Contents

စာရေးသူ၏အမှာစာ i

ဆရာကိုရဲနောင်ဦး၏အမှာစာ iii

ဆရာကိုအောင်ဖြိုးလွင်၏အမှာစာ iv

Lab – 1 Basic Static Route 1

Diagram 1

LAB Objective 1

Static Route Theory အကျဉ်းချုပ် 2

Static route Configuration 2

Task 5

Solution 5

Verification 5

Explanation 6

Lab – 2 Static Route with IP SLA 7

Diagram 7

Objective 7

Task 7

Solution 8

Explanation 12

Lab – 3 PBR1 14

Diagram 14

Objective 14

Task 14

Solution 15

Policy Routing Based on Application 20

Explanation 22

Lab – 4 PBR for ISP Failover 24

Diagram 24

Objective 24

Task 25

Solution 25

Explanation 37

Lab – 5 Basic EIGRP Lab 39

Diagram 39

LAB Objective 39

Theory Brief 39

Task 41

Solution 41

Explanation 45

Lab – 6 EIGRP Full Lab in Classic Mode 47

Diagram 47

Objectives 47

Basic Configuration 48

Classic EIGRP Configuration 56

EIGRP Authentication in classic mode 59

EIGRP Summarization in classic mode 62

EIGRP Leak Map in classic mode 63

EIGRP Passive Interface in classic mode 65

- EIGRP Timer Optimization in classic mode 67
- Stub configuration in EIGP classic mode 68
- Changing K Value in classic mode 71
- How to caculate EIGRP metric 72
- EIGRP Equal cost and unequal load balancing 74
- NAT configuration 82

Lab – 7 EIGRP Full Lab in Named Mode 85

- Diagram 85
- Objectives 85
- EIGP Named Mode Theory Brief 85
- Named Mode EIGRP Configuration 86
- EIGRP SHA Authentication in named mode 90
- EIGRP Summarization in named mode 91
- EIGRP Leak Map in named mode 92
- EIGRP Passive Interface in named mode 94
- EIGRP Timer Optimization in named mode 96
- Stub configuration in EIGP named mode 97
- Changing K Value in named mode 100
- How to caculate EIGRP metric in named mode 101
- EIGRP Wide Metric 101
- Wide metric formula 102
- Important Notes for wide metric: 103

Lab – 8 OSPF 108

- Diagram 108

- Objective 108
- OSPF Theory Brief 108
- Task 111
- Solution 112
- OSPF Basic 112
- Changing OSPF network type 119
- Authentication 120
- Virtual-link 122
- Configure EIGRP on R3 and R4 124
- Redistribute between OSPF and EIGRP 124
- Summarization 125
- OSPF Special Area 128
- Incremental SPF 130
- NAT configuration 131

Lab – 9 BGP Full Lab 137

- Diagram 137
- Objective 137
- BGP Theory Brief 137
- Task 1 ISP1 139
- Task 1 solution 139
- ISP1 iBGP and eBGP configuration 141
- Task 2 ISP2 142
- Task 2 ISP Solution 143
- ISP2 iBGP and eBGP configuration 144

Task 3 Customer1 146
Task 4 Customer2 147
Task 4 Customer2 solution 148
Task 5 Customer3 150
Task 6 Customer4 154
Lab – 10 Reistribution 159
Diagram 159
Objective 159
Redistribution Theory 159
Task 1 Basic routing configuration 162
Task 2 Redistribution 176
Task 3 Filtering between DC1 and Partner 189
Task 3 Filtering between DC1 and DC2 192
Lab – 11 VRF-Lite for ISP 197
Diagram 197
Objective 197
VRF Theory brief 197
Task 198
Solution 199
Lab – 12 VRF Lite for Enterprise 207
Diagram 207
Objective 207
Task 207
Solution 208

Lab – 13 Inter-VRF Routing 217
Diagram 217
Objective 217
Task 218
Solution 218
Lab – 14 Easy Virtual Network (EVN) 224
Diagram 224
Objective 224
Task 224
Solution 224
EVN Theory Brief 231
Lab – 15 DMVPN with phase-3 234
Diagram 234
Objective 234
Task 234
Solution 235
Lab – 16 Layer 3 MPLS 246
Diagram 246
Objective 246
Layer 3 MPLS Theory Brief 247
Task 247
Solution 247
Explanation 260
Lab – 17 IPv6 EIGRP 262

- Diagram 262
- Task 262
- Solution 262

Lab – 18 IPv6 OSPF Lab 1 271
- Diagram 271
- Task 271
- Solution 271

Lab – 19 OSPFv3 for IPv4 and IPv6 278
- Diagram 278
- Task 278
- Solution 278
- Explanation 284

Lab – 20 IPv6 BGP 286
- Diagram 286
- Task 286
- Solution 287

Lab – 21 Unicast Reverse Path Forwarding (uRPF) 293
- What is uRPF? 293
- How uRPF works? 294
- Stric Mode 294
- Loose Mode 297
- How to Confifure uRPF? 300
  - uRPF summary 306

