HCL

SUMMER TRAINING PROJECT

(DESIGN OF COLLEGE NETWORK IN CISCO PACKET TRACER)

SUBMITTED BY:

KARTIK.K

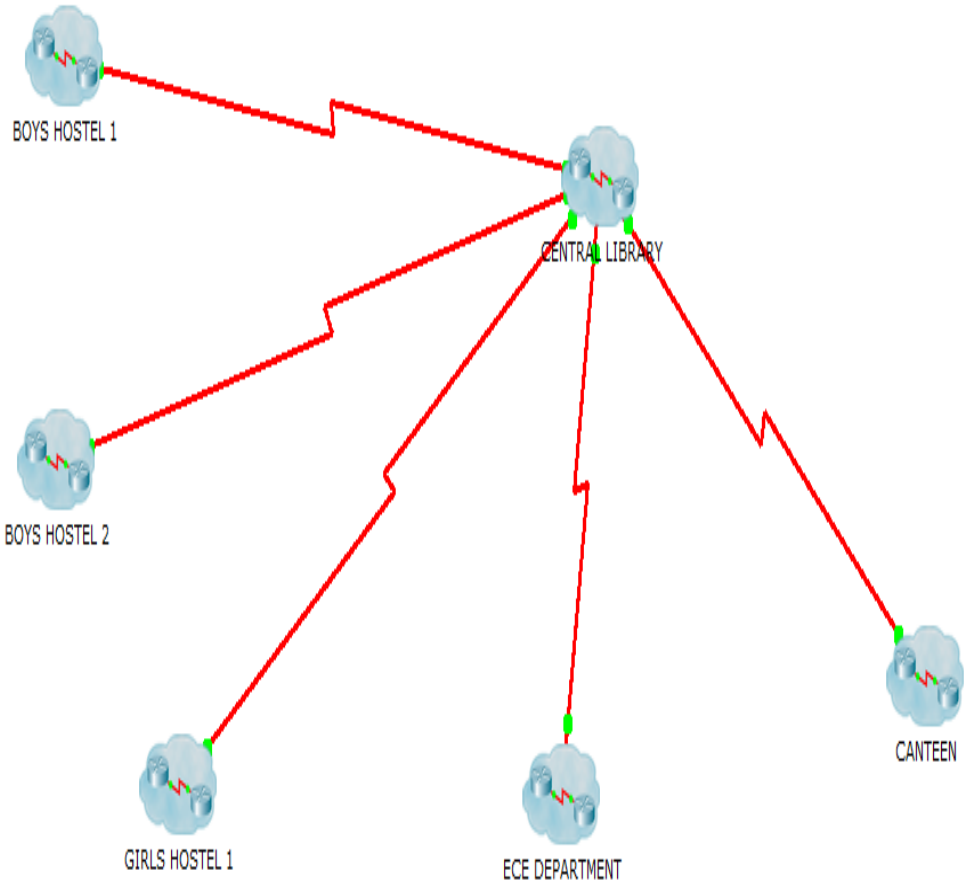
ACKNOWLEDGEMENT

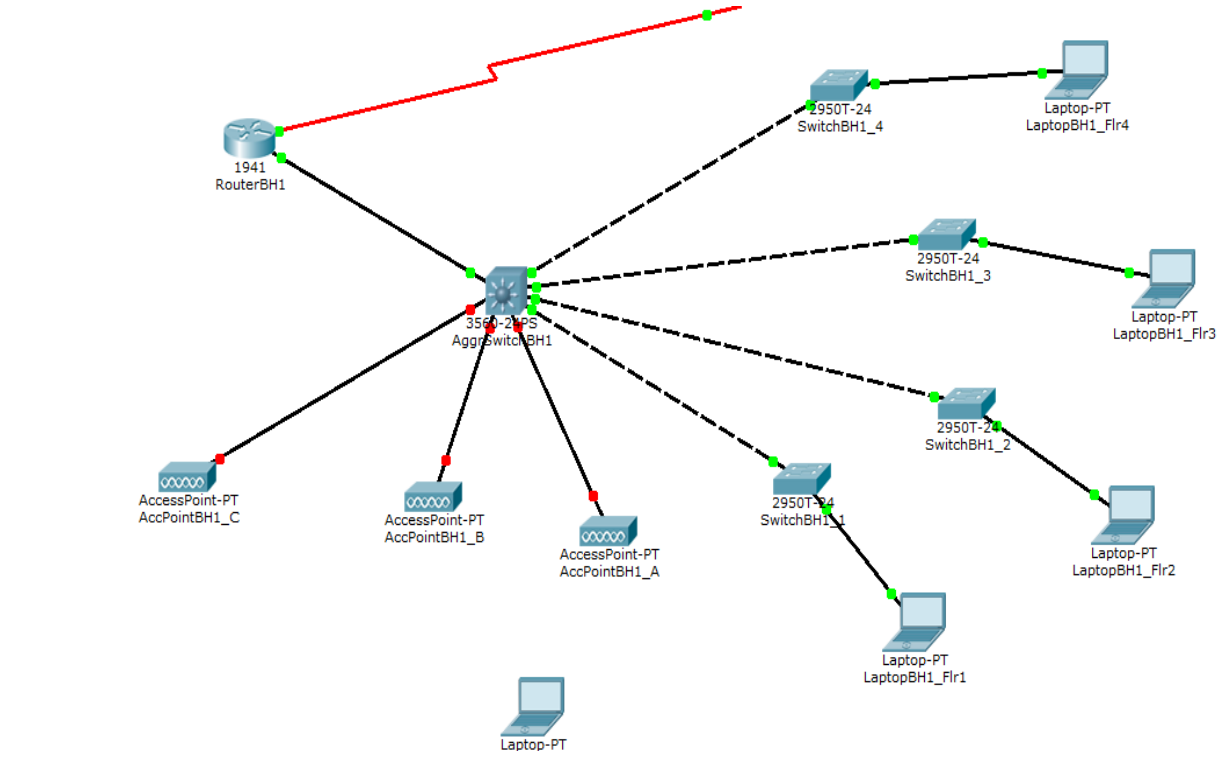
At the outset I would like to extend my gratitude to **Mr. Har Vimal** (**Human Resource Department**) for giving me an opportunity of undergoing **SIX WEEKS INDUSTRIAL TRAINING AT HCL INFOTECH LTD.**, Noida. I express my special gratitude to **Mr. Adhiratna Jha**, who not only helped me throughout my project but also encouraged me at every step and gave an insight to the real and practical problems of networking. Without his encouragement and moral boosting, it would not have been possible to accomplish this task successfully.

