

- Preface p. xiii
- 1 Introduction to Computer Networks p. 1
 - Introduction p. 1
 - 1.1 Network Models p. 2
 - 1.2 Network Components p. 3
 - 1.3 Network Topology p. 4
 - 1.4 Types of Networks p. 8
 - Summary p. 10
 - Review Questions p. 11
- 2 Introduction to Data Communication p. 15
 - Introduction p. 15
 - 2.1 Characteristics of Analog Signals p. 16
 - 2.2 Digital Signals p. 17
 - 2.3 Binary Numbers p. 18
 - 2.4 Coding Schemes p. 19
 - 2.5 Transmission Modes p. 20
 - 2.6 Transmission Methods p. 23
 - 2.7 Communication Modes p. 24
 - 2.8 Bandwidth and Signal Transmission p. 25
 - 2.9 Digital Signal Encoding p. 26
 - 2.10 Error Detection Methods p. 28
 - Summary p. 34
 - Review Questions p. 36
- 3 Introduction to Computer Architecture p. 41
 - Introduction p. 41
 - 3.1 Components of a Microcomputer p. 41
 - 3.2 Memory Hierarchy p. 48
 - 3.3 Disk Controller p. 49
 - 3.4 Microcomputer Bus p. 50
 - 3.5 Plug-and-Play p. 52
 - 3.6 Universal Serial Bus p. 53
 - 3.7 Intel Microprocessor Family p. 54
 - Summary p. 55
 - Review Questions p. 56
- 4 Standards Organizations and OSI Model p. 59
 - Introduction p. 59
 - 4.1 Communication Protocols p. 60
 - 4.2 Open System Interconnection Model p. 61
 - 4.3 Frame Transmission Methods p. 65
 - 4.4 Error and Flow Control p. 67
 - 4.5 IEEE 802 Standard Committee p. 70
 - Summary p. 73
 - Review Questions p. 75
- 5 Communication Channels and Media p. 79
 - Introduction p. 79
 - 5.1 Conductive Media p. 79

- 5.2 Fiber-Optic Cable p. 81
- 5.3 Wireless Transmission p. 84
- Summary p. 86
- Review Questions p. 87
- 6 Multiplexers and Switching Concepts p. 89
- Introduction p. 89
- 6.1 Types of Multiplexers p. 90
- 6.2 Telephone System Operation p. 92
- 6.3 Digitizing the Voice p. 92
- 6.4 T1 Link p. 93
- 6.5 Switching Concepts p. 94
- Summary p. 97
- Review Questions p. 98
- 7 Modem, DSL, Cable Modem, and ISDN p. 101
- Introduction p. 101
- 7.1 Modem p. 101
- 7.2 Digital Subscriber Line p. 108
- 7.3 Cable Modem p. 110
- 7.4 Integrated Services Digital Network p. 114
- Summary p. 118
- Review Questions p. 120
- 8 Ethernet and IEEE 802.3 Networking Technology p. 123
- Introduction p. 123
- 8.1 Ethernet Operation p. 123
- 8.2 IEEE 802.3 Frame Format p. 124
- 8.3 Ethernet Characteristics p. 127
- 8.4 Ethernet Cabling and Components p. 127
- Summary p. 132
- Review Questions p. 133
- 9 Token Ring and Token Bus Networking Technology p. 137
- Introduction p. 137
- 9.1 Token Ring Operation p. 138
- 9.2 Physical Connections p. 139
- 9.3 Ring Management p. 140
- 9.4 Token Frame Format p. 141
- 9.5 IEEE 802.5 Frame Format p. 142
- 9.6 Token Ring NIC and Cable Specifications p. 144
- 9.7 Token Bus (IEEE 802.4) p. 145
- Summary p. 146
- Review Questions p. 147
- 10 Fast Ethernet Networking Technology p. 149
- Introduction p. 149
- 10.1 Fast Ethernet p. 149
- 10.2 Fast Ethernet Media Types p. 150
- 10.3 Fast Ethernet Repeaters p. 153
- 10.4 Fast Ethernet Network Diameter p. 154

