

Computer Networking Essentials

Debra Littlejohn Shinder

II



Cisco Press
201 West 103rd Street
Indianapolis, IN 46290 USA

Computer Networking Essentials

Debra Littlejohn Shinder

Copyright © 2001 Cisco Systems, Inc.

Cisco Press logo is a trademark of Cisco Systems, Inc.

Published by:

Cisco Press

201 West 103rd Street

Indianapolis, IN 46290 USA

All rights reserved. No part of this book may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system, without written permission from the publisher, except for the inclusion of brief quotations in a review.

Printed in the United States of America 1 2 3 4 5 6 7 8 9 0

Library of Congress Cataloging-in-Publication Number: 2001090429

ISBN: 1-58713-038-6

Trademark Acknowledgments

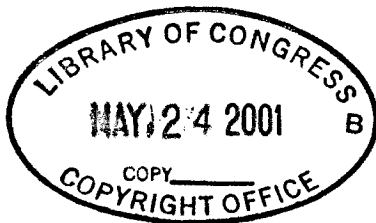
All terms mentioned in this book that are known to be trademarks or service marks have been appropriately capitalized. Cisco Press or Cisco Systems, Inc., cannot attest to the accuracy of this information. Use of a term in this book should not be regarded as affecting the validity of any trademark or service mark.

Warning and Disclaimer

This book is designed to provide information about basic networking and operating system technologies. Every effort has been made to make this book as complete and as accurate as possible, but no warranty or fitness is implied.

The information is provided on an "as is" basis. The author, Cisco Press, and Cisco Systems, Inc., shall have neither liability nor responsibility to any person or entity with respect to any loss or damages arising from the information contained in this book or from the use of the discs or programs that may accompany it.

The opinions expressed in this book belong to the author and are not necessarily those of Cisco Systems, Inc.



Contents

Part I	Introduction to Networking Concepts 3
Chapter 1	Introduction to PC Networking 5
	A Brief History of PC Networking 5
	The First Communications Networks 6
	Disadvantages of Standalone Systems 10
	What Is a Network, Anyway? 11
	Why Network Computers? 11
	Benefits of Getting Connected 12
	The Birth of the Internet 13
	The Cost of Technology: More and More for Less and Less 15
	PC Networking Today 16
	Home Computing 16
	Web Presence and E-commerce 16
	High-Performance Business Solutions 16
	Online Learning 17
	Tomorrow's Networks 17
	"Smart" Appliances and Homes 17
	Phoning Home 18
	The Wired Workplace 19
	Schools of the Future 20
	Networking Health Care 20
	Technology and the Law 21
	Intergalactic Networking? 21
	A Brief Overview of Networking Terminology 21
	Concept-Related Terminology 22
	Network Hardware-Related Terminology 22
	Software-Related Terminology 23
	Design and Topology Terminology 24
	Measurement-Related Terminology 24
	What This Book Covers and What It Doesn't 25
	Networking Certifications 26
	Vendor-Specific Certifications 26
	Non-Vendor-Specific Certifications 26
	This Book and Certification 27

Summary 27
Further Reading 28
Review Questions 28

Chapter 2 Categorizing Networks 33

Categorizing Networks by Physical Scope 33
 Characteristics of a LAN 34
 Characteristics of a MAN 35
 Characteristics of a WAN 37

Categorizing Networks by Administrative Method 38
 Servers and Clients 39
 Characteristics of Peer-to-Peer Networks 44
 Characteristics of Server-Based Networks 47

Categorizing Networks by NOS 49
 Windows Networks 50
 NetWare Networks 50
 UNIX Networks 50
 Hybrid Networks 51

Categorizing Networks by Protocol 52
 NetBEUI Networks 52
 IPX/SPX Networks 52
 TCP/IP Networks 53
 Other LAN Protocols Used in Networks 53

Categorizing Networks by Topology 54
 Linear Bus Networks 55
 Ring Networks 56
 Star Bus Networks 57
 Mesh Networks 59
 Hybrid Topologies 60

Categorizing Networks by Architecture 61
 Ethernet Networks 62
 Token Ring Networks 67
 AppleTalk Networks 68
 ARCnet Networks 68

Summary 70
Further Reading 70
Review Questions 71

Chapter 3	Networking Concepts, Models, and Standards	75
	Computer Communication Concepts	75
	The Language of the Machine	76
	Common Numbering Systems	76
	Using Packets	80
	A Layered Communication Process	82
	Networking Models	84
	The Purpose of Models	84
	The OSI Model	85
	The DoD Model	97
	Vendor-Specific Models	99
	Networking Standards and Specifications	99
	Why Standardize?	100
	Standards-Setting Bodies	100
	Summary	104
	Further Reading	104
	Review Questions	105
Chapter 4	Networking Communications Methods	109
	Signaling Methods and Characteristics	109
	Analog and Digital	109
	Baseband and Broadband	112
	Multiplexing	113
	Asynchronous and Synchronous Transmission	115
	Simplex, Half-Duplex, and Full-Duplex Transmission	116
	Signaling and Communications Problems	118
	Electromagnetic Interference	119
	Radio Frequency Interference	119
	Crosstalk	119
	Attenuation	120
	Bandwidth Capacity Issues	121
	Media Access Methods	121
	CSMA/CD	122
	CSMA/CA	123
	Token Passing	123
	Demand Priority	125
	Summary	126
	Further Reading	126

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.