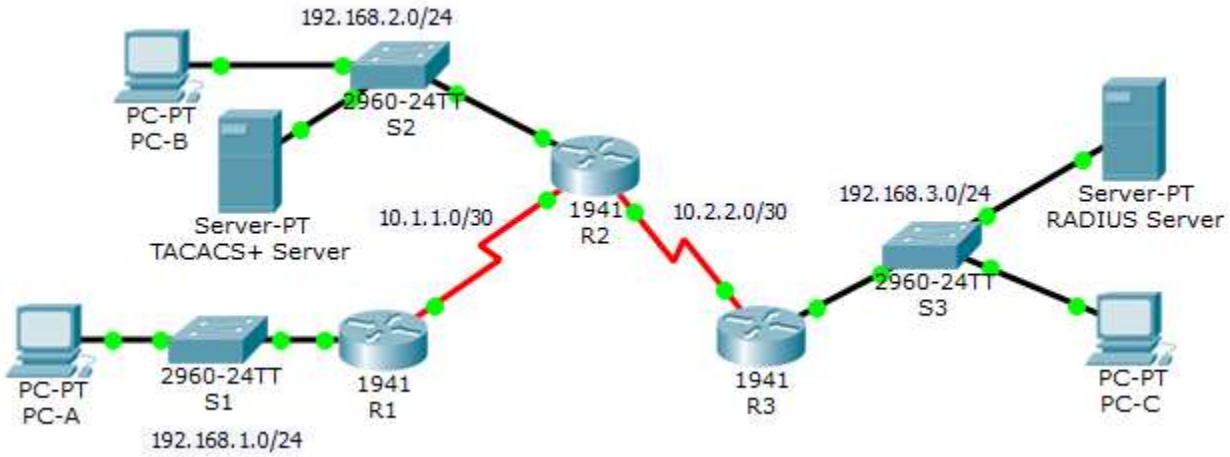
# Packet Tracer - Configure AAA Authentication on Cisco Routers (Instructor Version)

**Instructor Note**: Red font color or Gray highlights indicate text that appears in the instructor copy only.

## Topology




## Addressing Table

| Device | Interface | IP Address | Subnet Mask | Default Gateway | Switch Port |
|---|---|---|---|---|---|
| R1 | G0/1 | 192.168.1.1 | 255.255.255.0 | N/A | S1 F0/1 |
| | S0/0/0 (DCE) | 10.1.1.2 | 255.255.255.252 | N/A | N/A |
| R2 | G0/0 | 192.168.2.1 | 255.255.255.0 | N/A | S2 F0/2 |
| | S0/0/0 | 10.1.1.1 | 255.255.255.252 | N/A | N/A |
| | S0/0/1 (DCE) | 10.2.2.1 | 255.255.255.252 | N/A | N/A |
| R3 | G0/1 | 192.168.3.1 | 255.255.255.0 | N/A | S3 F0/5 |
| | S0/0/1 | 10.2.2.2 | 255.255.255.252 | N/A | N/A |
| TACACS+ Server | NIC | 192.168.2.2 | 255.255.255.0 | 192.168.2.1 | S2 F0/6 |
| RADIUS Server | NIC | 192.168.3.2 | 255.255.255.0 | 192.168.3.1 | S3 F0/1 |
| PC-A | NIC | 192.168.1.3 | 255.255.255.0 | 192.168.1.1 | S1 F0/2 |
| PC-B | NIC | 192.168.2.3 | 255.255.255.0 | 192.168.2.1 | S2 F0/1 |
| PC-C | NIC | 192.168.3.3 | 255.255.255.0 | 192.168.3.1 | S3 F0/18 |

## Objectives

- Configure a local user account on R1 and configure authenticate on the console and vty lines using local AAA.
- Verify local AAA authentication from the R1 console and the PC-A client.

- Configure server-based AAA authentication using TACACS+.
- Verify server-based AAA authentication from the PC-B client.
- Configure server-based AAA authentication using RADIUS.
- Verify server-based AAA authentication from the PC-C client.

## Background / Scenario

The network topology shows routers R1, R2 and R3. Currently, all administrative security is based on knowledge of the enable secret password. Your task is to configure and test local and server-based AAA solutions.

