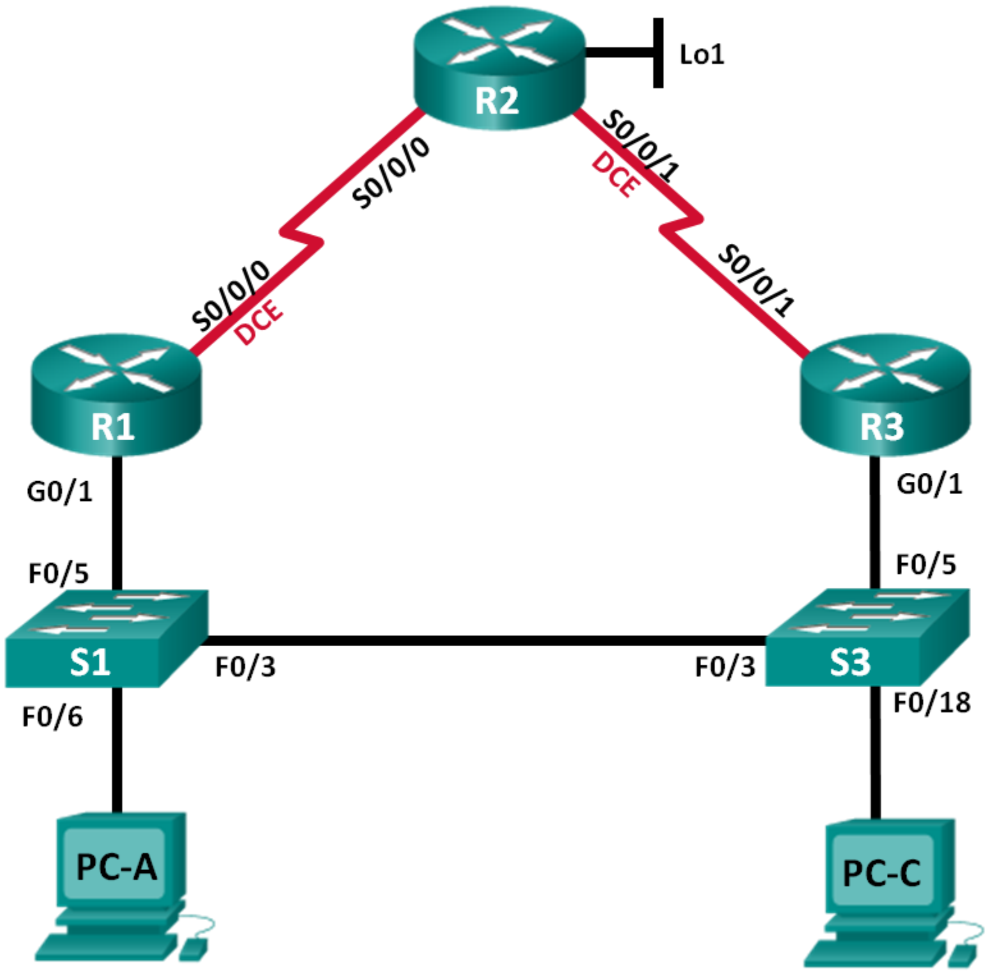
Lab – Configuring HSRP and GLBP (Instructor Version)

Instructor Note: Red font color or Gray highlights indicate text that appears in the instructor copy only.

Topology



Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	G0/1	192.168.1.1	255.255.255.0	N/A
	S0/0/0 (DCE)	10.1.1.1	255.255.255.252	N/A
R2	S0/0/0	10.1.1.2	255.255.255.252	N/A
	S0/0/1 (DCE)	10.2.2.2	255.255.255.252	N/A
	Lo1	209.165.200.225	255.255.255.224	N/A
R3	G0/1	192.168.1.3	255.255.255.0	N/A
	S0/0/1	10.2.2.1	255.255.255.252	N/A
S1	VLAN 1	192.168.1.11	255.255.255.0	192.168.1.1
S3	VLAN 1	192.168.1.13	255.255.255.0	192.168.1.3
PC-A	NIC	192.168.1.31	255.255.255.0	192.168.1.1
PC-C	NIC	192.168.1.33	255.255.255.0	192.168.1.3

Objectives

Part 1: Build the Network and Verify Connectivity

Part 2: Configure First Hop Redundancy using HSRP

Part 3: Configure First Hop Redundancy using GLBP

Background / Scenario

Spanning tree provides loop-free redundancy between switches within your LAN. However, it does not provide redundant default gateways for end-user devices within your network if one of your routers fails. First Hop Redundancy Protocols (FHRPs) provide redundant default gateways for end devices with no end-user configuration necessary.

