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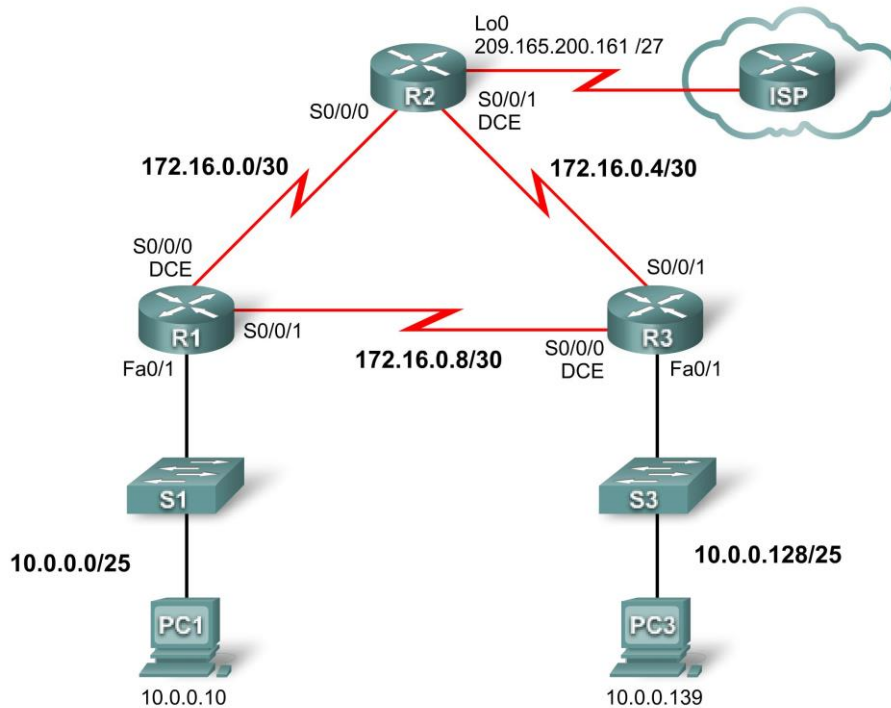# PT Activity 2.5.2: Challenge PPP Configuration

Topology

Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	Fa0/1	10.0.0.1	255.255.255.128	N/A
	S0/0/0	172.16.0.1	255.255.255.252	N/A
	S0/0/1	172.16.0.9	255.255.255.252	N/A
R2	Lo0	209.165.200.161	255.255.255.224	N/A
	S0/0/0	172.16.0.2	255.255.255.252	N/A
	S0/0/1	172.16.0.5	255.255.255.252	N/A
R3	Fa0/1	10.0.0.129	255.255.255.128	N/A
	S0/0/0	172.16.0.10	255.255.255.252	N/A
	S0/0/1	172.16.0.6	255.255.255.252	N/A
PC1	NIC	10.0.0.10	255.255.255.128	10.0.0.1
PC3	NIC	10.0.0.139	255.255.255.128	10.0.0.129

Learning Objectives

- Configure and activate interfaces.
- Configure OSPF routing on all routers.
- Configure PPP encapsulation on all serial interfaces.
- Configure PPP CHAP authentication.

Introduction

In this activity, you will configure PPP encapsulation on serial links using the network shown in the topology diagram. You will also configure PPP CHAP authentication. If you need assistance, refer back to the Basic PPP Configuration lab or activity, but try to do as much on your own as possible.

Task 1: Configure and Activate Serial and Ethernet Addresses

Step 1. Configure interfaces on R1, R2, and R3.

The addressing scheme is listed on the topology and in the Addressing Table. Some interface addresses are provided, but for some interfaces only the network is provided. In the cases where you are only given the network address, you may use any valid address on the specified network in order to be graded correctly in Packet Tracer.

