Cisco IOS Security Command Reference: Commands S to Z, Cisco IOS XE Release 3SE (Catalyst 3850 Switches)

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server_(Diameter)

To associate a Diameter server with a Diameter authentication, authorization, and accounting (AAA) server group, use the **server** command in Diameter server group configuration submode. To remove a server from the server group, enter the **no** form of this command.

server *name*

no server *name*

Syntax Description

name	Character string used to name the Diameter server. **Note** The name specified for this command should match the name of a Diameter peer defined using the **diameter peer** command.

Command Default

No server is associated with a Diameter AAA server group.

Command Modes

Diameter server group configuration

Command History

Release	Modification
12.4(9)T	This command was introduced.

Usage Guidelines

The **server** command allows you to associate a Diameter server with a Diameter server group.

Examples

The following example shows how to associate a Diameter server with a Diameter server group:

```
Router (config-sg-diameter)# server
 dia_peer_1
```

Related Commands

Command	Description
aaa accounting	Enables AAA accounting of requested services for billing or security purposes.
aaa authentication login	Set AAA authentication at login.
aaa authorization	Sets parameters that restrict user access to a network.

Command	Description
aaa group server diameter	Configures a server group for Diameter.

server (RADIUS)

To configure the IP address of the RADIUS server for the group server, 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 *ip-address* [**auth-port** *port-number*] [**acct-port** *port-number*]

no server *ip-address* [**auth-port** *port-number*] [**acct-port** *port-number*]

Syntax Description

ip-address	IP address of the RADIUS server host.
auth-port *port-number*	(Optional) Specifies the User Datagram Protocol (UDP) destination port for authentication requests. The port-number argument specifies the port number for authentication requests. The host is not used for authentication if this value is set to 0.
acct-port *port-number*	(Optional) Specifies the UDP destination port for accounting requests. The port number argument specifies the port number for accounting requests. The host is not used for accounting services if this value is set to 0.

Command Default

If no port attributes are defined, the defaults are as follows:

- Authentication port: 1645
- Accounting port: 1646

Command Modes

Server-group configuration

Command History

Release	Modification
12.0(5)T	This command was introduced.
12.0(7)T	The following new keywords/arguments were added: • **auth-port** *port-number* • **acct-port** *port-number*
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Release	Modification
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

Use the **server** command to associate a particular server with a defined group server. There are two different ways in which you can identify a server, depending on the way you want to offer AAA services. You can identify the server simply by using its IP address, or you can identify multiple host instances or entries using the optional **auth-port** and **acct-port** keywords.

When you use the optional keywords, the network access server identifies RADIUS security servers and host instances associated with a group server on the basis of their IP address and specific UDP port numbers. The combination of the IP address and UDP port number creates a unique identifier, allowing different ports to be individually defined as RADIUS host entries providing a specific AAA service. If two different host entries on the same RADIUS server are configured for the same service--for example, accounting--the second host entry configured acts as failover backup to the first one. Using this example, if the first host entry fails to provide accounting services, the network access server will try the second host entry configured on the same device for accounting services. (The RADIUS host entries will be tried in the order they are configured.)

Examples

Examples

The following example shows the network access server configured to recognize several RADIUS host entries with the same IP address. Two different host entries on the same RADIUS server are configured for the same services--authentication and accounting. The second host entry configured acts as fail-over backup to the first one. (The RADIUS host entries are tried in the order in which they are configured.)

```
! This command enables AAA.
aaa new-model
! The next command configures default RADIUS parameters.
aaa authentication ppp default radius
! The next set of commands configures multiple host entries for the same IP address.
radius-server host 172.20.0.1 auth-port 1000 acct-port 1001
radius-server host 172.20.0.1 auth-port 2000 acct-port 2000
```

Examples

In this example, the network access server is configured to recognize two different RADIUS group servers. One of these groups, group1, has two different host entries on the same RADIUS server configured for the same services. The second host entry configured acts as failover backup to the first one.

```
! This command enables AAA.
aaa new-model
! The next command configures default RADIUS parameters.
aaa authentication ppp default group group1
! The following commands define the group1 RADIUS group server and associates servers
! with it.
aaa group server radius group1
   server 172.20.0.1 auth-port 1000 acct-port 1001
! The following commands define the group2 RADIUS group server and associates servers
! with it.
aaa group server radius group2
   server 172.20.0.1 auth-port 2000 acct-port 2001
! The following set of commands configures the RADIUS attributes for each host entry
! associated with one of the defined group servers.
radius-server host 172.20.0.1 auth-port 1000 acct-port 1001
```

```
radius-server host 172.20.0.1 auth-port 1000 acct-port 1001
radius-server host 172.31.0.1 auth-port 1645 acct-port 1646
```

Related Commands

Command	Description
aaa group server	Groups different server hosts into distinct lists and distinct methods.
aaa new-mode l	Enables the AAA access control model.
radius-server host	Specifies a RADIUS server host.

server name (IPv6 TACACS+)

To specify an IPv6 TACACS+ server, use the **server name**command in TACACS+ group server configuration mode. To remove the IPv6 TACACS+ server from configuration, use the **no** form of this command.

server name *server-name*

no server name *server-name*

Syntax Description

server-name	The IPv6 TACACS+ server to be used.

Command Default

No server name is specified.

Command Modes

TACACS+ group server configuration (config-sg-tacacs+)

Command History

Release	Modification
Cisco IOS XE Release 3.2S	This command was introduced.

Usage Guidelines

You must configure the **aaa group server tacacs** command before configuring this command.

Enter the **server name** command to specify an IPv6 TACACS+ server.

Examples

The following example shows how to specify an IPv6 TACACS+ server named server1:

```
Router(config)# aaa group server tacacs+
Router(config-sg-tacacs+)# server name server1
```

Related Commands

Command	Description
aaa group server tacacs	Configures the TACACS+ server for IPv6 or IPv4 and enters TACACS+ server configuration mode.

server-private (RADIUS)

To configure the IP address of the private RADIUS server for the group server, use the **server-private** command in RADIUS server-group configuration mode. To remove the associated private server from the authentication, authorization, and accounting (AAA) group server, use the **no** form of this command.

server-private *ip-address* [**auth-port** *port-number* | **acct-port** *port-number*] **[non-standard]** [**timeout** *seconds*] [**retransmit** *retries*] [**key** *string*]

no server-private *ip-address* [**auth-port** *port-number* | **acct-port** *port-number*] **[non-standard]** [**timeout** *seconds*] [**retransmit** *retries*] [**key** *string*]

Syntax Description

ip-address	IP address of the private RADIUS server host.
auth-port *port-number*	(Optional) User Datagram Protocol (UDP) destination port for authentication requests. The default value is 1645.
acct-port *port-number*	Optional) UDP destination port for accounting requests. The default value is 1646.
non-standard	(Optional) RADIUS server is using vendor-proprietary RADIUS attributes.
timeout *seconds*	(Optional) Time interval (in seconds) that the router waits for the RADIUS server to reply before retransmitting. This setting overrides the global value of the **radius-server timeout** command. If no timeout value is specified, the global value is used.
retransmit *retries*	(Optional) Number of times a RADIUS request is resent to a server, if that server is not responding or responding slowly. This setting overrides the global setting of the **radius-server retransmit** command.
key *string*	(Optional) Authentication and encryption key used between the router and the RADIUS daemon running on the RADIUS server. This key overrides the global setting of the **radius-server key** command. If no key string is specified, the global value is used. The *string* can be **0** (specifies that an unencrypted key follows), **6** (specifies that an advanced encryption scheme [AES] encrypted key follows), **7** (specifies that a hidden key follows), or a line specifying the unencrypted (clear-text) server key.

Command Default If server-private parameters are not specified, global configurations will be used; if global configurations are not specified, default values will be used.

Command Modes RADIUS server-group configuration (config-sg-radius)

Command History

Release	Modification
12.2(1)DX	This command was introduced on the Cisco 7200 series and Cisco 7401ASR.
12.2(2)DD	This command was integrated into Cisco IOS Release 12.2(2)DD.
12.2(4)B	This command was integrated into Cisco IOS Release 12.2(4)B.
12.2(13)T	This command was integrated into Cisco IOS Release 12.2(13)T.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.2(33)SRC	This command was integrated into Cisco IOS Release 12.2(33)SRC.
12.2(33)SXH	This command was integrated into Cisco IOS Release 12.2(33)SXH.
12.2(33)SXI	This command was integrated into Cisco IOS Release 12.2(33)SXI.
15.4(1)T	This command was modified. The **6** keyword was added.

Usage Guidelines Use the **server-private** command to associate a particular private server with a defined server group. To prevent possible overlapping of private addresses between virtual route forwarding (VRF) instances, private servers (servers with private addresses) can be defined within the server group and remain hidden from other groups, while the servers in the global pool (default "radius" server group) can still be referred to by IP addresses and port numbers. Thus, the list of servers in server groups includes references to the hosts in the global configuration and the definitions of private servers.

Note If the **radius-server directed-request** command is configured, then a private RADIUS server cannot be used as the group server by configuring the **server-private** (RADIUS) command.

Use the **password encryption aes** command to configure type 6 AES encrypted keys.

Examples The following example shows how to define the sg_water RADIUS group server and associate private servers with it:

```
Device> enable
Device# configure terminal
Device(config)# aaa new-model
```

```
Device(config)# aaa group server radius sg_water
Device(config-sg-radius)# server-private 10.1.1.1 timeout 5 retransmit 3 key xyz
Device(config-sg-radius)# server-private 10.2.2.2 timeout 5 retransmit 3 key xyz
```

Related Commands

Command	Description
aaa group server	Groups different server hosts into distinct lists and distinct methods.
aaa new-model	Enables the AAA access control model.
password encryption aes	Enables a type 6 encrypted preshared key.
radius-server host	Specifies a RADIUS server host.
radius-server directed-request	Allows users to log in to a Cisco NAS and select a RADIUS server for authentication.

server-private (TACACS+)

To configure the IPv4 or IPv6 address of the private TACACS+ server for the group server, use the **server-private** command in TACACS+ server-group configuration mode. To remove the associated private server from the authentication, authorization, and accounting (AAA) group server, use the **no** form of this command.

server-private {*ip-address* | *name* | *ipv6-address*} **[nat] [single-connection]** [**port** *port-number*] [**timeout** *seconds*] [**key** [**0** | **6** | **7**] *string*]

no server-private

Syntax Description

ip-address	IP address of the private RADIUS or TACACS+ server host.
name	Name of the private RADIUS or TACACS+ server host.
ipv6-address	IPv6 address of the private RADIUS or TACACS+ server host.
nat	(Optional) Specifies the port Network Address Translation (NAT) address of the remote device. This address is sent to the TACACS+ server.
single-connection	(Optional) Maintains a single open connection between the router and the TACACS+ server.
port *port-number*	(Optional) Specifies a server port number. This option overrides the default, which is port 49.
timeout *seconds*	(Optional) Specifies a timeout value. This value overrides the global timeout value set with the **tacacs-server timeout** command for this server only.
key [**0** | **6** | **7**]	(Optional) Specifies an authentication and encryption key. This key must match the key used by the TACACS+ daemon. Specifying this key overrides the key set by the global **tacacs-server key** command for this server only. • If no number or 0 is entered, the string that is entered is considered to be plain text. If 6 is entered, the string that is entered is considered to be an advanced encryption scheme [AES] encrypted text. If 7 is entered, the string that is entered is considered to be hidden text.

string	(Optional) Character string specifying the authentication and encryption key.

Command Default

If server-private parameters are not specified, global configurations are used; if global configurations are not specified, default values are used.

Command Modes

TACACS+ server-group configuration (config-sg-tacacs+)

Command History

Release	Modification
12.3(7)T	This command was introduced.
12.2(33)SRA1	This command was integrated into Cisco IOS Release 12.2(33)SRA1.
12.2(33)SXH	This command was integrated into Cisco IOS Release 12.2(33)SXH.
12.2(33)SXI	This command was integrated into Cisco IOS Release 12.2(33)SXI.
12.2(54)SG	This command was integrated into Cisco IOS Release 12.2(54)SG.
Cisco IOS XE Release 3.2S	This command was modified. The *ipv6-address* argument was added.
15.4(1)T	This command was modified. The **6** keyword was added.

