

Security Configuration Commands

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Chapter 1 AAA Authentication Configuration Commands

1.1 AAA Authentication Configuration Commands

This chapter describes the commands used to configure AAA authentication methods. Authentication identifies users before they are allowed access to the network and network services.

For information on how to configure authentication using AAA methods, refer to the "Configuring Authentication" chapter. For configuration examples using the commands in this chapter, refer to the "Authentication Examples" section located at the end of the "Configuring Authentication" chapter.

AAA Authentication Configuration Commands include:

- `aaa authentication enable default`
- `aaa authentication login`
- `aaa authentication password-prompt`
- `aaa authentication username-prompt`
- `aaa group server`
- `debug aaa authentication`
- `enable password`
- `server`
- `service_password-encryption`
- `username`

1.1.1 `aaa authentication enable default`

To enable AAA authentication to determine if a user can access the privileged command level, use the `aaa authentication enable default` global configuration command. Use the `no` form of this command to disable this authentication method.

`aaa authentication enable default` *method1* [*method2...*]

`no aaa authentication enable default` *method1* [*method2...*]

parameter

parameter	description
<i>method</i>	At least one of the keywords described in Table 1.

default

If the default list is not set, only the `enable password` is checked. This has the same effect as the following command:

aaa authentication enable default enable

On the console, the enable password is used if it exists. If no password is set, the process will succeed anyway.

command mode

Global configuration

instruction

Use the aaa authentication enable default command to create a series of authentication methods that are used to determine whether a user can access the privileged command level. Method keywords are described in Table 1. The additional methods of authentication are used only if the previous method returns an error, not if it fails. To specify that the authentication should succeed even if all methods return an error, specify none as the final method in the command line.

Table 1-1 aaa authentication enable default Methods

Keyword	Description
group name	Uses the server group for authentication.
enable	Uses the enable password for authentication.
line	Uses the line password for authentication.
none	Uses no authentication.
group radius	Uses RADIUS authentication.

example

The following example creates an authentication list that first tries to contact a TACACS+ server. If no server can be found, AAA tries to use the enable password. If this attempt also returns an error (because no enable password is configured on the server), the user is allowed access with no authentication.

```
aaa authentication enable default line enable none
```

related commands

enable password

1.1.2 aaa authentication login

To set authentication, authorization, and accounting (AAA) authentication at login, use the aaa authentication login command in global configuration mode. To disable AAA authentication, use the no form of this command.

```
aaa authentication login {default | list-name} method1 [method2...]
```

```
no aaa authentication login {default | list-name} method1 [method2...]
```

parameter

parameter	description
Default	Uses the listed authentication methods that follow this argument as the default list of methods when a user logs in.
<i>list-name</i>	Character string used to name the list of authentication methods activated when a user logs in.
method	At least one of the keywords described in Table 2.

default

If the default list is not set, only the local user database is checked. This has the same effect as the following command:

```
aaa authentication login default none
```

command mode

Global configuration

instruction

The default and optional list names that you create with the `aaa authentication login` command are used with the `login` authentication command.

The additional methods of authentication are used only if the previous method returns an error, not if it fails. To ensure that the authentication succeeds even if all methods return an error, specify `none` as the final method in the command line.

If authentication is not specifically set for a line, the default is to deny access and no authentication is performed.

Table 1-2 AAA authentication login Methods

Keyword	Description
enable	Uses the enable password for authentication.
group	Uses the server group for authentication.
line	Uses the line password for authentication.
local	Uses the local username database for authentication.
local-case	Uses case-sensitive local username authentication.
none	Uses no authentication.
group radius	Used RADIUS for authentication.

example

The following example creates an AAA authentication list called TEST. This authentication first tries to contact a TACACS+ server. If no server is found, TACACS+

returns an error and AAA tries to use the enable password. If this attempt also returns an error (because no enable password is configured on the server), the user is allowed access with no authentication.

```
aaa authentication login TEST tacacs+ enable none
```

