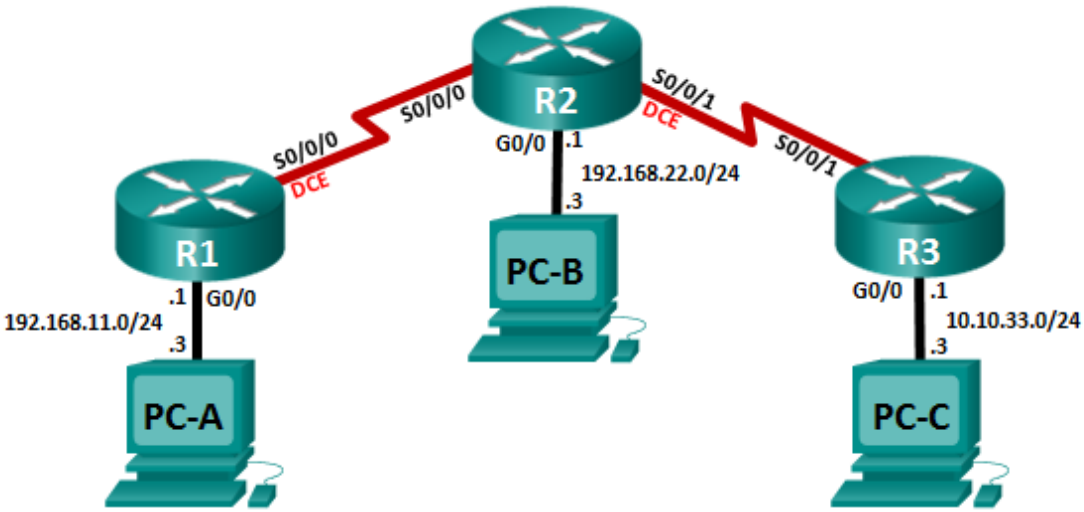
CCNA: Connecting Networks

Skills Assessment – Student Training Exam

Topology



Assessment Objectives

Part 1: Initialize Devices (2 points, 5 minutes)

Part 2: Configure Device Basic Settings (18 points, 20 minutes)

Part 3: Configure PPP Connections (17 points, 20 minutes)

Part 4: Configure NAT (14 points, 15 minutes)

Part 5: Monitor the Network (16 points, 15 minutes)

Part 6: Configure Frame Relay (17 points, 20 minutes)

Part 7: Configure a GRE VPN Tunnel (16 points, 20 minutes)

Scenario

In this Skills Assessment (SA) you will create a small network. You must connect the network devices and configure those devices to support various WAN protocols. This will require that you reload the routers before starting your configuration of the next WAN protocol. The assessment has you save your basic device configurations to flash prior to implementing a WAN protocol to allow you to restore these basic configurations after each reload.

The first WAN protocol you will configure is Point-to-Point Protocol (PPP) with CHAP authentication. You will also configure Network Address Translation (NAT), and network monitoring protocols during this phase of the assessment. After your instructor has signed off on this phase, you will reload the routers and configure Frame Relay. After the Frame Relay part is complete, and has been signed off by your instructor, you will reload the routers and configure a GRE VPN tunnel. Network configurations and connectivity will be verified throughout the assessment by using common CLI commands.

Required Resources

- 3 Routers (Cisco 1941 with Cisco IOS Release 15.2(4)M3 universal image or comparable)
- 3 PCs (Windows 7, Vista, or XP with terminal emulation program, such as Tera Term.
- Console cable to configure the Cisco IOS devices via the console ports
- Ethernet and Serial cables as shown in the topology

Part 1: Initialize Devices

Total points: 2

Time: 5 minutes

Step 1: Initialize and reload routers.

Erase the startup configurations and reload the devices.

Task	IOS Command	Points
Erase the startup-config file on all routers.		(1 point)
Reload all routers.		(1 point)

Note: Before proceeding, have your instructor verify device initializations.

Instructor Sign-off Part 1: _____

Points: _____ **of 2**

Part 2: Configure Device Basic Settings

Total points: 18

Time: 20 minutes

Step 1: Configure PCs.

