



IP
n-tier
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Web Server
Gigabit Ethernet
VPN
Backbone
TM
networking

NETWORK DESIGN



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NETWORK DESIGN

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CREDITS

Author and Development Editor: Kenneth D. Reed
Editorial and Production Manager: Marilee E. Aust
Technical Reviewers: John Lacey and Dave Watts
Technical Editor: Kathy Russell
Copy Editor Manager: Debbie Remmen, PageWorks
Copy Editor: Michelle Hanson, PageWorks
Book Design and Composition: Debbie Remmen, PageWorks
Illustrator: Lynn Siefken
Indexer: Amy Casey
Cover Design: Andrew Ambrose
Printer: Johnson Printing

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Network Design
Includes illustrations and index

1. Gathering Requirements 2. Analyzing the Network 3. Logical Network Design 4. Physical Network Design
5. Designing a Small Network 6. Large Network Case Studies

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WestNet Learning Technologies (dba: WestNet Inc.)
Editorial and Sales Office
5420 Ward Road, Suite 150
Arvada, CO 80002
USA
Telephone: 303-424-9168
Facsimile: 303-432-2565
E-mail: Info@westnetinc.com
Web site: <http://www.westnetinc.com>

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INTRODUCTION

This book explains the process of analyzing and designing a new network or network upgrade. We present a step-by-step approach that breaks this complex job into five major phases, each with its own inputs, tasks, and outputs:

- 1 Requirements Gathering
- 2 Analysis
- 3 Logical Design
- 4 Physical Design
- 5 Installation and Maintenance

If you have experience with other design disciplines, such as engineering, software development, architecture, or construction, this phased approach will sound familiar. That's because a network, like a bridge, application, or house, is a unique solution to a particular set of needs. By focusing on user requirements first, we are much more likely to create an effective solution.

COURSE OVERVIEW

This course has the following prerequisites:

- ▶ *Introduction to Networking*
- ▶ *Introduction to Local Area Networks*
- ▶ *Introduction to Wide Area Networks*

In addition, you will find it helpful to have taken *Introduction to TCP/IP* and *Internetworking Devices* as well.

The details of installation and maintenance depend heavily on each network's specific architecture and physical topology. Therefore, this course concentrates on the first four phases of the network design process, which can be applied to any network.

Unit 1 begins with an overview of the phased network development process, then discusses the process of gathering requirements. We break the requirements gathering process down to focus on the differing needs of a business organization, its users, applications, computing platforms, and the network itself. Unit 1 concludes with a general approach to creating a Requirements Specification document, the main deliverable of the first phase.

Unit 2 presents the second phase, in which we analyze an existing network. We begin with a brief review of the functional principles of internetworking devices, then define the basic terms and concepts used when measuring network performance. After applying those concepts to both estimate and measure local area network (LAN) traffic, we explain how to present this information in a Traffic Specification document, the main deliverable of the second phase.

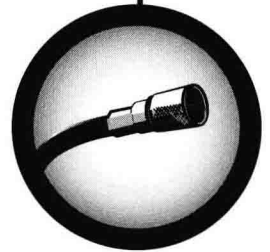
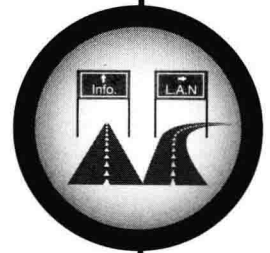
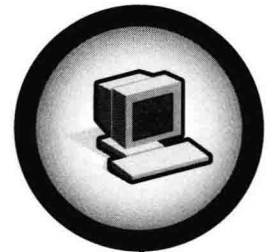
Unit 3 continues this pattern, by showing how the data gathered in the first two phases comes together to guide the network's logical design. Each lesson of this unit focuses on a different major design consideration, such as physical media characteristics, wide area performance, network management, security, and Transmission Control Protocol/Internet Protocol (TCP/IP) addressing flexibility. We conclude by discussing the content of a Logical Design document.

Unit 4 concludes our discussion of design phases, by examining the factors that shape a network's physical design. We discuss how a signal is transmitted over each type of physical medium: copper wire, optical fiber, and wireless systems. You will learn the importance of structured wiring standards, and see how to communicate your design in a Physical Design document.

Finally, Units 5 and 6 apply all of these principles to case studies that illustrate the process of designing both small and large networks. Unit 5 is a single case study that follows a small network upgrade through the four phases discussed above. Unit 6 is a more wide-ranging discussion of network design tradeoffs and principles. Each lesson of Unit 6 concentrates on a single broad type of network requirement, such as performance, availability, or security.

Unit 1

Gathering Requirements



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