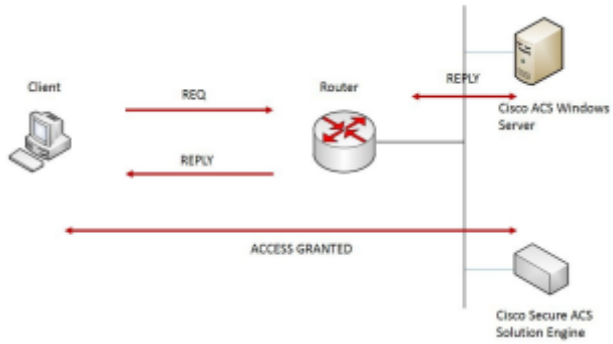
Lesson Proper for Week 10

IMPLEMENTING AUTHENTICATION USING EXTERNAL SERVICES

Due to the scaling of large networks, creating a user account on each router can be an inconvenience. If the account's details are adjusted on one device, the network engineer will need to replicate the changes to all other devices on the network individually. A convenient solution to adjust scaling and ensuring that all of the accounts and privileges are kept synchronized is to use a centralized AAA server such as a Cisco **Access Control Server (ACS)** or a Cisco **Identity Services Engine (ISE**):



The user accounts are created on the ACS or ISE appliance. The routers and switches are configured to query the AAA server if they receive any login requests. The AAA server would also be responsible for providing privileges and getting logs of the activities of each user.

Examples of these security protocols are as follows:

- RADIUS
- TACACS+

TACACS+

This is a Cisco proprietary third-generation protocol that facilitates the use of AAA services. This protocol is derived from TACACS and XTACACS, and supports authentication, authorization, and accounting. Multiple servers can be used to handle different services. For example, one server can be used to handle authentication and another server can be used to handle authorization for a router.

TACACS+ provides additional layers of security by encrypting the messages between the client and the AAA server.

Here are the some of the special features of TACACS+:

- TACACS+ supports authorization commands with some advanced authentication mechanisms like Data Encryption Standard and one-time password (OTP) keys
- TACACS+ supports all 16 privilege levels (0-15)
- TACACS+ allows the blocking of specific port services such as a TTY or VTY
- The TACACS+ AAA server can contain an internal database size up to 5,000 users
- A TACACS+ server acts as a proxy server which authenticates, authorizes, and accounts access details

CONFIGURING TACACS+

The following are the steps involved to configure external authentication using TACACS+.

1. Creating a username and password:

```
Router (config) # username ccnasecurity secret cisco
```

2. Enabling AAA on the device:

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

3. Configuring the TACACS+ server. The next step is to configure the router to point to the TACACS+ server that has been created. This can be achieved by two methods. The first is to create a pointer on the router by specifying the IP address of the TACACS+ server and the shared key:

```
Router (config) # tacacs-server host 10.10.10.10 key secretkey
```

While the second is to create a group of TACACS+ servers and define the same:

```
Router (config) # aaa group server tacacs+ Authforlogin
Router (config-sg-tacacs+) #server 10.10.10.10
```

4. Defining a method list for AAA. The next step is to define a method list for AAA logins using the following parameters:

```
Router (config) # aaa authentication login default group tacacs+ local
```

Where:

- The keyword `aaa authentication login` specifies that this is only used for login authentication
- The keyword `default` is used in case of a custom name or when only one default list can be created for each function of AAA
- The keyword `group tacacs+` specifies the user who is going to use the configured TACACS+ servers
- The keyword `local` specifies the secondary authentication method in case the TACACS+ server is not reachable

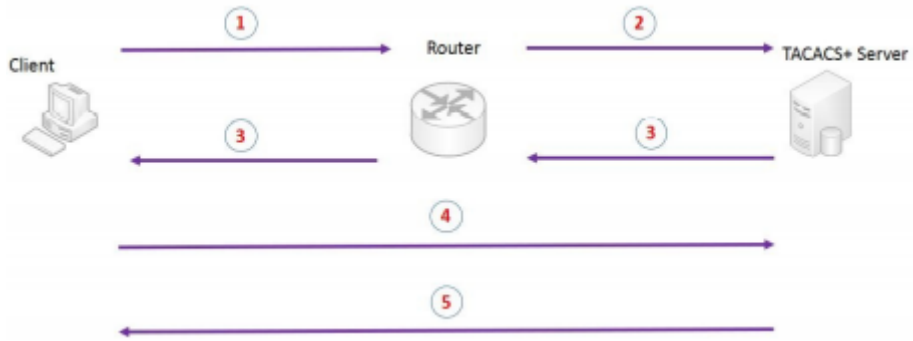
5. Attaching the configured AAA authentication on the line modes:

```
Router (config) # line console 0
Router (config-line) # login authentication default
Router (config) # line vty 0 15
Router (config-line) # login authentication default
```

The keyword `default` here substitutes the default method list available.

USING AAA WITH TACACS+

Let's consider the example of a user connected to the router, and the TACACS+ server is requesting access to the router. The following are the steps involved in authenticating the user with TACACS+:



1. The **Client** sends a request message to the **Router**

2. The **Router** passes the request to the **TACACS+ Server** and requests for the login text

3. The **TACACS+ Server** prompts for the username and the password, and the **Router** passes the server request to the server

4. The **Client** sends the username and password to the router and the **Router** forwards the same to TACACS+

5. Then, the server replies with an ACCEPT or REJECT code

RADIUS

This is an open standard protocol that works in a client and server model. In the implementation of Cisco, the RADIUS client is configured on the Cisco routers and sends authentication or authorization requests to a RADIUS server which is located centrally.

RADIUS can be implemented in various network environments that are in need of high security levels. Some of the environments where RADIUS can be used are as follows:

1. It can be implemented in networks that are built with different vendor products. RADIUS can act as a single server-based database.

2. In networks environments where smart cards are used.

3. It can be used in environments where administrators need to do accounting independently.

4. It can be used in networks where administrators want to set up pre-authentication profiles. Pre-authentication mainly helps ISP's to manage ports and shared resources depending on the agreed upon service agreements.

On the other hand, RADIUS cannot be used for some situations, and they are as follows:

1. RADIUS does not support some of the protocols like AppleTalk Remote Access (ARA), X.25 PAD connections, and NetBIOS

2. RADIUS does not work on the two-way authentication model

3. RADIUS binds the user client to only one service model and does not support a variety of services

CONFIGURING RADIUS

The following are the steps involved in configuring external authentication using RADIUS:

1. Creating a username and password:

```
Router (config) # username ccnasecurity secret cisco
```

2. Enabling AAA on the device:

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

3. Configuring the RADIUS server. The next step is to configure the router to point to the RADIUS server that has been created. This can be achieved by creating a pointer on the router by specifying the IP address of the RADIUS server and the shared key:

```
Router (config) # radius-server host 10.10.10.10
Router (config) # radius-server key thesecretkey
```

4. Defining a method list for AAA. The next step is to define a method list for AAA logins using the following parameters:

```
Router (config) # aaa authentication login default group radius local
```

5. Attaching the configured AAA authentication on the line modes:

```
Router (config) # line console 0
Router (config-line) # login authentication default
Router (config) # line vty 0 15
Router (config-line) # login authentication default
```

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