You will create a local user account and configure local AAA on router R1 to test the console and vty logins.

- User account: **Admin1** and password **admin1pa55**

You will then configure router R2 to support server-based authentication using the TACACS+ protocol. The TACACS+ server has been pre-configured with the following:

- Client: **R2** using the keyword **tacacspa55**
- User account: **Admin2** and password **admin2pa55**

Finally, you will configure router R3 to support server-based authentication using the RADIUS protocol. The RADIUS server has been pre-configured with the following:

- Client: **R3** using the keyword **radiuspa55**
- User account: **Admin3** and password **admin3pa55**

The routers have also been pre-configured with the following:

- Enable secret password: **ciscoenpa55**
- OSPF routing protocol with MD5 authentication using password: **MD5pa55**

**Note**: The console and vty lines have not been pre-configured.

**Note**: IOS version 15.3 uses SCRYPT as a secure encryption hashing algorithm; however, the IOS version that is currently supported in Packet Tracer uses MD5. Always use the most secure option available on your equipment.

# Part 1: Configure Local AAA Authentication for Console Access on R1

### Step 1: Test connectivity.

- Ping from **PC-A** to **PC-B**.
- Ping from **PC-A** to **PC-C**.
- Ping from **PC-B** to **PC-C**.

### Step 2: Configure a local username on R1.

Configure a username of **Admin1** with a secret password of **admin1pa55**.

```
R1(config)# username Admin1 secret admin1pa55
```

### Step 3: Configure local AAA authentication for console access on R1.

Enable AAA on R1 and configure AAA authentication for the console login to use the local database.

```
R1(config)# aaa new-model
```

```
R1(config)# aaa authentication login default local
```

### Step 4: Configure the line console to use the defined AAA authentication method.

Enable AAA on **R1** and configure AAA authentication for the console login to use the default method list.

```
R1(config)# line console 0
R1(config-line)# login authentication default
```

### Step 5: Verify the AAA authentication method.

Verify the user EXEC login using the local database.

```
R1(config-line)# end
%SYS-5-CONFIG_I: Configured from console by console
R1# exit

R1 con0 is now available
Press RETURN to get started.

************ AUTHORIZED ACCESS ONLY *************
UNAUTHORIZED ACCESS TO THIS DEVICE IS PROHIBITED.


User Access Verification

Username: Admin1
Password: admin1pa55
R1>
```

## Part 2: Configure Local AAA Authentication for vty Lines on R1

### Step 1: Configure domain name and crypto key for use with SSH.

a. Use ccnasecurity.com as the domain name on R1.

```
R1(config)# ip domain-name ccnasecurity.com
```

b. Create an RSA crypto key using 1024 bits.

```
R1(config)# crypto key generate rsa

Choose the size of the key modulus in the range of 360 to 2048 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.

How many bits in the modulus [512]: 1024
% Generating 1024 bit RSA keys, keys will be non-exportable...[OK]
```

### Step 2: Configure a named list AAA authentication method for the vty lines on R1.

Configure a named list called **SSH-LOGIN** to authenticate logins using local AAA.

```
R1(config)# aaa authentication login SSH-LOGIN local
```

### Step 3: Configure the vty lines to use the defined AAA authentication method.

Configure the vty lines to use the named AAA method and only allow SSH for remote access.

```
R1(config)# line vty 0 4
R1(config-line)# login authentication SSH-LOGIN
R1(config-line)# transport input ssh
R1(config-line)# end
```

### Step 4: Verify the AAA authentication method.

Verify the SSH configuration SSH to **R1** from the command prompt of **PC-A**..

```
PC> ssh –l Admin1 192.168.1.1
Open
Password: admin1pa55
```

## Part 3: Configure Server-Based AAA Authentication Using TACACS+ on R2

### Step 1: Configure a backup local database entry called Admin.

For backup purposes, configure a local username of **Admin2** and a secret password of **admin2pa55**.

```
R2(config)# username Admin2 secret admin2pa55
```

### Step 2: Verify the TACACS+ Server configuration.

Click the TACACS+ Server. On the Services tab, click **AAA**. Notice that there is a Network configuration entry for **R2** and a User Setup entry for **Admin2**.