Assign static IPv4 address information (IP address, subnet mask, default gateway) to the three PCs in the topology. Refer to the Topology diagram to obtain the IP address information.

Configuration Item or Task	Specification	Points
Configure static IPv4 address information on PC-A.		(1 point)
Configure static IPv4 address information on PC-B.		(1 point)
Configure static IPv4 address information on PC-C.		(1 point)

Step 2: Configure R1.

Configuration tasks for R1 include the following:

Configuration Item or Task	Specification	Points
Disable DNS lookup		(1/2 point)
Router name	R1	(1/2 point)
Encrypted privileged EXEC password	class	(1/2 point)
Console access password	cisco	(1/2 point)
Telnet access password	cisco	(1/2 point)
Encrypt the plain text passwords		(1/2 point)
MOTD banner	Unauthorized Access is Prohibited!	(1/2 point)
Configure G0/0	Set the description. Set the Layer 3 IPv4 address. Use the IP address information listed in the Topology. Activate the interface.	(1 1/2 point)

Step 3: Configure R2.

Configuration tasks for R2 include the following:

Configuration Item or Task	Specification	Points
Disable DNS lookup		(1/2 point)
Router name	R2	(1/2 point)
Encrypted privileged EXEC password	class	(1/2 point)
Console access password	cisco	(1/2 point)
Telnet access password	cisco	(1/2 point)
Encrypt the plain text passwords		(1/2 point)
MOTD banner	Unauthorized Access is Prohibited!	(1/2 point)
Configure G0/0	Set the description. Set the Layer 3 IPv4 address. Use the IP address information listed in the Topology. Activate the interface.	(1 1/2 point)

Step 4: Configure R3.

Configuration tasks for R3 include the following:

Configuration Item or Task	Specification	Points
Disable DNS lookup		(1/2 point)
Router name	R3	(1/2 point)
Encrypted privileged EXEC password	class	(1/2 point)
Console access password	cisco	(1/2 point)
Telnet access password	cisco	(1/2 point)
Encrypt the plain text passwords		(1/2 point)
MOTD banner	Unauthorized Access is Prohibited!	(1/2 point)
Configure G0/0	Set the description. Set the Layer 3 IPv4 address. Use the IP address information listed in the Topology. Activate the interface.	(1 1/2 point)

Step 5: Save device configurations to Flash.

Use the **copy running-config BasicConfig** command to save the running configuration to flash on each router. You will need this configuration file later in the assessment to restore the routers back to their basic configuration.

Configuration Item or Task	Specification	Points
Copy the running-config on R1 to flash. Name the file **BasicConfig**.		(1/2 point)
Copy the running-config on R2 to flash. Name the file **BasicConfig**.		(1/2 point)
Copy the running-config on R3 to flash. Name the file **BasicConfig**.		(1/2 point)