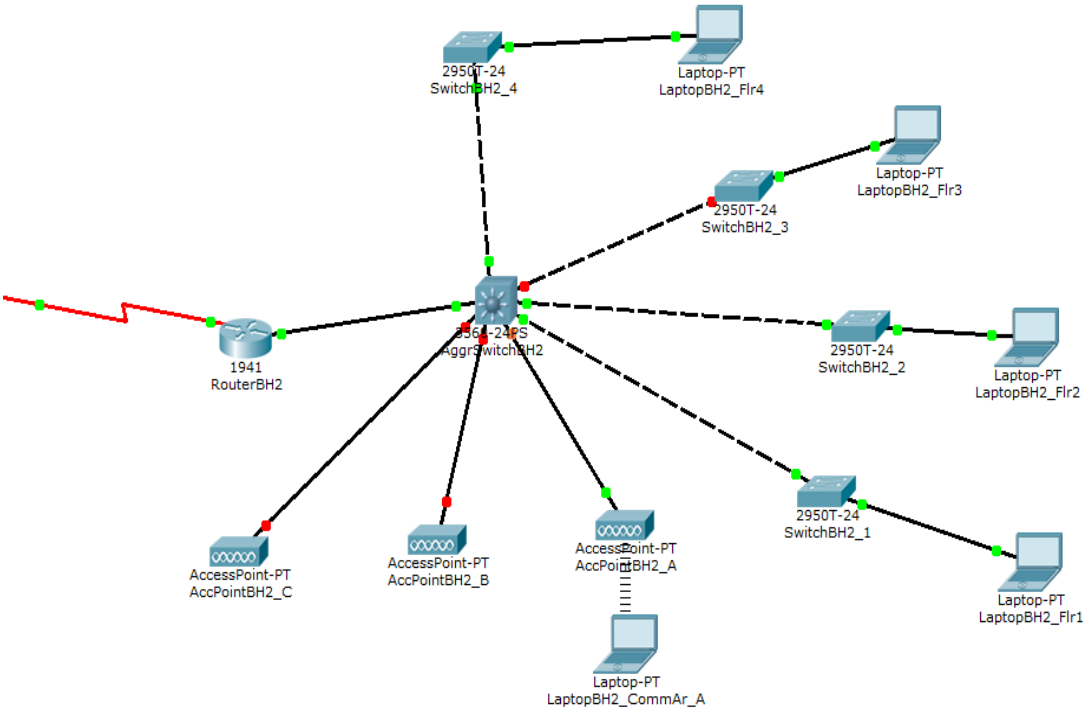
INTRODUCTION

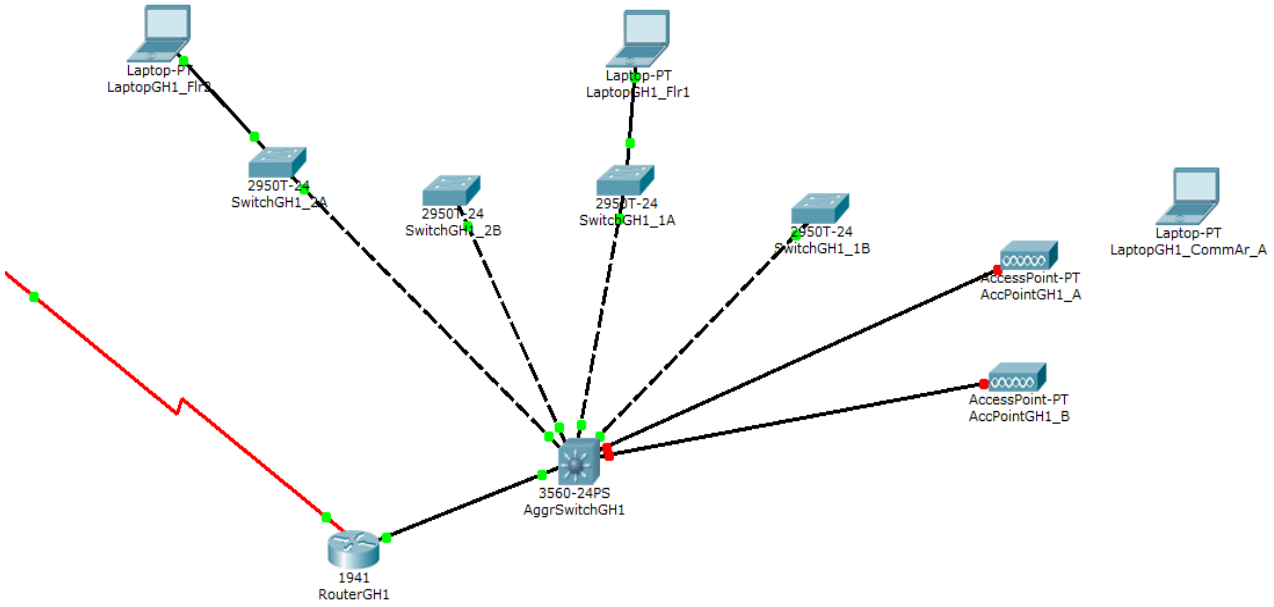
To implement the concepts and technologies of CCNA learnt during the summer training, using the “CISCO Packet Tracer” software, this project has been designed. CCNA gives the information about networking, its types and its application. Networking is very important as it provides communication. It is also very useful as it helps in resource sharing. Thus, overall it is a cost saving technique.

