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DATA COMMUNICATIONS AND NETWORK TECHNOLOGIES

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Preface

Computer network textbooks are mainly divided into two categories: computer network textbooks for colleges and universities, and network engineer certification textbooks of vendors such as Huawei, H3C, and Cisco.

Computer network textbooks for colleges and universities mainly focus on computer communication protocols and organize contents of each chapter by TCP/IP layers, without specific experiments and operations for these computer network theories. As a basic course, it is reasonable to introduce principles and theories, which are applicable to devices of all network vendors. Students in colleges and universities have zero experience in operating and configuring network devices, and have not even seen them before, so they are not well informed about the various applications on the Internet. Consequently, they will feel learning theoretical network courses relatively abstract and will not realize how these theories can contribute to their future work.

This book uses Huawei network devices to set up computer networks and uses virtual machines to construct learning environments so as to design experiments and cases for computer network theories. It can train network engineers who can both have a deep understanding on the theories of computer data communications and use Huawei routers, switches as well as wired and wireless devices to design and set up campus networks.

Content Organization of This Book

This book contains 18 chapters, and the content of each chapter is briefly described as follows:

Chapters 1 to 4 explain the theoretical basis of communication technologies, including data communications basics, TCP/IP protocol, management of Huawei devices, IP address, and subnetting.

Chapter 5 explains routing basics, including the basic concepts of routing, static routing, route summarization, and default routing.

Chapter 6 introduces dynamic routing, including introduction to dynamic routing, dynamic routing protocol OSPF, and the configuration of OSPF protocol.

Chapter 7 explains how switches work, VLAN and inter-VLAN routing.

Chapter 8 elaborates Spanning Tree Protocol, link aggregation, Smart Link, and Monitor Link technology.

Chapter 9 is an introduction to network security, including the working principles of ACL and AAA.

Chapter 10 illustrates network address translation, including NAT types, implementation of Static NAT, NAPT, Easy IP, and implementation of NAT Server.

Chapter 11 explains Dynamic Host Configuration Protocol, enabling DHCP Server on the router so as to configure IP addresses for the computers in the network.

Chapter 12 describes the enterprise network WLAN, introducing the basic concepts of WLAN, the working principles and configuration implementation of WLAN.

Chapter 13 covers IPv6, including IPv6 addressing, IPv6 address configuration, IPv6 static routing and dynamic routing.

Chapter 14 illustrates WANs, mainly PPP protocol and PPPoE protocol.

Chapter 15 explains the typical networking architectures and case practices of campus networks, including the basic concepts and the case practices of the campus network. Among them, the hands-on practice includes the design of a networking scheme, VLAN design and planning, IP address design and planning, IP address assignment methods, routing design, WLAN design and planning, reliability design, egress NAT design, and security design.

Chapter 16 covers network management and operation and maintenance, including SNMP principles and configuration, and the configuration of Network Time Protocol (NTP) to synchronize network equipment time.

Chapter 17 explains SND and NFV.

Chapter 18 introduces network programming and automation, using Python for network device management.

Resources of this Book

Supporting PPT.

Supporting lab manual.

After-class exercises and answers.

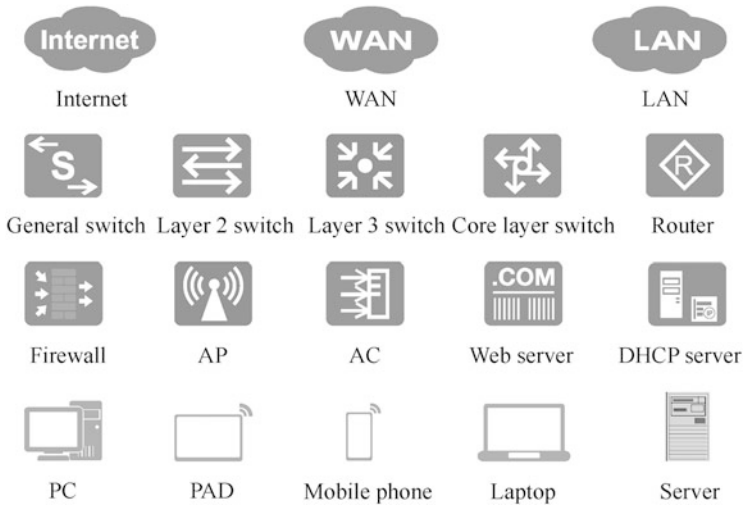
Syllabus and teaching plan.

QQ group and WeChat group for teaching, providing Q&A and required software.