Instructor Sign-off Part 2: _____

Points: _____ **of 18**

Part 3: Configure PPP Connections

Total points: 17

Time: 20 minutes

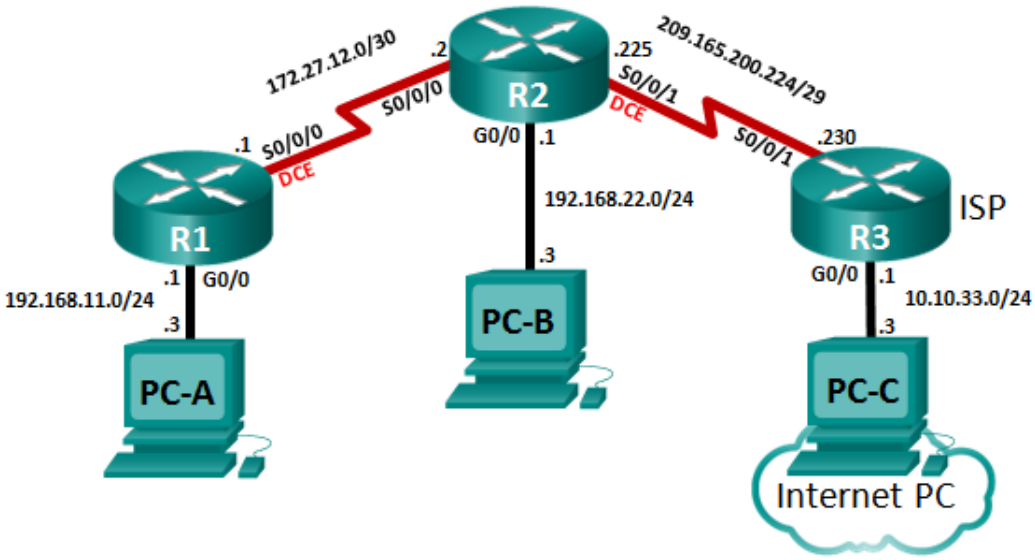


Figure 1: PPP Topology

Use **Figure 1** to obtain the IP information needed for this part of the student assessment.

Step 1: Configure R1.

Configuration tasks for R1 include the following:

Task	Specification	Points
Configure S0/0/0.	Set the description. Set the Layer 3 IPv4 address. Refer to Figure 1 at the top of Part 3 for IP address information. Set encapsulation to **PPP**. Set the clocking rate to **128000**. Activate the interface.	(2 points)
Configure CHAP authentication on S0/0/0.		(1 point)
Create a local database entry for CHAP authentication.	Username: **R2** Password: **cisco**	(1 point)
Set a static default route out S0/0/0.		(1/2 point)

Step 2: Configure R2.

Configuration tasks for R2 include the following:

Task	Specification	Points
Configure S0/0/0.	Set the description. Set the Layer 3 IPv4 address. Refer to Figure 1 at the top of Part 3 for IP address information. Set the encapsulation to **PPP**. Activate the interface.	(2 point)
Configure CHAP authentication on S0/0/0.		(1 point)
Create a local database entry for CHAP authentication.	Username: **R1** Password: **cisco**	(1 point)
Configure S0/0/1.	Set the description. Set the Layer 3 IPv4 address. Refer to Figure 1 at the top of Part 3 for IP address information. Set the encapsulation to **PPP**. Set the clocking rate to **128000**. Activate the interface.	(2 points)
Set a static default route out S0/0/1.		(1/2 point)
Set a static route for R1 LAN traffic out S0/0/0.		(1 point)

Step 3: Configure R3.

Configuration tasks for R3 include the following:

Task	Specification	Points
Configure S0/0/1.	Set the description. Set the Layer 3 IPv4 address. Refer to Figure 1 at the top of Part 3 for IP address information. Set the encapsulation to **PPP**. Activate the interface.	(2 points)

Step 4: Verify network connectivity.

Verify connectivity using the **ping** command.

From	Command	To	Expected Results	Points
PC-A	ping	PC-B	Ping should be successful.	(1/2 point)
PC-C	ping	R3 G0/1	Ping should be successful.	(1/2 point)
PC-C	ping	R2 S0/0/1	Ping should be successful.	(1/2 point)
PC-A	ping	PC-C	Ping should **not** be successful.	(1/2 point)
PC-B	ping	PC-C	Ping should **not** be successful.	(1/2 point)
PC-C	ping	PC-B	Ping should **no**t be successful.	(1/2 point)

Note: It may be necessary to disable the PC firewall for pings to be successful.

Instructor Sign-off Part 3: _____

Points: _____ **of 17**

Part 4: Configure NAT

Total points: 14

Time: 15 minutes

Step 1: Configure R2.

