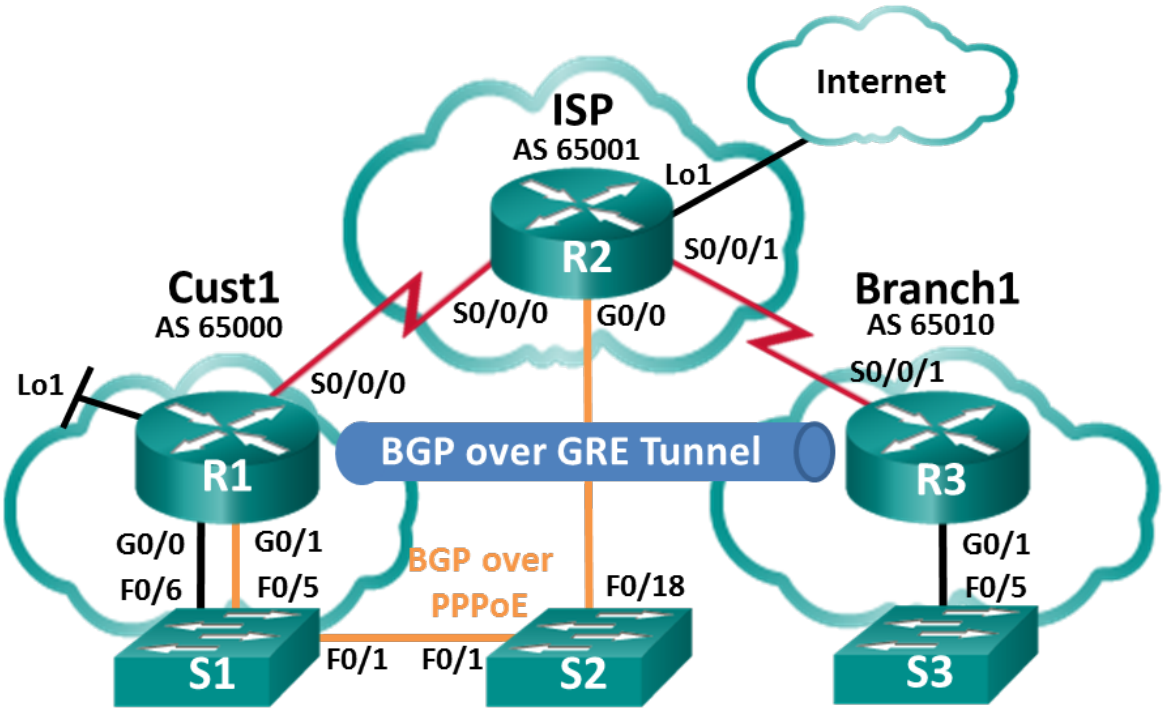
Lab – Configure a Branch Connection

Topology



Addressing Table

Device	Interface	IP Address	Subnet Mask
R1	G0/0	192.168.1.1	255.255.255.0
	G0/1	PPPoE Client	
	Lo1	209.165.200.49	255.255.255.240
	S0/0/0 (DCE)	209.165.200.81	255.255.255.252
R2	G0/0	PPPoE Provider	
	Lo1	209.165.200.65	255.255.255.240
	S0/0/0	209.165.200.82	255.255.255.252
	S0/0/1 (DCE)	209.165.200.85	255.255.255.252
R3	G0/1	192.168.3.1	255.255.255.0
	S0/0/1 (DCE)	209.165.200.86	255.255.255.252

Objectives

Part 1: Build the Network and Load Device Configurations

Part 2: Configure a PPPoE Client Connection

Part 3: Configure a GRE Tunnel

Part 4: Configure BGP over PPPoE and BGP over a GRE Tunnel

Background / Scenario

In this lab, you will configure two separate WAN connections, a BGP route over a PPPoE connection, and a BGP route over a GRE tunnel. This lab is a test case scenario and does not represent a realistic BGP implementation.

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). Other routers 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: Ensure that the routers have been erased and have no startup configurations. If you are unsure, contact your instructor.

Required Resources

- 3 Routers (Cisco 1941 with Cisco IOS Release 15.2(4)M3 universal image or comparable)
- 3 Switches (Cisco 2960 with Cisco IOS Release 15.0(2) lanbasek9 image or comparable)
- Console cables to configure the Cisco IOS devices via the console ports
- Ethernet cables and Serial cables as shown in the topology

Part 1: Build the Network and Load Device Configurations

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

Step 2: Load router configurations.

Copy and paste the following configurations into the appropriate routers and switch.

Cust 1 (R1) Configuration:

```
conf t
hostname Cust1
no cdp run
interface Loopback1
 ip address 209.165.200.49 255.255.255.240
interface GigabitEthernet0/0
 ip address 192.168.1.1 255.255.255.0
 no shut
interface Serial0/0/0
 ip address 209.165.200.81 255.255.255.252
 no shut
ip route 0.0.0.0 0.0.0.0 s0/0/0 25
end
```

Note: In the Cust1 configuration above, CDP is disabled with the **no cdp run** command. The static default route with an administrative distance is manually configured to 25 instead of the default 1. The significance of these configurations will be explained later in the lab.