Configure the interfaces for R1, R2, and R3 according to the topology. On the DCE sides of the serial links, the clock rate is 64000 bits.

```
R1
s0/0/0 172.16.0.1/30
s0/0/1 172.16.0.9/30

R2
s0/0/0 172.16.0.2/30
s0/0/1 172.16.0.5/30

R3
s0/0/0 172.16.0.10/30
s0/0/1 172.16.0.6/30

R1
R1(config)#int s0/0/0
R1(config-if)#ip address 172.16.0.1 255.255.255.252
R1(config-if)#no sh
R1(config-if)#clock rate 64000
R1(config-if)#exit
R1(config)#int s0/0/1
R1(config-if)#ip address 172.16.0.9 255.255.255.252
R1(config-if)#no sh
R1(config-if)#exit
R1(config)#int f0/1
R1(config-if)#ip address 10.0.0.1 255.255.255.128
R1(config-if)#no sh
R1(config-if)#exit
```

R2
```
R2(config)#int s0/0/0
R2(config-if)#ip address 172.16.0.2 255.255.255.252
R2(config-if)#no sh
R2(config-if)#exit
R2(config)#int s0/0/1
R2(config-if)#ip address 172.16.0.5 255.255.255.252
R2(config-if)#clock rate 64000
R2(config-if)#no sh
R2(config-if)#exit
R2(config)#int lo0
R2(config-if)#ip address 209.165.200.161 255.255.255.224
R2(config-if)#no sh
R2(config-if)#exit
```

R3
```
R3(config)#int s0/0/0
R3(config-if)#ip address 172.16.0.10 255.255.255.252
R3(config-if)#clock rate 64000
R3(config-if)#no sh
R3(config-if)#exit
R3(config)#int s0/0/1
R3(config-if)#ip address 172.16.0.6 255.255.255.252
R3(config-if)#no sh
R3(config-if)#exit
R3(config)#int f0/1
R3(config-if)#ip address 10.0.0.129 255.255.255.128
R3(config-if)#no sh
```

Step 2. Verify IP addressing and interfaces.

Verify that all the interfaces are up at both the physical and data link layers. Directly connected routers should be able to ping each other.

Done

Step 3. Configure the Ethernet interfaces of PC1 and PC3.

Done

Step 4. Test connectivity between the PCs.

Should the PCs be able to ping each other at this point? Can they ping their default gateways?

GW: OK

other PCs: no

Task 2: Configure OSPF on Routers

Step 1. Enable OSPF routing on the routers.

When configuring OSPF routing, use a process ID of 1.

```
R1
R1#conf t
R1(config)#router ospf 1
R1(config-router)#network 172.16.0.0 0.0.0.3 area 0
R1(config-router)#network 172.16.0.8 0.0.0.3 area 0
R1(config-router)#network 10.0.0.0 0.0.0.127 area 0

R2
R2#conf t
R2(config)#router ospf 1
R2(config-router)#network 172.16.0.0 0.0.0.3 area 0
R2(config-router)#network 172.16.0.4 0.0.0.3 area 0

R3
R3#conf t
R3(config)#router ospf 1
R3(config-router)#network 172.16.0.4 0.0.0.3 area 0
R3(config-router)#network 172.16.0.8 0.0.0.3 area 0
R3(config-router)#network 10.0.0.128 0.0.0.127 area 0
```

Step 2. Verify that you have full network connectivity.

All routers should have routes to all networks and now be able to ping any device.

Done

Task 3: Configure PPP Encapsulation on Serial Interfaces

Step 1. Configure PPP on the serial interfaces of all three routers.

Currently encapsulation is set to HDLC on all the serial links. In order to configure authentication later, encapsulation must be set to PPP.

```
encapsulation ppp
```

Step 2. Verify that all serial interfaces are using PPP encapsulation.

If connected serial interfaces have mismatched encapsulation, the link will go down. Make sure all interfaces are set to PPP encapsulation.

Done

Task 4: Configure PPP CHAP Authentication

The password for CHAP authentication is cisco.

Step 1. Configure PPP CHAP authentication on all serial links.

```
R1
R1(config)#int s0/0/0
R1(config-if)#encapsulation ppp
R1(config-if)#ppp authentication chap
R1(config-if)#exit
R1(config)#username R2 password cisco
R1(config)#int s0/0/1
R1(config-if)#ppp authentication chap
R1(config-if)#exit
R1(config)#username R3 password cisco
R1(config)#exit

R2
R2(config)#int s0/0/0
R2(config-if)#encapsulation ppp
R2(config-if)#ppp authentication chap
R2(config-if)#exit
R2(config)#username R1 password cisco
R2(config)#int s0/0/1
R2(config-if)#encapsulation ppp
R2(config-if)#ppp authentication chap
R2(config-if)#exit
R2(config)#username R3 password cisco
R2(config)#exit

R3
R3(config)#int s0/0/0
R3(config-if)#encapsulation ppp
R3(config-if)#ppp authentication chap
R3(config-if)#exit
R3(config)#username R1 password cisco
R3(config)#int s0/0/1
R3(config-if)#encapsulation ppp
R3(config-if)#ppp authentication chap
R3(config-if)#exit
R3(config)#username R2 password cisco
R3(config-if)#exit
```

Step 2. Verify PPP CHAP authentication on all serial links.