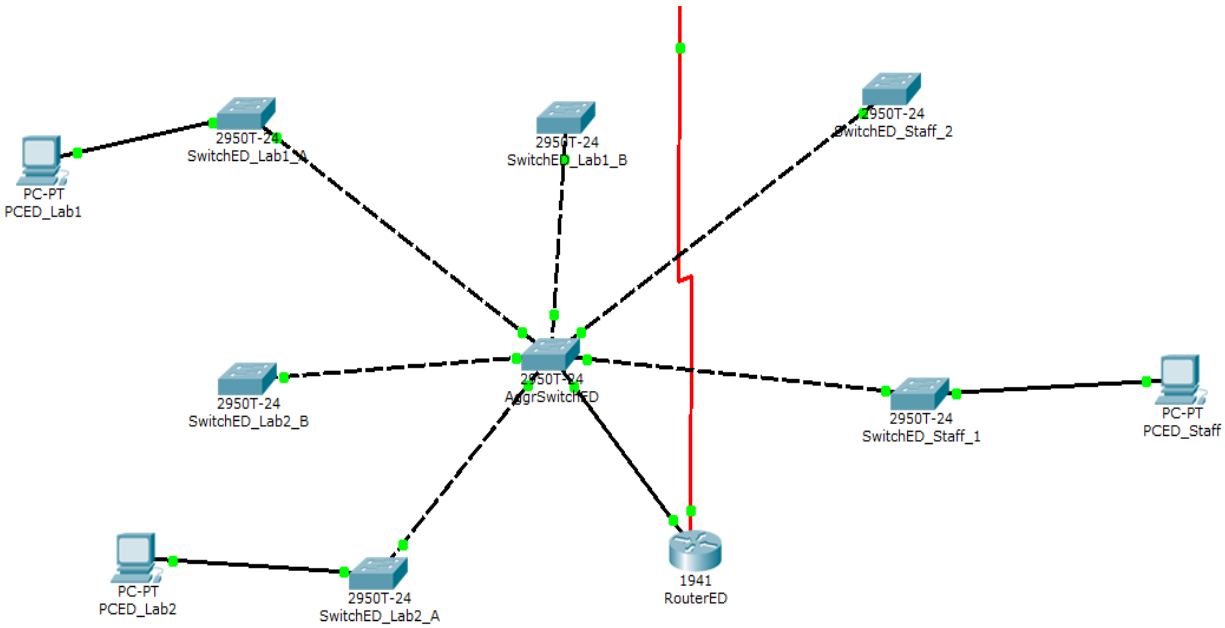
INFRASTRUCTURE DIAGRAM

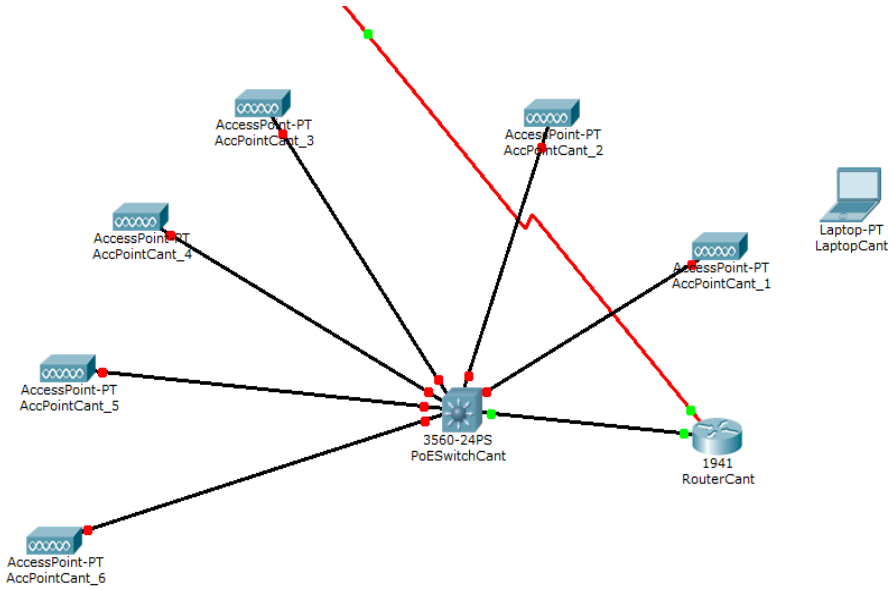


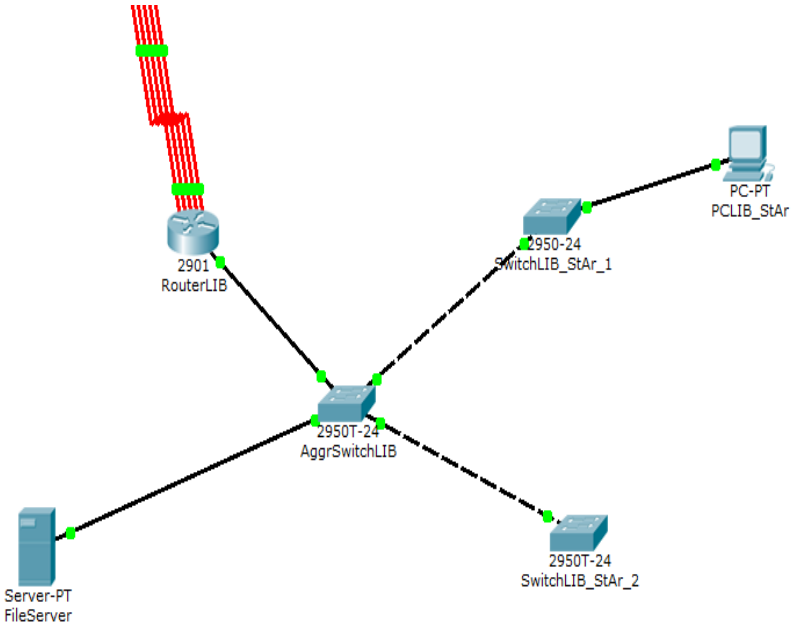

1941
RouterBH1
2950T-24
SwitchBH1_4
Laptop-PT
LaptopBH1_Flr4
2950T-24
SwitchBH1_3
Laptop-PT
LaptopBH1_Flr3
AccessPoint-PT
AccPointBH1_C
AccessPoint-PT
AccPointBH1_B
AccessPoint-PT
AccPointBH1_A
2950T-24
SwitchBH1_2
Laptop-PT
LaptopBH1_Flr2
2950T-24
SwitchBH1_1
Laptop-PT
LaptopBH1_Flr1
Laptop-PT


2950T-24
SwitchBH2_4
Laptop-PT
LaptopBH2_Flr4
Laptop-PT
LaptopBH2_Flr3
2950T-24
SwitchBH2_3
1941
RouterBH2
2950T-24
SwitchBH2_2
Laptop-PT
LaptopBH2_Flr2
AccessPoint-PT
AccPointBH2_C
AccessPoint-PT
AccPointBH2_B
AccessPoint-PT
AccPointBH2_A
2950T-24
SwitchBH2_1
Laptop-PT
LaptopBH2_Flr1
Laptop-PT
LaptopBH2_CommAr_A


Laptop-PT
LaptopGH1_Flr2
Laptop-PT
LaptopGH1_Flr1
2950T-24
SwitchGH1_2A
2950T-24
SwitchGH1_2B
2950T-24
SwitchGH1_1A
2950T-24
SwitchGH1_1B
Laptop-PT
LaptopGH1_CommAr_A
AccessPoint-PT
AccPointGH1_A
AccessPoint-PT
AccPointGH1_B
3560-24PS
AggrSwitchGH1
1941
RouterGH1


PC-PT
PCED_Lab1
2950T-24
SwitchED_Lab1_A
2950T-24
SwitchED_Lab1_B
2950T-24
SwitchED_Staff_2
2950T-24
SwitchED_Lab2_B
2950T-24
AggrSwitchED
2950T-24
SwitchED_Staff_1
PC-PT
PCED_Staff
PC-PT
PCED_Lab2
2950T-24
SwitchED_Lab2_A
1941
RouterED


AccessPoint-PT
AccPointCant_3
AccessPoint-PT
AccPointCant_2
Laptop-PT
LaptopCant
AccessPoint-PT
AccPointCant_4
AccessPoint-PT
AccPointCant_1
AccessPoint-PT
AccPointCant_5
3560-24PS
PoESwitchCant
1941
RouterCant
AccessPoint-PT
AccPointCant_6


PC-PT
PCLIB_StAr
2901
RouterLIB
2950-24
SwitchLIB_StAr_1
2950T-24
AggrSwitchLIB
Server-PT
FileServer
2950T-24
SwitchLIB_StAr_2

ESTIMATED COST OF PROJECT

According to the cost list and use case given, the total estimated cost of the above network is 6174K. The cost break is as follows-

Routers: 5*1941=75K, 1*2901=25K,

Total cost=100K

Switches: 22*2950T=880K, 4*3560P=400K

Total cost=1280K

WAP: 14*Generic=70K

Total cost=70K

Installation cost: 6*routers=18K, 26*switches=52K,

14*WAPs=14K

Total cost=84K

IPv4 cost: 724*2K=1448K

IPv6 cost: 40*0.2K=8K

Total cost=1456K

Port cost: 26*24*fast Ethernet=3120K

32*2*gigabit Ethernet=64K

Total cost=3184K

PROTOCOLS USED IN THE PROJECT

1. **EIGRP (Enhanced Interior Gateway Routing Protocol)**: this is a CISCO proprietary protocol.

Some of the many advantages of EIGRP are:

- very low usage of network resources during normal operation; only hello packets are transmitted on a stable network
- when a change occurs, only routing table changes are propagated, not the entire routing table; this reduces the load the routing protocol itself places on the network
- rapid convergence times for changes in the network topology (in some situations convergence can be almost instantaneous)

EIGRP is an enhanced distance vector protocol, relying on the Diffused Update Algorithm (DUAL) to calculate the shortest path to a destination within a network.