Applicable Readers

This book is a basic data communications textbook, positioned as a computer network textbook for undergraduate colleges and universities. The data communications, knowledge, and network cases in the book are designed for the application of computer network theories, and readers can take the HuaWei Certified ICT Associate (HCIA) certification after learning it.

This book is suitable for students of network engineering and software engineering in colleges and universities; for employees engaged in IT operation and maintenance, network security, software development, and software testing; for graduate students in computer science; and for students and employees who have passed Huawei HCIA.



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Authors of this Book

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Contents

1 Network Fundamentals 1
1.1 Overview of Network 1
1.1.1 Network and Internet 1
1.1.2 Network Topology 2
1.1.3 Network Types 4
1.2 Networking Equipment 6
1.3 Planning and Design of Enterprise Networks 10
1.3.1 Enterprise LANs 10
1.3.2 Enterprise WANs 11
1.4 Exercises 13

2 TCP/IP 15
2.1 Overview of Protocols 15
2.1.1 Introduction to Protocols 15
2.1.2 Computer Communication Protocols 18
2.1.3 Relationship Between OSI 7-Layer Model and the TCP/IPv4 Protocol Stack 23
2.2 Application Layer Protocols 25
2.2.1 HTTP Protocol 27
2.2.2 FTP Protocol 32
2.3 Transport Layer Protocols 37
2.3.1 Application Scenarios of TCP and UDP 37
2.3.2 Relationship Between Transport Layer Protocols and Application Layer Protocols 39
2.3.3 TCP Headers 41
2.3.4 TCP Connection Management 45
2.3.5 Implementation of TCP Reliable Transmission 48
2.3.6 UDP 50
2.4 Network Layer Protocols 50
2.4.1 Two Versions of Network Layer Protocols 51
2.4.2 IP 52

2.4.3 ICMP . . . 55
2.4.4 ARP . . . 59
2.5 Network Interface Layer Protocols . . . 64
2.6 Exercises . . . 67

3 VRP Fundamentals . . . 73
3.1 Introduction to VRP . . . 73
3.2 VRP Command Lines . . . 74
3.2.1 Basic Concepts of the Command Line . . . 75
3.2.2 How to Use Command Lines . . . 77
3.3 Login to Network Devices . . . 82
3.3.1 Configure the User Interface . . . 82
3.3.2 Login to the Device via the Console Port . . . 85
3.3.3 Login to the Device via Telnet . . . 88
3.3.4 Login to the Device via SSH . . . 90
3.3.5 Login to the Device via Web . . . 93
3.4 Basic Configurations of Network Devices . . . 95
3.4.1 Configure the Device Name . . . 95
3.4.2 Configure the Device Clock . . . 96
3.4.3 Configure the Device IP Address . . . 97
3.5 Introduction to Configuration Files . . . 99
3.5.1 Configuration Files of Huawei Network Devices . . . 100
3.5.2 Save the Current Configuration . . . 100
3.5.3 Set the Configuration File for the Next Startup . . . 103
3.5.4 View Configuration Results . . . 103
3.5.5 File Management . . . 104
3.6 Exercises . . . 107

4 IP Addresses and Subnetting . . . 113
4.1 Preliminary Knowledge . . . 114
4.1.1 Binary System and Decimal System . . . 114
4.1.2 Rules for Converting Decimal Numbers to Binary Numbers . . . 116
4.2 Detailed Explanation of IP Addresses . . . 117
4.2.1 MAC Addresses and IP Addresses . . . 117
4.2.2 Composition of IP Addresses and Gateways . . . 118
4.2.3 Format of IP Addresses . . . 120
4.2.4 Subnet Masks of IP Addresses . . . 121
4.2.5 Classification of IP Addresses . . . 126
4.2.6 Special IP Addresses . . . 128
4.3 Public Addresses and Private Addresses . . . 129
4.3.1 Public Addresses . . . 129
4.3.2 Private Addresses . . . 131
4.4 Subnetting . . . 133
4.4.1 Why Is Subnetting Needed . . . 133

4.4.2 FLSM Subnetting . . . 134
4.4.3 Examples of FLSM Subnetting . . . 138
4.4.4 VLSM Subnetting . . . 139
4.5 Merge Subnets . . . 142
4.5.1 Merge Network Segments . . . 142
4.5.2 Rules of Merging Network Segments . . . 144
4.6 Determine Which Network Segment an IP Address Belongs . . . 147
4.7 Exercises . . . 148

