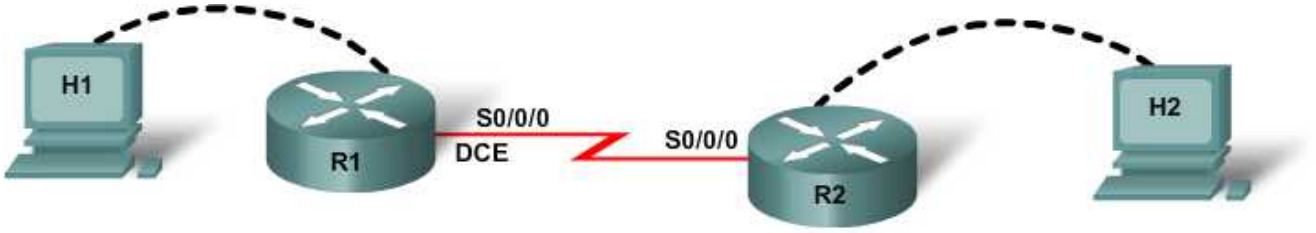
# Lab 7.2.5 Configuring and Verifying PAP and CHAP Authentication





| Device | Host Name | Serial 0/0/0 IP Address | Subnet Mask | Serial 0/0/0 Interface Type | Enable Secret Password | Enable, vty, and Console Password |
|---|---|---|---|---|---|---|
| Router 1 | R1 | 192.168.15.1 | 255.255.255.0 | DCE | class | cisco |
| Router 2 | R2 | 192.168.15.2 | 255.255.255.0 | DTE | class | cisco |

## Objectives

- Configure PPP authentication using PAP and CHAP.
- Verify connectivity using **show** and **debug** commands.

## Background / Preparation

Cable a network similar to the one shown in the topology diagram. Any router that has a single serial interface may be used for this lab. For example, router series 800, 1600, 1700, 1800, 2500, 2600, 2800, or any combination are acceptable.

The information in this lab applies to other routers; however, command syntax may vary. Depending on the router model, the interfaces may be identified differently. For example, on some routers, Serial0 may be Serial0/0 or Serial0/0/0 and Ethernet0 may be FastEthernet0/0. The information in this lab applies to routers that use the Serial0/0/0 notation. If the router in use differs, use the correct notation for the serial interface.

The following resources are required:

- Two routers both with a serial connection
- Two Windows-based PCs, each with a terminal emulation program
- At least one RJ-45-to-DB-9 connector console cable to configure the routers
- One 2-part (DTE/DCE) serial cable

**NOTE:** Make sure that the routers and the switches have been erased and have no startup configurations. Instructions for erasing both switch and router are provided in the Lab Manual, located on Academy Connection in the Tools section.

**NOTE: SDM Enabled Routers** – If the startup-config is erased in an SDM enabled router, SDM will no longer come up by default when the router is restarted. It will be necessary to build a basic router configuration using IOS commands. The steps provided in this lab use IOS commands and do not require the use of SDM. If you wish to use SDM, refer to the instructions in the Lab Manual, located on the Academy Connection in the Tools section or contact your instructor if necessary.

### Step 1: Connect the equipment

Connect Router 1 and Router 2 with a serial cable connecting both Serial 0/0/0 interfaces as shown in the topology diagram.

### Step 2: Perform basic configuration on Router 1

a. Connect a PC to the console port of the router to perform configurations using a terminal emulation program.

b. On Router 1, configure the hostname, IP addresses, and passwords as provided in the addressing table. Save the configuration.

### Step 3: Perform basic configuration on Router 2

On Router 2, configure the hostname, IP addresses, and passwords as provided in the addressing table. Save the configuration.

### Step 4: Configure PPP encapsulation on both R1 and R2

Change the encapsulation type to PPP by entering **`encapsulation ppp`** at the interface Serial 0/0 configuration mode prompt on both routers.

```
R1(config-if)#encapsulation ppp
R2(config-if)#encapsulation ppp
```

### Step 5: Verify PPP encapsulation on R1 and R2

Enter the command **`show interfaces serial 0/0/0`** to verify the PPP encapsulation on R1 and R2.

```
R1#show interfaces serial 0/0/0
R2#show interfaces serial 0/0/0
```

Is R1 using PPP encapsulation? _____

Is R2 using PPP encapsulation? _____

### Step 6: Verify that the serial connection is functioning

Ping from R1 to R2 to verify that there is connectivity between the two routers.

```
R1#ping 192.168.15.2
R2#ping 192.168.15.1
```

Can the serial interface on the R2 router be pinged from R1? _____

Can the serial interface on the R1 router be pinged from R2? _____

If the answer is no for either question, troubleshoot the router configurations to find the error. Repeat the pings until they are successful.