Usage Guidelines

Use the **server-private** command to associate a particular private server with a defined server group. To prevent possible overlapping of private addresses between virtual route forwardings (VRFs), private servers (servers with private addresses) can be defined within the server group and remain hidden from other groups, while the servers in the global pool (default "TACACS+" server group) can still be referred to by IP addresses and port numbers. Thus, the list of servers in server groups includes references to the hosts in the global configuration and the definitions of private servers.

Use the **password encryption aes** command to configure type 6 AES encrypted keys.

Examples

The following example shows how to define the tacacs1 TACACS+ group server and associate private servers with it:

```
Device> enable
Device# configure terminal
Device(config)# aaa new-model
Device(config)# aaa group server tacacs+ tacacs1
Device(config-sg-tacacs+)# server-private 10.1.1.1 port 19 key cisco
Device(config-sg-tacacs+)# exit
Device(config)# ip vrf cisco
Device(config-vrf)# rd 100:1
Device(config-vrf)# exit
Device(config)# interface Loopback0
Device(config-if)# ip address 10.0.0.2 255.0.0.0
```

```
Device(config-if)# ip vrf forwarding cisco
Device(config-if)# exit
```

Related Commands

Command	Description
aaa group server	Groups different server hosts into distinct lists and distinct methods.
aaa new-model	Enables the AAA access control model.
ip tacacs source-interface	Uses the IP address of a specified interface for all outgoing TACACS+ packets.
ip vrf forwarding (server-group)	Configures the VRF reference of an AAA RADIUS or TACACS+ server group.
password encryption aes	Enables a type 6 encrypted preshared key.
tacacs-server host	Specifies a TACACS+ server host.

service password-encryption

To automatically convert unencrypted passwords to encrypted 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

Syntax Description

This command has no arguments or keywords.

Command Default

No passwords are encrypted.

Command Modes

Global configuration

Command History

Release	Modification
10.0	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.
12.2(33)SB	This command was integrated into Cisco IOS Release 12.2(33)SB.

Usage Guidelines

The actual encryption process occurs when the current configuration is written or when a password is configured. Password encryption is applied to all passwords, including username passwords, authentication key passwords, the privileged command password, console and virtual terminal line access passwords, and Border Gateway Protocol neighbor passwords. This command is primarily useful for keeping unauthorized individuals from viewing your password in your configuration file.

When password encryption is enabled, the encrypted form of the passwords is displayed when a **more system:running-config** command is entered.

Caution This command does not provide a high level of network security. If you use this command, you should also take additional network security measures.

Note You cannot recover a lost encrypted password. You must clear NVRAM and set a new password.

Examples

The following example causes password encryption to take place:

```
service password-encryption
```

Related Commands

Command	Description
enable password	Sets a local password to control access to various privilege levels.
key-string (authentication)	Specifies the authentication string for a key.
neighbor password	Enables MD5 authentication on a TCP connection between two BGP peers.

service password-recovery

To enable password recovery capability, use the **service password-recovery** command in global configuration mode. To disable password recovery capability, use the **no service password-recovery [strict]** command.

service password-recovery

no service password-recovery[strict]

Syntax Description

[strict]	(Optional) Restricts device recovery.

Command Default

Password recovery capability is enabled.

Command Modes

Global configuration

Command History

Release	Modification
12.3(8)YA	This command was introduced.
12.3(14)T	This command was integrated into Cisco IOS Release 12.3(14)T.
15.1(1)SY	This command was integrated into Cisco IOS Release 15.1(1)SY.
Cisco IOS XE Release 3.10S	This command was integrated into Cisco IOS XE Release 3.10S. The **strict** keyword was added to the **no** form of this command.

Usage Guidelin

Note This command is not available on all platforms. Use Feature Navigator to ensure that it is available on your platform.

If you plan to disable the password recovery capability with the **no service password-recovery** command, we recommend that you save a copy of the system configuration file in a location away from the device. If you are using a device that is operating in VTP transparent mode, we recommend that you also save a copy of the vlan.dat file in a location away from the device.

Caution Entering the no **service password-recovery** command at the command line disables password recovery. Always disable this command before downgrading to an image that does not support password recovery capability, because you cannot recover the password after the downgrade.

The configuration register boot bit must be enabled so that there is no way to break into ROMMON when this command is configured. Cisco IOS software should prevent the user from configuring the boot field in the config register.

Bit 6, which ignores the startup configuration, and bit 8, which enables a break should be set.

The Break key should be disabled while the router is booting up and disabled in Cisco IOS software when this feature is enabled.

It may be necessary to use the **config-register** global configuration command to set the configuration register to autoboot *before* entering the **no service password-recovery** command. The last line of the **show version** EXEC command displays the configuration register setting. Use the **show version** EXEC command to obtain the current configuration register value, configure the router to autoboot with the **config-register** command if necessary, then enter the **no service password-recovery** command.

Once disabled, the following configuration register values are *invalid* for the **no service password-recovery** command:

- 0x0
- 0x2002 (bit 8 restriction)
- 0x0040 (bit 6)
- 0x8000 (bit 15)

The **no service password-recoverystrict** command does not allow device recovery and prevents the **send break** command, which is used to recover a device from the no service password-recovery feature, from having any effect during bootup.

The **strict** keyword is supported on the Cisco ASR 1000 Series platform, effective from Cisco IOS XE Release 3.10.

Note Since the **strict** keyword makes the router unrecoverable, before you use the keyword, ensure that you configure the password and configuration register, set up the autoboot image, save the configuration and reboot the router. Only if the correct image is autobooted and the enable password works, should you add the **no service password-recovery strict** command to the configuration. If the enable password is lost, the router should be shipped back to the Cisco support center to fix it.

Catalyst Switch Operation

Use the **service password-recovery** command to reenable the password-recovery mechanism (the default). This mechanism allows a user with physical access to the switch to hold down the **Mode** button and interrupt the boot process while the switch is powering up and to assign a new password. Use the **no** form of this command to disable the password-recovery capability.

When the password-recovery mechanism is disabled, interrupting the boot process is allowed only if the user agrees to set the system back to the default configuration. Use the **show version** EXEC command to verify if password recovery is enabled or disabled on a switch.

The **service password-recovery** command is valid only on Catalyst 3550 Fast Ethernet switches; it is not available for Gigabit Ethernet switches.

Examples

The following example shows how to obtain the configuration register setting (which in this example is set to autoboot), disable the password-recovery capability, and then verify that the configuration persists through

a system reload. The **noconfirm** keyword prevents a confirmation prompt from interrupting the booting process.

```
Router# show version
Cisco Internetwork Operating System Software
IOS (tm) 5300 Software (C7200-P-M), Version 12.3(8)YA, RELEASE SOFTWARE (fc1)
TAC Support: http://www.cisco.com/tac
Copyright (c) 1986-2004 by Cisco Systems, Inc.
Compiled Wed 05-Mar-03 10:16 by xxx
Image text-base: 0x60008954, data-base: 0x61964000
ROM: System Bootstrap, Version 12.3(8)YA, RELEASE SOFTWARE (fc1)
BOOTLDR: 7200 Software (C7200-KBOOT-M), Version 12.3(8)YA, RELEASE SOFTWARE (fc1)
Router uptime is 10 minutes
System returned to ROM by reload at 16:28:11 UTC Thu Mar 6 2003
.
.
.
125440K bytes of ATA PCMCIA card at slot 0 (Sector size 512 bytes).
8192K bytes of Flash internal SIMM (Sector size 256K).
Configuration register is 0x2012
Router# configure terminal
Router(config)# no service password-recovery noconfirm
WARNING:
Executing this command will disable the password recovery mechanism.
Do not execute this command without another plan for password recovery.
Are you sure you want to continue? [yes/no]: yes
.
.
.
Router(config)# exit
Router#
Router# reload
Proceed with reload? [confirm] yes
00:01:54: %SYS-5-RELOAD: Reload requested
System Bootstrap, 12.3(8)YA...
Copyright (c) 1994-2004 by cisco Systems, Inc.
C7400 platform with 262144 Kbytes of main memory
PASSWORD RECOVERY FUNCTIONALITY IS DISABLED
.
.
.
```

The following example shows what happens when a break is confirmed and when a break is not confirmed.

Examples

```
PASSWORD RECOVERY FUNCTIONALITY IS DISABLED
program load complete, entry point: 0x80013000, size: 0x8396a8
Self decompressing the image :
########################################################################################################################
 [OK] !The 5-second window starts.
telnet> send break
                Restricted Rights Legend
Use, duplication, or disclosure by the Government is subject to restrictions as set forth
in subparagraph (c) of the Commercial Computer Software - Restricted Rights clause at FAR
sec. 52.227-19 and subparagraph (c) (1) (ii) of the Rights in Technical Data and Computer
Software clause at DFARS sec. 252.227-7013.
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, California 95134-1706
Cisco IOS Software, C831 Software (C831-K9O3SY6-M), Version 12.3(8)YA
Copyright (c) 1986-2004 by Cisco Systems, Inc.
Compiled Fri 13-Aug-04 03:21
Image text-base: 0x80013200, data-base: 0x81020514
PASSWORD RECOVERY IS DISABLED.
Do you want to reset the router to factory default configuration and proceed [y/n]?
!The user enters "y" here.
Reset router configuration to factory default.
This product contains cryptographic features and is subject to United States and local
country laws governing import, export, transfer and use. Delivery of Cisco cryptographic
products does not imply third-party authority to import, export, distribute or use encryption.
```

```
 Importers, exporters, distributors and users are responsible for compliance with U.S. and
 local country laws. By using this product you agree to comply with applicable laws and
regulations. If you are unable to comply with U.S. and local laws, return this product
immediately.
A summary of U.S. laws governing Cisco cryptographic products may be found at:
http://www.cisco.com/wwl/export/crypto/tool/stqrg.html
If you require further assistance please contact us by sending email to export@cisco.com.
Cisco C831 (MPC857DSL) processor (revision 0x00) with 46695K/2457K bytes of memory.
Processor board ID 0000 (1314672220), with hardware revision 0000 CPU rev number 7
3 Ethernet interfaces
4 FastEthernet interfaces
128K bytes of NVRAM
24576K bytes of processor board System flash (Read/Write)
2048K bytes of processor board Web flash (Read/Write)
         --- System Configuration Dialog ---
Would you like to enter the initial configuration dialog? [yes/no]: no
!Start up config is erased.
SETUP: new interface FastEthernet1 placed in "up" state
SETUP: new interface FastEthernet2 placed in "up" state
SETUP: new interface FastEthernet3 placed in "up" state
SETUP: new interface FastEthernet4 placed in "up" state
Press RETURN to get started!
Router> enable
Router# show startup configuration
startup-config is not present
Router# show running-config | incl service
no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption !The "no service password-recovery" is disabled.
==========================================================================================
```