In this lab, you will configure two FHRPs. In Part 2, you will configure Cisco's Hot Standby Routing Protocol (HSRP), and in Part 3 you will configure Cisco's Gateway Load Balancing Protocol (GLBP).

Note: The routers used with CCNA hands-on labs are Cisco 1941 Integrated Services Routers (ISRs) with Cisco IOS Release 15.2(4)M3 (universalk9 image). The switches used are Cisco Catalyst 2960s with Cisco IOS Release 15.0(2) (lanbasek9 image). Other routers, switches, and Cisco IOS versions can be used. Depending on the model and Cisco IOS version, the commands available and output produced might vary from what is shown in the labs. Refer to the Router Interface Summary Table at the end of this lab for the correct interface identifiers.

Note: Make sure that the routers and switches have been erased and have no startup configurations. If you are unsure, contact your instructor.

Instructor Note: Refer to the Instructor Lab Manual for the procedures to initialize and reload devices.

Required Resources

- 3 Routers (Cisco 1941 with Cisco IOS Release 15.2(4)M3 universal image or comparable)
- 2 Switches (Cisco 2960 with Cisco IOS Release 15.0(2) lanbasek9 image or comparable)
- 2 PCs (Windows 7, Vista, or XP with terminal emulation program, such as Tera Term)

- Console cables to configure the Cisco IOS devices via the console ports
- Ethernet and serial cables as shown in the topology

Part 1: Build the Network and Verify Connectivity

In Part 1, you will set up the network topology and configure basic settings, such as the interface IP addresses, static routing, device access, and passwords.

Step 1: Cable the network as shown in the topology.

Attach the devices as shown in the topology diagram, and cable as necessary.

Step 2: Configure PC hosts.

Step 3: Initialize and reload the routers and switches as necessary.

Step 4: Configure basic settings for each router.

a. Disable DNS lookup.

b. Configure the device name as shown in the topology.

c. Configure IP addresses for the routers as listed in the Addressing Table.

d. Set clock rate to **128000** for all DCE serial interfaces.

e. Assign **class** as the encrypted privileged EXEC mode password.

f. Assign **cisco** for the console and vty password and enable login.

g. Configure **logging synchronous** to prevent console messages from interrupting command entry.

h. Copy the running configuration to the startup configuration.

Step 5: Configure basic settings for each switch.

a. Disable DNS lookup.

b. Configure the device name as shown in the topology.

c. Assign **class** as the encrypted privileged EXEC mode password.

d. Configure IP addresses for the switches as listed in the Addressing Table.

e. Configure the default gateway on each switch.

f. Assign **cisco** for the console and vty password and enable login.

g. Configure **logging synchronous** to prevent console messages from interrupting command entry.

h. Copy the running configuration to the startup configuration.

Step 6: Verify connectivity between PC-A and PC-C.

Ping from PC-A to PC-C. Were the ping results successful? ________________ Yes

If the pings are not successful, troubleshoot the basic device configurations before continuing.

Note: It may be necessary to disable the PC firewall to successfully ping between PCs.

Step 7: Configure routing.

a. Configure EIGRP on the routers and use AS of 1. Add all the networks, except 209.165.200.224/27 into the EIGRP process.

b. Configure a default route on R2 using Lo1 as the exit interface to 209.165.200.224/27 network and redistribute this route into the EIGRP process.

Step 8: Verify connectivity.

a. From PC-A, you should be able to ping every interface on R1, R2, R3, and PC-C. Were all pings successful? ______________ Yes

b. From PC-C, you should be able to ping every interface on R1, R2, R3, and PC-A. Were all pings successful? ______________ Yes

Part 2: Configure First Hop Redundancy Using HSRP

Even though the topology has been designed with some redundancy (two routers and two switches on the same LAN network), both PC-A and PC-C are configured with only one gateway address. PC-A is using R1 and PC-C is using R3. If either of these routers or the interfaces on the routers went down, the PC could lose its connection to the Internet.