Lab – 22 Configuration Backup 307
- The archive Command 308

Lab – 23 Full Lab 1 310
- Diagram 310
- Lab Objective 310
- Task 1 311
- Task 1 Solution 311
- Site 1 Transit IP address table 324
- Site 1 CS Switch Configuration 324
- Task 2 OSPF Basic 326
- OSPF Basic Configuration on Site1 Switches 326
- Task 3 OSPF Special Area 327
- OSPF Special Area Configuration 328
- Task 4 OSPF Basic on Site 1 Routers 329
- OSPF Configuration on Site1 Routers 329
- OSPF Verification 332
- Task 5 OSPF Network Type 333
- Changing the OSPF network Type 333
- Task 6 OSPF MD5 Authentication 334
- OSPF MD5 Authentication between CS and Routers 334
- Task 7 OSPF SHA Authentication 335
- OSPF SHA Authentication between CS and DS 335
- Configure OSPF summarization on CS 337
- Task 8 337
- PPPoE Configuration on ISP4 and its client 338
- PPPoE verification 341

Task 9 DMVPN 342
DMVPN Configuration 343
DMVPN Verification 345
Task 10 EIGRP on DMVPN Network 346
EIGRP Configuration on DMVPN network 346
EIGRP Verification 349
EIGRP Summarization 351
Task 11 IPSec 352
IPSec Configuration 353
IPSec Verification 355
Task 12 IBGP 357
BGP Configuration on R1 and ISPs 357
IBGP Configuration 357
IBGP verification 358
Task 13 EBGP 358
EBGP Configuration on Site1 Routers and ISPs 359
BGP Verification 362
Task 14 BGP Policy 362
BGP Policy on Site 1 362
Task 15 Layer 2 switching 363
Site 2 Solution on Site 2 364
Layer 2 solution 364
Site 2 Transit IP address table 375
Site 2 CS Switch configuration 375

Task 16 EIGRP on site 2 376
EIGRP Solution on Site 2 377
EIGRP Configuration on site 2 switches 377
EIGRP Configuration on site 2 routers 378
EIGRP Verification 379
Task 17 EIGRP Stub and Leak Map 380
EIGRP Stub Configuration 380
EIGRP Leak-Map Configuration 381
Task 18 382
EIGRP Default route 382
Task 19 EIGRP Authentication 382
EIGRP Authentication 382
Task 20 PPP 386
PPP Configuration between R2 and R3 386
Task 21 redistribution 387
Redistribution between OSPF and EIGRP 387
Redistribution between EIGRP and OSPF on R4 389
Task 22 OSPF Filtering 390
Task 23 NAT 390
NAT Configuration On site 1 390
Task 24 PBR 391
NAT and PBR configuration on site 2 391
SSH and Banner MOTD Configuration on R10 394
Lab – 24 Full LAB 2 398

Network Diagram 398
Lab Objective 398
Task 1 OSPF 398
Task 1 OSPF Solution 399
  OSPF Solution on CS, DS1 – DS4 403
  OSPF Verification 410
  Additional useful show command for ospf 412
✍OSPF Note: 412
  Area Type 412
  LSA Type 413
  OSPF parameter to become neighbor 414
  Neighbor establishment Step 414
  OSPF Network Type 414
  OSPF Summarization 415
  Passive Interface 416
  OSPF Default Routes 416
  Virtual Links 416
  OSPF Authentication 416
Task 2 BGP 417
Task 2 BGP Solution 417
  BGP verification 421
✍ BGP Note 422
  BGP overview 422
  BGP Databases 423
  BGP Message Types 423
  BGP Peering States 423
  BGP Path Selection Criteria 424
Task 3 DMVPN 424

Task3 DMVPN Solution 426
✍DMVPN Note: 433
Task 4 MPLS 433
Task 4 MPLS Solution 434
  MPLS Configuration on MPLS Backbone 434
  MPLS Verification 439
MP BGP Configuration 440
  MP BGP verification 441
VRF, RD, RT configuration 441
  Verification 443
  PE/CE routing EIGRP between R10 and R14 443
  PE CE Routing OSPF between R11 and R15 445
  PE CE Routing Static route between R12 and R16 447
  PE CE Routing BGP between R7 and R13 450
Task 5 Redistributon 452
Task 5 Redistribution 452
  Ping from server farm to MPLS network 455
Task 6 system management 457
NAT Configuration 457
  NTP Configuration Example 458
Task 6 SSH and Banner login configuration 459
Banner Login and Banner Motd 459
SDN Basics 461
The Data Plane 462
Cisco Switch Dataplane Internal 463
What is CAM table and TCAM table? 464

The Control Plane 465

The Management Plane 467

What is SDN? 468

  SDN ဘယ်က စတင်ခဲ့သလဲ? 469

  OpenFlow ဆိုတာ ဘာလဲ? 470

Controllers and Network Architecture 470

Controllers and Centralized Control 471

The Northbound Interface 472

The Southbound Interface (SBI) 472

Representational State Transfer APIs (REST) 474

What is SDN controller? 476

Examples of Network Programmability and SDN 478

Open SDN and OpenFlow 478

The OpenDaylight Controller 479

Cisco Open SDN Controller 481

The Cisco Application Centric Infrastructure 481

  What is ACI? 481

  Nexus 9000 ACI switches 482

  Application Policy Infrastructure Controller (APIC) Controller 482

APIC-EM 485

  Cisco APIC-EM Path Trace ACL Analysis Application 487

APIC-EM Summary 489

နိဂုံး 492