The following example creates the same list, but it sets it as the default list that is used for all login authentications if no other list is specified:

```
aaa authentication login default tacacs+ enable none
```

related commands

none

1.1.3 aaa authentication password-prompt

To change the text displayed when users are prompted for a password, use the `aaa authentication password-prompt` global configuration command. Use the `no` form of this command to return to the default password prompt text.

aaa authentication password-prompt *text-string*

no aaa authentication password-prompt *text-string*

parameter

parameter	description
test-string	String of text that will be displayed when the user is prompted to enter a password.

default

There is no user-defined text-string, and the password prompt appears as "Password."

command mode

Global configuration

instruction

Use the `aaa authentication password-prompt` command to change the default text that the software displays when prompting a user to enter a password. This command changes the password prompt for the enable password as well as for login passwords that are not supplied by remote security servers. The `no` form of this command returns the password prompt to the default value:

Password:

The `aaa authentication password-prompt` command does not change any dialog that is supplied by a remote TACACS+ server.

example

The following example changes the text for the username prompt:

```
aaa authentication password-prompt YourPassword:
```

related commands

aaa authentication username-prompt

enable password

1.1.4 aaa authentication username-prompt

To change the text displayed when users are prompted to enter a username, use the `aaa authentication username-prompt` global configuration command. Use the `no` form of this command to return to the default username prompt text.

aaa authentication username-prompt text-string

no aaa authentication username-prompt text-string

parameter

parameter	description
text-string	String of text that will be displayed when the user is prompted to enter a username.

default

There is no user-defined text-string, and the username prompt appears as "Username."

command mode

Global configuration

instruction

Use the `aaa authentication username-prompt` command to change the default text that the software displays when prompting a user to enter a username. The `no` form of this command returns the username prompt to the default value:

Username:

Some protocols (for example, TACACS+) have the ability to override the use of local username prompt information. Using the `aaa authentication username-prompt` command will not change the username prompt text in these instances.

Note:

The `aaa authentication username-prompt` command does not change any dialog that is supplied by a remote TACACS+ server.

example

The following example changes the text for the username prompt:

```
aaa authentication username-prompt YourUsername:
```

related commands

```
aaa authentication password-prompt
```

1.1.5 aaa group server

To group different RADIUS server hosts into distinct lists and distinct methods, enter the `aaa group server radius` command in global configuration mode. To remove a group server from the configuration list, enter the `no` form of this command.

```
aaa group server radius group-name
```

```
no aaa group server radius group-name
```

parameter

parameter	description
<i>group-name</i>	Character string used to name the group of servers.

default

No default behavior or values.

command mode

Global configuration

instruction

The authentication, authorization, and accounting (AAA) server-group feature introduces a way to group existing server hosts. The feature enables you to select a subset of the configured server hosts and use them for a particular service.

Example

The following example adds a radius server group named `radius-group`:

```
aaa group server radius radius-group
```

related commands

server

1.1.6 debug aaa authentication

To display information on authentication, authorization, and accounting (AAA) TACACS+ authentication, use the `debug aaa authentication` command in privileged EXEC mode. To disable debugging output, use the `no` form of this command.

debug aaa authentication

no debug aaa authentication

parameter

none

default

disabled

command mode

EXEC

instruction

Use this command to learn the methods of authentication being used and the results of these methods.

example

The following is sample output from the `debug aaa authentication` command.

```
switch#debug aaa authentication
```

```
AAA: Authen start (0x1f74208), user=, authen_type=ASCII, priv=0, method-list=default
```

```
AAA: Use authen method LOCAL (0x1f74208).
```

```
AAA: Authen CONT, need username.
```

```
AAA: Authen CONT, need password.
```

```
AAA: Authen ERROR (0x1f74208)! Use next method.
```

```
AAA: Authen FAIL(0x1f74208)! Method-list polling finish.
```