Configuration tasks for R2 include the following:

Task	Specification	Points
Assign a static NAT to map the inside local IP address for PC-B to a Inside Global address.	Inside Global: **209.165.200.226**	(1 point)
Define an access control list to permit the R1 LAN for dynamic NAT.	Access List: **1**	(1 point)
Define the dynamic NAT pool for the R1 LAN.	Pool: **R1-LAN** Inside Global: **209.165.200.227**	(1 point)
Define the NAT from the inside source to the outside pool. Make sure to allow multiple PCs access to this single Inside Global address.	Inside source: **Access list 1** Outside pool: **R1-LAN**	(1 point)
Define an access control list to permit the R2 LAN for dynamic NAT.	Access List: **2**	(1 point)
Define the dynamic NAT pool for the R2 LAN.	Pool: **R2-LAN** Inside Global: **209.165.200.228**	(1 point)
Define the NAT from the inside source to the outside pool. Make sure to allow multiple PCs access to this single Inside Global address.	Inside source: **Access list 2** Outside pool: **R2-LAN**	(1 point)
Assign the outside NAT interface.		(1 point)
Assign the inside NAT interface for the R1 LAN.		(1 point)
Assign the inside NAT interface for the R2 LAN.		(1 point)

Step 2: Verify network connectivity.

Verify connectivity using the **ping** command.

From	Command	To	Expected Results	Points
PC-A	ping	PC-C	Ping should be successful.	(1/2 point)
PC-C	ping	Inside Global address for PC-B (209.165.200.226).	Ping should be successful.	(1/2 point)

Note: It may be necessary to disable the PC firewall for pings to be successful.

Step 3: Verify NAT Configuration on R2.

Enter the appropriate CLI command needed to display the following:

Command Description	Student Input (command)	Points
Display configured access lists.		(1 point)
Display the current active NAT translations.		(1 point)
Display detailed information about NAT including interface, access list, and pool assignments.		(1 point)

Instructor Sign-off Part 4: _____

Points: _____ **of 14**

Part 5: Monitor the Network

Total points: 16

Time: 15 minutes

Step 1: Configure NTP.

Configuration tasks include the following:

Task	Specification	Points
Set the clock on R2 to a date and time specified for NTP testing.	Date: **August 25, 2013** Time: **9 am**	(1 point)
Configure R2 as the NTP Master.	Stratum Number: **5**	(1 point)
Configure R1 so that it uses R2 as its NTP Server.		(1 point)

Step 2: Configure Syslog messaging.

Configuration tasks include the following:

Task	Specification	Points
Enable the timestamp service on R1 and R2 for system logging purposes.	Include milliseconds in the timestamp.	(1 points)
Enable logging of messages on R1 and R2.	Syslog server: **192.168.11.3**	(1 points)
Change message trapping level on R1 and R2.	Level: **debugging** (severity 7)	(1 points)

Step 3: Configure SNMP on R1.

Configuration tasks include the following:

Task	Specification	Points
Create a standard access list to permit the SNMP management station (PC-A) to retrieve SNMP information from R1.	Access List: **SNMP-ACCESS**	(1 points)
Enable SNMP community access to the SNMP-ACCESS access list.	Community: **SA-LAB** Access level: **Read-only**	(1 points)
Set the SNMP notification host.	Host: **192.168.11.3** Version: **2c** Community: **SA-LAB**	(1 points)
Enable all SNMP traps.		(1 points)

Step 4: Collect NetFlow data on R2.

Configuration tasks include the following:

Task	Specification	Points
Configure NetFlow data capture on both serial interfaces. Capture ingress and egress data packets.		(1 points)
Configure NetFlow data export.	Destination: **PC-B IP address** UDP Port: **9996**	(1 points)
Configure the NetFlow export version.	Version: **9**	(1 points)

Step 5: Verify monitoring configurations.

Enter the appropriate CLI command needed to display the following:

Command Description	Student Input (command)	Points
Display the date and time.		(1/2 point)
Display the contents of logging buffers.		(1 point)
Display information about the SNMP communities.		(1/2 point)
Display the protocol using the highest volume of traffic.		(1 point)

Instructor Sign-off Part 5: _____

Points: _____ **of 16**

Part 6: Configure Frame Relay

NOTE: DO NOT PROCEED WITH THE ASSESSMENT UNTIL YOUR INSTRUCTOR HAS SIGNED OFF ON THE PREVIOUS PARTS.