In Part 2, you will test how the network behaves both before and after configuring HSRP. To do this, you will determine the path that packets take to the loopback address on R2.

Step 1: Determine the path for Internet traffic for PC-A and PC-C.

a. From a command prompt on PC-A, issue a **tracert** command to the 209.165.200.225 loopback address of R2.

```
C:\ tracert 209.165.200.225
Tracing route to 209.165.200.225 over a maximum of 30 hops

  1     1 ms     1 ms     1 ms  192.168.1.1
  2    13 ms    13 ms    13 ms  209.165.200.225

Trace complete.
```

What path did the packets take from PC-A to 209.165.200.225? ________________________________
PC-A to R1 to R2

b. From a command prompt on PC-C, issue a **tracert** command to the 209.165.200.225 loopback address of R2.

What path did the packets take from PC-C to 209.165.200.225? ________________________________
PC-C to R3 to R2

Step 2: Start a ping session on PC-A, and break the connection between S1 and R1.

a. From a command prompt on PC-A, issue a **ping –t** command to the **209.165.200.225** address on R2. Make sure you leave the command prompt window open.

Note: The pings continue until you press **Ctrl**+**C**, or until you close the command prompt window.

```
C:\ ping –t 209.165.200.225
Pinging 209.165.200.225 with 32 bytes of data:
Reply from 209.165.200.225: bytes=32 time=9ms TTL=254
Reply from 209.165.200.225: bytes=32 time=9ms TTL=254
```

```
Reply from 209.165.200.225: bytes=32 time=9ms TTL=254
Reply from 209.165.200.225: bytes=32 time=9ms TTL=254
Reply from 209.165.200.225: bytes=32 time=9ms TTL=254
Reply from 209.165.200.225: bytes=32 time=9ms TTL=254
Reply from 209.165.200.225: bytes=32 time=9ms TTL=254
Reply from 209.165.200.225: bytes=32 time=9ms TTL=254
Reply from 209.165.200.225: bytes=32 time=9ms TTL=254
Reply from 209.165.200.225: bytes=32 time=9ms TTL=254
Reply from 209.165.200.225: bytes=32 time=9ms TTL=254
Reply from 209.165.200.225: bytes=32 time=9ms TTL=254
Reply from 209.165.200.225: bytes=32 time=9ms TTL=254
<output omitted>
```

b. As the ping continues, disconnect the Ethernet cable from F0/5 on S1. You can also shut down the S1 F0/5 interface, which creates the same result.

   What happened to the ping traffic?

   ____

   After the cable was disconnected from F0/5 on S1 (or the interface was shut down), pings failed. Sample output is below.

```
Request timed out.
Request timed out.
Request timed out.
Request timed out.
<output omitted>
```

c. Repeat Steps 2a and 2b on PC-C and S3. Disconnect cable from F0/5 on S3.

   What were your results?

   ____

   The results were the same as on PC-A. After the Ethernet cable was disconnected from F0/5 on S3, the pings failed.

d. Reconnect the Ethernet cables to F0/5 or enable the F0/5 interface on both S1 and S3, respectively. Re-issue pings to 209.165.200.225 from both PC-A and PC-C to make sure connectivity is re-established.

Step 3: Configure HSRP on R1 and R3.

In this step, you will configure HSRP and change the default gateway address on PC-A, PC-C, S1, and S2 to the virtual IP address for HSRP. R1 becomes the active router via configuration of the HSRP priority command.