Output information	description
Authen start (0x1f74208), user=, authen_type=ASCII, method-list=default priv=0,	The authentication starts and the username is unknown. Uses ASCII-type authentication. The privileged level required for the user to enter is 0. Uses the default authentication method list. UserID = 0x1f74208
Use authen method LOCAL (0x1f74208)	Uses local authentication method. UserID = 0x1f74208
Authen CONT, need username	Prompts for username
Authen CONT, need password	Prompts for password
Authen ERROR (0x1f74208)! Use next	Indicates that the local authentication fails,

method	Uses the next method in the list.
Authen FAIL(0x1f74208)! Method-list polling finish	Method-list polling is finished. The authentication fails.

related commands

none

1.1.7 enable password

To set a local password to control access to various privilege levels, use the enable password command in global configuration mode. To remove the password requirement, use the no form of this command.

enable password { *password* | [*encryption-type*] *encrypted-password* } [*level number*]

no enable password [*level number*]

parameter

parameter	description
<i>password</i>	Password users type to enter enable mode.
encryption-type	Algorithm used to encrypt the password.
encrypted-password	Encrypted password you enter, copied from another router configuration.
level	Level for which the password applies.
number	Number between 1 and 15 that specifies the privilege level for the user.

default

No password is defined.

command mode

Global configuration

instruction

Can not have spaces in the password that the switch configures. When using the enable password command, you cannot input space if you enter a clear text password. The length of the clear text password cannot exceed 126 characters.

The default level parameter is 15 without inputting the level parameter. If a privilege level is not configured password, then no authentication is performed when a user entering this privileged level.

Our switch system only supports two types of encryption. The encryption type is 0 and 7 respectively. Parameter 0 indicates no password is defined and you enter a clear text password in the following encrypted-password blank. Parameter 7 indicates a

self-defined algorithm is used for encryption and you enter encrypted text password in the following encrypted-password blank. This encrypted text password can be copied from the configuration file of other switch.

example

The following example adds password clever for the privilege level 10, uses encryption-type 0, that is, the clear text password:

```
enable password 0 clever level 10
```

The following example adds password Oscar for the default privilege (15), uses encryption-type 7, that is, the encrypted text password:

```
enable password 7 074A05190326
```

Assuming the encrypted text password of Oscar is 074A05190326, which is obtained from the configuration file of other switch.

related commands

aaa authentication enable default

service password-encryption

1.1.8 server

To add a server in the AAA server group, use the server command in server-group configuration mode. To remove the associated server from the authentication, authorization, and accounting (AAA) group server, use the no form of this command.

```
server A.B.C.D
```

```
no server A.B.C.D
```

parameter

parameter	description
A.B.C.D	IP address of the server.

default

No server

command mode

Server-group configuration

instruction

You can add 20 different servers in a server group at most.

example

The following example adds a server at 12.1.1.1 to the server group:

```
server 12.1.1.1
```

related commands

aaa group server

1.1.9 service password-encryption

To encrypt passwords, use the service password-encryption command in global configuration mode. To restore the default, use the no form of this command.

service password-encryption

no service password-encryption

parameter

none

default

No encryption

command mode

global configuration

instruction

Currently in the realization of our switch system, this command is related to username password, enable password and password. If this command is not configured on the switch (namely default state), and the system uses the clear text storage method in the above three commands, then the configured clear text of the password can be displayed in the show running-config command. If this command is configured on the switch, then the configured password of the above three commands will be encrypted, then the configured clear text of the password cannot be displayed in the show running-config command, even using the no service password-encryption cannot restore the clear text of the password. Please make sure of the configured password before using this command for encryption. The no service password-encryption command only has effect on the password configured by the service password-encryption command.

example

Use the following command to encrypt for the configured clear text password and also to encrypt for the clear text password that configured after using this command.

```
switch_config#service password-encryption
```

related commands

username username password

enable password

password1.1.10 **username**

To establish a username-based authentication system, use the `username` command in global configuration mode. Use the `no` form of this command to remove an established username-based authentication.