Examples

```
PASSWORD RECOVERY FUNCTIONALITY IS DISABLED
telnet> send break
program load complete, entry point: 0x80013000, size: 0x8396a8
Self decompressing the image :
##############################################################################################################################
 [OK]
telnet> send break
             Restricted Rights Legend
Use, duplication, or disclosure by the Government is subject to restrictions as set forth
in subparagraph (c) of the Commercial Computer Software - Restricted Rights clause at FAR
sec. 52.227-19 and subparagraph (c) (1) (ii) of the Rights in Technical Data and Computer
Software clause at DFARS sec. 252.227-7013.
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, California 95134-1706
Cisco IOS Software, C831 Software (C831-K9O3SY6-M), Version 12.3(8)YA
Copyright (c) 1986-2004 by Cisco Systems, Inc.
Compiled Fri 13-Aug-04 03:21
Image text-base: 0x80013200, data-base: 0x81020514
PASSWORD RECOVERY IS DISABLED.
Do you want to reset the router to factory default configuration and proceed [y/n]?
!The user enters "n" here.
This product contains cryptographic features and is subject to United States and local
country laws governing import, export, transfer and use. Delivery of Cisco cryptographic
products does not imply third-party authority to import, export, distribute or use encryption.
Importers, exporters, distributors and users are responsible for compliance with U.S. and
local country laws. By using this product you agree to comply with applicable laws and
regulations. If you are unable to comply with U.S. and local laws, return this product
immediately.
A summary of U.S. laws governing Cisco cryptographic products may be found at:
http://www.cisco.com/wwl/export/crypto/tool/stqrg.html
If you require further assistance please contact us by sending email to export@cisco.com.
Cisco C831 (MPC857DSL) processor (revision 0x00) with 46695K/2457K bytes of memory.
Processor board ID 0000 (1314672220), with hardware revision 0000 CPU rev number 7
3 Ethernet interfaces
4 FastEthernet interfaces
128K bytes of NVRAM
24576K bytes of processor board System flash (Read/Write)
```

```
2048K bytes of processor board Web flash (Read/Write)
Press RETURN to get started! !The Cisco IOS software boots as if it is not interrupted.
Router> enable
Router# show startup configuration
Using 984 out of 131072 bytes
!
version 12.3
no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
no service password-recovery
!
hostname Router
!
boot-start-marker
boot-end-marker
!
memory-size iomem 5
!
no aaa new-model
ip subnet-zero
!
ip ips po max-events 100
no ftp-server write-enable
!
interface Ethernet0
 no ip address
 shutdown
!
interface Ethernet1
 no ip address
 shutdown
 duplex auto
!
interface Ethernet2
 no ip address
 shutdown
!
interface FastEthernet1
 no ip address
 duplex auto
 speed auto
!
interface FastEthernet2
 no ip address
 duplex auto
 speed auto
!
interface FastEthernet3
 no ip address
 duplex auto
 speed auto
!
interface FastEthernet4
 no ip address
 duplex auto
 speed auto
!
ip classless
!
ip http server
no ip http secure-server
!
control-plane
!
line con 0
 no modem enable
 transport preferred all
 transport output all
line aux 0
line vty 0 4
!
```

```
scheduler max-task-time 5000
end
Router# show running-configuration | incl service
no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
no service password-recovery
```

Examples

The **no service password-recovery** command expects the router configuration register to be configured to autoboot. If the configuration register is set to something other than to autoboot *before* the **no service password-recovery** command is entered, a prompt like the one shown in the following example asking you to use the **config-register** global configuration command to change the setting.

```
Router(config)# no service password-recovery
Please setup auto boot using config-register first.
```

Note To avoid any unintended result due to the behavior of this command, use the **show version** command to obtain the current configuration register value. If not set to autoboot, then the router needs to be configured to autoboot with the **config-register** command before entering the **no service password-recovery** command.

Once password recovery is disabled, you cannot set the bit pattern value to 0x40, 0x8000, or 0x0 (disables autoboot). The following example shows the messages displayed when invalid configuration register settings are attempted on a router with password recovery disabled.

```
Router(config)# config-register 0x2143
Password recovery is disabled, cannot enable diag or ignore configuration.
```

The command resets the invalid bit pattern and continue to allow modification of nonrelated bit patterns. The configuration register value resets to 0x3 at the next system reload, which can be verified by checking the last line of the **show version** command output:

```
Configuration register is 0x2012 (will be 0x3 at next reload)
```

Examples

The following example shows how to disable password recovery on a switch so that a user can only reset a password by agreeing to return to the default configuration:

```
Switch(config)# no service-password recovery
Switch(config)# exit
```

To use the password-recovery procedure, a user with physical access to the switch holds down the **Mode** button while the unit powers up and for a second or two after the LED above port 1X goes off. When the button is released, the system continues with initialization. If the password-recovery mechanism is disabled, the following message is displayed:

```
The password-recovery mechanism has been triggered, but is currently disabled. Access to
the boot loader prompt through the password-recovery mechanism is disallowed at this point.
 However, if you agree to let the system be reset back to the default system configuration,
 access to the boot loader prompt can still be allowed.
Would you like to reset the system back to the default configuration (y/n)?
```

If you choose not to reset the system back to the default configuration, the normal boot process continues, as if the **Mode** button had not been pressed. If you choose to reset the system back to the default configuration, the configuration file in flash memory is deleted and the VLAN database file, flash:vlan.dat (if present), is deleted.

The following is sample output from the **show version** command on a device when password recovery is disabled:

```
Switch# show version
Cisco Internetwork Operating System Software
IOS (tm) C3550 Software (C3550-I9Q3L2-M), Version 12.3(8)YA, RELEASE SOFTWARE (fc1)
Copyright (c) 1986-2004 by cisco Systems, Inc.
Compiled Wed 24-Oct-01 06:20 by xxx
Image text-base: 0x00003000, data-base: 0x004C1864
ROM: Bootstrap program is C3550 boot loader
flam-1-6 uptime is 1 week, 6 days, 3 hours, 59 minutes
System returned to ROM by power-on
Cisco WS-C3550-48 (PowerPC) processor with 65526K/8192K bytes of memory.
Last reset from warm-reset
Running Layer2 Switching Only Image
Ethernet-controller 1 has 12 Fast Ethernet/IEEE 802.3 interfaces
Ethernet-controller 2 has 12 Fast Ethernet/IEEE 802.3 interfaces
Ethernet-controller 3 has 12 Fast Ethernet/IEEE 802.3 interfaces
Ethernet-controller 4 has 12 Fast Ethernet/IEEE 802.3 interfaces
Ethernet-controller 5 has 1 Gigabit Ethernet/IEEE 802.3 interface
Ethernet-controller 6 has 1 Gigabit Ethernet/IEEE 802.3 interface
48 FastEthernet/IEEE 802.3 interface(s)
2 Gigabit Ethernet/IEEE 802.3 interface(s)
The password-recovery mechanism is disabled.
32K bytes of flash-simulated non-volatile configuration memory.
Base ethernet MAC Address: AA:00:0B:2B:02:00
Configuration register is 0x10F
```

Disabling Password Recovery Example

The following example shows how to disable password recovery capability using the **no service password-recovery strict** command:

```
Router# configure terminal
Router(config)# no service password-recovery strict
WARNING:
Executing this command will disable the password recovery mechanism.
Do not execute this command without another plan for password recovery.
Are you sure you want to continue? [yes]: yes
.
.
```

Related Commands

Command	Description
config-register	Changes the configuration register settings.
show version	Displays version information for the hardware and firmware.

set aggressive-mode client-endpoint through show content-scan

show aaa servers

To display the status and number of packets that are sent to and received from all public and private authentication, authorization, and accounting (AAA) RADIUS servers as interpreted by the AAA Server MIB, use the **show aaa servers** command in user EXEC or privileged EXEC mode.

show aaa servers [**private**| **public**]

Syntax Description

private	(Optional) Displays private AAA servers only, which are also displayed by the AAA Server MIB.
public	(Optional) Displays public AAA servers only, which are also displayed by the AAA Server MIB.

Command Modes

User EXEC (>) privileged EXEC (#)

Command History

Release	Modification
12.2(6)T	This command was introduced.
12.3(7)T	This command was integrated into Cisco IOS Release 12.3(7)T.
12.2(33)SRE	This command was integrated into Cisco IOS Release 12.2(33)SRE.
15.1(1)S	This command was modified. Support for private RADIUS servers in CISCO-AAA-SERVER-MIB was added.
15.1(4)M	This command was modified. Support for private RADIUS servers in CISCO-AAA-SERVER-MIB was added.
15.2(4)S1	This command was modified. Support for displaying the estimated outstanding and throttled transactions (access and accounting) in the command output was added.

Usage Guidelines

Only RADIUS servers are supported by the **show aaa servers** command.

The command displays information about packets sent and received for all AAA transaction types--authentication, authorization, and accounting.

Examples

The following is sample output from the **show aaa servers private** command. Only the first four lines of the display pertain to the status of private RADIUS servers, and the output fields in this part of the display are described in the table below.

```
Router# show aaa servers private

RADIUS: id 24, priority 1, host 172.31.164.120, auth-port 1645, acct-port 1646
     State: current UP, duration 375742s, previous duration 0s
     Dead: total time 0s, count 0
     Quarantined: No
     Authen: request 5, timeouts 1, failover 0, retransmission 1
             Response: accept 4, reject 0, challenge 0
             Response: unexpected 0, server error 0, incorrect 0, time 14ms
             Transaction: success 4, failure 0
             Throttled: transaction 0, timeout 0, failure 0
     Author: request 0, timeouts 0, failover 0, retransmission 0
             Response: accept 0, reject 0, challenge 0
             Response: unexpected 0, server error 0, incorrect 0, time 0ms
             Transaction: success 0, failure 0
             Throttled: transaction 0, timeout 0, failure 0
     Account: request 5, timeouts 0, failover 0, retransmission 0
             Request: start 3, interim 0, stop 2
             Response: start 3, interim 0, stop 2
             Response: unexpected 0, server error 0, incorrect 0, time 12ms
             Transaction: success 5, failure 0
             Throttled: transaction 0, timeout 0, failure 0
     Elapsed time since counters last cleared: 4d8h22m
     Estimated Outstanding Access Transactions: 0
     Estimated Outstanding Accounting Transactions: 0
     Estimated Throttled Access Transactions: 0
     Estimated Throttled Accounting Transactions: 0
     Maximum Throttled Transactions: access 0, accounting 0
     Requests per minute past 24 hours:
             high - 8 hours, 22 minutes ago: 0
             low  - 8 hours, 22 minutes ago: 0
             average: 0
```

The table below describes the significant fields in the display.

Table 1: show aaa servers Field Descriptions

Field	Description
id	A unique identifier for all AAA servers defined on the router.
priority	Order of use for servers within a group.
host	IP address of the private RADIUS server host.
auth-port	UDP destination port on the AAA server that is used for authentication and authorization requests. The default value is 1645.
acct-port	UDP destination port on the AAA server that is used for accounting requests. The default value is 1646.

Field	Description
State	Describes the current state of the AAA server; the duration, in seconds, that the server has been in that state; and the duration, in seconds, that the server was in the previous state. The following states are possible: • DEAD--Indicates that the server is currently down and, in the case of failovers, this server will be omitted unless it is the last server in the group. • duration--Indicates the amount of time the server is assumed to be in the current state, either UP or DEAD. • previous duration--Indicates the amount of time the server was considered to be in the previous state. • UP--Indicates that the server is currently considered alive and attempts will be made to communicate with it.
Dead	Indicates the number of times that this server has been marked dead, and the cumulative amount of time, in seconds, that it spent in that state.

Field	Description
Authen	

Field	Description

	Provides information about authentication packets that were sent to and received from the server, and authentication transactions that were successful or that failed. The following information may be reported in this field:
	• request--Number of authentication requests that were sent to the AAA server.
	• timeouts--Number of timeouts (no responses) that were observed when a transmission was sent to this server.
	• Response--Provides statistics about responses that were observed from this server and includes the following reports:
	  • unexpected--Number of unexpected responses. A response is considered unexpected when it is received after the timeout period for the packet has expired. This may happen if the link to the server is severely congested, for example. An unexpected response can also be produced when a server generates a response for no apparent reason.
	  • server error--Number of server errors. This category is a "catchall" for error packets that do not fall into one of the previous categories.
	  • incorrect--Number of incorrect responses. A response is considered incorrect if it is of the wrong format than the one expected by the protocol. This frequently happens when an incorrect server key is configured on the router.
	  • time--Time (in milliseconds) taken to respond to an authentication packets.
	• Transaction: These fields provide information about authentication, authorization, and accounting transactions related to the server. A transaction is defined as a request for authentication, authorization, or accounting information that is sent by the AAA module, or by an AAA client (such as PPP) to an AAA protocol (RADIUS or TACACS+), which may involve multiple packet transmissions and retransmissions. Transactions may require

Field	Description
	packet retransmissions to one or more servers in a single server group, to verify success or failure. Success or failure is reported to AAA by the RADIUS and TACACS+ protocols as follows • success--Incremented when a transaction is successful. • failure--Incremented when a transaction fails; for example, packet retransmissions to another server in the server group failed or did not succeed. A negative response to an Access-Request, such as Access-Reject, is considered to be a successful transaction.
Author	The fields in this category are similar to those in the Authen: fields. An important difference, however, is that because authorization information is carried in authentication packets for the RADIUS protocol, these fields are not incremented when using RADIUS.
Account	The fields in this category are similar to those in the Authen: fields, but provide accounting transaction and packet statistics.
Elapsed time since counters last cleared	Displays the time in days, hours, and minutes that have passed since the counters were last cleared.

