

CONTENTS

Preface	xi
1. Enterprise Networks: An Introduction	1
Learning Objectives	1
1.0 Introduction	1
1.1 What Are Enterprise Networks?	3
1.2 Layered Models Facilitate Understanding	6
1.3 Enterprise Architecture	8
1.4 Leveraging Enterprise Networks	16
1.5 Network Standards	19
1.6 Technologies Shaping the Evolution of Enterprise Networks	20
1.7 Overview of the Book	23
Summary	28
Key Terms	28
Review Questions	28
Problems and Exercises	29
Chapter References	30
Minicase: Business Network Evolution and Revolution	30
2. Enterprise Network Applications	33
Learning Objectives	33
2.0 Introduction	33
2.1 Enterprise Network Applications	34
2.2 Enterprise Systems and Enterprise Networks	36
2.3 Client-Server Computing Applications	41
2.4 Cloud Computing Architectures and Applications	50
2.5 Website Architecture and Infrastructure	57
2.6 Securing Enterprise Network Applications	60
Summary	64
Key Terms	65
Review Questions	65
Problems and Exercises	66
Chapter References	66
Minicase: Walmart Golocal	67
Minicase Questions	68
Minicase References	68
3. Enterprise Network Data	69
Learning Objectives	69
3.0 Introduction	69
3.1 Data/Information Architecture and Digitization	70
3.2 Structured and Unstructured Data	81
3.3 Logical Data Collections	84
3.4 Enterprise Data Storage	87
3.5 Data Governance	91
3.6 Data Security	92
Summary	94
Key Terms	95
Review Questions	95
Problems and Exercises	96
Chapter References	98

Minicase: Big Data and Avis Budget Group (ABG)	98
Minicase Questions	100
Minicase References	100
4. Network Communication Models	101
Learning Objectives	101
4.0 Introduction	101
4.1 The Value of Layered Communication Models	101
4.2 OSI Model	104
4.3 TCP/IP Model	106
4.4 TCP/IP Layers: Functions, Protocols, and Technologies	108
Summary	129
Key Terms	130
Review Questions	131
Problems and Exercises	131
Chapter References	132
Minicase: Professional Vision Clinic (PVC)	133
5. Enterprise Networks and the Internet	135
Learning Objectives	135
5.0 Introduction: The Internet and Today's Businesses	135
5.1 Internet Architecture and Internet Service Providers	136
5.2 Application Layer Protocols	144
5.3 Transport Layer Functions and Protocols	147
5.4 Network Layer Functions and Protocols	154
5.5 Intranets and Extranets	164
Chapter Summary	165
Key Terms	167
Review Questions	167
Problems and Exercises	168
Chapter References	171
Minicase: Web3	171
Minicase Questions	173
Minicase References	173
6. Wired Networks in Business Facilities	175
Learning Objectives	175
6.0 Introduction: Wired Networks in Today's Businesses	175
6.1 Data Link Layer Functions and Protocols	176
6.2 Physical Layer Communication Functions in Wired Networks	182
6.3 Data Link and Physical Layer Technologies	190
6.4 Ethernet LANS	194
6.5 Backbone Networks	199
6.6 Wired Network Resilience and Security	203
Summary	205
Key Terms	206
Review Questions	206
Problems and Exercises	207
Chapter References	208
Minicase: New Construction at Southeastern State University— LAN & BN Design & Cost Estimates	208

7. Wireless Networks in Business Facilities	211
Learning Objectives	211
7.0 Introduction: Wireless Networks in Today's Businesses	211
7.1 Data Link and Physical Layer Functions in Wireless Networks	212
7.2 802.11 Wi-Fi Networks	222
7.3 Evolving Wi-Fi Standards	229
7.4 Wi-Fi Security	235
7.5 Private 5G Networks in Business Facilities	239
Summary	241
Key Terms	242
Review Questions	242
Problems and Exercises	243
Chapter References	245
Minicase: SSU Cob Building Addition—Wi-Fi Network Design and Infrastructure Costs	246
8. Connecting Enterprise Network Locations: Wide Area Networks	249
Learning Objectives	249
8.0 Introduction: Business WANS	249
8.1 Wide Area Network Topologies and Architectures	252
8.2 Wan Technologies, Standards, and Protocols	255
8.3 Dedicated Circuit WANS	259
8.4 Packet-Switched Networks (PSNS)	263
8.5 Wireless WANS (WWANS) and Private Mobile Networks	269
8.6 Software-Defined WANS (SD-WANS)	271
8.7 WAN Security	273
Summary	274
Key Terms	275
Review Questions	275
Problems and Exercises	276
Chapter References	277
Minicase: Core Credit Union—Accommodating an Expanding WAN	278
9. Enterprise Networks and the Internet of Things	281
Learning Objectives	281
9.0 Introduction: Networks and the IoT	281
9.1 The IoT and Businesses	283
9.2 IoT Architectures	292
9.4 IoT Security	303
Summary	305
Key Terms	306
Review Questions	306
Problems and Exercises	307
Chapter References	308
Minicase: From the IoT to the Internet of Behaviors (IoB)	310
10. Enterprise Network Design and Management	313
Learning Objectives	313
10.0 Introduction	313
10.1 Network Design Realities	315
10.2 Network and Enterprise Architectures	316
10.3 Network Design Process	320
10.4 Network Design Best Practices	330

10.5 Enterprise Network Management	331
10.6 Network Audits	340
10.7 SDN and Network Management	341
10.8 Unified Endpoint Management (UEM)	343
Summary	343
Key Terms	345
Review Questions	345
Problems and Exercises	346
Chapter References	347
Minicase: NMS for New SSU Building	348
11. Enterprise Network Security	349
Learning Objectives	349
11.0 Introduction	349
11.1 Network Attack Surfaces and Vulnerabilities	350
11.2 Common Attacks and Attack Responses	353
11.3 Enterprise Network Security Goals	356
11.4 Security Plans, Policies, and Procedures	359
11.5 Enterprise Network Security Architectures	361
11.6 Physical Security	365
11.7 Cloud Security	366
11.8 Perimeter Security	367
11.9 Securing Internal Networks	372
Summary	379
Key Terms	380
Review Questions	380
Problems and Exercises	381
Chapter References	382
Minicase: Securing SSU's New Building Wing	383
12. Protecting Endpoints, Applications, and Data	387
Learning Objectives	387
12.0 Introduction	387
12.1 Securing Network Endpoints	388
12.2 Application Security	398
12.3 Data Security	410
Summary	418
Key Terms	419
Review Questions	419
Problems and Exercises	420
Chapter References	421
Minicase: The 2022 Uber Hack and Market-Driven Data Insecurity	422
Minicase Questions	423
Minicase Reference	423
Appendices	425
<i>The appendices are not included in the print edition but can be downloaded at https://www.prospectpressvt.com/textbooks/case-enterprise-networks</i>	
Index	519