Command: Router(config)#router eigrp [AS no.]

2.VLAN Switching: In computer networking, a single layer-2 network may be partitioned to create multiple distinct broadcast domains, which are mutually isolated so that packets can only pass between them via one or more routers; such a domain is referred to as a virtual local area network, virtual LAN or VLAN. VLANs address issues such as scalability, security, and network management.

3.DHCP(Dynamic Host Configuration Protocol): is a standardized networking protocol used on Internet Protocol (IP) networks for dynamically distributing network configuration parameters, such as IP addresses for interfaces and services. With DHCP, computers request IP addresses and networking parameters automatically from a DHCP server, reducing the need for a network administrator or a user to configure these settings manually.

IP ALLOCATION AND SUBNETTING

The ip addresses range from 172.16.67.0 upto 172.16.69.211, which are divided into subnets as follows:

Canteen(100 users):172.16.67.0/25…..172.16.67.127/25

ECE department:

Lab 1(60 users):172.16.67.128/26…..172.16.67.191/26

Lab 2(60 users):172.16.67.192/26…..172.16.67.255/26

Boys hostel 1(24 users per floor and 25 users in common area):

Floor 4:172.16.68.0/27…..172.16.68.31/27

Floor 3:172.16.68.32/27…..172.16.68.63/27

Floor 2:172.16.68.64/27…..172.16.68.95/27

Floor 1:172.16.68.96/27…..172.16.68.127/27

Gr. floor:172.16.68.128/27…..172.16.68.159/27

Boys hostel 2(24 users per floor and 25 users in common area):

Floor 4:172.16.68.160/27…..172.16.68.191/27

Floor 3:172.16.68.192/27…..172.16.68.223/27

Floor 2:172.16.68.224/27…..172.16.68.255/27

Floor 1:172.16.69.0/27…..172.16.68.31/27

Gr. floor:172.16.69.32/27…..172.16.69.63/27

Girls hostel 1(30 users per floor and 15 users in common area):

Floor 2:172.16.69.64/27…..172.16.69.95/27

Floor 1:172.16.69.96/27…..172.16.69.127/27

Gr. floor:172.16.69.128/27…..172.16.69.159/27

ECE staff(30 users):172.16.69.160/27…..172.16.69.191/27

Ips on serial interfaces:

RouterCant-RouterLIB(2 addresses):

172.16.69.192/30…172.16.69.195/30

RouterED-RouterLIB(2 addresses):

172.16.69.196/30…172.16.69.199/30

RouterGH1-RouterLIB(2 addresses):

172.16.69.200/30…172.16.69.203/30

RouterBH2-RouterLIB(2 addresses):

172.16.69.204/30…172.16.69.207/30

RouterBH1-RouterLIB(2 addresses):

172.16.69.208/30…172.16.69.211/30

Central library IPv6(35 users and 5 servers):

St. Ar.:2:2:2:2::0/64

Server:3:3:3:3:0/64

COMMANDS

telnet configuration on RouterBH1

Router>en

Router#conf t

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#hostname RouterBH1

RouterBH1(config)#pas

RouterBH1(config)#ena

RouterBH1(config)#enable secret ccna

RouterBH1(config)#int se0/1/0

RouterBH1(config-if)#ip add

RouterBH1(config-if)#ip address 172.16.69.209 255.255.255.252

RouterBH1(config-if)#no shut

%LINK-5-CHANGED: Interface Serial0/1/0, changed state to down

RouterBH1(config-if)#exit

RouterBH1(config)#line vty 0

RouterBH1(config-line)#pas

RouterBH1(config-line)#password ccna

RouterBH1(config-line)#login

RouterBH1(config-line)#exec

RouterBH1(config-line)#exec-timeout 30

RouterBH1(config-line)#logging syn

RouterBH1(config-line)#logging synchronous

RouterBH1(config-line)#mot

RouterBH1(config-line)#motd-banner

RouterBH1(config-line)#exit

RouterBH1(config)#do copy run start

Destination filename [startup-config]?

Building configuration...

[OK]

RouterBH1(config)#

Similarly, telnet is configured on rest of the routers

Routing configurations of RouterLIB

Router>en

Router#conf t

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#hos

Router(config)#hostname RouterLIB

RouterLIB(config)#enable secret ccna

RouterLIB(config)#int se0/1/0

RouterLIB(config-if)#ip add

RouterLIB(config-if)#ip address 172.16.69.194 255.255.255.252

RouterLIB(config-if)#no shut

RouterLIB(config-if)#

%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up

RouterLIB(config-if)#exit

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up

RouterLIB(config)#int se0/2/1

RouterLIB(config-if)#ip address 172.16.69.198 255.255.255.252

RouterLIB(config-if)#no shut

RouterLIB(config-if)#

%LINK-5-CHANGED: Interface Serial0/2/1, changed state to up

RouterLIB(config-if)#exit

RouterLIB(config)#

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/2/1, changed state to up

RouterLIB(config)#int se0/2/0

RouterLIB(config-if)#ip address 172.16.69.202 255.255.255.252

RouterLIB(config-if)#no shut

RouterLIB(config-if)#

%LINK-5-CHANGED: Interface Serial0/2/0, changed state to up

RouterLIB(config-if)#exit

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/2/0, changed state to up

RouterLIB(config)#int se0/3/1

RouterLIB(config-if)#ip address 172.16.69.206 255.255.255.252

RouterLIB(config-if)#no shut

RouterLIB(config-if)#

%LINK-5-CHANGED: Interface Serial0/3/1, changed state to up

RouterLIB(config-if)#exit

RouterLIB(config)#

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/3/1, changed state to up

RouterLIB(config)#int se0/3/0

RouterLIB(config-if)#ip address 172.16.69.210 255.255.255.252

RouterLIB(config-if)#no shut

RouterLIB(config-if)#

%LINK-5-CHANGED: Interface Serial0/3/0, changed state to up

RouterLIB(config-if)#exit

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/3/0, changed state to up

RouterLIB(config)#rout

RouterLIB(config)#router ei

RouterLIB(config)#router eigrp 1

RouterLIB(config-router)#net

RouterLIB(config-router)#network 172.16.69.192

RouterLIB(config-router)#network 172.16.69.196

RouterLIB(config-router)#network 172.16.69.200

RouterLIB(config-router)#network 172.16.69.204

RouterLIB(config-router)#network 172.16.69.208

RouterLIB(config-router)#no auto-summary

RouterLIB(config-router)#exit

RouterLIB(config)#do sh ip route eigrp

RouterLIB(config)#

RouterLIB#

%SYS-5-CONFIG_I: Configured from console by console

Routing configuration on other routers by telnet

RouterLIB#telnet 172.16.69.197 23

Trying 172.16.69.197 ...Open

User Access Verification

Password:

RouterED>en

Password:

RouterED#conf t

Enter configuration commands, one per line. End with CNTL/Z.

