

## Wireless Technologies and PCS Applications — Competition for the Local Loop

Raymond C. Schulz, *GLA International*, 1994, 143 pages, ordering: (800) 799-8914

REVIEWER: CHUNG-SHENG LI

*Wireless Technologies and PCS Applications* by R. C. Schulz was originally written as a report to provide an assessment of the current technology, applications and market potential of the personal communication services (PCS) industry for potential participants of the FCC spectrum auctioning that occurred earlier this year. The intriguing aspect of this book is its analysis of the PCS industry from the business point of view. The author speculates that if the cost target at around \$450-\$750 per subscriber can be established in five years, wireless technology might offer a very viable alternative for the subscriber loop. With this in mind, a set of business strategies are developed in this report for various industry segments such as cellular operators, satellite service providers, local exchange carriers, and even the electric power industries.

This book is divided into six chapters. After a brief executive summary in the first chapter, an overview of wireless technology is given in the second chapter. This chapter compares the transmission characteristics of each individual band, with

an emphasis on their impacts on the cost of the transmission equipment. This chapter also surveys some basic cellular architectures, several signal processing and modulation techniques for bandwidth preservation, and wireless access protocols such as TDMA and CDMA. The FHMA system from Geotek Communications Inc. and the DS/SS CDMA technology from Qualcomm were used as examples to illustrate two competing alternatives in the CDMA technology: frequency hopping and direct sequence.

Chapters 3 and 4 briefly survey the current analog and digital cellular system standards in the United States and Europe. In addition to giving a taxonomy of all the existing *de facto* analog cellular standards in the United States, Chapter 3 also discusses CDPD for digital packet data in detail. Chapter 4 gives an overview of the protocol and services provided by the Global System for Mobile (GSM) system used in Europe.

Fixed wireless technologies in which the wireless access loop can be used as a substitute for the traditional wired copper access loops between the telephone central office switch and the subscriber's network terminating equipments are discussed. Several implementations of these technologies, such as Qualcomm's CDMA fixed wireless access, Hughes Network System's E-TDMA fixed access, and AT&T's wireless subscriber system, already exist. Interestingly enough, these access loop technologies receive their initial acceptance in those international markets where their telephone infrastructures significantly lag behind those industrial nations.

However, according to the author, it is likely that this technology will eventually be imported to the United States when the competitive opportunities become available.

The last chapter reviews current wireless communication industry business trends. It also speculates on several probable PCS business scenarios that may evolve subsequent to the broadband PCS spectrum auctions. The bottom line of the PCS industry, as the author contends, is that its transmission characteristics direct its initial application in short-range service—a better fit for local exchange and local access competition. The author also outlines a number of possible business markets where PCS participants can effectively compete.

In summary, this report is an interesting summary of the current and future potential of the PCS industry—mostly from the local loop perspective. It does not have all the gory details of the technical background required for complete understanding of PCS technologies. However, this book does shed some insights regarding the business opportunities in this field. It is thus recommended as a reference for those readers who are interested in acquiring some knowledge of the business aspects of the PCS industry.

## Network Protocol Handbook

Matthew Naugle, *ISBN 0-07-046461-McGraw-Hill*, 1994, 521 Pages.

REVIEWER: TU-CHIH TSAI

With the fast proliferation of computer networks, the need to be proficient in all aspects of network protocols is not limited to just communications specialists. Today's communication networks consist of numerous protocols ranging from the hardware specifications of network connectors to the software running on the networks. There are incredibly many protocols in both proprietary and open environments. It becomes impossible (and unnecessary) to know all the intricacies of each and every network protocol in use. Rather, it is more practical to understand well the principles and functions of the major ones. The book *Network Protocol Handbook* is intended to introduce the major functions of computer protocols so that the reader can become familiar with networks in general and have an easier time comprehending a new protocol.

The book consists of ten chapters with a one-chapter-per-protocol style. The  
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first chapter introduces the basic networking environment, the OSI model, and the physical layer of the Ethernet and token ring. Although this chapter is an abbreviation of another book, some useful information such as cable specifications and the concept of the concentrator are explained in sufficient detail. Chapter 2 discusses the Ethernet and token ring, including the use of bridges and routers. Without getting into theory, most frequently encountered topics, such as network initialization, frame format, the Spanning Tree Algorithm and Source Routing, are covered. After flipping through about 50 pages of text, pictures and tables, the reader will acquire a general understanding of the two most popular LANs and be ready to look into more details if necessary. Learning these materials does not enable a reader to write code or troubleshoot a network, as the author states at the beginning. The rest of the book is basically presented at the same level of detail. Chapter 3 explains the overall functions of the LLC (IEEE 802.2). From Chapter 4 onward, except for the TCP/IP chapter, each chapter is organized

in a self-contained manner for protocols based on the technology of a specific vendor. Some of the material is duplicated among chapters, probably because of this arrangement.

Chapter 4 discusses the Xerox Network System (XNS), which was the first commercially implemented LAN protocol over Ethernet in the early '80s. Chapter 5 describes the Novell NetWare, which is the most frequently installed PC network system for the workgroup client/server class of networks. Chapter 6 introduces the TCP/IP protocol suite, the most widely used open networking protocols. In about 100 pages, quite a number of topics — ARP, IP, RIP, ICMP, UDP and TCP, and applications like TELNET, FTP, SMTP and so on — are discussed. The issue of IP routing is also covered. Chapter 7 explains the AppleTalk architecture with an assumption that the reader has some experience with an Apple computer. The next two chapters (8 and 9) describe DEC's DecNet architecture and local area transport (LAT). DecNet was originally introduced in the '70s for program-to-program communication on PDP-11 computers; it was developed into a full networking system later on. Its populari-

ty went along with Digital's computers. Relatively speaking, DecNet has been slow in incorporating support for popular networking protocols such as the token ring and TCP/IP, and remains proprietary for most implementations. The LAT is another proprietary protocol for data exchange between a terminal service and its application host. Its implementation is different from that of major popular networks above the data link layer. The last chapter of the book introduces the OSI protocol suite, which encompasses all seven layers of the OSI model. The basic concepts and terminologies of the OSI protocol suite in routing, transport and application layers are discussed.

For readers who are not in the computer networking profession but have a need to be familiar with the general aspects of networking protocols, this book is a good single-source reference to start with. As the author suggests, the reader can move on to any specific protocol topic after reading the first three chapters. Although some of the material is redundant, the experienced reader might still find the book useful because of its broad coverage of various protocols and abundant references for further reading.



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