Note In case of Intelligent Services Gateway (ISG), the estimated outstanding accounting transactions will take some time to become zero. This is because there is a constant churn in the interim accounting requests.

The fields in the output of the **show aaa servers**command are mapped to Simple Network Management Protocol (SNMP) objects in the Cisco AAA-SERVER-MIB and are used in SNMP reporting. The first line of the sample output of the **show aaa servers**command (RADIUS: id 24, priority 1, host 172.31.164.120, auth-port 1645, acct-port 1646) is mapped to the Cisco AAA-SERVER-MIB as follows:

- id maps to casIndex
- priority maps to casPriority
- host maps to casAddress
- auth-port maps to casAuthenPort
- acct-port maps to casAcctPort

Mapping the following set of objects listed in the Cisco AAA-SERVER-MIB map to fields displayed by the **show aaa servers** command is more straightforward. For example, the casAuthenRequests field corresponds to the Authen: request portion of the report, casAuthenRequestTimeouts corresponds to the Authen: timeouts portion of the report, and so on.

- casAuthenRequests
- casAuthenRequestTimeouts
- casAuthenUnexpectedResponses
- casAuthenServerErrorResponses
- casAuthenIncorrectResponses
- casAuthenResponseTime
- casAuthenTransactionSuccesses
- casAuthenTransactionFailures
- casAuthorRequests
- casAuthorRequestTimeouts
- casAuthorUnexpectedResponses
- casAuthorServerErrorResponses
- casAuthorIncorrectResponses
- casAuthorResponseTime
- casAuthorTransactionSuccesses
- casAuthorTransactionFailures
- casAcctRequests
- casAcctRequestTimeouts
- casAcctUnexpectedResponses
- casAcctServerErrorResponses
- casAcctIncorrectResponses
- casAcctResponseTime
- casAcctTransactionSuccesses
- casAcctTransactionFailures
- casState
- casCurrentStateDuration
- casPreviousStateDuration
- casTotalDeadTime
- casDeadCount

To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs.

Related Commands

Command	Description
radius-server dead-criteria	Forces one or both of the criteria--used to mark a RADIUS server as dead--to be the indicated constant.
server-private	Associates a particular private RADIUS server with a defined server group.

show access-lists

To display the contents of current access lists, use the **show access-lists** command in user EXEC or privileged EXEC mode.

show access-lists [*access-list-number*| *access-list-name*]

Syntax Description

access-list-number	(Optional) Number of the access list to display. The system displays all access lists by default.
access-list-name	(Optional) Name of the IP access list to display.

Command Default

The system displays all access lists.

Command Modes

User EXEC Privileged EXEC

Command History

Release	Modification
10.0	This command was introduced.
12.0(6)S	The output was modified to identify the compiled ACLs.
12.1(1)E	This command was implemented on the Cisco 7200 series.
12.1(5)T	The command output was modified to identify compiled ACLs.
12.1(4)E	This command was implemented on the Cisco 7100 series.
12.2(2)T	The command output was modified to show information for IPv6 access lists.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

The show access-lists command is used to display the current ACLs operating in the router. Each access list is flagged using the Compiled indication if it is operating as an accelerated ACL.

The display also shows how many packets have been matched against each entry in the ACLs, enabling the user to monitor the particular packets that have been permitted or denied. This command also indicates whether the access list is running as a compiled access list.

Examples

The following is sample output from the **show access-lists** command when access list 101 is specified:

```
Router# show access-lists 101
Extended IP access list 101
    permit tcp host 198.92.32.130 any established (4304 matches) check=5
    permit udp host 198.92.32.130 any eq domain (129 matches)
    permit icmp host 198.92.32.130 any
    permit tcp host 198.92.32.130 host 171.69.2.141 gt 1023
    permit tcp host 198.92.32.130 host 171.69.2.135 eq smtp (2 matches)
    permit tcp host 198.92.32.130 host 198.92.30.32 eq smtp
    permit tcp host 198.92.32.130 host 171.69.108.33 eq smtp
    permit udp host 198.92.32.130 host 171.68.225.190 eq syslog
    permit udp host 198.92.32.130 host 171.68.225.126 eq syslog
    deny   ip 150.136.0.0 0.0.255.255 224.0.0.0 15.255.255.255
    deny   ip 171.68.0.0 0.1.255.255 224.0.0.0 15.255.255.255 (2 matches) check=1
    deny   ip 172.24.24.0 0.0.1.255 224.0.0.0 15.255.255.255
    deny   ip 192.82.152.0 0.0.0.255 224.0.0.0 15.255.255.255
    deny   ip 192.122.173.0 0.0.0.255 224.0.0.0 15.255.255.255
    deny   ip 192.122.174.0 0.0.0.255 224.0.0.0 15.255.255.255
    deny   ip 192.135.239.0 0.0.0.255 224.0.0.0 15.255.255.255
    deny   ip 192.135.240.0 0.0.7.255 224.0.0.0 15.255.255.255
    deny   ip 192.135.248.0 0.0.3.255 224.0.0.0 15.255.255.255
```

An access list counter counts how many packets are allowed by each line of the access list. This number is displayed as the number of matches. Check denotes how many times a packet was compared to the access list but did not match.

The following is sample output from the show access-lists command when the Turbo Access Control List (ACL) feature is configured on all of the following access lists.

Note The permit and deny information displayed by the show access-lists command may not be in the same order as that entered using the access-list command.

```
Router# show access-lists
Standard IP access list 1 (Compiled)
    deny   any
Standard IP access list 2 (Compiled)
    deny   192.168.0.0, wildcard bits 0.0.0.255
    permit any
Standard IP access list 3 (Compiled)
    deny   0.0.0.0
    deny   192.168.0.1, wildcard bits 0.0.0.255
    permit any
Standard IP access list 4 (Compiled)
    permit 0.0.0.0
    permit 192.168.0.2, wildcard bits 0.0.0.255
```

The following is sample output from the **show access-lists** command that shows information for IPv6 access lists when IPv6 is configured on the network:

```
Router# show access-lists
IPv6 access list list2
     deny ipv6 FEC0:0:0:2::/64 any sequence 10
     permit ipv6 any any sequence 20
```

Related Commands

Command	Description
access-list (IP extended)	Defines an extended IP access list.
access-list (IP standard)	Defines a standard IP access list.
clear access-list counters	Clears the counters of an access list.
clear access-template	Clears a temporary access list entry from a dynamic access list manually.
ip access-list	Defines an IP access list by name.
show ip access-lists	Displays the contents of all current IP access lists.
show ipv6 access-list	Displays the contents of all current IPv6 access lists.

show authentication interface

To display information about the Auth Manager for a given interface, use the **show authentication interface**command in privileged EXEC mode.

show authentication interface *type number*

Syntax Description

type	Interface type. For more information, use the question mark (?) online help function.
number	Interface number. For more information about the numbering syntax for your networking device, use the question mark (?) online help function.

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
12.2(33)SXI	This command was introduced.
15.2(2)T	This command was integrated into Cisco IOS Release 15.2(2)T.

Usage Guidelines

Use the **show authentication interface** command to display information about the Auth Manager for a given interface.

Examples

The following is sample output from the **show authentication interface** command:

```
Switch# show authentication interface g1/0/23
Client list:
  MAC Address     Domain   Status         Handle      Interface
  000e.84af.59bd  DATA     Authz Success  0xE0000000  GigabitEthernet1/0/23
Available methods list:
  Handle  Priority  Name
  3        0        dot1x
Runnable methods list:
  Handle  Priority  Name
  3        0        dot1x
```

The table below describes the significant fields shown in the display. Other fields are self-explanatory.

Table 2: show authentication interface Field Descriptions

Field	Description
MAC Address	The MAC address of the client.

Field	Description
Domain	The domain of the client--either DATA or voice.
Status	The status of the authentication session. The possible values are: • Authc Failed--an authentication method has run for this session and authentication failed. • Authc Success--an authentication method has run for this session and authentication was successful. • Authz Failed--a feature has failed and the session has terminated. • Authz Success--all features have been applied to the session and the session is active. • Idle--this session has been initialized but no authentication methods have run. This is an intermediate state. • No methods--no authentication method has provided a result for this session. • Running--an authentication method is running for this session.
Interface	The type and number of the authentication interface.
Available methods list	Summary information for the authentication methods available on the interface.
Runnable methods list	Summary information for the authentication methods that can run on the interface.

Related Commands

Command	Description
show authentication registrations	Displays information about the authentication methods that are registered with the Auth Manager.
show authentication sessions	Displays information about the current Auth Manager sessions.

show authentication registrations

To display information about the authentication methods that are registered with the Auth Manager, use the **show authentication registrations**command in privileged EXEC mode.

show authentication registrations

Syntax Description

This command has no arguments or keywords.

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
12.2(33)SXI	This command was introduced.
15.2(2)T	This command was integrated into Cisco IOS Release 15.2(2)T.

Usage Guidelines

Use the **show authentication re gistrations** command to display information about all methods registered with the Auth Manager.

Examples

The following is sample output for the show authentication registrations command:

```
Switch# show authentication registrations
Auth Methods registered with the Auth Manager:
   Handle   Priority   Name
     3         0       dot1x
     2         1       mab
     1         2       webauth
```

The table below describes the significant fields shown in the display.

Table 3: show authentication registrations Field Descriptions

Field	Description
Priority	The priority of the method. If the priority for authentication methods has not been configured with the **authentication priority** command, then the default priority is displayed. The default from highest to lowest is dot1x, mab, and webauth.
Name	The name of the authentication method. The values can be dot1x, mab, or webauth.

Related Commands

Command	Description
show authentication interface	Displays information about the Auth Manager for a given interface.
show authentication sessions	Displays information about current Auth Manager sessions.

show authentication sessions

To display information about current Auth Manager sessions, use the **show authentication sessions** command in privileged EXEC mode.

Note Effective with Cisco IOS Release 12.2(33)SXI, the **show dot1x** command is supplemented by the **show authentication sessions** command. The **show dot1x** command is reserved for displaying output specific to the use of the 802.1X authentication method. The **show authentication sessions** command displays information for all authentication methods and authorization features.

Cisco IOS XE Release 3SE and Later Releases

show authentication sessions [**[database]**| [**handle** *handle-number*| **interface** *type number*| **mac** *mac-address*| **method** *method-name* [**interface** *type number*]| **session-id** *session-id*]] **[details]**

All Other Releases

show authentication sessions [**handle** *handle-number*| **interface** *type number*| **mac** *mac-address*| **method** *method-name* **interface** *type number*| **session-id** *session-id*]

Syntax Description

database	(Optional) Displays session data stored in the session database. This keyword allows you to see information like the VLAN ID, which is not cached internally. A warning message displays if data stored in the session database does not match the internally cached data.
handle *handle-id*	(Optional) Specifies the particular handle for which to display Auth Manager information.
interface *type number*	(Optional) Specifies a particular interface type and number for which Auth Manager information is to be displayed. To display the valid keywords and arguments for interfaces, use the question mark (?) online help function.
mac *mac-address*	(Optional) Specifies the particular MAC address for which you want to display information.

method *method-name*	(Optional) Specifies the particular authentication method for which to display Auth Manager information. Valid methods are one of the following: • **dot1x—**IEEE 802.1X authentication method. • **mab—**MAC authentication bypass (MAB) method. • **webauth—**Web authentication method. If you specify a method, you can also specify an interface.
session-id *session-id*	(Optional) Specifies the particular session for which to display Auth Manager information.
details	(Optional) Displays detailed information for each session instead of displaying a single-line summary for sessions.

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
12.2(33)SXH	Support for this command was introduced.
12.2(33)SXI	This command was changed to add the **handle** *handle* keyword and argument and add information to the output.
15.2(2)T	This command was integrated into Cisco IOS Release 15.2(2)T.
Cisco IOS XE Release 3.2SE	This command was modified. The **database** and **details** keywords were added.

Usage Guidelines

Use the **show authentication sessions** command to display information about all current Auth Manager sessions. To display information about specific Auth Manager sessions, use one or more of the keywords.