Can all routers communicate with one another? Can the PC1 ping PC3?

Done

```
R1#
Current configuration : 1157 bytes
!
version 12.3
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname R1
!
enable secret 5 $1$nMUp$TJJWuyKe0LGvBdfMdy6O7/
!
username R2 password 0 cisco
username R3 password 0 cisco
!
ip ssh version 1
no ip domain-lookup
!
spanning-tree mode pvst
!
interface FastEthernet0/0
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface FastEthernet0/1
 ip address 10.0.0.1 255.255.255.128
 duplex auto
 speed auto
!
interface Serial0/0/0
 ip address 172.16.0.1 255.255.255.252
 encapsulation ppp
 ppp authentication chap
 clock rate 64000
!
interface Serial0/0/1
 ip address 172.16.0.9 255.255.255.252
 encapsulation ppp
 ppp authentication chap
!
interface Vlan1
 no ip address
 shutdown
!
router ospf 1
 log-adjacency-changes
 network 172.16.0.0 0.0.0.3 area 0
 network 172.16.0.8 0.0.0.3 area 0
 network 10.0.0.0 0.0.0.127 area 0
!
ip classless
!
banner motd ^CUnauthorized access strictly
        prohibited and prosecuted
to the full extent of the law^C
!
line con 0
 password cisco
 login
!
line aux 0
!
line vty 0 4
 password cisco
 login
!
end
```

```
R2#
Current configuration : 1176 bytes
!
version 12.3
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname R2
!
enable secret 5 $1$a/eY$U0fXFnDHvS/3TgqxXsAPq1
!
username R1 password 0 cisco
username R2 password 0 cisco
!
ip ssh version 1
no ip domain-lookup
!
spanning-tree mode pvst
!
interface Loopback0
 ip address 209.165.200.161 255.255.255.224
!
interface FastEthernet0/0
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface FastEthernet0/1
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface Serial0/0/0
 ip address 172.16.0.2 255.255.255.252
 encapsulation ppp
 ppp authentication chap
!
interface Serial0/0/1
 ip address 172.16.0.5 255.255.255.252
 encapsulation ppp
 ppp authentication chap
 clock rate 64000
!
interface Vlan1
 no ip address
 shutdown
!
router ospf 1
 log-adjacency-changes
 network 172.16.0.0 0.0.0.3 area 0
 network 172.16.0.4 0.0.0.3 area 0
!
ip classless
!
banner motd ^CUnauthorized access strictly
        prohibited and prosecuted
to the full extent of the law^C
!
line con 0
 password cisco
 login
!
line aux 0
!
line vty 0 4
 password cisco
 login
end
```

R3#

```
Current configuration : 1162 bytes
!
version 12.3
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname R3
!
enable secret 5 $1$z4BN$n4I6MhlJ4un15ogAyuxVJ.
!
username R1 password 0 cisco
username R2 password 0 cisco
!
ip ssh version 1
no ip domain-lookup
!
spanning-tree mode pvst
!
interface FastEthernet0/0
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface FastEthernet0/1
 ip address 10.0.0.129 255.255.255.128
 duplex auto
 speed auto
!
interface Serial0/0/0
 ip address 172.16.0.10 255.255.255.252
 encapsulation ppp
 ppp authentication chap
 clock rate 64000
!
interface Serial0/0/1
 ip address 172.16.0.6 255.255.255.252
 encapsulation ppp
 ppp authentication chap
!
interface Vlan1
 no ip address
 shutdown
!
router ospf 1
 log-adjacency-changes
 network 172.16.0.4 0.0.0.3 area 0
 network 172.16.0.8 0.0.0.3 area 0
 network 10.0.0.128 0.0.0.127 area 0
!
ip classless
!
banner motd ^CUnauthorized access strictly
        prohibited and prosecuted
to the full extent of the law^C
!
line con 0
 password cisco
 login
!
line aux 0
!
line vty 0 4
 password cisco
 login
end
```