

Chapter 5: The Data Link Layer

Our goals:

- understand principles behind data link layer services:
 - error detection, correction
 - sharing a broadcast channel: multiple access
 - link layer addressing
 - reliable data transfer, flow control: *done!*
- instantiation and implementation of various link layer technologies

Overview:

- link layer services
- multiple access protocols and LANs
- error detection, correction
- link layer addressing, ARP
- specific link layer technologies:
 - Ethernet
 - hubs, bridges, switches
 - IEEE 802.11 LANs and wireless
 - PPP

Chapter Data Link Layer

David A. Stamper



Chapter Data Link Layer:

INTRODUCTION TO DATA , COMPUTER COMMUNICATION AND NETWORKING Dr.V.V.S.S.S.Chakravarthy,Dr.Udaya Kumar,Dr. B.V.D.S. Sekhar,Dr. Bomma Rama Krishna,2023-06-12 In the rapidly evolving world of technology data communication plays a pivotal role in enabling the exchange of information across various systems and networks This book provides a comprehensive overview of the fundamental concepts components and techniques involved in data communication Chapter 1 introduces the readers to the basics of data communication including an exploration of its applications and the components of a data communication system The chapter also covers essential topics such as data representation and the advantages of the binary number system Chapter 2 delves into the realm of data transmission discussing different modes of data transmission and various transmission media It also explores multiplexing techniques and provides insights into guided and unguided transmission media In Chapter 3 the focus shifts to signal encoding techniques The chapter explores the differences between analog and digital signals and discusses digital to analog conversion It also examines popular encoding methods such as AM FM Manchester coding and differential Manchester coding Chapter 4 expands on digital communication by exploring different digital modulation methods including frequency shift keying FSK phase shift keying PSK and quadrature amplitude modulation QAM The chapter also explores the uses of computer networks local area networks LANs and wide area networks WANs In Chapter 5 the concept of network topology takes center stage The chapter explains various line configurations and explores different network topologies such as bus star ring mesh and tree It also introduces the layered architecture including the OSI model and the TCP IP model Chapter 6 provides an introduction to the data link layer covering its functions and design issues The chapter discusses error detection and correction techniques and explores elementary data link protocols It also delves into multiple access protocols wireless local area networks WLANs and switching techniques Chapter 7 focuses on Data Link Control Protocols and High Level Data Link Control HDLC It explores the functions and design issues of the Data Link Layer including error detection and correction techniques The chapter also discusses elementary data link protocols such as Sliding Window Protocols and HDLC and their advantages and disadvantages Additionally it delves into the Medium Access Sublayer and multiple access protocols highlighting the advantages and disadvantages of these protocols Lastly the chapter covers wireless local area networks WLANs and introduces different switching techniques This book serves as a valuable resource for students professionals and enthusiasts seeking to gain a solid understanding of data communication By combining theoretical explanations with practical examples it aims to empower readers with the knowledge and skills necessary to navigate the complex world of data communication effectively Networking Explained Michael Gallo,William M. Hancock PhD CISSP CISM,2001-12-17 Networking Explained 2e offers a comprehensive overview of computer networking with new chapters and sections to cover the latest developments in the field including voice and data wireless networking multimedia networking and network convergence Gallo and