Examples

The following example shows how to display all authentication sessions on the switch:

```
Device# show authentication sessions

Interface  MAC Address     Method   Domain   Status         Session ID
Gi1/48     0015.63b0.f676  dot1x    DATA     Authz Success  0A3462B1000000102983C05C
Gi1/5      000f.23c4.a401  mab      DATA     Authz Success  0A3462B10000000D24F80B58
Gi1/5      0014.bf5d.d26d  dot1x    DATA     Authz Success  0A3462B10000000E29811B94
```

The following example shows how to display all authentication sessions on an interface:

```
Device# show authentication sessions interface GigabitEthernet3/0/2 details

            Interface:  GigabitEthernet3/0/2
               IIF-ID:  0x1055240000001F6
          MAC Address:  0010.0010.0001
         IPv6 Address:  Unknown
         IPv4 Address:  192.0.2.1
            User-Name:  auto601
               Status:  Authorized
               Domain:  DATA
       Oper host mode:  single-host
     Oper control dir:  both
      Session timeout:  N/A
    Common Session ID:  AC14FC0A0000101200E28D62
      Acct Session ID:  Unknown
               Handle:  0xDB003227
       Current Policy:  dot1x_dvlan_reauth_hm

Local Policies:
             Template: CRITICAL_VLAN (priority 150)
          Vlan Group:  Vlan: 130

Method status list:
       Method           State
       dot1x            Authc Failed
```

The following example shows how to display the authentication session for a specified session ID:

```
Device# show authentication sessions session-id 0B0101C70000004F2ED55218

            Interface:  GigabitEthernet9/2
          MAC Address:  0000.0000.0011
           IP Address:  192.0.2.254
             Username:  johndoe
               Status:  Authz Success
               Domain:  DATA
       Oper host mode:  multi-host
     Oper control dir:  both
        Authorized By:  Critical Auth
          Vlan policy:  N/A
      Session timeout:  N/A
         Idle timeout:  N/A
    Common Session ID:  0B0101C70000004F2ED55218
      Acct Session ID:  0x00000003
               Handle:  0x91000001
Runnable methods list:
       Method   State
       mab      Authc Success
       dot1x    Not run
```

The following examples show how to display all clients authorized by the specified authentication method:

```
Device# show authentication sessions method mab

No Auth Manager contexts match supplied criteria

Device# show authentication sessions method dot1x

Interface  MAC Address     Domain   Status         Session ID
Gi9/2      0000.0000.0011  DATA     Authz Success  0B0101C70000004F2ED55218
```

The table below describes the significant fields shown in the displays.

Table 4: show authentication sessions Field Descriptions

Field	Description
Interface	The type and number of the authentication interface.
MAC Address	The MAC address of the client.
Domain	The name of the domain, either DATA or VOICE.
Status	The status of the authentication session. The possible values are: • Authc Failed—An authentication method has run for this session and authentication failed. • Authc Success—An authentication method has run for this session and authentication was successful. • Authz Failed—A feature has failed and the session has terminated. • Authz Success—All features have been applied to the session and the session is active. • Idle—This session has been initialized but no authentication methods have run. This is an intermediate state. • No methods—No authentication method has provided a result for this session. • Running—An authentication method is running for this session.
Handle	The context handle.
State	The operating states for the reported authentication sessions. The possible values are: • Not run—The method has not run for this session. • Running—The method is running for this session. • Failed over—The method has failed and the next method is expected to provide a result. • Success—The method has provided a successful authentication result for the session. • Authc Failed—The method has provided a failed authentication result for the session.

Related Commands

Command	Description
show access-sessions	Displays information about session aware networking sessions.
show authentication registrations	Displays information about the authentication methods that are registered with the Auth Manager.
show authentication statistics	Displays statistics for Auth Manager sessions.
show dot1x	Displays details for an identity profile specific to the use of the 802.1X authentication method.

show diameter peer through show object-group

show dot1x

To display details for an identity profile, use the **show dot1x** command in privileged EXEC mode.

Note Effective with Cisco IOS Release 12.2(33)SXI, the **show dot1x** command is supplemented by the **show authentication** command. The **show dot1x** command is reserved for displaying output specific to the use of the 802.1X authentication method. The **show authentication sessions**command has a wider remit of displaying information for all authentication methods and authorization features. See the **show authentication sessions**command for more information.

show dot1x [**all [summary]**| **interface** *interface-name*| **details**| **statistics**]

Syntax Description

all	(Optional) Displays 802.1X status for all interfaces.
summary	(Optional) Displays summary of 802.1X status for all interfaces.
interface *interface-name*	(Optional) Specifies the interface name and number.
details	(Optional) Displays the interface configuration as well as the authenticator instances on the interface.
statistics	(Optional) Displays 802.1X statistics for all the interfaces.

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
12.1(11)AX	This command was introduced.
12.1(14)EA1	The **all** keyword was added.
12.3(2)XA	This command was integrated into Cisco IOS Release 12.3(2)XA.
12.3(4)T	This command was integrated into Cisco IOS Release 12.3(4)T.
12.2(25)SED	The output display was expanded to include auth-fail-vlan information in the authorization state machine state and port status fields.
12.2(25)SEE	The **details** and **statistics** keywords were added.

Release	Modification
12.3(11)T	The PAE, HeldPeriod, StartPeriod, and MaxStart fields were added to the **show dot1x** command output.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Usage Guidelines

If you do not specify a port, global parameters and a summary appear. If you specify a port, details for that port appear in the output.

Note In some IOS versions, the **show dot1x** command may not display the AUTHORIZED or UNAUTHORIZED value in the Port Status command output field if authentication methods other than the 802.1X authentication method are used. If the Port Status field does not contain a value, then use the **show authentication sessions** command to display the Authz Success or Authz Failed port status authentication value.

Examples

The following is sample output from the **show dot1x** command using both the **interface** and **details** keywords. The clients are successfully authenticated in this example.

```
Router# show dot1x interface ethernet1/0 details
Dot1x Info for Ethernet1/0
----------------------------------
PAE                       = AUTHENTICATOR
PortControl               = AUTO
ControlDirection          = Both
HostMode                  = MULTI_HOST
QuietPeriod               = 60
ServerTimeout             = 0
SuppTimeout               = 30
ReAuthMax                 = 2
MaxReq                    = 1
TxPeriod                  = 30
Dot1x Authenticator Client List
-------------------------------
Supplicant                = aabb.cc00.c901
Session ID                = 0A3462800000000000009F8
    Auth SM State         = AUTHENTICATED
    Auth BEND SM State    = IDLE
```

The following is sample output from the **show dot1x** command using both the **interface** and **details** keywords. The clients are unsuccessful at authenticating in this example.

```
Router# show dot1x interface ethernet1/0 details
Dot1x Info for Ethernet1/0
----------------------------------
PAE                       = AUTHENTICATOR
PortControl               = AUTO
ControlDirection          = Both
HostMode                  = MULTI_HOST
QuietPeriod               = 60
ServerTimeout             = 0
SuppTimeout               = 30
ReAuthMax                 = 2
MaxReq                    = 1
```

```
TxPeriod                  = 30
Dot1x Authenticator Client List Empty
```

The table below describes the significant fields shown in the displays.

Table 5: show dot1x Field Descriptions

Field	Description
PAE	Port Access Entity. Defines the role of an interface (as a supplicant, as an authenticator, or as an authenticator and supplicant).
PortControl	Port control value. • AUTO--The authentication status of the client PC is being determined by the authentication process. • Force-authorize--All the client PCs on the interface are being authorized. • Force-unauthorized--All the client PCs on the interface are being unauthorized.
ControlDirection	Indicates whether control for an IEEE 802.1X controlled port is applied to both directions (ingress and egress), or inbound direction only (ingress). See 'dot1x control-direction', or effective from Cisco IOS Release 12.2(33)SXI onwards, authentication control-direction for more detail.
HostMode	Indicates whether the host-mode is single-host or multi-host, and effective from Cisco IOS Release 12.2(33)SXI onwards, multi-auth or multi-domain as well. See 'dot1x host-mode', or effective from Cisco IOS Release 12.2(33)SXI onwards, 'authentication host-mode' for more detail.
QuietPeriod	If authentication fails for a client, the authentication gets restarted after the quiet period shown in seconds.
ServerTimeout	Timeout that has been set for RADIUS retries. If an 802.1X packet is sent to the server and the server does not send a response, the packet will be sent again after the number of seconds that are shown.
SuppTimeout	Time that has been set for supplicant (client PC) retries. If an 802.1X packet is sent to the supplicant and the supplicant does not send a response, the packet will be sent again after the number of seconds that are shown.

Field	Description
ReAuthMax	The maximum amount of time in seconds after which an automatic reauthentication of a client PC is initiated.
MaxReq	Maximum number of times that the router sends an Extensible Authentication Protocol (EAP) request/identity frame (assuming that no response is received) to the client PC before concluding that the client PC does not support 802.1X.
TxPeriod	Timeout for supplicant retries, that is the timeout for EAP Identity Requests. See 'dot1x timeout tx-period' for more detail.
Supplicant	MAC address of the client PC or any 802.1X client.
Session ID	The ID of the network session.
Auth SM State	Describes the state of the client PC as either AUTHENTICATED or UNAUTHENTICATED.
Auth BEND SM State	The state of the IEEE 802.1X authenticator backend state machine.

Related Commands

Command	Description
clear dot1x	Clears 802.1X interface information.
debug dot1x	Displays 802.1X debugging information.
dot1x default	Resets the global 802.1X parameters to their default values.
identity profile	Creates an identity profile.
show authentication sessions	Displays information about current Authentication Manager sessions.

show ip access-lists

To display the contents of all current IP access lists, use the **show ip access-lists** command in user EXEC or privileged EXEC modes.

show ip access-lists [*access-list-number*| *access-list-number-expanded-range*| *access-list-name*| **dynamic** [*dynamic-access-list-name*]| **interface** *name number* [**in**| **out**]]

Syntax Description

access-list-number	(Optional) Number of the IP access list to display.
access-list-number-expanded-range	(Optional) Expanded range of the IP access list to display.
access-list-name	(Optional) Name of the IP access list to display.
dynamic *dynamic-access-list-name*	(Optional) Displays the specified dynamic IP access lists.
interface *name number*	(Optional) Displays the access list for the specified interface.
in	(Optional) Displays input interface statistics.
out	(Optional) Displays output interface statistics.

Command Default

All standard and expanded IP access lists are displayed.

Command Modes

User EXEC (>) Privileged EXEC (#)

Command History

Release	Modification
10.3	This command was introduced.
12.3(7)T	The **dynamic** keyword was added.
12.4(6)T	The **interface** *name*and *number* keyword and argument pair was added. The **in** and **out** keywords were added.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.4(11)T	This command was modified. Example output from the **dynamic** keyword was added.

Release	Modification
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.
12.4(20)T	This command was modified. The output of this command was extended to display access lists that contain object groups.
Cisco IOS XE Release 2.5	This command was integrated into Cisco IOS XE Release 2.5.

Usage Guidelines

The **show ip access-lists** command provides output identical to the **show access-lists** command, except that it is IP-specific and allows you to specify a particular access list.

Examples

The following is sample output from the **show ip access-lists** command when all access lists are requested:

```
Router# show ip access-lists
Extended IP access list 101
   deny udp any any eq nntp
   permit tcp any any
   permit udp any any eq tftp
   permit icmp any any
   permit udp any any eq domain
```

The table below describes the significant fields shown in the display.

Table 6: show ip access-lists Field Descriptions

Field	Description
Extended IP access list	Extended IP access-list number.
deny	Packets to reject.
udp	User Datagram Protocol.
any	Source host or destination host.
eq	Packets on a given port number.
nntp	Network News Transport Protocol.
permit	Packets to forward.
tcp	Transmission Control Protocol.
tftp	Trivial File Transfer Protocol.
icmp	Internet Control Message Protocol.
domain	Domain name service.