a. Configure HSRP on R1.

```
R1(config)# interface g0/1
R1(config-if)# standby 1 ip 192.168.1.254
R1(config-if)# standby 1 priority 150
R1(config-if)# standby 1 preempt
```

b. Configure HSRP on R3.

```
R3(config)# interface g0/1
R3(config-if)# standby 1 ip 192.168.1.254
```

c. Verify HSRP by issuing the **show standby** command on R1 and R3.


```
R1# show standby
GigabitEthernet0/1 - Group 1
  State is Active
    1 state change, last state change 00:02:11
  Virtual IP address is 192.168.1.254
  Active virtual MAC address is 0000.0c07.ac01
    Local virtual MAC address is 0000.0c07.ac01 (v1 default)
  Hello time 3 sec, hold time 10 sec
    Next hello sent in 0.784 secs
  Preemption enabled
  Active router is local
  Standby router is 192.168.1.3, priority 100 (expires in 9.568 sec)
  Priority 150 (configured 150)
  Group name is "hsrp-Gi0/1-1" (default)

R3# show standby
GigabitEthernet0/1 - Group 1
  State is Standby
    4 state changes, last state change 00:02:20
  Virtual IP address is 192.168.1.254
  Active virtual MAC address is 0000.0c07.ac01
    Local virtual MAC address is 0000.0c07.ac01 (v1 default)
  Hello time 3 sec, hold time 10 sec
    Next hello sent in 2.128 secs
  Preemption disabled
  Active router is 192.168.1.1, priority 150 (expires in 10.592 sec)
  Standby router is local
  Priority 100 (default 100)
  Group name is "hsrp-Gi0/1-1" (default)
```

Using the output shown above, answer the following questions:

Which router is the active router? ______________________ R1

What is the MAC address for the virtual IP address? _____________________________ 0000.0c07.ac01

What is the IP address and priority of the standby router?

____

____

IP address is 192.168.1.3 and the priority is 100 (the default which is less than that of R1, the active router, with a priority of 150).

d. Use the **show standby brief** command on R1 and R3 to view an HSRP status summary. Sample output is shown below.

```
R1# show standby brief
                     P indicates configured to preempt.
                     |
Interface   Grp  Pri P State   Active          Standby         Virtual IP
Gi0/1       1    150 P Active  local           192.168.1.3     192.168.1.254

R3# show standby brief
```



```
                     P indicates configured to preempt.
                     |
Interface    Grp  Pri P State   Active          Standby         Virtual IP
Gi0/1        1    100   Standby 192.168.1.1     local           192.168.1.254
```

e. Change the default gateway address for PC-A, PC-C, S1, and S3. Which address should you use?

____

192.168.1.254

Verify the new settings. Issue a ping from both PC-A and PC-C to the loopback address of R2. Are the pings successful? __________ Yes

Step 4: Start a ping session on PC-A and break the connection between the switch that is connected to the Active HSRP router (R1).

a. From a command prompt on PC-A, issue a **ping –t** command to the 209.165.200.225 address on R2. Ensure that you leave the command prompt window open.

b. As the ping continues, disconnect the Ethernet cable from F0/5 on S1 or shut down the F0/5 interface.

What happened to the ping traffic?

____

____

____

A few packets may be dropped while the Standby router takes over. Sample output is shown below:

```
Reply from 209.165.200.225: bytes=32 time=9ms TTL=254
Request timed out.
Request timed out.
Reply from 209.165.200.225: bytes=32 time=9ms TTL=254
<output Omitted>
```

Step 5: Verify HSRP settings on R1 and R3.

a. Issue the **show standby brief** command on R1 and R3.

Which router is the active router? ________________________________ R3 is now the active router.

b. Reconnect the cable between the switch and the router or enable interface F0/5.

c. Disable the HSRP configuration commands on R1 and R3.

```
R1(config)# interface g0/1
R1(config-if)# no standby 1

R3(config)# interface g0/1
R3(config-if)# no standby 1
```

Part 3: Configure First Hop Redundancy Using GLBP

By default, HSRP does NOT do load balancing. The active router always handles all of the traffic, while the standby router sits unused, unless there is a link failure. This is not an efficient use of resources. GLBP provides nonstop path redundancy for IP by sharing protocol and MAC addresses between redundant gateways. GLBP also allows a group of routers to share the load of the default gateway on a LAN.

Configuring GLBP is very similar to HSRP. Load balancing can be done in a variety of ways using GLBP. In this lab, you will use the round-robin method.