- 10.5 Expanding Fast Ethernet p. 156
- Summary p. 156
- Review Questions p. 157
- 11 100 VG-AnyLAN Networking Technology p. 159
- Introduction p. 159
- 11.1 End Node Operation p. 160
- 11.2 Repeater and Access Method p. 161
- 11.3 100 VG-AnyLAN Transmission Media p. 162
- 11.4 Frame Transmission Method p. 162
- 11.5 100 VG-AnyLAN Frame Format p. 163
- Summary p. 165
- Review Questions p. 166
- 12 Local Area Network Switching p. 169
- Introduction p. 169
- 12.1 Ethernet LAN Switching p. 169
- 12.2 Switch Classifications p. 171
- 12.3 Switch Operations p. 171
- 12.4 Switch Architecture p. 172
- 12.5 Virtual LAN p. 173
- 12.6 Firewall p. 174
- Summary p. 177
- Review Questions p. 178
- 13 Gigabit Ethernet Networking Technology p. 181
- Introduction p. 181
- 13.1 Gigabit Ethernet Standards p. 182
- 13.2 Characteristics of Gigabit Ethernet p. 182
- 13.3 Gigabit Ethernet Protocol Architecture p. 182
- 13.4 MAC and Physical Layer Architecture p. 185
- 13.5 Buffered Distributor Device p. 186
- 13.6 Gigabit Ethernet Applications p. 186
- Summary p. 189
- Review Questions p. 189
- 14 LAN Interconnection Devices p. 193
- Introduction p. 193
- 14.1 Repeaters p. 193
- 14.2 Bridges p. 194
- 14.3 Routers p. 195
- 14.4 Gateways p. 197
- 14.5 CSU/DSU p. 197
- Summary p. 198
- Review Questions p. 199
- 15 Wireless Local Area Networks (WLAN) p. 201
- Introduction p. 201
- 15.1 Wireless LAN Topology p. 201
- 15.2 Wireless LAN Technology p. 203
- 15.3 WLAN Standard (IEEE 802.11) p. 205

- 15.4 Characteristics of WLANs p. 209
- Summary p. 210
- Review Questions p. 210
- 16 Fiber Distributed Data Interface p. 213
- Introduction p. 213
- 16.1 FDDI Technology p. 213
- 16.2 FDDI Layered Architecture p. 214
- 16.3 FDDI Ports p. 216
- 16.4 FDDI Access Method p. 217
- 16.5 FDDI Fault Tolerance p. 217
- 16.6 FDDI Bit Transmission p. 218
- 16.7 FDDI Frame and Token Formats p. 219
- 16.8 FDDI Backbone p. 219
- Summary p. 219
- Review Questions p. 221
- 17 Synchronous Optical Network (SONET) p. 223
- Introduction p. 223
- 17.1 Characteristics of SONET p. 223
- 17.2 SONET Components p. 224
- 17.3 SONET Signal Rates p. 225
- 17.4 SONET Frame Format p. 225
- 17.5 SONET Multiplexing p. 226
- 17.6 Virtual Tributaries p. 227
- Summary p. 228
- Review Questions p. 229
- 18 Frame Relay p. 233
- Introduction p. 233
- 18.1 Frame Relay Network p. 234
- 18.2 Components of Frame Relay p. 234
- 18.3 Frame Relay Frame Format p. 235
- 18.4 Frame Relay Operation p. 236
- Summary p. 238
- Review Questions p. 238
- 19 Internet Architecture and TCP/IP p. 241
- Introduction p. 242
- 19.1 The Internet Architecture Board (IAB) p. 245
- 19.2 TCP/IP Reference Model p. 245
- 19.3 TCP/IP Application Level p. 246
- 19.4 Transport Level Protocols: UDP and TCP p. 248
- 19.5 Internet Level Protocols: IP and ARP p. 251
- 19.6 IPv4 Addressing p. 256
- 19.7 Assigning IP Addresses p. 258
- 19.8 Point-to-Point Protocol p. 260
- 19.9 Demultiplexing Information p. 261
- 19.10 TCP Connection and Disconnection p. 261
- 19.11 Internet Protocol Version 6 (IPv6) p. 263

- 19.12 Internet II p. 267
- Summary p. 267
- Review Questions p. 269
- 20 Asynchronous Transfer Mode p. 275
- Introduction p. 276
- 20.1 ATM Network Components and Characteristics p. 276
- 20.2 ATM Forum p. 277
- 20.3 Types of ATM Connection p. 277
- 20.4 ATM Switch Operation p. 278
- 20.5 ATM Switch Architecture p. 279
- 20.6 ATM Connection Setup Through ATM Signaling p. 280
- 20.7 ATM Cell Format p. 280
- 20.8 ATM Protocol p. 282
- 20.9 Types of Adaptation Layers p. 285
- 20.10 Comparing ATM with Gigabit Ethernet p. 289
- Summary p. 289
- Review Questions p. 290
- 21 Network Operating System p. 295
- Introduction p. 295
- 21.1 BIOS and DOS p. 295
- 21.2 NetBIOS and NOS p. 296
- 21.3 Windows NT: New Technology p. 296
- 21.4 Novell NetWare Operating System p. 299
- Summary p. 300
- Review Questions p. 301
- Appendix A Computer and Communication Connectors p. 305
- Answers to Odd-Numbered Questions p. 313
- Acronyms p. 331
- Index p. 339