RouterED(config)#router ei

RouterED(config)#router eigrp 1

RouterED(config-router)#network 172.16.69.196

%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 172.16.69.197 (Serial0/2/1) is up: new adjacency

RouterED(config-router)#no auto

RouterED(config-router)#no auto-summary

%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 172.16.69.197 (Serial0/2/1) is down: Interface Goodbye received

%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 172.16.69.197 (Serial0/2/1) is up: new adjacency

RouterED(config-router)#exit

RouterED(config)#exit

RouterED#exit

[Connection to 172.16.69.197 closed by foreign host]

RouterLIB#telnet 172.16.69.193 23

Trying 172.16.69.193 ...Open

User Access Verification

Password:

RouterCant>en

Password:

Password:

RouterCant#conf t

Enter configuration commands, one per line. End with CNTL/Z.

RouterCant(config)#rou

RouterCant(config)#router ei

RouterCant(config)#router eigrp 1

RouterCant(config-router)#net

RouterCant(config-router)#network 172.16.69.192

%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 172.16.69.193 (Serial0/1/0) is up: new adjacency

RouterCant(config-router)#no aut

RouterCant(config-router)#no auto-summary

%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 172.16.69.193 (Serial0/1/0) is down: Interface Goodbye received

%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 172.16.69.193 (Serial0/1/0) is up: new adjacency

RouterCant(config-router)#exit

RouterCant(config)#exit

RouterCant#exit

[Connection to 172.16.69.193 closed by foreign host]

RouterLIB#conf t

Enter configuration commands, one per line. End with CNTL/Z.

RouterLIB(config)#rout

RouterLIB(config)#router ei

RouterLIB(config)#router eigrp 1

RouterLIB(config-router)#no aut

RouterLIB(config-router)#no auto-summary

RouterLIB(config-router)#

%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 172.16.69.197 (Serial0/2/1) is up: new adjacency

%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 172.16.69.205 (Serial0/3/1) is up: new adjacency

%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 172.16.69.209 (Serial0/3/0) is up: new adjacency

%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 172.16.69.201 (Serial0/2/0) is up: new adjacency

%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 172.16.69.193 (Serial0/1/0) is up: new adjacency

RouterLIB(config-router)#exit

RouterLIB(config)#exit

RouterLIB#

%SYS-5-CONFIG_I: Configured from console by console

RouterLIB#conf t

Enter configuration commands, one per line. End with CNTL/Z.

RouterLIB(config)#exit

RouterLIB#

%SYS-5-CONFIG_I: Configured from console by console

RouterLIB#telnet 172.16.69.209 23

Trying 172.16.69.209 ...Open

User Access Verification

Password:

RouterBH1>en

Password:

RouterBH1#conf t

Enter configuration commands, one per line. End with CNTL/Z.

RouterBH1(config)#rout

RouterBH1(config)#router ei

RouterBH1(config)#router eigrp 1

RouterBH1(config-router)#network 172.16.69.208

RouterBH1(config-router)#no aut

RouterBH1(config-router)#no auto-summary

%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 172.16.69.209 (Serial0/3/0) is down: Interface Goodbye received

%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 172.16.69.209 (Serial0/3/0) is up: new adjacency

RouterBH1(config-router)#exit

RouterBH1(config)#exit

RouterBH1#exit

%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 172.16.69.209 (Serial0/3/0) is up: new adjacency

RouterBH1(config-router)#exit

RouterBH1(config)#exit

RouterBH1#exit

[Connection to 172.16.69.209 closed by foreign host]

RouterLIB#telnet 172.16.69.205 23

Trying 172.16.69.205 ...Open

User Access Verification

Password:

RouterBH2>en

Password:

RouterBH2#conf t

Enter configuration commands, one per line. End with CNTL/Z.

RouterBH2(config)#rout

RouterBH2(config)#router ei

RouterBH2(config)#router eigrp 1

RouterBH2(config-router)#network 172.16.69.204

RouterBH2(config-router)#no aut

RouterBH2(config-router)#no auto-summary

%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 172.16.69.205 (Serial0/3/1) is down: Interface Goodbye received

%DUAL-5-NBRCHANGE: IP-EIGRP 1: Neighbor 172.16.69.205 (Serial0/3/1) is up: new adjacency

RouterBH2(config-router)#exit

RouterBH2(config)#exit

RouterBH2#exit

[Connection to 172.16.69.205 closed by foreign host]

Similarly, rest of the routers are configured by telnet

Routing , Neighbor and topology table of RouterLIB

RouterLIB(config)#do sh ip route

Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP

D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area

N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2

E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP

i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area

* - candidate default, U - per-user static route, o - ODR

P - periodic downloaded static route

Gateway of last resort is not set

172.16.0.0/16 is variably subnetted, 10 subnets, 2 masks

C 172.16.69.192/30 is directly connected, Serial0/1/0

L 172.16.69.194/32 is directly connected, Serial0/1/0

C 172.16.69.196/30 is directly connected, Serial0/2/1

L 172.16.69.198/32 is directly connected, Serial0/2/1

C 172.16.69.200/30 is directly connected, Serial0/2/0

L 172.16.69.202/32 is directly connected, Serial0/2/0

C 172.16.69.204/30 is directly connected, Serial0/3/1

L 172.16.69.206/32 is directly connected, Serial0/3/1

C 172.16.69.208/30 is directly connected, Serial0/3/0

L 172.16.69.210/32 is directly connected, Serial0/3/0

RouterLIB(config)#do sh ip eigrp neighbors

IP-EIGRP neighbors for process 1

H	Address	Interface	Hold	Uptime	SRTT	RTO	Q	Seq
			(sec)		(ms)		Cnt	Num
0	172.16.69.197	Se0/2/1	11	00:40:10	40	1000	0	27
1	172.16.69.193	Se0/1/0	11	00:40:10	40	1000	0	27
2	172.16.69.209	Se0/3/0	13	00:38:34	40	1000	0	36
3	172.16.69.205	Se0/3/1	11	00:37:10	40	1000	0	36
4	172.16.69.201	Se0/2/0	14	00:36:07	40	1000	0	36

RouterLIB(config)#do sh ip eigrp topology

IP-EIGRP Topology Table for AS 1

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,

r - Reply status

P 172.16.69.200/30, 1 successors, FD is 2169856

via Connected, Serial0/2/0

P 172.16.69.196/30, 1 successors, FD is 2169856

via Connected, Serial0/2/1

P 172.16.69.192/30, 1 successors, FD is 2169856

via Connected, Serial0/1/0

P 172.16.69.204/30, 1 successors, FD is 2169856

via Connected, Serial0/3/1

P 172.16.69.208/30, 1 successors, FD is 2169856

via Connected, Serial0/3/0

Routing, Neighbor and topology table of RouterBH1

```
RouterBH1(config)#do sh ip route eigrp
      172.16.0.0/16 is variably subnetted, 6 subnets, 2 masks
D        172.16.69.192/30 [90/2681856] via 172.16.69.210, 00:49:10, Serial0/1/0
D        172.16.69.196/30 [90/2681856] via 172.16.69.210, 00:49:10, Serial0/1/0
D        172.16.69.200/30 [90/2681856] via 172.16.69.210, 00:49:10, Serial0/1/0
D        172.16.69.204/30 [90/2681856] via 172.16.69.210, 00:49:10, Serial0/1/0
RouterBH1(config)#do sh ip eigrp neighbors
IP-EIGRP neighbors for process 1
H   Address          Interface      Hold Uptime   SRTT   RTO  Q  Seq
                                    (sec)         (ms)       Cnt Num
0   172.16.69.210    Se0/1/0        14 00:51:52   40     1000 0  18

RouterBH1(config)#do sh ip eigrp topology
IP-EIGRP Topology Table for AS 1

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
       r - Reply status

P 172.16.69.208/30, 1 successors, FD is 2169856
        via Connected, Serial0/1/0
P 172.16.69.200/30, 1 successors, FD is 2681856
        via 172.16.69.210 (2681856/2169856), Serial0/1/0
P 172.16.69.196/30, 1 successors, FD is 2681856
```