Total points: 17

Time: 20 minutes

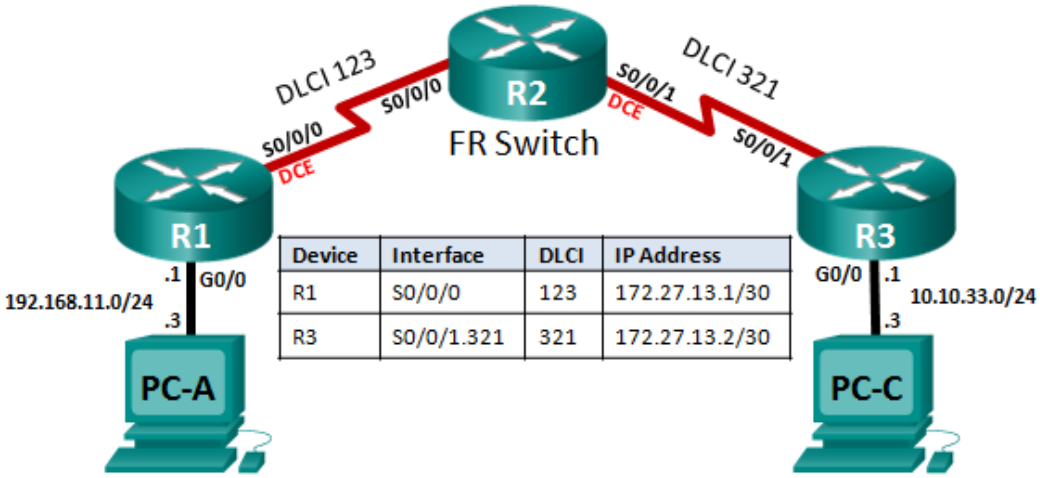


Figure 2: Frame Relay Topology

Use **Figure 2** to obtain the IP information needed for this part of the student assessment.

Step 1: Reload routers and restore the BasicConfig to memory.

a. Erase the startup configurations and reload the devices.

b. For each router, issue the **copy flash:BasicConfig running-config** command to reload the basic configuration that you saved at the end of Part 2.

c. Issue the **no shutdown** command for the G0/0 interface on R1 and R3.

Step 2: Configure R2 as a Frame Relay Switch.

Copy and paste the following configuration lines into R2. This will configure R2 as a Frame Relay switch and allow you to complete Part 6.

```
frame-relay switching
int s0/0/0
```

```
 encapsulation frame-relay
 frame-relay intf-type dce
 frame-relay route 123 interface s0/0/1 321
 frame-relay lmi-type ansi
 no shutdown
int s0/0/1
 clock rate 128000
 encapsulation frame-relay ietf
 frame-relay intf-type dce
 frame-relay route 321 interface s0/0/0 123
 no shutdown
```

Step 3: Configure R1.

Configure Frame Relay on S0/0/0 on R1. Configuration tasks for R1 include the following:

Task	Specification	Points
Configure S0/0/0.	Set the description. Set the Layer 3 IPv4 address. Refer to Figure 2 at the top of Part 6 for IP address information. Set encapsulation to **frame-relay** Set the clocking rate to 128000	(2 points)
Disable Inverse ARP on S0/0/0.		(1/2 point)
Map the IP local address to the DLCI.	Refer to Figure 2 for DLCI information.	(1 point)
Map the remote IP address to the DLCI. Allow for multicast or broadcast traffic.	Refer to Figure 2 for IP address and DLCI information.	(1 point)
Change the LMI type to the ANSI standard.		(1 point)
Activate the interface.		(1/2 point)
Create a default route to the IP address on the other side of the Frame Relay link.	Refer to Figure 2 for the IP address.	(1/2 point)

Step 4: Configure R3.

Configure Frame Relay on a subinterface of S0/0/1 on R3. Configuration tasks for R3 include the following:

Task	Specification	Points
Configure S0/0/1.	Configure Frame Relay Encapsulation. Set encapsulation to **frame-relay** (use the IETF standard). Activate the interface.	(1 point)
Create a point-to-point subinterface on S0/0/1.	Subinterface #: **321** Set the description.	(1 point)
Set the Layer 3 IPv4 address on the subinterface.	Refer to Figure 2 at the top of Part 6 for IP address information.	(1 point)
Disable Inverse ARP on the subinterface.		(1/2 point)
Map the subinterface to the DLCI.	Refer to Figure 2 for DLCI information.	(1 point)
Create a default route to the IP address on the other side of the Frame Relay link.	Refer to Figure 2 for IP address.	(1/2 point)

Step 5: Verify network connectivity.