The following is sample output from the **show ip access-lists** command when the name of a specific access list is requested:

```
Router# show ip access-lists Internetfilter
Extended IP access list Internetfilter
   permit tcp any 192.0.2.0 255.255.255.255 eq telnet
   deny tcp any any
   deny udp any 192.0.2.0 255.255.255.255 lt 1024
   deny ip any any log
```

The following is sample output from the **show ip access-lists** command when the name of a specific access list that contains an object group is requested:

```
Router# show ip access-lists my-ogacl-policy
Extended IP access list my-ogacl-policy
   10 permit object-group eng-service any any
```

The following sample output from the **show ip access-lists** command shows input statistics for Fast Ethernet interface 0/0:

```
Router#
 show ip access-lists interface FastEthernet0/0 in

Extended IP access list 150 in
   10 permit ip host 10.1.1.1 any
   30 permit ip host 10.2.2.2 any (15 matches)
```

The following is sample output from the **show ip access-lists** command using the **dynamic** keyword:

```
Router#
show ip access-lists dynamic CM_SF#1
Extended IP access list CM_SF#1
    10 permit udp any any eq 5060 (650 matches)
    20 permit tcp any any eq 5060
    30 permit udp any any dscp ef (806184 matches)
```

To check your configuration, use the **show run interfaces cable** command:

```
Router#
show run interfaces cable 0/1/0
Building configuration...
Current configuration : 144 bytes
!
interface cable-modem0/1/0
 ip address dhcp
 load-interval 30
 no keepalive
  service-flow primary upstream
   service-policy output llq
end
```

Related Commands

Command	Description
deny	Sets conditions in a named IP access list or OGACL that will deny packets.
ip access-group	Applies an ACL or OGACL to an interface or a service policy map.
ip access-list	Defines an IP access list or OGACL by name or number.

Command	Description
object-group network	Defines network object groups for use in OGACLs.
object-group service	Defines service object groups for use in OGACLs.
permit	Sets conditions in a named IP access list or OGACL that will permit packets.
show object-group	Displays information about object groups that are configured.
show run interfaces cable	Displays statistics on the cable modem.

show ip admission

To display the network admission cache entries and information about web authentication sessions, use the **show ip admission** command in user EXEC or privileged EXEC mode.

Cisco IOS XE Release 3SE and Later Releases

show ip admission {**cache**| **statistics** [**brief**| **details**| **httpd**| **input-feature**]| **status** [**banners**| **custom-pages**| **httpd**| **parameter-map** [*parameter-map-name*]]| **watch-list**}

All Other Releases

show ip admission {**cache** [**consent**| **eapoudp**| **ip-addr** *ip-address*| **username** *username*]| **configuration**| **httpd**| **statistics**| [**brief**| **details**| **httpd**]| **status [httpd]**| **watch-list**}

Syntax Description

cache	Displays the current list of network admission entries.
statistics	Displays statistics for web authentication.
brief	(Optional) Displays a statistics summary for web authentication.
details	(Optional) Displays detailed statistics for web authentication.
httpd	(Optional) Displays information about web authentication HTTP processes
input-feature	Displays statistics about web authentication packets.
status	Displays status information about configured web authentication features including banners, custom pages, HTTP processes, and parameter maps.
banners	Displays information about configured banners for web authentication.
custom-pages	Displays information about custom pages configured for web authentication. Custom files are read into a local cache and served from the cache. A background process periodically checks if the files need to be re-cached.
parameter-map *parameter-map-name*	Displays information about configured banners and custom pages for all parameter maps or only for the specified parameter map.
watch-list	Displays the list of IP addresses in the watch list.

consent	(Optional) Displays the consent web page cache entries.
eapoudp	(Optional) Displays the Extensible Authentication Protocol over UDP (EAPoUDP) network admission cache entries. Includes the host IP addresses, session timeout, and posture state.
ip-addr *ip-address*	(Optional) Displays information for a client IP address.
username *username*	(Optional) Display information for a client username.
configuration	(Optional) Displays the NAC configuration. **Note** This keyword is not supported in Cisco IOS XE Release 3.2SE and later releases. Use the **show running-config all** command to see the running web authentication configuration and the commands configured with default parameters.

Command Modes

User EXEC (>)

Privileged EXEC (#)

Command History

Release	Modification
12.3(8)T	This command was introduced.
12.4(11)T	This command was modified. The output of this command was enhanced to display whether the AAA timeout policy is configured.
12.4(15)T	This command was modified. The **consent** keyword was added.
12.2(33)SXI	This command was integrated into Cisco IOS Release 12.2(33)SXI.
15.3(1)T	This command was modified. The **statistics**, **brief**, **details**, **httpd**, and **status** keywords were added.
Cisco IOS XE Release 3.2SE	This command was modified. The **input-feature**, **banners**, **custom-pages**, and **parameter-map** keywords were added. The **configuration** keyword was removed.

Usage Guidelines

Use the **show ip admission** command to display information about network admission entries and information about web authentication sessions.

Examples

The following is sample output from the **show ip admission cache** command:

```
Device# show ip admission cache

Authentication Proxy Cache
Total Sessions: 1 Init Sessions: 1
 Client MAC 5cf3.fc25.7e3d Client IP 1.150.128.2 IPv6 :: Port 0, State INIT, Method Webauth
```

The following is sample output from the **show ip admission statistics** command:

```
Device# show ip admission statistics

Webauth input-feature statistics:
                                                        IPv4          IPv6
  Total packets received                                46            0
    Delivered to TCP                                    46            0
    Forwarded                                           0             0
    Dropped                                             0             0
    TCP new connection limit reached                    0             0

Webauth HTTPd statistics:

  HTTPd process 1
    Intercepted HTTP requests:                          8
    IO Read events:                                     9
    Received HTTP messages:                             7
    IO write events:                                    11
    Sent HTTP replies:                                  7
    IO AAA messages:                                    4
    SSL OK:                                             0
    SSL Read would block:                               0
    SSL Write would block:                              0
    HTTPd process scheduled count:                      23
```

The following is sample output from the **show ip admission status** command:

```
Device# show ip admission status

IP admission status:
  Enabled interfaces            1
  Total sessions                1
  Init sessions                 1     Max init sessions allowed     100
    Limit reached               0     Hi watermark                  1
  TCP half-open connections     0     Hi watermark                  0
  TCP new connections           0     Hi watermark                  0
  TCP half-open + new           0     Hi watermark                  0
  HTTPD1 Contexts               0     Hi watermark                  1

  Parameter Map: Global
    Custom Pages
      Custom pages not configured
    Banner
      Banner not configured

  Parameter Map: PMAP_WEBAUTH
    Custom Pages
      Custom pages not configured
    Banner
      Type: text
        Banner                  " <H2>Login Page Banner</H2> "
        Html                    " <H2>Login Page Banner</H2> "
        Length                  48

  Parameter Map: PMAP_CONSENT
    Custom Pages
      Custom pages not configured
    Banner
      Banner not configured

  Parameter Map: PMAP_WEBCONSENT
    Custom Pages
      Custom pages not configured
```

```
    Banner
      Banner not configured

  Parameter Map: PMAP_WEBAUTH_CUSTOM_FLASH
    Custom Pages
      Type: "login"
        File                    flash:webauth_login.html
        File status             Ok - File cached
        File mod time           2012-07-20T02:29:36.000Z
        File needs re-cached    No
        Cache                   0x3AEE1E1C
        Cache len               246582
        Cache time              2012-09-18T13:56:57.000Z
        Cache access            0 reads, 1 write
      Type: "success"
        File                    flash:webauth_success.html
        File status             Ok - File cached
        File mod time           2012-02-21T06:57:28.000Z
        File needs re-cached    No
        Cache                   0x3A529B3C
        Cache len               70
        Cache time              2012-09-18T13:56:57.000Z
        Cache access            0 reads, 1 write
      Type: "failure"
        File                    flash:webauth_fail.html
        File status             Ok - File cached
        File mod time           2012-02-21T06:55:49.000Z
        File needs re-cached    No
        Cache                   0x3A5BEBC4
        Cache len               67
        Cache time              2012-09-18T13:56:57.000Z
        Cache access            0 reads, 1 write
      Type: "login expired"
        File                    flash:webauth_expire.html
        File status             Ok - File cached
        File mod time           2012-02-21T06:55:25.000Z
        File needs re-cached    No
        Cache                   0x3AA20090
        Cache len               69
        Cache time              2012-09-18T13:56:57.000Z
        Cache access            0 reads, 1 write
    Banner
      Banner not configured

  Parameter Map: PMAP_WEBAUTH_CUSTOM_EXTERNAL
    Custom Pages
      Custom pages not configured
    Banner
      Banner not configured
```

The following is sample output from the **show ip admission status banners** command for a banner configured with the **banner text** command:

```
Device# show ip admission status banners

IP admission status:
  Parameter Map: Global
    Banner not configured

  Parameter Map: PMAP_WEBAUTH
    Type: text
      Banner                    " <H2>Login Page Banner</H2> "
      Html                      " <H2>Login Page Banner</H2> "
      Length                    48
```

The following is sample output from the **show ip admission status banners** command for a banner configured with the **banner file** command:

```
Device# show ip admission status banners

IP admission status:
  Parameter Map: Global
    Banner not configured
```

```
  Parameter Map: PMAP_WEBAUTH
    Type: file
      Banner                    <h2>Cisco Systems</h2>
<h3>Webauth Banner from file</h3>

      Length                    60
      File                      flash:webauth_banner1.html
      File status               Ok - File cached
      File mod time             2012-07-24T07:07:09.000Z
      File needs re-cached      No
      Cache                     0x3AF6CEE4
      Cache len                 60
      Cache time                2012-09-19T10:13:59.000Z
      Cache access              0 reads, 1 write
```

The following is sample output from the **show ip admission status custom pages** command:

```
Device# show ip admission status custom pages

IP admission status:
  Parameter Map:  Global
    Custom pages not configured
  Parameter Map:  PMAP_WEBAUTH
    Type: "login"
      File                      flash:webauth_login.html
      File status               Ok - File cached
      File mod time             2012-07-20T02:29:36.000Z
      File needs re-cached      No
      Cache                     0x3B0DCEB4
      Cache len                 246582
      Cache time                2012-09-18T16:26:13.000Z
      Cache access              0 reads, 1 write
    Type: "success"
      File                      flash:webauth_success.html
      File status               Ok - File cached
      File mod time             2012-02-21T06:57:28.000Z
      File needs re-cached      No
      Cache                     0x3A2E9090
      Cache len                 70
      Cache time                2012-09-18T16:26:13.000Z
      Cache access              0 reads, 1 write
    Type: "failure"
      File                      flash:webauth_fail.html
      File status               Ok - File cached
      File mod time             2012-02-21T06:55:49.000Z
      File needs re-cached      No
      Cache                     0x3AF6D1A4
      Cache len                 67
      Cache time                2012-09-18T16:26:13.000Z
      Cache access              0 reads, 1 write
    Type: "login expired"
      File                      flash:webauth_expire.html
      File status               Ok - File cached
      File mod time             2012-02-21T06:55:25.000Z
      File needs re-cached      No
      Cache                     0x3A2E8284
      Cache len                 69
      Cache time                2012-09-18T16:26:13.000Z
      Cache access              0 reads, 1 write
  Parameter Map:  PMAP_CONSENT
    Custom pages not configured
```

The following table describes the significant fields shown in the above display.

Table 7: show ip admission Field Descriptions

File mod time	Time stamp when the file was changed on the file system.
Cache time	Time stamp when the file was last read into cache.

The following output displays all the IP admission control rules that are configured on a router:

```
Device# show ip admission configuration

Authentication Proxy Banner not configured
Consent Banner is not configured
Authentication Proxy webpage
        Login page              : flash:test1.htm
        Success page            : flash:test1.htm
        Fail page               : flash:test1.htm
        Login Expire page       : flash:test1.htm
Authentication global cache time is 60 minutes
Authentication global absolute time is 0 minutes
Authentication global init state time is 5 minutes
Authentication Proxy Watch-list is disabled

Authentication Proxy Max HTTP process is 7
Authentication Proxy Auditing is disabled
Max Login attempts per user is 5
```

The following output displays the host IP addresses, the session timeout, and the posture states. If the posture statue is POSTURE ESTAB, the host validation was successful.

```
Device# show ip admission cache eapoudp

Posture Validation Proxy Cache
Total Sessions: 3 Init Sessions: 1
 Client IP 10.0.0.112, timeout 60, posture state POSTURE ESTAB
 Client IP 10.0.0.142, timeout 60, posture state POSTURE INIT
 Client IP 10.0.0.205, timeout 60, posture state POSTURE ESTAB
```

The fields in the displays are self-explanatory.

