

NETWORKS

Design and Management

Second Edition

Steven T. Karris



*Includes an
Introduction to
Simple Network
Management Protocol
(SNMP) and Remote
Monitoring (RMON)*



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Preface

Networks are groups of computers that communicate by either cable or wireless transmissions. By the use of computer networking, we can share data with others. Today, all businesses, small or large use some type of computers and most use computer networking to handle their daily business operations such as bookkeeping, inventory tracking, document storing, and e-mail.

Networks are growing in size and complexity and this trend has created a rapid increase for networking engineers to provide practical and efficient solutions. Networking needs vary from one network to another; there is no such thing as “one size fits all.” Also, a properly designed network must allow for expansion. The management of a small company may feel that this advanced technology is of no use to them since their monetary budget is limited. However, with proper planning, small companies can start with an affordable and versatile network and later expand on the next level of affordability.

This text is the second edition and presents updated networks material. The word “design” on the title of this book implies the purchasing and installation of the essential hardware and software that one must collect to assemble an effective computer network. Basically, it means the building of a network. The word “management” is used to denote the duties and responsibilities of a network administrator. Of course, one may argue that network management should include the Simple Network Management Protocol (SNMP) and Remote Monitoring (RMON). While this is true, a detailed treatment of those two topics are beyond the scope of this book. Chapters 8 and 9 are introductions to those two topics. SNMP and RMON are discussed in books that are devoted just to these topics.

This book is primarily intended for those student and working professionals that have the desire to become network administrators. However, all practicing engineers will find it to be a very valuable source of information on this subject. It contains very interesting topics, and with the exception of a simple example on Chapter 1, the material requires no mathematical operations.

The author makes no claim to originality of content or of treatment, but has taken care to present concepts, definitions, and statements.

A few years ago, telephone networks and computer networks were considered two separate entities. Nowadays, these two technologies are rapidly merging into one. For this reason, Chapter 1 begins with a discussion of the basic components of telephone and computer networks, and their interaction. This chapter continues with the introduction of the centralized and distributive processing networks, and outlines the differences among these networks. It concludes with a discussion of Local Area Networks (LANs), Metropolitan Area Networks (MANs), and Wide Area Networks (WANs).

Chapter 2 begins with a discussion on protocols to establish their relevance to the International Standards Organization (OSI) Management Model. Protocols are covered in more detail on Chapter 3. This chapter introduces several network devices and identify those that operate at different layers of the OSI model. It concludes with a discussion of the IEEE 802 Standards.

Chapter 3 introduces several protocols including X.25, TCP/IP, IPX/SPX, NetBEUI, AppleTalk, and DNA. In this chapter, we learn how these protocols combine to form a suite of protocols that work at the various layers of the OSI model.

Chapter 4 presents the various physical network connections. It begins with the different physical topologies, bus, star, ring, and mesh. Then, it introduces the network types including the ARCNet, Ethernet, Token Ring, and Fiber Distributed Data Interface (FDDI). A discussion of the wiring types and methods used in each of these network types is also included.

Chapter 5 begins with a discussion of the different buses, past and present. Network adapters are discussed next. The chapter concludes with the introduction of the different components that work together to provide source-to-destination data transmissions between devices on the same network or different networks. Discussions on Bluetooth and Wi-Fi are also included.

Chapter 6 focuses on wired and wireless transmissions. No previous knowledge of data communications is required for understanding the topics of this chapter.

Chapter 7 is devoted to discussions on the various types of networks that we can use for our needs, the hardware and software required, and tasks that a network administrator must perform to maintain the network(s) he is responsible for. These tasks include security and safeguarding data from internal and external disasters.

Chapters 8 and 9 are introductions to SNMP and RMON respectively.

This text contains five appendices, A through E. Appendix A is a brief introduction to network analysis as defined in operations research which is a branch of mathematics concerned with financial and engineering economic problems. A simple and yet practical example is included. Appendix B contains a review of the binary information representation, and the standard codes used for information processing systems, communications systems, and associated equipment. It provides the basic concepts to illustrate how networking devices work and communicate with others. Appendix C is a review of the decimal, binary, octal, and hexadecimal numbers, their representation, and conversion from one base to another. The conversion procedures are illustrated with several examples. Appendix D is an introduction to RSA Encryption. Finally, Appendix E is a glossary of terms and acronyms that are used in networks and on the Internet.

Like any other new book, this text may not be completely error-free; accordingly, all feedback for errors and comments will be most welcomed and greatly appreciated. Please write us at Orchard Publications www.orchardpublications.com, e-mail info@orchardpublications.com.

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