5 IP Routing Fundamentals . . . 155
5.1 Basic Concepts of Route . . . 155
5.1.1 What Is a Route . . . 155
5.1.2 Sources of Routing Information . . . 157
5.1.3 Route Preferences . . . 160
5.1.4 Route Cost . . . 160
5.1.5 Conditions for an Unobstructed Network . . . 162
5.2 Static Routing . . . 163
5.2.1 Basic Concepts of Static Routing . . . 163
5.2.2 Notes on Static Routing Configuration . . . 164
5.2.3 Examples of Configuring Static Routing . . . 166
5.2.4 Floating Static Routes . . . 168
5.3 Route Summarization . . . 170
5.3.1 Simplify Routing Tables with Route Summarization . . . 171
5.3.2 Longest Prefix Match . . . 173
5.3.3 Classless Inter-Domain Routing . . . 174
5.4 Default Routing . . . 175
5.4.1 Overview of Default Routing . . . 175
5.4.2 The Writing of Default Routing . . . 175
5.4.3 Simplify Routing Tables with Default Routing . . . 176
5.4.4 Simplify Routing Tables with Route Summarization . . . 177
5.4.5 Routing on a Ring Network Caused by Default Routing . . . 179
5.4.6 Default Routes and Gateways on Hosts . . . 182
5.5 Exercises . . . 185

6 Dynamic Routing . . . 193
6.1 Classification of Dynamic Routing Protocols . . . 193
6.2 Overview of OSPF Protocol . . . 195
6.2.1 Introduction to OSPF Protocol . . . 195
6.2.2 Routing Tables Generated from the Shortest Path . . . 196
6.2.3 Related Terms of OSPF Protocol . . . 197
6.2.4 OSPF Working Process . . . 200
6.2.5 OSPF Message Types . . . 202
6.2.6 Network Types Defined by OSPF . . . 202
6.2.7 DR and BDR . . . 203

6.2.8 Three Tables of OSPF 205
6.2.9 OSPF Areas 206
6.3 Configuration of OSPF Protocol 207
6.3.1 Single-Area Configuration of OSPF Protocol 207
6.3.2 Multi-area Configuration of OSPF Protocol 211
6.3.3 View the Three Tables of the OSPF Protocol 214
6.3.4 Route Summarization on the Area Border Router 216
6.4 Exercises 217

7 Ethernet Switching Technologies 221
7.1 Ethernet Switching Fundamentals 221
7.1.1 Evolution of Ethernet 221
7.1.2 MAC Addresses 224
7.1.3 Ethernet Frame Format 226
7.2 Ethernet Switches 229
7.2.1 MAC Address Table of Switches 229
7.2.2 Three Forwarding Operations of Switches 230
7.2.3 MAC Address Table Building Process of a Single Switch 232
7.2.4 MAC Address Table Building Process of Multiple Switches 234
7.2.5 Typical Campus Network Architecture 238
7.3 VLANs 238
7.3.1 Concept and Meaning of VLAN 238
7.3.2 Multiple VLANs on a Single Switch 240
7.3.3 VLANs Across Switches 242
7.3.4 Link Types and Port Types 244
7.3.5 VLAN Types 246
7.3.6 Configure Port-Based VLANs 247
7.3.7 Configure MAC Address-Based VLANs 252
7.4 Implement Inter-VLAN Routing 254
7.4.1 Why Is Implementing Inter-VLAN Routing Needed . . . 254
7.4.2 Implement Inter-VLAN Routing Through Routers 255
7.4.3 Implement Inter-VLAN Routing Through a One-Armed Router 256
7.4.4 Implement Inter-VLAN Routing Through Layer 3 Switching 258
7.5 Exercises 260

8 Advanced Ethernet Switching Technologies 265
8.1 Spanning Tree Protocol 265
8.1.1 Loop Problem of Switch Networking 265
8.1.2 Overview of the Spanning Tree Protocol 267
8.1.3 Basic Concepts and Working Principles of the Spanning Tree Protocol 269

8.1.4 STP Message Types 274
8.1.5 Port States of Spanning Tree 275
8.1.6 View and Configure STP 276
8.2 Link Aggregation 280
8.2.1 Basic Concepts of Link Aggregation 280
8.2.2 Application Scenarios of Link Aggregation Technology 281
8.2.3 Basic Principles of Link Aggregation 282
8.2.4 Modes of Link Aggregation 284
8.2.5 Load-Balance Mode 286
8.2.6 An Example of Link Aggregation Configuration 288
8.3 Smart Link 289
8.3.1 Basic Principles of Smart Link 290
8.3.2 An Example of Smart Link Configuration 296
8.4 Monitor Link 299
8.4.1 Basic Principles of Monitor Link 299
8.4.2 An Example of Monitor Link Configuration 301
8.5 Alternatives to STP and Current Networking Recommendations 303
8.6 Exercises 304

