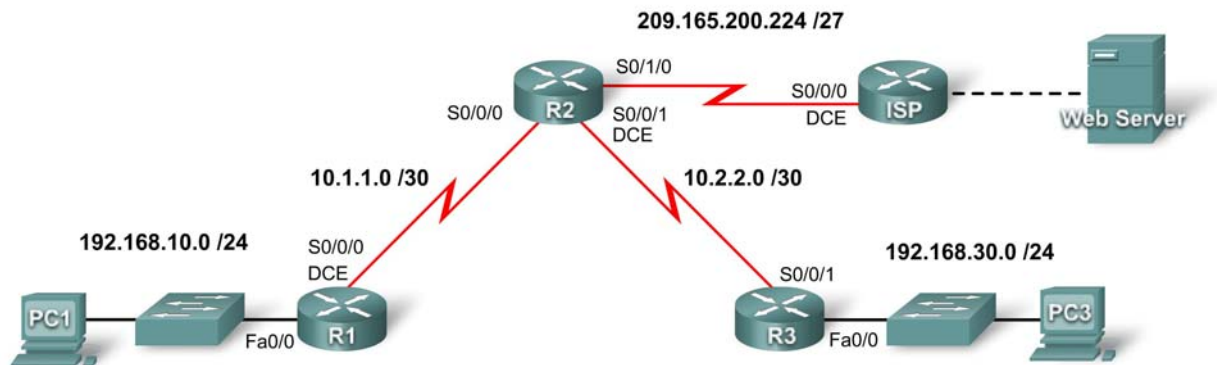


## PT Activity 2.4.6: Configuring PAP and CHAP Authentication

### Topology Diagram



### Addressing Table

| Device     | Interface | IP Address      | Subnet Mask     |
|------------|-----------|-----------------|-----------------|
| R1         | Fa0/0     | 192.168.10.1    | 255.255.255.0   |
|            | S0/0/0    | 10.1.1.1        | 255.255.255.252 |
| R2         | S0/0/0    | 10.1.1.2        | 255.255.255.252 |
|            | S0/0/1    | 10.2.2.1        | 255.255.255.252 |
|            | S0/1/0    | 209.165.200.225 | 255.255.255.252 |
| R3         | Fa0/0     | 192.168.30.1    | 255.255.255.0   |
|            | S0/0/0    | 10.2.2.2        | 255.255.255.252 |
| ISP        | S0/0/0    | 209.165.200.226 | 255.255.255.252 |
|            | Fa0/0     | 209.165.200.1   | 255.255.255.252 |
| Web Server | NIC       | 209.165.200.2   | 255.255.255.252 |
| PC1        | NIC       | 192.168.10.10   | 255.255.255.0   |
| PC3        | NIC       | 192.168.30.10   | 255.255.255.0   |

### Learning Objectives

- Configure OSPF routing.
- Configure PAP authentication between R1 and R2.
- Configure CHAP authentication between R3 and R2.

## Introduction

PPP encapsulation allows for two different types of authentication: PAP (Password Authentication Protocol) and CHAP (Challenge Handshake Authentication Protocol). PAP uses a clear-text password, while CHAP invokes a one-way hash that provides more security than PAP. In this activity, you will configure both PAP and CHAP as well as review OSPF routing configuration.

### Task 1: Configure OSPF Routing

#### Step 1. Enable OSPF on R1.

With a *process-ID* of 1, use the **router ospf 1** command to enable OSPF routing.

#### Step 2. Configure network statements on R1.

In router configuration mode, add all the networks connected to R1 using the **network** command. The OSPF *area-id* parameter is **0** for all the **network** statements in this topology.

```
R1(config-router)#network 192.168.10.0 0.0.0.255 area 0
R1(config-router)#network 10.1.1.0 0.0.0.3 area 0
```

#### Step 3. Configure network statements on R2 and R3.

Repeat steps 1 and 2 for routers R2 and R3. Use the addressing table to determine the correct statements. On R2, do *not* advertise the 209.165.200.224/30 network. You will configure a default route in the next step.

#### Step 4. Establish and redistribute the OSPF default route.

- On R2, create a static default route to ISP with the command **ip route 0.0.0.0 0.0.0.0 s0/1/0**.
- At the router prompt, issue the **default-information originate** command to include the static route in OSPF updates sent from R2.

#### Step 5. Verify end-to-end connectivity.

At this point in your configuration, all devices should be able to ping all locations.