### Step 3: Configure the TACACS+ server specifics on R2.

Configure the AAA TACACS server IP address and secret key on **R2**.

**Note**: The commands **tacacs-server host** and **tacacs-server key** are deprecated. Currently, Packet Tracer does not support the new command **tacacs server**.

```
R2(config)# tacacs-server host 192.168.2.2
R2(config)# tacacs-server key tacacspa55
```

### Step 4: Configure AAA login authentication for console access on R2.

Enable AAA on **R2** and configure all logins to authenticate using the AAA TACACS+ server. If it is not available, then use the local database.

```
R2(config)# aaa new-model
R2(config)# aaa authentication login default group tacacs+ local
```

### Step 5: Configure the line console to use the defined AAA authentication method.

Configure AAA authentication for console login to use the default AAA authentication method.

```
R2(config)# line console 0
R2(config-line)# login authentication default
```

### Step 6: Verify the AAA authentication method.

Verify the user EXEC login using the AAA TACACS+ server.

```
R2(config-line)# end
```

```
%SYS-5-CONFIG_I: Configured from console by console
R2# exit

R2 con0 is now available
Press RETURN to get started.

************ AUTHORIZED ACCESS ONLY *************
UNAUTHORIZED ACCESS TO THIS DEVICE IS PROHIBITED.


User Access Verification

Username: Admin2
Password: admin2pa55
R2>
```

# Part 4: Configure Server-Based AAA Authentication Using RADIUS on R3

## Step 1: Configure a backup local database entry called Admin.

For backup purposes, configure a local username of **Admin3** and a secret password of **admin3pa55**.

```
R3(config)# username Admin3 secret admin3pa55
```

## Step 2: Verify the RADIUS Server configuration.

Click the RADIUS Server. On the Services tab, click **AAA**. Notice that there is a Network configuration entry for **R3** and a User Setup entry for **Admin3**.

## Step 3: Configure the RADIUS server specifics on R3.

Configure the AAA RADIUS server IP address and secret key on **R3**.

**Note**: The commands **radius-server host** and **radius-server key** are deprecated. Currently Packet Tracer does not support the new command **radius server**.

```
R3(config)# radius-server host 192.168.3.2
R3(config)# radius-server key radiuspa55
```

## Step 4: Configure AAA login authentication for console access on R3.

Enable AAA on **R3** and configure all logins to authenticate using the AAA RADIUS server. If it is not available, then use the local database.

```
R3(config)# aaa new-model
R3(config)# aaa authentication login default group radius local
```

## Step 5: Configure the line console to use the defined AAA authentication method.

Configure AAA authentication for console login to use the default AAA authentication method.

```
R3(config)# line console 0
R3(config-line)# login authentication default
```

### Step 6: Verify the AAA authentication method.

Verify the user EXEC login using the AAA RADIUS server.

```
R3(config-line)# end
%SYS-5-CONFIG_I: Configured from console by console
R3# exit

R3 con0 is now available
Press RETURN to get started.

************ AUTHORIZED ACCESS ONLY *************
UNAUTHORIZED ACCESS TO THIS DEVICE IS PROHIBITED.


User Access Verification

Username: Admin3
Password: admin3pa55
R3>
```

### Step 7: Check results.

Your completion percentage should be 100%. Click **Check Results** to see feedback and verification of which required components have been completed.

## !!!Script for R1

```
!!!Part 1
config t
username Admin1 secret admin1pa55
aaa new-model
aaa authentication login default local
line console 0
 login authentication default
!!!Part 2
ip domain-name ccnasecurity.com
crypto key generate rsa
1024
aaa authentication login SSH-LOGIN local
line vty 0 4
 login authentication SSH-LOGIN
 transport input ssh
```

## !!!!Script for R2

```
conf t
username Admin2 secret admin2pa55
tacacs-server host 192.168.2.2
tacacs-server key tacacspa55
aaa new-model
```

```
aaa authentication login default group tacacs+ local
line console 0
 login authentication default
```

## !!!!Script for R3

```
conf t
username Admin3 secret admin3pa55
radius-server host 192.168.3.2
radius-server key radiuspa55
aaa new-model
aaa authentication login default group radius local
line console 0
login authentication default
```