ISP (R2) Configuration:

```
conf t
hostname ISP
username Cust1 password 0 ciscopppoe
bba-group pppoe global
 virtual-template 1
interface Loopback 1
 ip address 209.165.200.65 255.255.255.240
interface GigabitEthernet0/0
 ip tcp adjust-mss 1452
 pppoe enable group global
 no shut
interface Serial0/0/0
 ip address 209.165.200.82 255.255.255.252
 no shut
interface Serial0/0/1
 ip address 209.165.200.85 255.255.255.252
 no shut
interface Virtual-Template1
 mtu 1492
 ip address 209.165.200.30 255.255.255.224
 peer default ip address pool PPPoEPOOL
 ppp authentication chap callin
router bgp 65001
 network 0.0.0.0
 neighbor 209.165.200.1 remote-as 65000
ip local pool PPPoEPOOL 209.165.200.1 209.165.200.20
ip route 0.0.0.0 0.0.0.0 Loopback1
end
```

Branch1 (R3) Configuration:

```
conf t
hostname Branch1
interface GigabitEthernet0/1
 ip address 192.168.3.1 255.255.255.0
 no shut
interface Serial0/0/1
 ip address 209.165.200.86 255.255.255.252
 no shut
ip route 0.0.0.0 0.0.0.0 Serial0/0/1
end
```

S1 Configuration:

```
conf t
hostname S1
vlan 111
interface f0/6
 switchport mode access
 switchport access vlan 111
end
```

Note: Because S1 connects to two separate networks, G0/0 and G0/1 on Cust1, it is necessary to segment the switch into two separate VLANs, in this case VLAN111, and VLAN1.

Step 3: Save the configuration on all configured routers and switches.

Part 2: Configure a PPPoE Client Connection

In Part 2, following the PPPoE requirements listed below, you will configure Cust1 as the PPPoE client. The ISP router configuration is already complete.

PPPoE requirements for the Cust1 router:

- Configure an **interface Dialer1** with the following settings:
  - **a negotiated ip address**
  - **mtu 1492**
  - **ppp encapsulation**
  - **dialer pool 1**
  - **ppp chap callin authentication**
  - **ppp chap hostname Cust1**
  - **ppp chap password ciscopppoe (unencrypted)**
- Configure **G0/1** with the following settings:
  - **enable global pppoe**
  - **adjust the TCP maximum segment size to 1452**
  - **set the pppoe-client to dialer pool 1**

List the commands used to configure Cust1 as the PPPoE Client:

If the Cust1 router is configured correctly, it should receive an IP address from the ISP router. What IP address did Cust1 receive and on what interface? What command did you use to check for the IP address and interface?

Note: If Cust1 had CDP running on interface dialer1, it could produce the following repeating log message: *PPP: Outbound cdp packet dropped, NCP not negotiated*. To prevent this, CDP was globally turned off.

Part 3: Configure a GRE Tunnel

In Part 3, following the GRE requirements listed below, you will configure a GRE tunnel between Cust1 and Branch1.

GRE tunnel requirements:

- On Cust1 and Branch1, configure **interface Tunnel 0** with the following settings:
  - **IP address 192.168.2.1/24 and 192.168.2.2/24 respectively**
  - **Tunnel mode GRE over IP**
  - **Tunnel source interface and destination address using serial interfaces**

List the commands used to configure a GRE tunnel between Cust1 and Branch1:

How can you tell if the tunnel was created successfully? What command could you use to test the tunnel?

What would happen if Cust1 did not have a static default route? Test it by removing the static default route. What was the result? Make sure to replace the static default route, as shown in the Cust1 configuration in Part 1 Step2, before moving on.

Part 4: Configure BGP over PPPoE and BGP over a GRE Tunnel

In Part 4, following the BGP requirements listed below, you will configure BGP on Cust1 and Branch1. The ISP router configuration is already complete.

BGP requirements:

- On Cust1:
  - **Create a BGP routing process AS 65000**
  - **Advertise networks attached to Loopback 1 and G0/0**
  - **Configure BGP neighbors to the ISP and Branch1 routers**
- On Branch1:
  - **Create a BGP routing process AS 65010**
  - **Advertise the network attached to G0/1**
  - **Configure BGP neighbor to Cust1 only**

List the commands used to configure BGP on Cust1 and Branch1:

On Cust1, did you receive console messages regarding BGP neighbor relationships to ISP and Branch1?

On Cust1, can you ping the ISP at 209.165.200.30 over PPPoE? Can you ping the Branch1 local network at 192.168.3.1?

Check the routing table of Cust1. What routes were learned by BGP? There should be a route learned from both ISP and Branch1.

Examine the two routes learned by BGP in the Cust1 routing table. What do they show about routes in the network now?

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.