Internetworking

Technologies Handbook

Merilee Ford H. Kim Lew Steve Spanier Tim Stevenson



New Riders Publishing 201 West 103rd Street Indianapolis, IN 46290 USA



Copyright © 1997 by New Riders Publishing

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

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 Data

CIP data available upon request

Warning and Disclaimer

This book is designed to provide information about internetworking 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, New Riders Publishing, 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 disks or programs that may accompany it.

Publisher: Don Fowley
Publishing Manager: Julie Fairweather

Executive Editor-in-Chief: Ann Trump Daniel, Macmillan Cisco Systems Representative: H. Kim Lew, Cisco Systems

Marketing Manager: Mary Foote Managing Editor: Carla Hall

Project Managers: Tracy Turgeson

Gina Brown Cliff Shubs Sarah Kearns

Senior Editors: Sarah Kearns

Suzanne Snyder Krista Hansing

Copy Editor: Krista Hansing
Technical Editor: H. Kim Lew
Cover Designer: Sandra Schroeder
Cover Production: Aren Howell

Cover Art: Provided by Cisco Systems

Interior Layout and Design: Argosy

Indexer: Brad Herriman



Contents at a Glance

PART 1	INTRODUCTION TO INTERNETWORKING	
Chapter 1	Internetworking Basics 3	
	What is an Internetwork? 3	
	Open Systems Interconnection (OSI) Reference Model	5
	Information Formats 17	
	ISO Hierarchy of Networks 20	
	Connection-Oriented and Connectionless Network	
	Services 21	
	Internetwork Addressing 23	
	Flow-Control Basics 30	
	Error-Checking Basics 31	
	Multiplexing Basics 32	
	Standards Organizations 34	
Chapter 2	Introduction to LAN Protocols 37	
	What is a LAN? 38	
	LAN Protocols and the OSI Reference Model 38	
	LAN Media-Access Methods 39	



LAN Transmission Methods 40

iii

LAN Topologies 40 LAN Devices 42

Chapter 3 Introduction to WAN Technologies 45

What is a WAN? 45
Point-to-Point Links 46
Circuit Switching 47
Packet Switching 48
WAN Virtual Circuits 49
WAN Dialup Services 50
WAN Devices 50

Chapter 4 Bridging and Switching Basics 55

What are Bridges and Switches? 55 Link-Layer Device Overview 56 Types of Bridges 58 Types of Switches 60

Chapter 5 Routing Basics 63

What is Routing? 63
Routing Components 64
Routing Algorithms 67
Network Protocols 75

Chapter 6 Network Management Basics 77

What is Network Management? 77
Network Management Architecture 78
ISO Network Management Model 79

PART 2 LAN PROTOCOLS

Chapter 7 Ethernet Technologies 87

Background 87



Ethernet and IEEE 802.3 88 100-Mbps Ethernet 93 100VG-AnyLAN 103 Gigabit Ethernet 106

Chapter 8 Fiber Distributed Data Interface (FDDI) 111

Background 111

FDDI Transmission Media 113

FDDI Specifications 114

FDDI Station-Attachment Types 116

FDDI Fault Tolerance 117 FDDI Frame Format 122

Copper-Distributed Data Interface (CDDI) 123

Chapter 9 Token Ring/IEEE 802.5 125

Background 125

Physical Connections 126

Token Ring Operation 127

Priority System 128

Fault-Management Mechanisms 129

Frame Format 129

PART 3 WAN TECHNOLOGIES

Chapter 10 Frame Relay 135

Background 135

Frame Relay Devices 137

Frame Relay Virtual Circuits 138

Congestion-Control Mechanisms 141

Frame Relay Local Management Interface (LMI) 142

Frame Relay Network Implementation 143

Frame Relay Frame Formats 145



DOCKET

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.