Verify connectivity using the **ping** command.

From	Command	To	Expected Results	Points
PC-A	ping	Default gateway	Ping should be successful.	(1/2 point)
PC-C	ping	Default gateway	Ping should be successful.	(1/2 point)
PC-A	ping	172.27.13.2	Ping should be successful.	(1/2 point)
PC-C	ping	172.27.13.1	Ping should be successful.	(1/2 point)
PC-A	ping	PC-C	Ping should be successful.	(1/2 point)

Note: It may be necessary to disable the PC firewall for pings to be successful.

Step 6: Verify Frame Relay configuration.

Enter the appropriate CLI command needed to display the following:

Command Description	Student Input (command)	Points
Display Frame Relay LMI statistics.		(1 point)
Display the input and output packet count totals on a Frame Relay permanent virtual circuit (PVC).		(1 point)
Display the Frame Relay maps between DLCIs and IP addresses.		(1 point)

Instructor Sign-off Part 6: _____

Points: _____ **of 17**

Part 7: Configure a GRE VPN Tunnel

NOTE: DO NOT PROCEED WITH THE ASSESSMENT UNTIL YOUR INSTRUCTOR HAS SIGNED OFF ON THE PREVIOUS PART.

Total points: 16

Time: 20 minutes

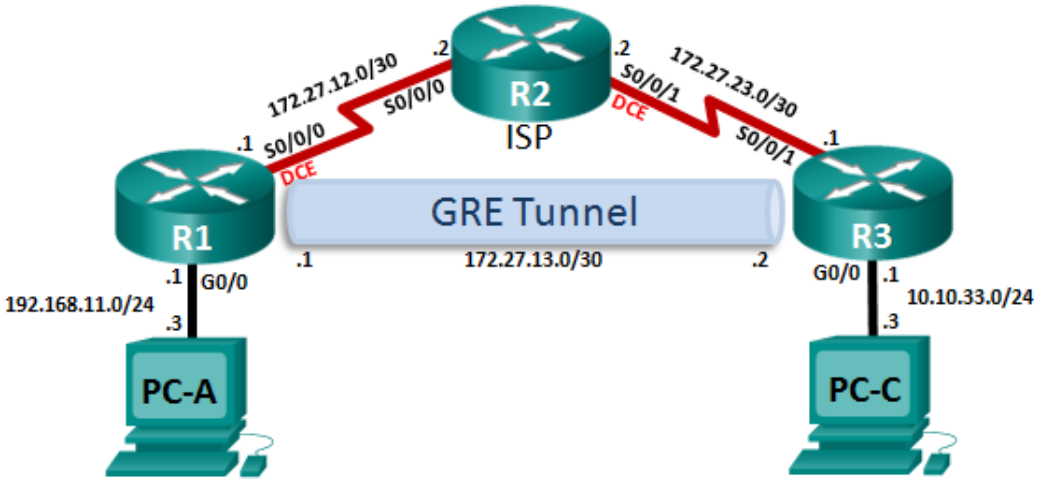


Figure 3: GRE VPN Topology

Use **Figure 3** to obtain the IP information needed for this part of the student assessment.

Step 1: Reload routers and restore the BasicConfig to memory.

a. Erase the startup configurations and reload the devices.

b. For each router, issue the **copy flash:BasicConfig running-config** command to reload the basic configuration that you saved at the end of Part 2.

c. Issue the **no shutdown** command for the G0/0 interface on R1 and R3.