username *username* [**password** { *password* | [encryption-type] *encrypted-password* }] [**user-maxlinks** *number*] [**autocommand** *command*]

no username *username*

parameter

parameter	description
Username	Username character string
password	Password a user enters.
password	Clear text of the password character string
encryption-type	Encryption type
encrypted-password	Encrypted password a user enters.
user-maxlinks	Limits the user's number of inbound links.
number	Link number that established simultaneously.
autocommand	Causes the specified command to be issued automatically after the user logs in. The autocommand must be used in the end of the command line.
command	Executes automatically command character string

default

No username-based authentication system is established.

command mode

global configuration

instruction

The password is considered as empty character string when there is no password parameter. The trust-host will bind the user to the specified host. This user and other hosts cannot pass authentication when logging in switch. The `user-maxlinks` command limit the user's number of inbound links. User can use the `show users` command to check which kind of authentication that each online user passes.

White spaces are not allowed in the configured password of our switch. This also applies to the `enable password` command.

Our switch system only supports two types of encryption. The encryption type is 0 and 7 respectively. Parameter 0 indicates no password is defined and you enter a clear text password in the following `encrypted-password` blank. Parameter 7 indicates a

self-defined algorithm is used for encryption and you enter encrypted text password in the following encrypted-password blank. This encrypted text password can be copied from the configuration file of other switch.

example

The following example adds a local user, its username is someone, its password is someone:

```
username someone password someone
```

The following example adds a local user, its user name is Oscar, its password is Joan, uses encryption-type 7, that is, the encrypted text password:

```
enable password 7 1105718265
```

Assuming the encrypted text password is 1105718265, which is obtained from the configuration file of other switch.

related commands

aaa authentication login

Chapter 2 RADIUS Configuration Commands

This chapter describes the commands used to configure RADIUS. RADIUS is a distributed client/server system that secures networks against unauthorized access. In the implementation, RADIUS clients run on switches and send authentication requests to a central RADIUS server that contains all user authentication and network service access information.

For information on how to configure RADIUS, refer to the chapter "Configuring RADIUS".

2.1 RADIUS Configuration Commands

RADIUS Configuration Commands include:

- debug radius
- ip radius source-interface
- radius-server challenge-noecho
- radius-server deadtime
- radius-server host
- radius-server optional-passwords
- radius-server key
- radius-server retransmit
- radius-server timeout
- radius-server vsa send

2.1.1 debug radius

To display information associated with RADIUS, use the debug radius command in EXEC mode. To disable debugging output, use the no form of this command.

debug radius { *event* | *packet* }

no debug radius { *event* | *packet* }

parameter

Parameter	description
Event	Displays radius event
Packet	Displays radius packet.

default

none

command mode

EXEC

instruction

Use this command to debug network system to locate the authentication failure reason.

Switch#debug radius event

RADIUS:return message to aaa, Give me your username

RADIUS:return message to aaa, Give me your password

RADIUS:initial transmit access-request [4] to 192.168.20.126 1812 <length=70>

RADIUS:retransmit access-request [4] to 192.168.20.126 1812 <length=70>

RADIUS:retransmit access-request [4] to 192.168.20.126 1812 <length=70>

RADIUS:192.168.20.126 is dead to response [4]

RADIUS:Have tried all servers, return error to aaa

output information	description
return message to aaa, Give me your username	It needs username
return message to aaa, Give me your password	It needs the password that corresponds to the username
initial transmit access-request [4] to 192.168.20.126 1812 <length=70>	Sends authentication request to RADIUS server for the first time. The server address is 192.168.20.126, port number 1812, packet length 70
retransmit access-request [4] to 192.168.20.126 1812 <length=70>	The server doesn't respond to the request in time. The authentication request will be retransmitted.
192.168.20.126 is dead to response [4]	The server doesn't respond after many times of retransmission. This server is marked as dead.
Have tried all servers, return error to aaa	RADIUS cannot complete this authentication and returns to error.