Step 1: Configure GLBP on R1 and R3.

a. Configure GLBP on R1.

```
R1(config)# interface g0/1
R1(config-if)# glbp 1 ip 192.168.1.254
R1(config-if)# glbp 1 preempt
R1(config-if)# glbp 1 priority 150
R1(config-if)# glbp 1 load-balancing round-robin
```

b. Configure GLBP on R3.

```
R3(config)# interface g0/1
R3(config-if)# glbp 1 ip 192.168.1.254
R3(config-if)# glbp 1 load-balancing round-robin
```

Step 2: Verify GLBP on R1 and R3.

a. Issue the **show glbp brief** command on R1 and R3.

```
R1# show glbp brief
Interface   Grp  Fwd Pri State    Address         Active router   Standby router
Gi0/1       1    -   150 Active   192.168.1.254   local           192.168.1.3
Gi0/1       1    1   -   Active   0007.b400.0101  local           -
Gi0/1       1    2   -   Listen   0007.b400.0102  192.168.1.3     -

R3# show glbp brief
Interface   Grp  Fwd Pri State    Address         Active router   Standby router
Gi0/1       1    -   100 Standby  192.168.1.254   192.168.1.1     local
Gi0/1       1    1   -   Listen   0007.b400.0101  192.168.1.1     -
Gi0/1       1    2   -   Active   0007.b400.0102  local           -
```

Step 3: Generate traffic from PC-A and PC-C to the R2 loopback interface.

a. From a command prompt on PC-A, ping the 209.165.200.225 address of R2.

```
C:\> ping 209.165.200.225
```

b. Issue an **arp –a** command on PC-A. Which MAC address is used for the 192.168.1.254 address?

____

Answers will vary due to timing, but the MAC address will be either R1 or R3 GLBP G0/1 interface MAC.

c. Generate more traffic to the loopback interface of R2. Issue another **arp –a** command. Did the MAC address change for the default gateway address of 192.168.1.254?

____

Yes. The MAC address changed from R1 to R3 and back. Note: You may need to have students generate traffic multiple times to see the change.

As you can see, both R1 and R3 play a role in forwarding traffic to the loopback interface of R2. Neither router remains idle.

Step 4: Start a ping session on PC-A, and break the connection between the switch that is connected to R1.

a. From a command prompt on PC-A, issue a **ping –t** command to the 209.165.200.225 address on R2. Make sure you leave the command prompt window open.

b. As the ping continues, disconnect the Ethernet cable from F0/5 on S1 or shut down the F0/5 interface.

What happened to the ping traffic?

____

____

A few packets are dropped while transitioning to the Standby router. Sample output is shown below.

```
Reply from 209.165.200.225: bytes=32 time=9ms TTL=254
Request timed out.
Reply from 209.165.200.225: bytes=32 time=18ms TTL=252
Reply from 209.165.200.225: bytes=32 time=18ms TTL=252
```

Reflection

1. Why would there be a need for redundancy in a LAN?

____

In today's networks, down time can be a critical issue affecting sales, productivity, and general connectivity (IP Telephony phones for example).

2. If you had a choice, which protocol would you implement in your network, HSRP or GLBP? Explain your choice.

____

Answers will vary. HSRP is easier to configure. There are more options with GLBP which can make it complex to configure.

Router Interface Summary Table

Router Interface Summary				
Router Model	**Ethernet Interface #1**	**Ethernet Interface #2**	**Serial Interface #1**	**Serial Interface #2**
1800	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (F0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
1900	Gigabit Ethernet 0/0 (G0/0)	Gigabit Ethernet 0/1 (G0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
2801	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (F0/1)	Serial 0/1/0 (S0/1/0)	Serial 0/1/1 (S0/1/1)
2811	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (F0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
2900	Gigabit Ethernet 0/0 (G0/0)	Gigabit Ethernet 0/1 (G0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
Note: To find out how the router is configured, look at the interfaces to identify the type of router and how many interfaces the router has. There is no way to effectively list all the combinations of configurations for each router class. This table includes identifiers for the possible combinations of Ethernet and Serial interfaces in the device. The table does not include any other type of interface, even though a specific router may contain one. An example of this might be an ISDN BRI interface. The string in parenthesis is the legal abbreviation that can be used in Cisco IOS commands to represent the interface.				

