

Data Communications and Computer Networks

Brijendra Singh

Contents

Preface

xi

Chapter 1 INTRODUCTION

1-19

- 1.1 A Brief History 1
- 1.2 Applications 3
- 1.3 Computer Networks 4
- 1.4 Categories of Networks 9
- 1.5 Standards and Standards Organizations 10
- 1.6 Open Systems and OSI Model 13
- 1.7 TCP/IP 16

Review Questions 18

Chapter 2 COMMUNICATION MEDIA AND DATA TRANSMISSION

20-40

- 2.1 Fourier Analysis 21
- 2.2 Modulation and Demodulation 24
- 2.3 Transmission Media 26
- 2.4 Wireless Communications 30
- 2.5 Transmission Mode 32
- 2.6 Interfacing 34
- 2.7 Multiplexing 37

Review Questions 39

Chapter 3 ERROR DETECTION AND CORRECTION

41-54

- 3.1 Types of Errors 41
- 3.2 Error Detection 42
- 3.3 Error Correction 49

Chapter 4	DATA LINK CONTROL	55-63
4.1	Flow Control	55
4.2	Error Control	58
	Review Questions	62
Chapter 5	PROTOCOL CONCEPTS	64-74
5.1	Asynchronous Protocols	64
5.2	Synchronous Protocols	65
5.3	High-Level Data Link Control (HDLC)	69
	Review Questions	74
Chapter 6	LOCAL AREA NETWORKS	75-95
6.1	Types of Networks and Topology	75
6.2	LAN Transmission Equipment	77
6.3	Ethernet: IEEE Standard 802.3	82
6.4	Token Bus: IEEE Standard 802.4	87
6.5	Token Ring: IEEE Standard 802.5	88
6.6	Fiber Distributed Data Interface (FDDI)	89
6.7	LAN Operating Systems and Protocols	89
6.8	Ethernet Technologies	90
6.9	Distributed Queue Dual Bus (DQDB): IEEE Standard 802.6	93
	Review Questions	94
Chapter 7	WIDE AREA NETWORKS	96-111
7.1	WAN Transmission Methods	96
7.2	WAN Carrier Types	101
7.3	WAN Transmission Equipment	104
7.4	WAN Design and Multicast Considerations	106
7.5	WAN Protocols	107
	Review Questions	111
Chapter 8	INTEGRATED SERVICES AND ROUTING PROTOCOLS	112-125
8.1	Integrating Services	113
8.2	ISDN Services	113
8.3	ISDN Topology	114
8.4	ISDN Protocols	116
8.5	Broadband ISDN	117
8.6	Asynchronous Transfer Mode (ATM)	118
8.7	Principal Characteristics of ATM	120
8.8	Frame Relay	123
8.9	Comparison of ISDN, ATM and Frame Relay	125

Chapter 9 WIRELESS LANs

- 9.1 WLAN Applications 127
- 9.2 Wireless LAN Requirements 128
- 9.3 Planning for Wireless LANs 129
- 9.4 Wireless LAN Architecture 131
- 9.5 IEEE 802.11 Protocol Layer 132
- 9.6 IEEE 802.11 Physical Layer 133
- 9.7 Designing the Wireless LAN Layout 134
- Review Questions* 143

144-160

Chapter 10 INTERNETWORKING

- 10.1 Principles of Internetworking 145
- 10.2 Routing Principles 146
- 10.3 Internetwork Protocols (IP) 152
- 10.4 Shortcomings of IPv4 157
- 10.5 IP Next Generation 158
- Review Questions* 160

161-172

Chapter 11 TCP RELIABLE TRANSPORT SERVICE

- 11.1 Transport Protocols 161
- 11.2 The Service TCP Provides to Applications 163
- 11.3 End-to-End Service and Datagrams 164
- 11.4 Transmission Control Protocol 165
- 11.5 User Datagram Protocol 171
- Review Questions* 172

173-193

Chapter 12 NETWORK APPLICATIONS

- 12.1 Client-Server Model 173
- 12.2 Domain Name System (DNS) 176
- 12.3 Telnet 178
- 12.4 File Transfer and Remote File Access 180
- 12.5 Electronic Mail 184
- 12.6 World Wide Web (WWW) 189
- Review Questions* 193

194-207

Chapter 13 NETWORK MANAGEMENT

- 13.1 Goal of Network Management 194
- 13.2 Network Management Standards 197
- 13.3 Network Management Model 199
- 13.4 Infrastructure for Network Management 200
- 13.5 Simple Network Management Protocol (SNMP) 203

Chapter 14 NETWORK SECURITY	208-240
14.1 Fundamental Concepts	209
14.2 Identification and Authentication	212
14.3 Access Control	214
14.4 A Model for Network Security	216
14.5 Malicious Software	220
14.6 Security Services and Cryptography	221
14.7 Security Network Using Firewall	233
14.8 Web Security	235
14.9 Intrusion Detection	236
Review Questions	239
Appendix 1 ASCII Code	241-247
Appendix 2 Abbreviations and Acronyms	248-250
Appendix 3 Questions and Answers on Networking	251-279
Glossary of Terms	281-294
Bibliography	295-299
Index	301-303