example

The following example debugs RADIUS event:

debug radius event

2.1.2 ip radius source-interface

To force RADIUS to use the IP address of a specified interface for all outgoing RADIUS packets, use the `ip radius source-interface` command in global configuration mode. To prevent RADIUS from using the IP address of a specified interface for all outgoing RADIUS packets, use the `no` form of this command.

ip radius source-interface *interface-name*

no ip radius source-interface

parameter

Parameter	description
<i>interface-name</i>	Name of the interface that RADIUS uses for all of its outgoing packets.

default

No default behavior or values

command mode

global configuration

instruction

Use this command to set the IP address of a subinterface to be used as the source address for all outgoing RADIUS packets. The IP address is used as long as the subinterface is in the up state. In this way, the RADIUS server can use one IP address entry for every network access client instead of maintaining a list of IP addresses.

This command is especially useful in cases where the router has many subinterfaces and you want to ensure that all RADIUS packets from a particular router have the same IP address.

The specified subinterface must have an IP address associated with it. If the specified subinterface does not have an IP address or is in the down state, then RADIUS reverts to the default. To avoid this, add an IP address to the subinterface or bring the subinterface to the up state.

example

The following example shows how to configure RADIUS to use the IP address of vlan 1 for all outgoing RADIUS packets:

```
ip radius source-interface vlan 1
```

related commands

ip tacacs source-interface**2.1.3 radius-server challenge-noecho**

To prevent user responses to Access-Challenge packets from being displayed on the screen, use the radius-server challenge-noecho command in global configuration mode. To return to the default condition, use the no form of this command.

radius-server challenge-noecho**no radius-server challenge-noecho**

parameter

none

default

All user responses to Access-Challenge packets are echoed to the screen.

command mode

global configuration

instruction

none

example

```
radius-server challenge-noecho
```

2.1.4 radius-server deadtime

To improve RADIUS response times when some servers might be unavailable and cause the unavailable servers to be skipped immediately, use the `radius-server deadtime` command in global configuration mode. To set dead-time to 0, use the `no` form of this command.

radius-server deadtime minutes

no radius-server deadtime

parameter

Parameter	description
Minutes	Length of time, in minutes, for which a RADIUS server is skipped over by transaction requests, up to a maximum of 1440 minutes (24 hours).

default

Dead time is set to 0.

command mode

global configuration

instruction

Use this command to cause the software to mark as "dead" any RADIUS servers that fail to respond to authentication requests, thus avoiding the wait for the request to time out before trying the next configured server. A RADIUS server marked as "dead" is skipped by additional requests for the duration of minutes or unless there are no servers not marked "dead."

example

The following example specifies five minutes deadtime for RADIUS servers that fail to respond to authentication requests:

```
radius-server deadtime 5
```

related commands

radius-server host

radius-server retransmit

radius-server timeout

2.1.5 radius-server host

To specify a RADIUS server host, use the `radius-server host` command in global configuration mode. To delete the specified RADIUS host, use the `no` form of this command.

radius-server host *ip-address* [*auth-port port-number1*] [*acct-port port-number2*]

no radius-server host *ip-address*

parameter

Parameter	Description
<i>ip-address</i>	IP address of the RADIUS server host.
<i>auth-port</i>	(Optional) Specifies the UDP destination port for authentication requests.
<i>port-number1</i>	(Optional) Port number for authentication requests; the host is not used for authentication if set to 0.
<i>acct-port</i>	(Optional) Specifies the UDP destination port for accounting requests.
<i>port-number2</i>	(Optional) Specifies the UDP destination port for accounting requests; the host is not used for accounting if set to 0.

default

No RADIUS host is specified;

command mode

global configuration

instruction

You can use multiple `radius-server host` commands to specify multiple hosts. The software searches for hosts in the order in which you specify them.

example

The following example specifies host 1.1.1.1 as the RADIUS server and uses default ports for both accounting and authentication

```
radius-server host 1.1.1.1
```