Device Configs

Router R1 (After Part 3 of this lab)

```
R1# show run
Building configuration...

Current configuration : 1375 bytes
!
version 15.2
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname R1
!
boot-start-marker
boot-end-marker
enable secret 4 06YFDUHH61wAE/kLkDq9BGho1QM5EnRtoyr8cHAUg.2
!
no aaa new-model
!
no ip domain lookup
ip cef
no ipv6 cef
multilink bundle-name authenticated
```



```
!
interface Embedded-Service-Engine0/0
 no ip address
 shutdown
!
interface GigabitEthernet0/0
 no ip address
 shutdown
 duplex auto
 speed auto
!
interface GigabitEthernet0/1
 ip address 192.168.1.1 255.255.255.0
 glbp 1 ip 192.168.1.254
 glbp 1 priority 150
 glbp 1 preempt
 duplex auto
 speed auto
!
interface Serial0/0/0
 ip address 10.1.1.1 255.255.255.252
 clock rate 128000
!
interface Serial0/0/1
 no ip address
 shutdown
!
!
router eigrp 1
 network 10.1.1.0 0.0.0.3
 network 192.168.1.0
!
ip forward-protocol nd
!
no ip http server
no ip http secure-server
!
!
!
control-plane
!
line con 0
 password cisco
 logging synchronous
 login
line aux 0
line 2
 no activation-character
 no exec
```



```
 transport preferred none
 transport input all
 transport output pad telnet rlogin lapb-ta mop udptn v120 ssh
 stopbits 1
line vty 0 4
 password cisco
 login
 transport input all
!
scheduler allocate 20000 1000
!
end
```

Router R2

```
R2# show run
Building configuration...

Current configuration : 1412 bytes
!
version 15.2
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname R2
!
boot-start-marker
boot-end-marker
!
!
enable secret 4 06YFDUHH61wAE/kLkDq9BGho1QM5EnRtoyr8cHAUg.2
!
no aaa new-model
!
no ip domain lookup
ip cef
no ipv6 cef
multilink bundle-name authenticated
!
interface Loopback1
 ip address 209.165.200.225 255.255.255.224
!
interface Embedded-Service-Engine0/0
 no ip address
 shutdown
!
interface GigabitEthernet0/0
 no ip address
 shutdown
```

```
 duplex auto
 speed auto
!
interface GigabitEthernet0/1
 no ip address
 shutdown
 duplex auto
 speed auto
!
interface Serial0/0/0
 ip address 10.1.1.2 255.255.255.252
!
interface Serial0/0/1
 ip address 10.2.2.2 255.255.255.252
 clock rate 128000
!
!
router eigrp 1
 network 10.1.1.0 0.0.0.3
 network 10.2.2.0 0.0.0.3
 redistribute static
!
ip forward-protocol nd
!
no ip http server
no ip http secure-server
!
ip route 0.0.0.0 0.0.0.0 Loopback1
!
!
control-plane
!
!
line con 0
 password cisco
 logging synchronous
 login
line aux 0
line 2
 no activation-character
 no exec
 transport preferred none
 transport input all
 transport output pad telnet rlogin lapb-ta mop udptn v120 ssh
 stopbits 1
line vty 0 4
 password cisco
 login
 transport input all
```



```
!
scheduler allocate 20000 1000
!
end
```

Router R3 (After Part 3 of this Lab)

```
R3# show run
Building configuration...

Current configuration : 1319 bytes
!
version 15.2
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname R3
!
boot-start-marker
boot-end-marker
!
!
enable secret 4 06YFDUHH61wAE/kLkDq9BGho1QM5EnRtoyr8cHAUg.2
!
no aaa new-model
!
no ip domain lookup
ip cef
no ipv6 cef
multilink bundle-name authenticated
!
interface Embedded-Service-Engine0/0
 no ip address
 shutdown
!
interface GigabitEthernet0/0
 no ip address
 shutdown
 duplex auto
 speed auto
!
interface GigabitEthernet0/1
 ip address 192.168.1.3 255.255.255.0
 glbp 1 ip 192.168.1.254
 duplex auto
 speed auto
!
interface Serial0/0/0
 no ip address
```



```
 shutdown
 clock rate 2000000
!
interface Serial0/0/1
 ip address 10.2.2.1 255.255.255.252
!
!
router eigrp 1
 network 10.2.2.0 0.0.0.3
 network 192.168.1.0
!
ip forward-protocol nd
!
no ip http server
no ip http secure-server
!
!
!
control-plane
!
line con 0
 password cisco
 logging synchronous
 login
line aux 0
line 2
 no activation-character
 no exec
 transport preferred none
 transport input all
 transport output pad telnet rlogin lapb-ta mop udptn v120 ssh
 stopbits 1
line vty 0 4
 password cisco
 login
 transport input all
!
scheduler allocate 20000 1000
!
end
```