9 ACL and AAA 307
9.1 Working Principles of ACL 307
9.1.1 Overview of ACL 307
9.1.2 Composition of ACL 308
9.1.3 Classification of ACLs 309
9.1.4 Wildcard-Mask 310
9.1.5 ACL Design Roadmap 312
9.1.6 Implementation of Basic ACL Configuration 314
9.1.7 Implementation of Advanced ACL Configuration 316
9.2 AAA 319
9.2.1 Working Modes of AAA 319
9.2.2 Configuration of AAA 320
9.3 Exercises 325

10 Network Address Translation Technologies 329
10.1 Public Addresses and Private Addresses 329
10.2 NAT Types 331
10.2.1 Static NAT 331
10.2.2 Dynamic NAT 332
10.2.3 NAPT 333
10.2.4 Easy IP 334
10.3 Implementation of NAT 335
10.4 Implementation of NAPT 337
10.5 Implementation of Easy IP 338

10.6 NAT Server . . . 339
10.6.1 Application Scenarios of NAT Server . . . 339
10.6.2 Implementation of NAT Server . . . 339
10.7 Exercises . . . 341

11 DHCP . . . 345
11.1 Application Scenarios of Static Addresses and Dynamic Addresses . . . 345
11.2 Working Principles of DHCP . . . 347
11.2.1 Basic Concepts of DHCP . . . 347
11.2.2 Working Process of DHCP . . . 348
11.2.3 Lease Renewal . . . 350
11.3 DHCP Service Configuration . . . 351
11.4 Assign Addresses to Directly Connected Network Segments Using Interface Address Pool . . . 354
11.5 DHCP Relay . . . 356
11.5.1 Principles of DHCP Relay . . . 356
11.5.2 Configure DHCP Relay for Cross-Network Segment Address Assignment . . . 357
11.6 Exercises . . . 358

12 WLAN Technologies . . . 361
12.1 Overview of WLAN . . . 361
12.1.1 What Is WLAN . . . 361
12.1.2 WLAN Standards and Wi-Fi Evolution . . . 362
12.1.3 Development of Wi-Fi in Office Scenarios . . . 363
12.2 WLAN Devices and Networking . . . 365
12.2.1 Introduction to WLAN Devices . . . 365
12.2.2 Basic WLAN Networking Architecture . . . 366
12.2.3 Agile Distributed AP Architecture . . . 367
12.2.4 Concepts of Wired Networking . . . 368
12.2.5 Concepts of Wireless Networking . . . 371
12.3 Working Principles of WLAN . . . 377
12.3.1 Working Process of WLAN . . . 377
12.3.2 APs Go Online Process . . . 377
12.3.3 Deliver WLAN Service Configuration . . . 383
12.3.4 STA Access . . . 387
12.3.5 WLAN Service Data Forwarding . . . 389
12.4 Case: Layer 2 Networking Tunnel Forwarding in Bypass Mode . . . 390
12.4.1 Configure Network Interworking . . . 392
12.4.2 Configure the APs to Go On Line . . . 394
12.4.3 Configure WLAN Service Parameters . . . 397
12.5 Development Trends of WLAN Technologies . . . 401
12.6 Exercises . . . 402

13 IPv6 . . . 405
13.1 Overview of IPv6 . . . 405
13.1.1 The Dilemma Faced by IPv4 . . . 405
13.1.2 Advantages of IPv6 . . . 407
13.1.3 IPv6 Base Headers . . . 408
13.1.4 IPv6 Extension Headers . . . 410
13.2 IPv6 Addressing . . . 411
13.2.1 Overview of IPv6 Address . . . 411
13.2.2 Classification of IPv6 Addresses . . . 413
13.2.3 Unicast Addresses . . . 414
13.2.4 Multicast Addresses . . . 416
13.2.5 Anycast Addresses . . . 418
13.2.6 Common IPv6 Address Types and Ranges . . . 420
13.3 IPv6 Address Configuration . . . 421
13.3.1 IPv6 Addresses for Computers and Routers . . . 421
13.3.2 Service Process of IPv6 Unicast Address . . . 421
13.3.3 Neighbor Discovery Protocol . . . 422
13.3.4 Configuration Methods of IPv6 Address . . . 423
13.3.5 Two Autoconfiguration Methods of IPv6 Address . . . 423
13.4 Implement IPv6 Address Autoconfiguration . . . 426
13.4.1 Implement IPv6 Address Stateless Autoconfiguration . . . 426
13.4.2 Packet Capture Analysis of RA and RS Packets . . . 428
13.4.3 Implement IPv6 Address Stateful Autoconfiguration . . . 429
13.5 IPv6 Routing . . . 433
13.5.1 IPv6 Static Routing . . . 434
13.5.2 OSPFv3 . . . 437
13.6 Exercises . . . 438

