Lab – Configuring a Router as a PPPoE Client for DSL Connectivity

1. Topology



1. Addressing Table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Device | Interface | IP Address | Subnet Mask | Default Gateway |
| Cust1 | G0/1 | Learned via PPP | Learned via PPP | Learned via PPP |
| ISP | G0/1 | N/A | N/A | N/A |

1. Objectives

Part 1: Build the Network

Part 2: Configure the ISP Router

Part 3: Configure the Cust1 Router

1. Background / Scenario

ISPs often use Point-to-Point Protocol over Ethernet (PPPoE) on DSL links to their customers. PPP supports the assignment of IP address information to a device at the remote end of a PPP link. More importantly, PPP supports CHAP authentication. ISPs can check accounting records to see if a customer’s bill has been paid, before letting them connect to the Internet.

In this lab, you will configure both the client and ISP side of the connection to set up PPPoE. Typically, you would only configure the client end.

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

1. Required Resources

* 2 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)
* Console cables to configure the Cisco IOS devices via the console ports
* Ethernet cables as shown in the topology

1. Build the Network
   1. Cable the network as shown in the topology.
   2. Initialize and reload the routers and switches.
   3. Configure basic settings for each router.
      1. Disable DNS lookup.
      2. Configure device name as shown in the topology.
      3. Encrypt plaintext passwords.
      4. Create a message of the day (MOTD) banner warning users that unauthorized access is prohibited.
      5. Assign **class** as the encrypted privileged EXEC mode password.
      6. Assign **cisco** as the console and vty password and enable login.
      7. Set console logging to synchronous mode.
      8. Save your configuration.
2. Configure the ISP Router

In Part 2, you configure the ISP router with PPPoE parameters for connection from the Cust1 router.

**Note**: Many of the ISP router PPPoE configuration commands are beyond the scope of the course; however, they are necessary for completion of the lab. They can be copied and pasted into the ISP router at the global configuration mode prompt.

* + 1. Create a local database username **Cust1** with a password of **ciscopppoe**.

ISP(config)# **username Cust1 password ciscopppoe**

* + 1. Create a pool of addresses that will be assigned to customers.

ISP(config)# **ip local pool PPPoEPOOL 10.0.0.1 10.0.0.10**

* + 1. Create the Virtual Template and associate the IP address of G0/1 with it. Associate the Virtual Template with the pool of addresses. Configure CHAP to authenticate customers.

ISP(config)# **interface virtual-template 1**

ISP(config-if)# **ip address 10.0.0.254 255.255.255.0**

ISP(config-if)# **mtu 1492**

ISP(config-if)# **peer default ip address pool PPPoEPOOL**

ISP(config-if)# **ppp authentication chap callin**

ISP(config-if)# **exit**

* + 1. Assign the template to the PPPoE group.

ISP(config)# **bba-group pppoe global**

ISP(config-bba-group)# **virtual-template 1**

ISP(config-bba-group)# **exit**

* + 1. Associate the bba-group with the G0/1 physical interface.

ISP(config)# **interface g0/1**

ISP(config-if# **pppoe enable group global**

ISP(config-if)# **no shutdown**

1. Configure the Cust1 Router

In Part 3, you will configure the Cust1 router with PPPoE parameters.

* + 1. Configure G0/1 interface for PPPoE connectivity.

Cust1(config)# **interface g0/1**

Cust1(config-if)# **pppoe enable**

Cust1(config-if)# **pppoe-client dial-pool-number 1**

Cust1(config-if)# **exit**

* + 1. Associate the G0/1 interface with a dialer interface. Use the username **Cust1** and password **ciscopppoe** configured in Part 2.

Cust1(config)# **interface dialer 1**

Cust1(config-if)# **mtu 1492**

Cust1(config-if)# **ip address negotiated**

Cust1(config-if)# **encapsulation ppp**

Cust1(config-if)# **dialer pool 1**

Cust1(config-if)# **ppp authentication chap callin**

Cust1(config-if)# **ppp chap hostname Cust1**

Cust1(config-if)# **ppp chap password ciscopppoe**

Cust1(config-if)# **exit**

* + 1. Set up a static default route pointing to the Dialer interface.

Cust1(config)# **ip route 0.0.0.0 0.0.0.0 dialer 1**

* + 1. Set up debugging on the Cust1 router to display PPP and PPPoE negotiation.

Cust1# **debug ppp authentication**

Cust1# **debug pppoe events**

* + 1. Enable the G0/1 interface on the Cust1 router and observe the debug output as the PPPoE dialer session is established and CHAP authentication takes place.