The following example specifies port 12 as the destination port for authentication requests and port 16 as the destination port for accounting requests on the RADIUS host named host1:

```
radius-server host 1.2.1.2 auth-port 12 acct-port 16
```

related commands

aaa authentication

radius-server key

tacacs server

username

2.1.6 radius-server optional-passwords

To specify that the first RADIUS request to a RADIUS server be made without password verification, use the `radius-server optional-passwords` command in global configuration mode. To restore the default, use the `no` form of this command.

radius-server optional-passwords

no radius-server optional-passwords

parameter

This command has no parameters or keywords.

default

disabled

command mode

global configuration

instruction

When the user enters the login name, the login request is transmitted with the name and a zero-length password. If accepted, the login procedure completes. If the RADIUS server refuses this request, the server software prompts for a password and tries again when the user supplies a password. The RADIUS server must support authentication for users without passwords to make use of this feature.

example

The following example configures the first login to not require RADIUS verification:

```
radius-server optional-passwords
```

related commands

radius-server host

2.1.7 radius-server key

To set the authentication and encryption key for all RADIUS communications between the router and the RADIUS daemon, use the `radius-server key` command in global configuration mode. To disable the key, use the `no` form of this command.

radius-server key *string*

no radius-server key

parameter

Parameter	description
<i>String</i>	Specifies the encrypted key. This encrypted key must match the encrypted key that RADIUS server uses.

default

The encrypted key is the empty character string.

command mode

Global configuration

instruction

The key entered must match the key used on the RADIUS daemon. All leading spaces are ignored, and all white spaces cannot be included in the encrypted key.

example

The following example sets the encryption key to "firstime":

```
radius-server key firstime
```

related commands

radius-server host**tacacs server****username****2.1.8 radius-server retransmit**

To specify the number of times the software searches the list of RADIUS server hosts before giving up, use the radius-server retransmit command in global configuration mode. To disable retransmission, use the no form of this command.

radius-server retransmit *retries***no radius-server retransmit**

parameter

parameter	description
<i>retries</i>	Maximum number of retransmission attempts. The default is 3 attempts.

default

3 attempts

command mode

global configuration

instruction

This command is generally used with the radius-server timeout command, indicating the interval for which a router waits for a server host to reply before timing out and the times of retry after timing out.

example

The following example specifies a retransmit counter value of five times:

radius-server retransmit 5

related commands**radius-server timeout****2.1.9 radius-server timeout**

To set the interval for which a router waits for a server host to reply, use the radius-server timeout command in global configuration mode. To restore the default, use the no form of this command.

radius-server timeout *seconds***no radius-server timeout****parameter**

parameter	description
<i>seconds</i>	Number that specifies the timeout interval, in seconds. The default is 5 seconds.

default

5 seconds

command mode

global configuration

instruction

This command is generally used with the radius-server retransmit command.

example

Use this command to set the number of seconds a router waits for a server host to reply before timing out.

```
radius-server timeout 10
```

related commands

none

2.1.10 radius-server vsa send

To configure the network access server to recognize and use vendor-specific attributes, use the radius-server vsa send command. To restore the default, use the no form of this command.

radius-server vsa send [authentication]

no radius-server vsa send [authentication]

parameter

parameter	description
authentication	(Optional) Limits the set of recognized vendor-specific attributes to only authentication attributes.

default

disabled

command mode

global configuration

instruction

The Internet Engineering Task Force (IETF) draft standard specifies a method for communicating vendor-specific information between the network access server and the RADIUS server by using the vendor-specific attribute (attribute 26). Vendor-specific attributes (VSAs) allow vendors to support their own extended attributes not suitable for general use. The radius-server vsa send command enables the network access server to recognize and use both accounting and authentication vendor-specific attributes. Use the accounting keyword with the radius-server vsa send command to limit the set of recognized vendor-specific attributes to just accounting attributes. Use the authentication keyword with the radius-server vsa send command to limit the set of recognized vendor-specific attributes to just authentication attributes.

example

The following example configures the network access server to recognize and use vendor-specific accounting attributes:

```
radius-server vsa send accounting
```

related commands

radius-server host