the differentiated services approach. A separate section discusses the key QoS parameters.

The last chapter is devoted to the applications for which QoS support is most critical. For audio and video applications, the basic technology and the issues that arise when application content is delivered over 3G networks are explained.

The author dedicates a large part of the book to an introduction to 3G technology in general. On this basis, he successfully gives an overview of the complete range of topics related to QoS in 3G networks as defined in the early releases of the UMTS and cdma2000 specifications. The book contains an extensive reference list at the end of each chapter and is a valuable guide for any network engineer or student who wants to get a detailed understanding of the QoS issues in 3G networks.

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"A dedicated scientist will strive to imagine new ideas, even though most of them will probably not prove fruitful... However, so great is the incentive to publish nowadays, that many regard it as good scientific practice to conduct this part of their education in public, mistakes and all."

The Encyclopedia of Ignorance

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