14 WAN Fundamentals . . . 441
14.1 Overview of WAN . . . 442
14.2 Principles and Configuration of PPP . . . 443
14.2.1 Overview of PPP . . . 443
14.2.2 PPP Frame Format . . . 444
14.2.3 Three Stages of PPP Negotiation . . . 445
14.2.4 PPP Working Process . . . 445
14.2.5 Configure PPP: PAP Mode for Authentication . . . 452
14.2.6 Configure PPP: CHAP Mode for Authentication . . . 454
14.2.7 Packet Capture Analysis for PPP Link Establishment Process . . . 455
14.3 PPPoE . . . 458
14.3.1 Overview of PPPoE . . . 458
14.3.2 PPPoE Message Format . . . 460
14.3.3 Working Process of PPPoE . . . 461
14.3.4 Configure Windows PPPoE Dial-Up Access . . . 463
14.4 Exercises . . . 467

15 Typical Networking Architectures for Campus Networks and Case Practice 471
15.1 Basic Concepts of Campus Networks 471
15.1.1 What Is a Campus Network? 471
15.1.2 Typical Architecture of Campus Network 472
15.1.3 Protocols and Technologies Commonly Used in Campus Networks 476
15.2 Lifecycle of a Campus Network 477
15.3 Hands-On Practice of Campus Network Projects 478
15.3.1 Network Requirements 478
15.3.2 Planning and Design of Small Campus Networks 478
15.3.3 Deployment and Implementation of Small Campus Networks 491
15.3.4 Operation and Maintenance of Small Campus Networks 496
15.3.5 Network Optimization of Small Campus Networks 499
15.4 Exercises 500

16 Network Management, Operation and Maintenance 501
16.1 Overview of Network Management, Operation and Maintenance 501
16.2 Principles and Configuration of SNMP 503
16.2.1 Overview of SNMP Protocol 503
16.2.2 Components of SNMP System 503
16.2.3 SNMP Queries 505
16.2.4 SNMP Setting 506
16.2.5 SNMP Traps 507
16.2.6 Configure SNMP 508
16.3 Principles and Configuration of NTP 510
16.3.1 Overview of NTP Protocol 510
16.3.2 Basic Principles of NTP 511
16.3.3 NTP Network Architecture 513
16.3.4 Working Modes of NTP 514
16.3.5 Configure NTP 515
16.4 Exercises 518

17 SDN and NFV 521
17.1 Overview of Traditional Networks 521
17.1.1 Traditional Networks and Their Distributed Control Architectures 521
17.1.2 Problems Faced by Traditional Networks 523
17.2 SDN and OpenFlow Protocol 524
17.2.1 Concept of SDN 524
17.2.2 OpenFlow Protocol 525
17.2.3 Introduction to FlowTable 527

17.2.4 SDN Network Architecture 528
17.3 Overview of NFV 530
17.3.1 Concepts of NFV 530
17.3.2 Value of NFV 531
17.3.3 Key Technologies for NFV 532
17.3.4 NFV Architecture 533
17.3.5 Huawei NFV Solutions 534
17.4 Exercises 535

18 Network Programming and Automation 537
18.1 Introduction to Network Programming and Automation 537
18.2 Overview of Programming Languages 538
18.2.1 Classification of High-Level Programming Languages 539
18.2.2 Computing Technology Stack and Program Execution Process 540
18.3 Python Language 542
18.3.1 What Is Python 542
18.3.2 Application Areas of Python 543
18.3.3 How Python Code Works 544
18.3.4 Coding Specifications of Python 545
18.3.5 Basic Concepts of Python 548
18.4 Manage Network Devices with Python 549
18.4.1 Introduction to Telnet 549
18.4.2 Manage Huawei Routers with Telnet 550
18.5 Exercises 551

Index 553