\*Jul 30 19:28:42.427: %LINK-3-UPDOWN: Interface GigabitEthernet0/1, changed state to down

\*Jul 30 19:28:46.175: %LINK-3-UPDOWN: Interface GigabitEthernet0/1, changed state to up

\*Jul 30 19:28:47.175: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up

\*Jul 30 19:29:03.839: padi timer expired

\*Jul 30 19:29:03.839: Sending PADI: Interface = GigabitEthernet0/1

\*Jul 30 19:29:03.839: PPPoE 0: I PADO R:30f7.0da3.0b01 L:30f7.0da3.0bc1 Gi0/1

\*Jul 30 19:29:05.887: PPPOE: we've got our pado and the pado timer went off

\*Jul 30 19:29:05.887: OUT PADR from PPPoE Session

\*Jul 30 19:29:05.895: PPPoE 1: I PADS R:30f7.0da3.0b01 L:30f7.0da3.0bc1 Gi0/1

\*Jul 30 19:29:05.895: IN PADS from PPPoE Session

\*Jul 30 19:29:05.899: %DIALER-6-BIND: Interface Vi2 bound to profile Di1

\*Jul 30 19:29:05.899: PPPoE: Virtual Access interface obtained.

\*Jul 30 19:29:05.899: PPPoE : encap string prepared

\*Jul 30 19:29:05.899: [0]PPPoE 1: data path set to PPPoE Client

\*Jul 30 19:29:05.903: %LINK-3-UPDOWN: Interface Virtual-Access2, changed state to up

\*Jul 30 19:29:05.911: Vi2 PPP: Using dialer call direction

\*Jul 30 19:29:05.911: Vi2 PPP: Treating connection as a callout

\*Jul 30 19:29:05.911: Vi2 PPP: Session handle[C6000001] Session id[1]

\*Jul 30 19:29:05.919: Vi2 PPP: No authorization without authentication

\*Jul 30 19:29:05.939: Vi2 CHAP: I CHALLENGE id 1 len 24 from "ISP"

\*Jul 30 19:29:05.939: Vi2 PPP: Sent CHAP SENDAUTH Request

\*Jul 30 19:29:05.939: Vi2 PPP: Received SENDAUTH Response FAIL

\*Jul 30 19:29:05.939: Vi2 CHAP: Using hostname from interface CHAP

\*Jul 30 19:29:05.939: Vi2 CHAP: Using password from interface CHAP

\*Jul 30 19:29:05.939: Vi2 CHAP: O RESPONSE id 1 len 26 from "Cust1"

\*Jul 30 19:29:05.955: Vi2 CHAP: I SUCCESS id 1 len 4

\*Jul 30 19:29:05.955: %LINEPROTO-5-UPDOWN: Line protocol on Interface Virtual-Access2, changed state to up

\*Jul 30 19:29:05.983: PPPoE : ipfib\_encapstr prepared

\*Jul 30 19:29:05.983: PPPoE : ipfib\_encapstr prepared

* + 1. Issue a **show ip interface brief** command on the Cust1 router to display the IP address assigned by the ISP router. Sample output is shown below. By what method was the IP address obtained? \_\_\_\_\_\_\_\_\_\_\_\_

Cust1# **show ip interface brief**

Interface IP-Address OK? Method Status Protocol

Embedded-Service-Engine0/0 unassigned YES unset administratively down down

GigabitEthernet0/0 unassigned YES unset administratively down down

GigabitEthernet0/1 unassigned YES unset up up

Serial0/0/0 unassigned YES unset administratively down down

Serial0/0/1 unassigned YES unset administratively down down

Dialer1 10.0.0.1 YES IPCP up up

Virtual-Access1 unassigned YES unset up up

Virtual-Access2 unassigned YES unset up up

* + 1. Issue a **show ip route** command on the Cust1 router. Sample output is shown below.

Cust1# **show 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

i - IS-IS, su - IS-IS summary, 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, H - NHRP, l - LISP

+ - replicated route, % - next hop override

Gateway of last resort is 0.0.0.0 to network 0.0.0.0

S\* 0.0.0.0/0 is directly connected, Dialer1

10.0.0.0/32 is subnetted, 2 subnets

C 10.0.0.1 is directly connected, Dialer1

C 10.0.0.254 is directly connected, Dialer1

* + 1. Issue a **show pppoe session** on Cust1 router. Sample output is shown below.

Cust1# **show pppoe session**

1 client session

Uniq ID PPPoE RemMAC Port VT VA State

SID LocMAC VA-st Type

N/A 1 30f7.0da3.0b01 Gi0/1 Di1 Vi2 UP

30f7.0da3.0bc1 UP

* + 1. Issue a ping to 10.0.0.254 from the Cust1 router. The ping should be successful. If not, troubleshoot until you have connectivity.

Cust1# **ping 10.0.0.254**

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 10.0.0.254, timeout is 2 seconds:

!!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/4 ms

1. Reflection

Why do ISPs who use DSL, primarily use PPPoE with their customers?

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1. 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. | | | | |