Click **Check Results**, and then click **Connectivity Tests**. The Status should be "Correct" for both tests. The routing tables for R1, R2, and R3 should be complete. R1 and R3 should have a default route as shown in the routing table for R1 below:

```
R1#show ip route
```

```
Codes: C - connected, S - static, I - IGRP, 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, E - EGP
<output omitted>
```

```
Gateway of last resort is 10.1.1.2 to network 0.0.0.0
```

```
10.0.0.0/30 is subnetted, 2 subnets
C    10.1.1.0 is directly connected, Serial0/0/0
O    10.2.2.0 [110/128] via 10.1.1.2, 00:03:59, Serial0/0/0
C    192.168.10.0/24 is directly connected, FastEthernet0/0
O    192.168.30.0/24 [110/129] via 10.1.1.2, 00:02:19, Serial0/0/0
O*E2 0.0.0.0/0 [110/1] via 10.1.1.2, 00:02:19, Serial0/0/0
```

**Step 6. Check results.**

Your completion percentage should be 40%. If not, click **Check Results** to see which required components are not yet completed.

**Task 2: Configure PAP Authentication****Step 1. Configure R1 to use PAP authentication with R2.**

- On R1 in global configuration mode, type the command **username R2 password cisco123**. This command enables the remote router R2 to connect to R1 when using the password **cisco123**.
- Change the encapsulation type on the s0/0/0 interface of R1 to PPP using the **encapsulation ppp** command.
- While in the serial interface configuration, configure PAP authentication with the **ppp authentication pap** command.
- Configure the username and password that will be sent to R2 with the **ppp pap sent-username R1 password cisco123** command. Although Packet Tracer does not grade the **ppp pap sent-username R1 password cisco123** command, the command is required to successfully configure PAP authentication.
- Return to the privileged exec mode and use the **show ip interface brief** command to observe that the link between R1 and R2 has gone down.

```
R1(config)#username R2 password cisco123
R1(config)#interface s0/0/0
R1(config-if)#encapsulation ppp
R1(config-if)#ppp authentication pap
R1(config-if)#ppp pap sent-username R1 password cisco123
R1(config-if)#end
%SYS-5-CONFIG_I: Configured from console by console
R1#show ip interface brief
```

| Interface       | IP-Address   | OK? | Method | Status                | Protocol |
|-----------------|--------------|-----|--------|-----------------------|----------|
| FastEthernet0/0 | 192.168.10.1 | YES | manual | up                    | up       |
| FastEthernet0/1 | unassigned   | YES | manual | administratively down | down     |
| Serial0/0/0     | 10.1.1.1     | YES | manual | up                    | down     |
| Serial0/0/1     | unassigned   | YES | manual | administratively down | down     |
| Vlan1           | unassigned   | YES | manual | administratively down | down     |

**Step 2. Configure R2 to use PAP authentication with R1.**

Repeat Step 1 for R2, using the serial link to R1.

Remember, the name used in the command **username name password password** is always the name of the remote router, but in the **ppp pap sent-username name password password** command, the name is that of the originating router.

Note: Although Packet Tracer will bring the link up, on real equipment it is necessary to **shutdown** and then **no shutdown** the interface to force PAP to reauthenticate. You could also simply reload the routers.

**Step 3. Test connectivity between the PC1 and the web server.**

Use the **show ip interface brief** command to observe that the link between R1 and R2 is now up. Access to the web server from R1 should now be restored. Test this by sending a ping from PC1 to the web server.

```
R2#show ip interface brief
```

| Interface       | IP-Address | OK? | Method | Status                | Protocol |
|-----------------|------------|-----|--------|-----------------------|----------|
| FastEthernet0/0 | unassigned | YES | manual | administratively down | down     |
| FastEthernet0/1 | unassigned | YES | manual | administratively down | down     |

|             |                 |     |        |                       |      |
|-------------|-----------------|-----|--------|-----------------------|------|
| Serial0/0/0 | 10.1.1.2        | YES | manual | up                    | up   |
| Serial0/0/1 | 10.2.2.1        | YES | manual | up                    | up   |
| Serial0/1/0 | 209.165.200.225 | YES | manual | up                    | up   |
| Serial0/1/1 | unassigned      | YES | manual | administratively down | down |
| Vlan1       | unassigned      | YES | manual | administratively down | down |

#### Step 4. Check results.

Your completion percentage should be 70%. If not, click **Check Results** to see which required components are not yet completed.

### Task 3: Configure CHAP Authentication

#### Step 1. Configure R3 to use CHAP authentication with R2.

- In global configuration mode for R3, type **username R2 password cisco123**.
- On the s0/0/1 interface, issue the **encapsulation ppp** and **ppp authentication chap** commands, enabling PPP encapsulation and CHAP authentication.
- Use the **show ip interface brief** command to observe that the link between R2 and R3 has gone down.

```
R3(config)#username R2 password cisco123
R3(config)#interface s0/0/1
R3(config-if)#encapsulation ppp
R3(config-if)#ppp authentication chap
```

#### Step 2. Configure R2 to use CHAP authentication with R3.

Repeat Step 1 for R2, but change the username to R3, because R3 is the remote router.

#### Step 3. Test connectivity between PC3 and the web server.

Using the **show ip interface brief** command, you should see that the link between R2 and R3 is now up, and PC3 can ping the web server.

#### Step 4. Check results.

Your completion percentage should be 100%. If not, click **Check Results** to see which required components are not yet completed.