### Step 7: Configure PPP authentication on R1 with PAP

a. Configure the username and password on the R1 router. The username must be identical to the hostname of the other router. Both the password and usernames are case-sensitive. On the router, define the username and password to expect from the remote router. On Cisco routers, the secret password must be the same for both routers.

```
R1(config)#username R2 password cisco
R1(config)#interface serial 0/0/0
R1(config-if)#ppp authentication pap
```

b. In Cisco IOS releases 11.1 or later, PAP must be enabled on the interface because it is disabled by default. From the Serial 0/0/0 interface configuration mode prompt, enable PAP on the interface.

```
R1(config-if)#ppp pap sent-username R1 password cisco
```

### Step 8: Verify that the serial connection is functioning

Verify that the serial connection is functioning by pinging the serial interface of R2.

```
Was it successful? _____
```

Why or why not? _____

### Step 9: Configure PPP authentication on R2 with PAP

a. Configure the username and password on the R2 router. The username and password must be identical to the hostname and password of the other router. Both the password and user names are case-sensitive. On the router, define the username and password to expect from the remote router. On Cisco routers, the secret password must be the same for both routers.

```
R2(config)#username R1 password cisco
R2(config)#interface serial 0/0/0
R2(config-if)#ppp authentication pap
```

b. In Cisco IOS releases 11.1 or later, PAP must be enabled on the interface because it is disabled by default. From the Serial 0/0/0 interface configuration mode prompt, enable PAP on the interface.

```
R2(config-if)#ppp pap sent-username R2 password cisco
```

### Step 10: Turn on PPP debugging

a. To display the authentication exchange process as it occurs, issue the command **debug ppp authentication** at the privileged EXEC mode prompt.

```
R1#debug ppp authentication
```

**NOTE:** Debugging output is assigned high priority in the CPU process and can render a system unusable. When working on a live network, use **debug** only during periods of low network traffic.

What did the debug function report when the PPP authentication was applied?

_____

_____

_____

_____

_____

Which line reveals the outgoing authentication acknowledgment?

_____

Which line reveals the incoming authentication request?

_____

b. Remove the debug command from R1.

```
R1#undebug all
```

### Step 11: Verify that the serial connection is functioning

Verify that the serial connection is functioning by pinging the serial interface of R1.

Was it successful? _____

Why or why not? _____

### Step 12: Remove PAP from R1 and R2

Remove PAP from R1 and R2 by issuing the command **no** in front of the commands used to configure PAP.

```
R1(config)#interface serial 0/0/0
R1(config-if)#no ppp authentication pap
R1(config-if)#no ppp pap sent-username R1 password cisco
R1(config-if)#exit
R1(config)#no username R2 password cisco

R2(config)#interface serial 0/0/0
R2(config-if)#no ppp authentication pap
R2(config-if)#no ppp pap sent-username R2 password cisco
R2(config-if)#exit
R2(config)#no username R1 password cisco
```

### Step 13: Configure PPP authentication on R1 with CHAP

a. If both CHAP and PAP are enabled, the first authentication method specified is requested during the link negotiation phase. If the peer suggests using the second method or simply refuses the first method, the second method is tried.

b. Save the configuration on R1 and R2 and reload both routers.

```
R1#copy running-config startup-config
R1#reload

R2#copy running-config startup-config
R2#reload
```

c. Configure the username and password on the R1 router. The username must be identical to the hostname of the other router. Both the password and usernames are case-sensitive. Define the username and password to expect from the remote router. On Cisco routers, the secret password must be the same for both routers.

```
R1(config)#username R2 password cisco
R1(config)#interface serial 0/0/0
R1(config-if)#ppp authentication chap
```

### Step 14: Configure PPP authentication on R2 with CHAP

a. Configure the username and password on the R2 router. The passwords must be the same on both routers. The username must be identical to the hostname on the other router. Both the password and user names are case-sensitive. Define the username and password to expect from the remote router.

```
R2(config)#username R1 password cisco
R2(config)#interface serial 0/0/0
R2(config-if)#ppp authentication chap
```

b. To display the authentication exchange process as it occurs, issue the command **debug ppp authentication** at the privileged EXEC mode prompt.

```
R1#debug ppp authentication
```

What did the debug function report when CHAP was applied on R2?

_____

_____

_____

_____

_____

Which authentication method is being used? _____

What line specifies the incoming authentication request?

_____

Which line identifies the outgoing authentication acknowledgment?

_____

c. Remove the debug command from R1.

```
R1#undebug all
```

### Step 15: Verify that the serial connection is functioning

Verify that the serial connection is functioning by pinging the serial interface of R1.

Was it successful? _____

Why or why not?

_____

_____

### Step 16: Verify the serial line encapsulation on R1

Enter the command **show interfaces serial 0/0** to view the details of the interface.

```
R1#show interfaces serial 0/0/0
```

What is the status of Serial 0/0/0? _____

Line Protocol is _____

Encapsulation is _____

Is the LCP open? _____

How many NCPs have been established? _____

### Step 17: Verify the serial line encapsulation on R2

Enter the command **show interfaces serial 0/0/0** to view the details of the interface.

```
R2#show interfaces serial 0/0/0
```

What is the status of Serial 0/0/0 _____

Line Protocol is _____

Encapsulation is _____

Is the LCP open? _____

How many NCPs have been established? _____

### Step 18: Reflection

a. What is an advantage of using CHAP over PAP?

_____

_____

_____

_____

b. Which PPP protocol is used for establishing a point-to-point link?

_____

c. Which PPP protocol is used for configuring the various Network Layer protocols?

_____