Step 2: Configure Serial Interfaces.

a. Configuration tasks for R1 include the following:

Task	Specification	Points
Configure S0/0/0.	Set the description. Set the Layer 3 IPv4 address. Refer to Figure 3 at the top of Part 7 for IP address information. Set the encapsulation to **HDLC.** Set the clocking rate to **128000**. Activate the interface.	(1 point)

b. Configuration tasks for R2 include the following:

Task	Specification	Points
Configure S0/0/0.	Set the description. Set the Layer 3 IPv4 address. Refer to Figure 3 at the top of Part 7 for IP address information. Set the encapsulation to **HDLC.** Activate the interface.	(1 point)
Configure S0/0/1.	Set the description. Set the Layer 3 IPv4 address. Refer to Figure 3 at the top of Part 7 for IP address information. Set the encapsulation to **HDLC.** Set the clocking rate to **128000.** Activate the interface.	(1 point)

c. Configuration tasks for R3 include the following:

Task	Specification	Points
Configure S0/0/1.	Set the description. Set the Layer 3 IPv4 address. Refer to Figure 3 at the top of Part 7 for IP address information. Set the encapsulation to **HDLC.** Activate the interface.	(1 point)

Step 3: Configure the GRE VPN tunnel and EIGRP on R1.

Configuration tasks for R1 include the following:

Task	Specification	Points
Create a GRE tunnel interface.	Interface: **tunnel 0** Set the description. Set the Layer 3 IPv4 address. Refer to Figure 3 at the top of Part 7 for IP address information.	(2 points)
Use S0/0/0 as the tunnel source.		(1/2 point)
Set the tunnel destination with the IP address of the R3 S0/0/1 interface.	Refer to Figure 3 for IP address information.	(1/2 point)
Create a default route out S0/0/0.		(1/2 point)
Configure EIGRP on R1	Autonomous System (AS) number: **1**	(1/2 point)
Advertise the LAN and Tunnel subnets in EIGRP. Set the LAN interface to passive.	Refer to the GRE VPN topology.	(1/2 point)

Step 4: Configure the GRE VPN tunnel and EIGRP on R3.

Configuration tasks for R3 include the following:

Task	Specification	Points
Create a GRE tunnel interface.	Interface: **tunnel 0** Set the description. Set the Layer 3 IPv4 address. Use the IP address information listed in Figure 3 at the top of Part 7.	(2 points)
Use S0/0/1 as the tunnel source.		(1/2 point)
Set the tunnel destination with the IP address of the R1 S0/0/0 interface.	Refer to Figure 3 at the top of Part 7 for IP address information.	(1/2 point)
Create a default route out S0/0/1.		(1/2 point)
Configure EIGRP on R3	Autonomous System (AS) number: **1**	(1/2 point)
Advertise the LAN and Tunnel subnets in EIGRP. Set the LAN interface to passive.	Refer to the GRE VPN topology.	(1/2 point)

Step 5: Verify network connectivity.

Verify connectivity using the following commands.

From	Command	To	Expected Results	Points
PC-A	ping	Default gateway	Ping should be successful.	(1/2 point)
PC-C	ping	Default gateway	Ping should be successful.	(1/2 point)
PC-A	ping	PC-C	Ping should be successful.	(1/2 point)
R1	traceroute	172.27.23.1	R2 should show up in the traceroute.	(1/2 point)
R1	traceroute	172.27.13.2	R2 should be absent from traceroute.	(1/2 point)

Note: It may be necessary to disable the PC firewall for pings to be successful.

Step 6: Verify GRE VPN configuration.

Enter the appropriate CLI command needed to display the following:

Command Description	Student Input (command)	Points
Display detail information about the GRE tunnel interface.		(1/2 point)

Instructor Sign-off Part 7: _____

Points: _____ **of 16**

Part 8: Cleanup

NOTE: DO NOT PROCEED WITH CLEANUP UNTIL YOUR INSTRUCTOR HAS GRADED YOUR SKILLS EXAM AND HAS INFORMED YOU THAT YOU MAY BEGIN CLEANUP.

Before turning off power to the routers:

- Remove the NVRAM configuration files (if saved) from all devices.
- Remove the **BasicConfig** file from flash using the **delete flash:BasicConfig** command.

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.