Related Commands

Command	Description
banner (parameter-map webauth)	Displays a banner on the web-authentication login web page.
clear ip admission cache	Clears IP admission cache entries from the router.
custom-page	Displays custom web pages during web authentication login.
ip admission name	Creates a Layer 3 network admission control rule.

show ip interface

To display the usability status of interfaces configured for IP, use the **show ip interface** command in privileged EXEC mode.

show ip interface [*type number*] **[brief]**

Syntax Description

type	(Optional) Interface type.
number	(Optional) Interface number.
brief	(Optional) Displays a summary of the usability status information for each interface.

Command Default

The full usability status is displayed for all interfaces configured for IP.

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
10.0	This command was introduced.
12.0(3)T	The command output was modified to show the status of the **ip wccp redirect out** and **ip wccp redirect exclude add in** commands.
12.2(14)S	The command output was modified to display the status of NetFlow on a subinterface.
12.2(15)T	The command output was modified to display the status of NetFlow on a subinterface.
12.3(6)	The command output was modified to identify the downstream VPN routing and forwarding (VRF) instance in the output.
12.3(14)YM2	The command output was modified to show the usability status of interfaces configured for Multiprocessor Forwarding (MPF) and implemented on the Cisco 7301 and Cisco 7206VXR routers.
12.2(14)SX	This command was implemented on the Supervisor Engine 720.
12.2(17d)SXB	This command was integrated into Cisco IOS 12.2(17d)SXB on the Supervisor Engine 2, and the command output was changed to include NDE for hardware flow status.

Release	Modification
12.4(4)T	This command was integrated into Cisco IOS Release 12.4(4)T.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(31)SB2	The command output was modified to display information about the Unicast Reverse Path Forwarding (RPF) notification feature.
12.4(20)T	The command output was modified to display information about the Unicast RPF notification feature.
12.2(33)SXI2	This command was modified. The command output was modified to display information about the Unicast RPF notification feature.
Cisco IOS XE Release 2.5	This command was modified. This command was implemented on the Cisco ASR 1000 Series Aggregation Services Routers.
Cisco IOS XE Release 3.9S	This command was implemented on Cisco 4400 Series ISRs.

Usage Guidelines

The Cisco IOS software automatically enters a directly connected route in the routing table if the interface is usable (which means that it can send and receive packets). If an interface is not usable, the directly connected routing entry is removed from the routing table. Removing the entry lets the software use dynamic routing protocols to determine backup routes to the network, if any.

If the interface can provide two-way communication, the line protocol is marked "up." If the interface hardware is usable, the interface is marked "up."

If you specify an optional interface type, information for that specific interface is displayed. If you specify no optional arguments, information on all the interfaces is displayed.

When an asynchronous interface is encapsulated with PPP or Serial Line Internet Protocol (SLIP), IP fast switching is enabled. A **show ip interface** command on an asynchronous interface encapsulated with PPP or SLIP displays a message indicating that IP fast switching is enabled.

You can use the **show ip interface brief** command to display a summary of the router interfaces. This command displays the IP address, the interface status, and other information.

The **show ip interface brief** command does not display any information related to Unicast RPF.

Examples

The following example shows configuration information for interface Gigabit Ethernet 0/3. In this example, the IP flow egress feature is configured on the output side (where packets go out of the interface), and the policy route map named PBRNAME is configured on the input side (where packets come into the interface).

```
Router# show running-config interface gigabitethernet 0/3
interface GigabitEthernet0/3
 ip address 10.1.1.1 255.255.0.0
 ip flow egress
 ip policy route-map PBRNAME
 duplex auto
 speed auto
```

```
 media-type gbic
 negotiation auto
end
```

The following example shows interface information on Gigabit Ethernet interface 0/3. In this example, MPF is enabled, and both Policy Based Routing (PBR) and NetFlow features are not supported by MPF and are ignored.

```
Router# show ip interface gigabitethernet 0/3
GigabitEthernet0/3 is up, line protocol is up
  Internet address is 10.1.1.1/16
  Broadcast address is 255.255.255.255
  Address determined by setup command
  MTU is 1500 bytes
  Helper address is not set
  Directed broadcast forwarding is disabled
  Outgoing access list is not set
  Inbound access list is not set
  Proxy ARP is enabled
  Local Proxy ARP is disabled
  Security level is default
  Split horizon is enabled
  ICMP redirects are always sent
  ICMP unreachables are always sent
  ICMP mask replies are never sent
  IP fast switching is enabled
  IP fast switching on the same interface is disabled
  IP Flow switching is disabled
  IP CEF switching is enabled
  IP Feature Fast switching turbo vector
  IP VPN Flow CEF switching turbo vector
  IP multicast fast switching is enabled
  IP multicast distributed fast switching is disabled
  IP route-cache flags are Fast, CEF
  Router Discovery is disabled
  IP output packet accounting is disabled
  IP access violation accounting is disabled
  TCP/IP header compression is disabled
  RTP/IP header compression is disabled
  Policy routing is enabled, using route map PBR
  Network address translation is disabled
  BGP Policy Mapping is disabled
  IP Multi-Processor Forwarding is enabled
     IP Input features, "PBR",
         are not supported by MPF and are IGNORED
     IP Output features, "NetFlow",
         are not supported by MPF and are IGNORED
```

The following example identifies a downstream VRF instance. In the example, "Downstream VPN Routing/Forwarding "D"" identifies the downstream VRF instance.

```
Router# show ip interface virtual-access 3
Virtual-Access3 is up, line protocol is up
  Interface is unnumbered. Using address of Loopback2 (10.0.0.8)
  Broadcast address is 255.255.255.255
  Peer address is 10.8.1.1
  MTU is 1492 bytes
  Helper address is not set
  Directed broadcast forwarding is disabled
  Outgoing access list is not set
  Inbound  access list is not set
  Proxy ARP is enabled
  Local Proxy ARP is disabled
  Security level is default
  Split horizon is enabled
  ICMP redirects are always sent
  ICMP unreachables are always sent
  ICMP mask replies are never sent
  IP fast switching is enabled
  IP fast switching on the same interface is enabled
  IP Flow switching is disabled
  IP CEF switching is enabled
```

```
  IP Feature Fast switching turbo vector
  IP VPN CEF switching turbo vector
  VPN Routing/Forwarding "U"
  Downstream VPN Routing/Forwarding "D"
  IP multicast fast switching is disabled
  IP multicast distributed fast switching is disabled
  IP route-cache flags are Fast, CEF
  Router Discovery is disabled
  IP output packet accounting is disabled
  IP access violation accounting is disabled
  TCP/IP header compression is disabled
  RTP/IP header compression is disabled
  Policy routing is disabled
  Network address translation is disabled
  WCCP Redirect outbound is disabled
  WCCP Redirect inbound is disabled
  WCCP Redirect exclude is disabled
  BGP Policy Mapping is disabled
```

The following example shows the information displayed when Unicast RPF drop-rate notification is configured:

```
Router# show ip interface ethernet 2/3
Ethernet2/3 is up, line protocol is up
  Internet address is 10.0.0.4/16
  Broadcast address is 255.255.255.255
  Address determined by non-volatile memory
  MTU is 1500 bytes
  Helper address is not set
  Directed broadcast forwarding is disabled
  Outgoing access list is not set
  Inbound  access list is not set
  Proxy ARP is enabled
  Local Proxy ARP is disabled
  Security level is default
  Split horizon is enabled
  ICMP redirects are always sent
  ICMP unreachables are always sent
  ICMP mask replies are never sent
  IP fast switching is disabled
  IP Flow switching is disabled
  IP CEF switching is disabled
  IP Null turbo vector
  IP Null turbo vector
  IP multicast fast switching is disabled
  IP multicast distributed fast switching is disabled
  IP route-cache flags are No CEF
  Router Discovery is disabled
  IP output packet accounting is disabled
  IP access violation accounting is disabled
  TCP/IP header compression is disabled
  RTP/IP header compression is disabled
  Probe proxy name replies are disabled
  Policy routing is disabled
  Network address translation is disabled
  WCCP Redirect outbound is disabled
  WCCP Redirect inbound is disabled
  WCCP Redirect exclude is disabled
  BGP Policy Mapping is disabled
```

Examples

```
  Input features: uRPF
  IP verify source reachable-via RX, allow default
   0 verification drops
   0 suppressed verification drops
   0 verification drop-rate
Router#
```

The following example shows how to display the usability status for a specific VLAN:

```
Router# show ip interface vlan 1
Vlan1 is up, line protocol is up
```

```
  Internet address is 10.0.0.4/24
  Broadcast address is 255.255.255.255
Address determined by non-volatile memory
  MTU is 1500 bytes
  Helper address is not set
  Directed broadcast forwarding is disabled
  Outgoing access list is not set
  Inbound  access list is not set
  Proxy ARP is enabled
  Local Proxy ARP is disabled
  Security level is default
  Split horizon is enabled
  ICMP redirects are always sent
  ICMP unreachables are always sent
  ICMP mask replies are never sent
  IP fast switching is enabled
  IP fast switching on the same interface is disabled
  IP Flow switching is disabled
  IP CEF switching is enabled
  IP Fast switching turbo vector
  IP Normal CEF switching turbo vector
  IP multicast fast switching is enabled
  IP multicast distributed fast switching is disabled
  IP route-cache flags are Fast, CEF
  Router Discovery is disabled
  IP output packet accounting is disabled
  IP access violation accounting is disabled
  TCP/IP header compression is disabled
  RTP/IP header compression is disabled
  Probe proxy name replies are disabled
  Policy routing is disabled
  Network address translation is disabled
  WCCP Redirect outbound is disabled
  WCCP Redirect inbound is disabled
  WCCP Redirect exclude is disabled
  BGP Policy Mapping is disabled
  Sampled Netflow is disabled
  IP multicast multilayer switching is disabled
  Netflow Data Export (hardware) is enabled
```

The table below describes the significant fields shown in the display.

Table 8: show ip interface Field Descriptions

Field	Description
Virtual-Access3 is up	Shows whether the interface hardware is usable (up). For an interface to be usable, both the interface hardware and line protocol must be up.
Broadcast address is	Broadcast address.
Peer address is	Peer address.
MTU is	MTU value set on the interface, in bytes.
Helper address	Helper address, if one is set.
Directed broadcast forwarding	Shows whether directed broadcast forwarding is enabled.
Outgoing access list	Shows whether the interface has an outgoing access list set.

Field	Description
Inbound access list	Shows whether the interface has an incoming access list set.
Proxy ARP	Shows whether Proxy Address Resolution Protocol (ARP) is enabled for the interface.
Security level	IP Security Option (IPSO) security level set for this interface.
Split horizon	Shows whether split horizon is enabled.
ICMP redirects	Shows whether redirect messages will be sent on this interface.
ICMP unreachables	Shows whether unreachable messages will be sent on this interface.
ICMP mask replies	Shows whether mask replies will be sent on this interface.
IP fast switching	Shows whether fast switching is enabled for this interface. It is generally enabled on serial interfaces, such as this one.
IP Flow switching	Shows whether Flow switching is enabled for this interface.
IP CEF switching	Shows whether Cisco Express Forwarding switching is enabled for the interface.
Downstream VPN Routing/Forwarding "D"	Shows the VRF instance where the PPP peer routes and AAA per-user routes are being installed.
IP multicast fast switching	Shows whether multicast fast switching is enabled for the interface.
IP route-cache flags are Fast	Shows whether NetFlow is enabled on an interface. Displays "Flow init" to specify that NetFlow is enabled on the interface. Displays "Ingress Flow" to specify that NetFlow is enabled on a subinterface using the **ip flow ingress**command. Shows "Flow" to specify that NetFlow is enabled on a main interface using the **ip route-cache flow** command.
Router Discovery	Shows whether the discovery process is enabled for this interface. It is generally disabled on serial interfaces.

Field	Description
IP output packet accounting	Shows whether IP accounting is enabled for this interface and what the threshold (maximum number of entries) is.
TCP/IP header compression	Shows whether compression is enabled.
WCCP Redirect outbound is disabled	Shows the status of whether packets received on an interface are redirected to a cache engine. Displays "enabled" or "disabled."
WCCP Redirect exclude is disabled	Shows the status of whether packets targeted for an interface will be excluded from being redirected to a cache engine. Displays "enabled" or "disabled."
Netflow Data Export (hardware) is enabled	NetFlow Data Expert (NDE) hardware flow status on the interface.

