Contents

Preface iii

1 Welcome to Electronic Commerce 1

1.1 Electronic Commerce Framework 3
1.2 Electronic Commerce and Media Convergence 7
1.3 The Anatomy of E-Commerce Applications 9
1.4 Electronic Commerce Consumer Applications 22
1.5 Electronic Commerce Organization Applications 30
1.6 Summary 40

2 The Network Infrastructure for Electronic Commerce 43

2.1 Market Forces Influencing the I-Way 46
2.2 Components of the I-Way 50
2.3 Network Access Equipment 51
2.4 The Last Mile: Local Roads and Access Ramps 56
2.5 Global Information Distribution Networks 76
2.6 Public Policy Issues Shaping the I-Way 78
2.7 Summary 83

3 The Internet as a Network Infrastructure 85

3.1 The Internet Terminology 86
3.2 Chronological History of the Internet 89
3.3 NSFNET: Architecture and Components 98
3.4 National Research and Education Network 106
3.5 Globalization of the Academic Internet 115
3.6 Internet Governance: The Internet Society 120
3.7 An Overview of Internet Applications 123
3.8 Summary 130

4 The Business of Internet Commercialization 133

4.1 Telco/Cable/On-Line Companies 137
4.2 National Independent ISPs 142
4.3 Regional-Level ISPs 148

4.4 Local-Level ISPs 150
4.5 Service Providers Abroad 154
4.6 Service Provider Connectivity: Network Interconnection Points 157
4.7 Internet Connectivity Options 160
4.8 Logistics of Being an Internet Service Provider 163
4.9 Summary 174

5 Network Security and Firewalls 177

5.1 Client–Server Network Security 177
5.2 Emerging Client–Server Security Threats 182
5.3 Firewalls and Network Security 185
5.4 Data and Message Security 192
5.5 Challenge-Response Systems 203
5.6 Encrypted Documents and Electronic Mail 207
5.7 U.S. Government Regulations and Encryption 210
5.8 Summary 212

6 Electronic Commerce and World Wide Web 215

6.1 Architectural Framework for Electronic Commerce 217
6.2 World Wide Web (WWW) as the Architecture 227
6.3 Web Background: Hypertext Publishing 230
6.4 Technology behind the Web 234
6.5 Security and the Web 243
6.6 Summary 250

7 Consumer-Oriented Electronic Commerce 253

7.1 Consumer-Oriented Applications 254
7.2 Mercantile Process Models 273
7.3 Mercantile Models from the Consumer's Perspective 274
7.4 Mercantile Models from the Merchant's Perspective 288
7.5 Summary 292

8 Electronic Payment Systems 295

8.1 Types of Electronic Payment Systems 296
8.2 Digital Token-Based Electronic Payment Systems 299

8.3 Smart Cards and Electronic Payment Systems 312
8.4 Credit Card-Based Electronic Payment Systems 317
8.5 Risk and Electronic Payment Systems 326
8.6 Designing Electronic Payment Systems 329
8.7 Summary 330

9 Interorganizational Commerce and EDI 333

9.1 Electronic Data Interchange 334
9.2 EDI Applications in Business 342
9.3 EDI: Legal, Security, and Privacy Issues 360
9.4 EDI and Electronic Commerce 363
9.5 Summary 367

10 EDI Implementation, MIME, and Value-Added Networks 369

10.1 Standardization and EDI 370
10.2 EDI Software Implementation 375
10.3 EDI Envelope for Message Transport 379
10.4 Value-Added Networks (VANs) 387
10.5 Internet-Based EDI 395
10.6 Summary 400

11 Intraorganizational Electronic Commerce 403

11.1 Internal Information Systems 406
11.2 Macroforces and Internal Commerce 410
11.3 Work-Flow Automation and Coordination 419
11.4 Customization and Internal Commerce 423
11.5 Supply Chain Management (SCM) 427
11.6 Summary 438

12 The Corporate Digital Library 441

12.1 Dimensions of Internal Electronic Commerce Systems 443
12.2 Making a Business Case for a Document Library 452
12.3 Types of Digital Documents 455
12.4 Issues behind Document Infrastructure 461
12.5 Corporate Data Warehouses 465
12.6 Summary 472

13 Advertising and Marketing on the Internet 475

13.1 The New Age of Information-Based Marketing 478
13.2 Advertising on the Internet 485
13.3 Charting the On-Line Marketing Process 496
13.4 Market Research 508
13.5 Summary 510

14 Consumer Search and Resource Discovery 513

14.1 Search and Resource Discovery Paradigms 517
14.2 Information Search and Retrieval 519
14.3 Electronic Commerce Catalogs or Directories 529
14.4 Information Filtering 543
14.5 Consumer-Data Interface: Emerging Tools 545
14.6 Summary 551

15 On-Demand Education and Digital Copyrights 553

15.1 Computer-Based Education and Training 554
15.2 Technological Components of Education On-Demand 566
15.3 Digital Copyrights and Electronic Commerce 585
15.4 Summary 593

16 Software Agents 595

16.1 History of Software Agents 598
16.2 Characteristics and Properties of Agents 600
16.3 The Technology behind Software Agents 603
16.4 Telescript Agent Language 612
16.5 Safe-Tcl 616
16.6 Applets, Browsers, and Software Agents 618
16.7 Software Agents in Action 621
16.8 Summary 626

17 The Internet Protocol Suite 629

17.1 Layers and Networking 630
17.2 Internet Protocol Suite 633
17.3 Desktop TCP/IP: SLIP and PPP 640

17.4 Other Forms of IP-Based Networking 645
17.5 Mobile TCP/IP-Based Networking 646
17.6 Multicast IP 651
17.7 Next Generation IP (IPng) 654
17.8 Summary 657

18 Multimedia and Digital Video 659

18.1 Key Multimedia Concepts 660
18.2 Digital Video and Electronic Commerce 670
18.3 Desktop Video Processing 681
18.4 Desktop Video Conferencing 685
18.5 Summary 694

19 Broadband Telecommunications 695

19.1 Broadband Background Concepts 696
19.2 Frame Relay 704
19.3 Cell Relay 706
19.4 Switched Multimegabit Data Service (SMDS) 708
19.5 Asynchronous Transfer Mode (ATM) 710
19.6 Summary 726

20 Mobile and Wireless Computing Fundamentals 729

20.1 Mobile Computing Framework 731
20.2 Wireless Delivery Technology and Switching Methods 732
20.3 Mobile Information Access Devices 741
20.4 Mobile Data Internetworking Standards 746
20.5 Cellular Data Communications Protocols 750
20.6 Mobile Computing Applications 753
20.7 Personal Communication Service (PCS) 758
20.8 Summary 762

21 Structured Documents 765

21.1 Structured Document Fundamentals 766
21.2 Standard Generalized Markup Language (SGML) 774
21.3 Summary 788

22 Active/Compound Document Architecture 791

22.1 Defining Active Documents 792
22.2 Approaches to Active Documents 798
22.3 Object Linking and Embedding 804
22.4 OpenDoc 805
22.5 COBRA: Distributed Objects 807
22.6 Summary 809

References 811
Index 817