via 172.16.69.210 (2681856/2169856), Serial0/1/0

P 172.16.69.192/30, 1 successors, FD is 2681856

via 172.16.69.210 (2681856/2169856), Serial0/1/0

P 172.16.69.204/30, 1 successors, FD is 2681856

via 172.16.69.210 (2681856/2169856), Serial0/1/0

Routing , Neighbor and topology table of RouterBH2

RouterBH2(config)#do sh ip route eigrp

172.16.0.0/16 is variably subnetted, 6 subnets, 2 masks

D 172.16.69.192/30 [90/2681856] via 172.16.69.206, 00:53:45, Serial0/1/0

D 172.16.69.196/30 [90/2681856] via 172.16.69.206, 00:53:45, Serial0/1/0

D 172.16.69.200/30 [90/2681856] via 172.16.69.206, 00:53:45, Serial0/1/0

D 172.16.69.208/30 [90/2681856] via 172.16.69.206, 00:53:45, Serial0/1/0

RouterBH2(config)#do sh ip eigrp neighbors

IP-EIGRP neighbors for process 1

H	Address	Interface	Hold	Uptime	SRTT	RTO	Q	Seq
			(sec)		(ms)		Cnt	Num
0	172.16.69.206	Se0/1/0	14	00:55:19	40	1000	0	19

RouterBH2(config)#do sh ip eigrp topology

IP-EIGRP Topology Table for AS 1

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,

r - Reply status

P 172.16.69.204/30, 1 successors, FD is 2169856

via Connected, Serial0/1/0

P 172.16.69.200/30, 1 successors, FD is 2681856

via 172.16.69.206 (2681856/2169856), Serial0/1/0

P 172.16.69.196/30, 1 successors, FD is 2681856

via 172.16.69.206 (2681856/2169856), Serial0/1/0

P 172.16.69.192/30, 1 successors, FD is 2681856

via 172.16.69.206 (2681856/2169856), Serial0/1/0

P 172.16.69.208/30, 1 successors, FD is 2681856

via 172.16.69.206 (2681856/2169 856), Serial0/1/0

Routing , Neighbor and topology table of RouterGH1

RouterGH1#conf t

Enter configuration commands, one per line. End with CNTL/Z.

RouterGH1(config)#do sh ip route eigrp

172.16.0.0/16 is variably subnetted, 6 subnets, 2 masks

D 172.16.69.192/30 [90/2681856] via 172.16.69.202, 00:57:50, Serial0/1/0

D 172.16.69.196/30 [90/2681856] via 172.16.69.202, 00:57:50, Serial0/1/0

D 172.16.69.204/30 [90/2681856] via 172.16.69.202, 00:57:50, Serial0/1/0

D 172.16.69.208/30 [90/2681856] via 172.16.69.202, 00:57:50, Serial0/1/0

RouterGH1(config)#do sh ip eigrp neighbors

IP-EIGRP neighbors for process 1

H	Address	Interface	Hold Uptime	SRTT	RTO	Q	Seq
			(sec)	(ms)		Cnt	Num
0	172.16.69.202	Se0/1/0	13 00:58:09	40	1000	0	20

RouterGH1(config)#do sh ip eigrp topology

IP-EIGRP Topology Table for AS 1

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,

r - Reply status

P 172.16.69.200/30, 1 successors, FD is 2169856

via Connected, Serial0/1/0

P 172.16.69.196/30, 1 successors, FD is 2681856

via 172.16.69.202 (2681856/2169856), Serial0/1/0

P 172.16.69.192/30, 1 successors, FD is 2681856

via 172.16.69.202 (2681856/2169856), Serial0/1/0

P 172.16.69.204/30, 1 successors, FD is 2681856

via 172.16.69.202 (2681856/2169856), Serial0/1/0

P 172.16.69.208/30, 1 successors, FD is 2681856

via 172.16.69.202 (2681856/2169856), Serial0/1/0

Routing , Neighbor and topology table of RouterED

RouterED(config)#do sh ip route eigrp

172.16.0.0/16 is variably subnetted, 6 subnets, 2 masks

D 172.16.69.192/30 [90/2681856] via 172.16.69.198, 01:04:30, Serial0/1/0

D 172.16.69.200/30 [90/2681856] via 172.16.69.198, 01:04:30, Serial0/1/0

D 172.16.69.204/30 [90/2681856] via 172.16.69.198, 01:04:30, Serial0/1/0

D 172.16.69.208/30 [90/2681856] via 172.16.69.198, 01:04:30, Serial0/1/0

RouterED(config)#do sh ip eigrp neighbors

IP-EIGRP neighbors for process 1

H	Address	Interface	Hold	Uptime	SRTT	RTO	Q	Seq
			(sec)		(ms)		Cnt	Num
0	172.16.69.198	Se0/1/0	13	01:04:49	40	1000	0	13

RouterED(config)#do sh ip eigrp topology

IP-EIGRP Topology Table for AS 1

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,

r - Reply status

P 172.16.69.196/30, 1 successors, FD is 2169856

via Connected, Serial0/1/0

P 172.16.69.200/30, 1 successors, FD is 2681856

via 172.16.69.198 (2681856/2169856), Serial0/1/0

P 172.16.69.192/30, 1 successors, FD is 2681856

via 172.16.69.198 (2681856/2169856), Serial0/1/0

P 172.16.69.204/30, 1 successors, FD is 2681856

via 172.16.69.198 (2681856/2169856), Serial0/1/0

P 172.16.69.208/30, 1 successors, FD is 2681856

via 172.16.69.198 (2681856/2169856), Serial0/1/0

Routing , Neighbor and topology table of RouterCant

RouterCant(config)#do sh ip route eigrp

172.16.0.0/16 is variably subnetted, 6 subnets, 2 masks

D 172.16.69.196/30 [90/2681856] via 172.16.69.194, 01:07:16, Serial0/1/0

D 172.16.69.200/30 [90/2681856] via 172.16.69.194, 01:07:16, Serial0/1/0

D 172.16.69.204/30 [90/2681856] via 172.16.69.194, 01:07:16, Serial0/1/0

D 172.16.69.208/30 [90/2681856] via 172.16.69.194, 01:07:16, Serial0/1/0

RouterCant(config)#do sh ip eigrp neighbors

IP-EIGRP neighbors for process 1

H	Address	Interface	Hold	Uptime	SRTT	RTO	Q	Seq
			(sec)		(ms)		Cnt	Num
0	172.16.69.194	Se0/1/0	11	01:07:34	40	1000	0	17

RouterCant(config)#do sh ip eigrp topology

IP-EIGRP Topology Table for AS 1

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,

r - Reply status

P 172.16.69.192/30, 1 successors, FD is 2169856

via Connected, Serial0/1/0

P 172.16.69.200/30, 1 successors, FD is 2681856

via 172.16.69.194 (2681856/2169856), Serial0/1/0

P 172.16.69.196/30, 1 successors, FD is 2681856

via 172.16.69.194 (2681856/2169856), Serial0/1/0

P 172.16.69.204/30, 1 successors, FD is 2681856

via 172.16.69.194 (2681856/2169856), Serial0/1/0

P 172.16.69.208/30, 1 successors, FD is 2681856

via 172.16.69.194 (2681856/2169856), Serial0/1/0

Configuration of Access Switch 2950T

Switch>en

Switch#conf t

Enter configuration commands, one per line. End with CNTL/Z.