Hancock provide a sophisticated introduction to their subject in a clear readable format These two top networking experts answer hundreds of questions about hardware software standards and future directions in network technology Wireless networks Convergence of voice and data Multimedia networking Storage Networking Protocol Fundamentals James Long,2006 A comparative analysis of Ethernet TCP IP and Fibre Channel in the context of SCSI Introduces network administrators to the requirements of storage protocols Explains the operation of network protocols to storage administrators Compares and contrasts the functionality of Ethernet TCP IP and Fibre Channel Documents the details of the major protocol suites explains how they operate and identifies common misunderstandings References the original standards and specifications so you can get a complete understanding of each protocol Helps you understand the implications of network design choices Discusses advanced network functionality such as QoS security management and protocol analysis Corporations increasingly depend on computer and communication technologies to remain competitive in the global economy Customer relationship management enterprise resource planning and e mail are a few of the many applications that generate new data every day Effectively storing managing and accessing that data is a primary business challenge in the information age Storage networking is a crucial component of the solution to meet that challenge Written for both storage administrators who need to learn more about networking and network administrators who need to learn more about storage Storage Networking Protocol Fundamentals is a concise introduction to storage networking protocols The book picks up where Storage Networking Fundamentals left off by focusing on the networking protocols that underlie modern open systems block oriented storage networks The first part of the book introduces you to the field of storage networking and the Open Systems Interconnection OSI reference model The second part compares networked storage technologies including iSCSI Small Computer Systems Interface over IP and Fibre Channel It also examines in detail each of the major protocol suites layer by layer within the OSI reference model The third part discusses advanced functionalities of these technologies such as quality of service QoS load balancing functions security management and protocol analysis You can read this book cover to cover or use it as a reference directly accessing the particular topics of interest to you Storage networking is a critical concept for today s businesses and this book provides a unique and helpful way to better understand it Storage networking is also continuously evolving and as such this book may be seen as an introduction to the information technology infrastructures of the future from the foreword by Claudio DeSanti vice chairman of the ANSI INCITS T11 Technical Committee Hack the Stack Stephen Watkins,George Mays,Ronald M. Bandes,Brandon Franklin,Michael Gregg,Chris Ries,2006-11-06 This book looks at network security in a new and refreshing way It guides readers step by step through the stack the seven layers of a network Each chapter focuses on one layer of the stack along with the attacks vulnerabilities and exploits that can be found at that layer The book even includes a chapter on the mythical eighth layer The people layer This book is designed to offer readers a deeper understanding of many common vulnerabilities and the ways in which attacker s exploit manipulate misuse

and abuse protocols and applications The authors guide the readers through this process by using tools such as Ethereal sniffer and Snort IDS The sniffer is used to help readers understand how the protocols should work and what the various attacks are doing to break them IDS is used to demonstrate the format of specific signatures and provide the reader with the skills needed to recognize and detect attacks when they occur What makes this book unique is that it presents the material in a layer by layer approach which offers the readers a way to learn about exploits in a manner similar to which they most likely originally learned networking This methodology makes this book a useful tool to not only security professionals but also for networking professionals application programmers and others All of the primary protocols such as IP ICMP TCP are discussed but each from a security perspective The authors convey the mindset of the attacker by examining how seemingly small flaws are often the catalyst of potential threats The book considers the general kinds of things that may be monitored that would have alerted users of an attack Remember being a child and wanting to take something apart like a phone to see how it worked This book is for you then as it details how specific hacker tools and techniques accomplish the things they do This book will not only give you knowledge of security tools but will provide you the ability to design more robust security solutions Anyone can tell you what a tool does but this book shows you how the tool works

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further examines the network and transport layers followed by in depth discussion of session presentation and application layers within the OSI framework Designed for students of computer science information technology and engineering this book offers a structured and clear understanding of layered network architecture and protocol mechanisms essential for modern communication systems

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ISDN Implementor's Guide Charles K. Summers,1995 This is a straightforward implementor's guide to Integrated Services Digital Network ISDN showing telecommunications managers how to implement both narrow and broadband ISDN the standards involved and the problems encountered Summers focuses on the specific standards used for implementing both N ISDN and B ISDN and on specific ISDN implementation and concerns **Logical Link Control** American National Standards Institute,Institute of Electrical and Electronics Engineers,IEEE Computer Society. Technical Committee on Computer Communications,1984 **Local Area Networks** David A. Stamper,1998 Written by successful author and experienced teacher David A Stamper Local Area Networks 2 e is completely updated with all new problems and exercises This text provides an up to date introduction to local Area Networks covering the selection management and interconnection of various networks This text is ideal for LAN end users administrators and managers *CompTIA Network+ Deluxe Study Guide* Todd Lammle,2018-05-08 To complement the CompTIA Network Study Guide Exam N10 007 4e and the CompTIA Network Deluxe Study Guide Exam N10 007 4e look at CompTIA Network Practice Tests Exam N10 007 9781119432128 Todd Lammle's bestselling CompTIA Network Deluxe Study Guide for the N10 007 exam CompTIA's Network certification tells the world you have the skills to install configure and troubleshoot today's basic networking hardware peripherals and protocols First however you have to pass the exam CompTIA Network Deluxe Study Guide Fourth Edition by networking guru Todd Lammle has everything you need to prepare for the CompTIA Network Exam N10 007 Inside Todd covers all exam objectives explains key topics offers plenty of practical examples and draws upon his own invaluable 30 years of networking experience to help you learn Prepares you for Exam N10 007 the newest CompTIA Network Exam Covers all exam objectives including network technologies network installation and configuration network media and topologies security and more

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