Switch S1

```
S1# show run
Building configuration...

Current configuration : 3114 bytes
!
version 15.0
no service pad
```



```
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname S1
!
boot-start-marker
boot-end-marker
!
enable secret 4 06YFDUHH61wAE/kLkDq9BGho1QM5EnRtoyr8cHAUg.2
!
no aaa new-model
system mtu routing 1500
!
!
no ip domain-lookup
!
crypto pki trustpoint TP-self-signed-2530377856
 enrollment selfsigned
 subject-name cn=IOS-Self-Signed-Certificate-2530377856
 revocation-check none
 rsakeypair TP-self-signed-2530377856
!
!
!1panning-tree mode pvst
spanning-tree extend system-id
!
vlan internal allocation policy ascending
!
!
interface FastEthernet0/1
!
interface FastEthernet0/2
!
interface FastEthernet0/3
!
interface FastEthernet0/4
!
interface FastEthernet0/5
!
interface FastEthernet0/6
!
interface FastEthernet0/7
!
interface FastEthernet0/8
!
interface FastEthernet0/9
!
interface FastEthernet0/10
```



```
!
interface FastEthernet0/11
!
interface FastEthernet0/12
!
interface FastEthernet0/13
!
interface FastEthernet0/14
!
interface FastEthernet0/15
!
interface FastEthernet0/16
!
interface FastEthernet0/17
!
interface FastEthernet0/18
!
interface FastEthernet0/19
!
interface FastEthernet0/20
!
interface FastEthernet0/21
!
interface FastEthernet0/22
!
interface FastEthernet0/23
!
interface FastEthernet0/24
!
interface GigabitEthernet0/1
!
interface GigabitEthernet0/2
!
interface Vlan1
 ip address 192.168.1.11 255.255.255.0
!
ip default-gateway 192.168.1.254
ip http server
ip http secure-server
!
line con 0
 password cisco
 logging synchronous
 login
line vty 0 4
 password cisco
 login
line vty 5 15
 password cisco
```



```
 login
!
end
```

Switch S3

```
S3# show run
Building configuration...

Current configuration : 2974 bytes
!
version 15.0
no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname S3
!
boot-start-marker
boot-end-marker
!
enable secret 4 06YFDUHH61wAE/kLkDq9BGho1QM5EnRtoyr8cHAUg.2
!
no aaa new-model
system mtu routing 1500
!
!
no ip domain-lookup
!
!
crypto pki trustpoint TP-self-signed-2530358400
 enrollment selfsigned
 subject-name cn=IOS-Self-Signed-Certificate-2530358400
 revocation-check none
 rsakeypair TP-self-signed-2530358400
!
!
!
spanning-tree mode pvst
spanning-tree extend system-id
!
vlan internal allocation policy ascending
!
interface FastEthernet0/1
!
interface FastEthernet0/2
!
interface FastEthernet0/3
!
```

```
interface FastEthernet0/4
!
interface FastEthernet0/5
!
interface FastEthernet0/6
!
interface FastEthernet0/7
!
interface FastEthernet0/8
!
interface FastEthernet0/9
!
interface FastEthernet0/10
!
interface FastEthernet0/11
!
interface FastEthernet0/12
!
interface FastEthernet0/13
!
interface FastEthernet0/14
!
interface FastEthernet0/15
!
interface FastEthernet0/16
!
interface FastEthernet0/17
!
interface FastEthernet0/18
!
interface FastEthernet0/19
!
interface FastEthernet0/20
!
interface FastEthernet0/21
!
interface FastEthernet0/22
!
interface FastEthernet0/23
!
interface FastEthernet0/24
!
interface GigabitEthernet0/1
!
interface GigabitEthernet0/2
!
interface Vlan1
 ip address 192.168.1.13 255.255.255.0
!
```

```
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 login
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 login
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 login
!
end
```