Switch(config)#hostname SwBH1_4

SwBH1_4(config)#ena

SwBH1_4(config)#enable sec

SwBH1_4(config)#enable secret ccna

SwBH1_4(config)#line console 0

SwBH1_4(config-line)#pas

SwBH1_4(config-line)#password ccna

SwBH1_4(config-line)#login

SwBH1_4(config-line)#ex

% Ambiguous command: "ex"

SwBH1_4(config-line)#exit

SwBH1_4(config)#line vty 0

SwBH1_4(config-line)#pas

```
SwBH1_4(config-line)#password ccna
SwBH1_4(config-line)#login
SwBH1_4(config-line)#int vlan1
SwBH1_4(config-if)#ip add
SwBH1_4(config-if)#ip address 172.16.68.2 255.255.255.224
SwBH1_4(config-if)#no shut

SwBH1_4(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up
exit
SwBH1_4(config)#mot
SwBH1_4(config)#ban
SwBH1_4(config)#banner mot
SwBH1_4(config)#banner motd
% Incomplete command.
SwBH1_4(config)#banner motd ?
  LINE    c banner-text c, where 'c' is a delimiting character
SwBH1_4(config)#banner motd #this is 4th floor switch#

SwBH1_4(config)#ex
SwBH1_4#
%SYS-5-CONFIG_I: Configured from console by console
copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
SwBH1_4#conf t
```

```
Enter configuration commands, one per line.   End with CNTL/Z.
SwBH1_4(config)#ip def
SwBH1_4(config)#ip default-gateway 172.16.68.1
SwBH1_4(config)#ex
SwBH1_4#
%SYS-5-CONFIG_I: Configured from console by console

SwBH1_4#conf t
Enter configuration commands, one per line.   End with CNTL/Z.
SwBH1_4(config)#int range fa0/2-24
SwBH1_4(config-if-range)#span
SwBH1_4(config-if-range)#spanning-tree por
SwBH1_4(config-if-range)#spanning-tree portfast
%Warning: portfast should only be enabled on ports connected to a single
 host. Connecting hubs, concentrators, switches, bridges, etc... to this
 interface   when portfast is enabled, can cause temporary bridging loops.
 Use with CAUTION

%Portfast will be configured in 23 interfaces due to the range command
 but will only have effect when the interfaces are in a non-trunking mode.
SwBH1_4(config-if-range)#spanning-tree bp
SwBH1_4(config-if-range)#spanning-tree bpduguard ena
SwBH1_4(config-if-range)#spanning-tree bpduguard enable
SwBH1_4(config-if-range)#spanning-tree bpdufilter enable
SwBH1_4(config-if-range)#exit                                          ^
SwBH1_4(config)#exit
SwBH1_4#
%SYS-5-CONFIG_I: Configured from console by console
```

VLAN configuration on Access Switch 2950T

```
SwBH1_4#conf t
Enter configuration commands, one per line.   End with CNTL/Z.
SwBH1_4(config)#vlan 2
SwBH1_4(config-vlan)#BH1_Flr4
                                    ^
% Invalid input detected at '^' marker.

SwBH1_4(config-vlan)#name BH1_Flr4
SwBH1_4(config-vlan)#int range f0/2-24
SwBH1_4(config-if-range)#sw
SwBH1_4(config-if-range)#switchport mo
SwBH1_4(config-if-range)#switchport mode ac
SwBH1_4(config-if-range)#switchport mode access
SwBH1_4(config-if-range)#sw
SwBH1_4(config-if-range)#switchport ac
SwBH1_4(config-if-range)#switchport access v
SwBH1_4(config-if-range)#switchport access vlan 2
SwBH1_4(config-if-range)#ex
SwBH1_4(config)#ex
SwBH1_4#
%SYS-5-CONFIG_I: Configured from console by console
```

Aggr Switch 3560 vlan trunking configuration

```
Switch>en
Switch#conf t
Enter configuration commands, one per line.    End with CNTL/Z.
Switch(config)#ho AggrSwitchGH1
AggrSwitchGH1(config)#ena sec ccna
AggrSwitchGH1(config)#li con 0
AggrSwitchGH1(config-line)#pas ccna
AggrSwitchGH1(config-line)#login
AggrSwitchGH1(config-line)#exit
AggrSwitchGH1(config)#li vty 0
AggrSwitchGH1(config-line)#pas ccna
AggrSwitchGH1(config-line)#login
AggrSwitchGH1(config-line)#exit
AggrSwitchGH1(config)#do copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
AggrSwitchGH1(config)#vlan 10
AggrSwitchGH1(config-vlan)#int ran f0/1-2
AggrSwitchGH1(config-if-range)#sw m a
AggrSwitchGH1(config-if-range)#sw a v 10
AggrSwitchGH1(config-if-range)#vlan 11
```

```
AggrSwitchGH1(config-vlan)#int ran f0/3-4
AggrSwitchGH1(config-if-range)#sw m a
AggrSwitchGH1(config-if-range)#sw a v 11
AggrSwitchGH1(config-if-range)#exit
AggrSwitchGH1(config)#int gig0/1
AggrSwitchGH1(config-if)#sw tr enc d
AggrSwitchGH1(config-if)#sw mod
AggrSwitchGH1(config-if)#sw mode tr
AggrSwitchGH1(config-if)#sw mode trunk
AggrSwitchGH1(config-if)#exit
AggrSwitchGH1(config)#
```

Configuration of inter-VLAN Routing on Router1941

```
RouterGH1>en
Password:
RouterGH1#conf t
Enter configuration commands, one per line.    End with CNTL/Z.
RouterGH1(config)#int gig0/0
RouterGH1(config-if)#no ip
```

```
RouterGH1(config-if)#no ip add
RouterGH1(config-if)#no ip address
RouterGH1(config-if)#int gig0/0.10
RouterGH1(config-subif)#enc
RouterGH1(config-subif)#encapsulation d
RouterGH1(config-subif)#encapsulation dot1Q 10
RouterGH1(config-subif)#ip add
RouterGH1(config-subif)#ip address 172.16.69.65 255.255.255.224
RouterGH1(config-subif)#int gig0/0.11
RouterGH1(config-subif)#encapsulation dot1Q 11
RouterGH1(config-subif)#ip address 172.16.69.97 255.255.255.224
RouterGH1(config-subif)#exit
RouterGH1(config)#exit
RouterGH1#
%SYS-5-CONFIG_I: Configured from console by console

RouterGH1#conf t
Enter configuration commands, one per line.    End with CNTL/Z.
RouterGH1(config)#int gig0/0
RouterGH1(config-if)#no shut

RouterGH1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up

%LINK-5-CHANGED: Interface GigabitEthernet0/0.10, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.10, changed state to up
```

%LINK-5-CHANGED: Interface GigabitEthernet0/0.11, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.11, changed state to up

DHCP Configuration on PoE Switch 3560

Switch>en

Switch#conf t

Enter configuration commands, one per line. End with CNTL/Z.

Switch(config)#ho PoESwitchCant

PoESwitchCant(config)#ena sec ccna

PoESwitchCant(config)#lin con 0

PoESwitchCant(config-line)#pas ccna

PoESwitchCant(config-line)#login

PoESwitchCant(config-line)#exit

PoESwitchCant(config)#lin vty 0

PoESwitchCant(config-line)#pas ccna

PoESwitchCant(config-line)#login

PoESwitchCant(config-line)#exit

```
PoESwitchCant(config)#int vlan 1
PoESwitchCant(config-if)#ip add 172.16.67.1 255.255.255.128
PoESwitchCant(config-if)#no sh

PoESwitchCant(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up
%IP-4-DUPADDR: Duplicate address 172.16.67.1 on Vlan1, sourced by 00E0.F7A4.2C16
exit
PoESwitchCant(config)#ip dhcp pool canteen
PoESwitchCant(dhcp-config)#netw
PoESwitchCant(dhcp-config)#network 172.16.67.0 255.255.255.128
PoESwitchCant(dhcp-config)#def
PoESwitchCant(dhcp-config)#default-router 172.16.67.1
PoESwitchCant(dhcp-config)#dns
PoESwitchCant(dhcp-config)#dns-server 172.16.67.50
PoESwitchCant(dhcp-config)#exit
PoESwitchCant(config)#ip dhc
PoESwitchCant(config)#ip dhcp exc
PoESwitchCant(config)#ip dhcp excluded-address 172.16.67.1 172.16.67.4
PoESwitchCant(config)#exit
PoESwitchCant#
%SYS-5-CONFIG_I: Configured from console by console
%IP-4-DUPADDR: Duplicate address 172.16.67.1 on Vlan1, sourced by 00E0.F7A4.2C16
```

Library access switch configuration

```
Switch>en
Switch#conf t
Enter configuration commands, one per line.   End with CNTL/Z.
Switch(config)#ho
% Incomplete command.
Switch(config)#ho SwitchLIB_StAr_1
SwitchLIB_StAr_1(config)#ena sec ccna
SwitchLIB_StAr_1(config)#lin con 0
SwitchLIB_StAr_1(config-line)#pas ccna
SwitchLIB_StAr_1(config-line)#login
SwitchLIB_StAr_1(config-line)#exit
SwitchLIB_StAr_1(config)#lin vty 0
SwitchLIB_StAr_1(config-line)#pas ccna
SwitchLIB_StAr_1(config-line)#login
SwitchLIB_StAr_1(config-line)#exit
SwitchLIB_StAr_1(config)#do copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
SwitchLIB_StAr_1(config)#vlan 15
SwitchLIB_StAr_1(config-vlan)#name LIB_StAr
SwitchLIB_StAr_1(config-vlan)#int range f0/1-24
SwitchLIB_StAr_1(config-if-range)#sw m a
SwitchLIB_StAr_1(config-if-range)#sw a v 15
SwitchLIB_StAr_1(config-if-range)#end
```

SwitchLIB_StAr_1#

%SYS-5-CONFIG_I: Configured from console by console

AggrSwitchLIB configuration

Switch>en

Switch#conf t

Enter configuration commands, one per line. End with CNTL/Z.

Switch(config)#ho AggrSwitchLIB

AggrSwitchLIB(config)#ena sec ccna

AggrSwitchLIB(config)#lin con 0

AggrSwitchLIB(config-line)#pas ccna

AggrSwitchLIB(config-line)#login

AggrSwitchLIB(config-line)#exit

AggrSwitchLIB(config)#lin vty 0

AggrSwitchLIB(config-line)#pas ccna

AggrSwitchLIB(config-line)#login

AggrSwitchLIB(config-line)#exit

AggrSwitchLIB(config)#vlan 16

AggrSwitchLIB(config-vlan)#name LIB_main

AggrSwitchLIB(config-vlan)#int range f0/3-7

AggrSwitchLIB(config-if-range)#sw m a

AggrSwitchLIB(config-if-range)#sw a v 16

```
AggrSwitchLIB(config-if-range)#exit
AggrSwitchLIB(config)#vlan 15
AggrSwitchLIB(config-vlan)#int range f0/1-2
AggrSwitchLIB(config-if-range)#sw m a
AggrSwitchLIB(config-if-range)#sw a v 15
AggrSwitchLIB(config-if-range)#exit
AggrSwitchLIB(config)#int gig1/1
AggrSwitchLIB(config-if)#sw tr all
AggrSwitchLIB(config-if)#sw tr allowed all
AggrSwitchLIB(config-if)#sw tr v
AggrSwitchLIB(config-if)#sw tr vl
AggrSwitchLIB(config-if)#sw tr ?
  allowed    Set allowed VLAN characteristics when interface is in trunking mode
  native     Set trunking native characteristics when interface is in trunking
               mode
AggrSwitchLIB(config-if)#sw tr
AggrSwitchLIB(config-if)#sw trunk all
AggrSwitchLIB(config-if)#sw trunk allowed v
AggrSwitchLIB(config-if)#sw trunk allowed vlan all
AggrSwitchLIB(config-if)#sw trunk allowed vlan all
AggrSwitchLIB(config-if)#sw mod
AggrSwitchLIB(config-if)#sw mode tr
AggrSwitchLIB(config-if)#sw mode trunk
AggrSwitchLIB(config-if)#end
AggrSwitchLIB#
%SYS-5-CONFIG_I: Configured from console by console
```

Ipv6 configuration in library

RouterLIB#conf t

Enter configuration commands, one per line. End with CNTL/Z.

RouterLIB(config)#int gig0/1

RouterLIB(config-if)#no ip add

RouterLIB(config-if)#no ip address

RouterLIB(config-if)#int gig0/1.15

RouterLIB(config-subif)#enc

RouterLIB(config-subif)#encapsulation do

RouterLIB(config-subif)#encapsulation dot1Q 15

RouterLIB(config-subif)#no ip add

RouterLIB(config-subif)#no ip address

RouterLIB(config-subif)#ipv6 add

RouterLIB(config-subif)#ipv6 address 2:2:2:2::1/64

RouterLIB(config-subif)#int gig0/1.16

RouterLIB(config-subif)#enc

RouterLIB(config-subif)#encapsulation do

RouterLIB(config-subif)#encapsulation dot1Q 16

RouterLIB(config-subif)#no ip add

RouterLIB(config-subif)#ipv6 add

RouterLIB(config-subif)#ipv6 address 3:3:3:3::1/64

RouterLIB(config-subif)#exit

RouterLIB(config)#int gig0/1

RouterLIB(config-if)#no shut

RouterLIB(config-if)#

%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up

%LINK-5-CHANGED: Interface GigabitEthernet0/1.15, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1.15, changed state to up

%LINK-5-CHANGED: Interface GigabitEthernet0/1.16, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1.16, changed state to up