The table below describes the significant fields shown in the display.

Examples

The following is a sample out of the **show ip interface brief** command displaying a summary of the interfaces and their status on the device.

```
Router#show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0/0   unassigned      YES NVRAM  down                  down
GigabitEthernet0/0/1   unassigned      YES NVRAM  down                  down
GigabitEthernet0/0/2   unassigned      YES NVRAM  down                  down
GigabitEthernet0/0/3   unassigned      YES NVRAM  down                  down
Serial1/0/0            unassigned      YES unset  down                  down
GigabitEthernet0       unassigned      YES NVRAM  up                    up
```

Examples

The following example shows how to display a summary of the usability status information for each interface:

```
Router# show ip interface brief
Interface     IP-Address     OK?  Method  Status                  Protocol
Ethernet0     10.108.00.5    YES  NVRAM   up                      up
Ethernet1     unassigned     YES  unset   administratively down   down
Loopback0     10.108.200.5   YES  NVRAM   up                      up
Serial0       10.108.100.5   YES  NVRAM   up                      up
Serial1       10.108.40.5    YES  NVRAM   up                      up
Serial2       10.108.100.5   YES  manual  up                      up
Serial3       unassigned     YES  unset   administratively down   down
```

Table 9: show ip interface brief Field Descriptions

Field	Description
Interface	Type of interface.
IP-Address	IP address assigned to the interface.

Field	Description
OK?	"Yes" means that the IP Address is valid. "No" means that the IP Address is not valid.
Method	The Method field has the following possible values: • RARP or SLARP--Reverse Address Resolution Protocol (RARP) or Serial Line Address Resolution Protocol (SLARP) request. • BOOTP--Bootstrap protocol. • TFTP--Configuration file obtained from the TFTP server. • manual--Manually changed by the command-line interface. • NVRAM--Configuration file in NVRAM. • IPCP--**ip address negotiated** command. • DHCP--**ip address dhcp** command. • unset--Unset. • other--Unknown.
Status	Shows the status of the interface. Valid values and their meanings are: • up--Interface is up. • down--Interface is down. • administratively down--Interface is administratively down.
Protocol	Shows the operational status of the routing protocol on this interface.

Related Commands

Command	Description
ip address	Sets a primary or secondary IP address for an interface.
ip vrf autoclassify	Enables VRF autoclassify on a source interface.
match ip source	Specifies a source IP address to match to required route maps that have been set up based on VRF connected routes.

Command	Description
route-map	Defines the conditions for redistributing routes from one routing protocol into another or to enable policy routing.
set vrf	Enables VPN VRF selection within a route map for policy-based routing VRF selection.
show ip arp	Displays the ARP cache, in which SLIP addresses appear as permanent ARP table entries.
show route-map	Displays static and dynamic route maps.

show ip ssh

To display the version and configuration data for Secure Shell (SSH), use the **show ip ssh** command in privileged EXEC mode.

show ip ssh

Syntax Description

This command has no arguments or keywords.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.0(5)S	This command was introduced.
12.1(1)T	This command was integrated into Cisco IOS Release 12.1 T.
12.1(5)T	This command was modified to display the SSH status--enabled or disabled.
12.2(17a)SX	This command was integrated into Cisco IOS Release 12.2(17a)SX.
12.2(33)SRA	This command was integrated into Cisco IOS release 12.(33)SRA.

Usage Guidelines

Use the **show ip ssh** command to view the status of configured options such as retries and timeouts. This command allows you to see if SSH is enabled or disabled.

Examples

The following is sample output from the **show ip ssh** command when SSH has been enabled:

```
Router# show ip ssh
SSH Enabled - version 1.5
Authentication timeout: 120 secs; Authentication retries: 3
The following is sample output from the show ip ssh
 command when SSH has been disabled:
Router# show ip ssh
%SSH has not been enabled
```

Related Commands

Command	Description
show ssh	Displays the status of SSH server connections.

show ipv6 access-list

To display the contents of all current IPv6 access lists, use the **show ipv6 access-list**command in user EXEC or privileged EXEC mode.

show ipv6 access-list [*access-list-name*]

Syntax Description

access-list-name	(Optional) Name of access list.

Command Default

All IPv6 access lists are displayed.

Command Modes

User EXEC Privileged EXEC

Command History

Release	Modification
12.2(2)T	This command was introduced.
12.0(21)ST	This command was integrated into Cisco IOS Release 12.0(21)ST.
12.0(22)S	This command was integrated into Cisco IOS Release 12.0(22)S.
12.0(23)S	The priority field was changed to sequence and Layer 4 protocol information (extended IPv6 access list functionality) was added to the display output.
12.2(13)T	This command was integrated into Cisco IOS Release 12.2(13)T.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.2(25)SG	This command was integrated into Cisco IOS Release 12.2(25)SG.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(33)SXH	This command was integrated into Cisco IOS Release 12.2(33)SXH.
12.2(50)SY	This command was modified. Information about IPv4 and IPv6 hardware statistics is displayed.
Cisco IOS XE Release 3.2SE	This command was integrated into Cisco IOS XE Release 3.2SE.

Usage Guidelines

The **show ipv6 access-list** command provides output similar to the **show ip access-list** command, except that it is IPv6-specific.

Examples

The following output from the **show ipv6 access-list**command shows IPv6 access lists named inbound, tcptraffic, and outbound:

```
Router# show ipv6 access-list
IPv6 access list inbound
    permit tcp any any eq bgp reflect tcptraffic (8 matches) sequence 10
    permit tcp any any eq telnet reflect tcptraffic (15 matches) sequence 20
    permit udp any any reflect udptraffic sequence 30
IPv6 access list tcptraffic (reflexive) (per-user)
    permit tcp host 2001:0DB8:1::1 eq bgp host 2001:0DB8:1::2 eq 11000 timeout 300 (time
       left 243) sequence 1
    permit tcp host 2001:0DB8:1::1 eq telnet host 2001:0DB8:1::2 eq 11001 timeout 300
    (time left 296) sequence 2
IPv6 access list outbound
    evaluate udptraffic
    evaluate tcptraffic
```

The following sample output shows IPv6 access list information for use with IPSec:

```
Router#  show ipv6 access-list
IPv6 access list Tunnel0-head-0-ACL (crypto)
     permit ipv6 any any (34 matches) sequence 1
IPv6 access list Ethernet2/0-ipsecv6-ACL (crypto)
     permit 89 FE80::/10 any (85 matches) sequence 1
```

The table below describes the significant fields shown in the display.

Table 10: show ipv6 access-list Field Descriptions

Field	Description
ipv6 access list inbound	Name of the IPv6 access list, for example, inbound.
permit	Permits any packet that matches the specified protocol type.
tcp	Transmission Control Protocol. The higher-level (Layer 4) protocol type that the packet must match.
any	Equal to ::/0.
eq	An equal operand that compares the source or destination ports of TCP or UDP packets.
bgp	Border Gateway Protocol. The lower-level (Layer 3) protocol type that the packet must be equal to.
reflect	Indicates a reflexive IPv6 access list.

Field	Description
tcptraffic (8 matches)	The name of the reflexive IPv6 access list and the number of matches for the access list. The **clear ipv6 access-list** privileged EXEC command resets the IPv6 access list match counters.
sequence 10	Sequence in which an incoming packet is compared to lines in an access list. Lines in an access list are ordered from first priority (lowest number, for example, 10) to last priority (highest number, for example, 80).
host 2001:0DB8:1::1	The source IPv6 host address that the source address of the packet must match.
host 2001:0DB8:1::2	The destination IPv6 host address that the destination address of the packet must match.
11000	The ephemeral source port number for the outgoing connection.
timeout 300	The total interval of idle time (in seconds) after which the temporary IPv6 reflexive access list named tcptraffic will time out for the indicated session.
(time left 243)	The amount of idle time (in seconds) remaining before the temporary IPv6 reflexive access list named tcptraffic is deleted for the indicated session. Additional received traffic that matches the indicated session resets this value to 300 seconds.
evaluate udptraffic	Indicates the IPv6 reflexive access list named udptraffic is nested in the IPv6 access list named outbound.

Related Commands

Command	Description
clear ipv6 access-list	Resets the IPv6 access list match counters.
hardware statistics	Enables the collection of hardware statistics.
show ip access-list	Displays the contents of all current IP access lists.
show ip prefix-list	Displays information about a prefix list or prefix list entries.

Command	Description
show ipv6 prefix-list	Displays information about an IPv6 prefix list or IPv6 prefix list entries.

show mab

To display MAC Authentication Bypass (MAB) information, use the **show mab** command in privileged EXEC mode.

show mab {**all**| **interface** *type number*} **[detail]**

Syntax Description

all	Specifies all interfaces.
interface *type number*	Specifies a particular interface for which to display MAB information.
detail	(Optional) Displays detailed information.

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
12.2(33)SXI	This command was introduced.
15.2(2)T	This command was integrated into Cisco IOS Release 15.2(2)T.
15.2(3)T	This command was modified. The authorization status of the authentication result is displayed as SUCCESS or FAIL instead of AUTHORIZED or UNAUTHORIZED in the command output.

Usage Guidelines

Use the **show mab** command to display information about MAB ports and MAB sessions.

Examples

The following is sample output from the **show mab interface detail** command where a MAB session has been authorized:

```
Switch# show mab interface
FastEthernet1/0/1
 detail
MAB details for FastEthernet1/0/1
-----------------------------------
Mac-Auth-Bypass           = Enabled
Inactivity Timeout        = None
MAB Client List
---------------
Client MAC                = 000f.23c4.a401
MAB SM state              = TERMINATE
Auth Status               = SUCCESS
```

The table below describes the significant fields shown in the display.

Table 11: show mab Field Descriptions

Field	Description
Mac-Auth-Bypass	Specifies whether MAB is enabled or disabled.
Inactivity Timeout	The period of time of no activity after which the session is ended.
Client MAC	The MAC address of the client.
MAB SM state	The state of the MAB state machine. The possible values, from start to finish, are: • INITIALIZE--the state of the session when it is being initialized. • ACQUIRING--the state of the session when the MAC address is being obtained from the client. • AUTHORIZING--the state of the session when the MAC address is being authorized. • TERMINATE--the state of the session once an authorization result has been obtained.
Auth Status	The authorization status of the MAB session. The possible values are: • SUCCESS--the session has been successfully authorized. • FAIL--the session failed to be authorized.

Related Commands

Command	Description
show authentication interface	Displays information about the Auth Manager for a given interface.
show authentication registrations	Displays information about authentication methods registered with the Auth Manager.
show authentication sessions	Displays information about Auth Manager sessions.

show mac-address-table

To display the MAC address table, use the **show mac-address-table** command in privileged EXEC mode.

Cisco 2600, 3600, and 3700 Series Routers

show mac-address-table [**secure**| **self**| **count**][**address***macaddress*][**interface***type/number*]{**fa** | **gi***slot/port*}[**atm***slot/port*][**atm***slot/port*][**vlan***vlan-id*]

Catalyst 4500 Series Switches

show mac-address-table {**assigned**| **ip**| **ipx**| **other**}

Catalyst 6000/6500 Series Switches and 7600 Series Routers

show mac-address-table [**address** *mac-addr* [**all** | **interface** *type/number* | **module** *number* | **vlan** *vlan-id*] | **aging-time** [**vlan** *vlan-id*] | **count**[**module** *number* | **vlan** *vlan-id*] | **interface** *type/number* | **limit** [**vlan** *vlan-id* | **module** *number* | **interface** *type*] | **module** *number* | **multicast** [**count**] [**igmp-snooping** | **mld-snooping** | **user**][**vlan** *vlan-id*] | **notification** {**mac-move**[**counter**[**vlan**]]| **threshold**| **change**}[**interface** [*number*]] | **synchronize statistics** | **unicast-flood** | **vlan** *vlan-id* [**all**| **module** *number*]]

Syntax Description

secure	(Optional) Displays only the secure addresses.
self	(Optional) Displays only addresses added by the switch itself.
count	(Optional) Displays the number of entries that are currently in the MAC address table.
address *mac-addr*	(Optional) Displays information about the MAC address table for a specific MAC address. See the Usage Guidelines section for formatting information.
interface *type* / *number*	(Optional) Displays addresses for a specific interface. For the Catalyst 6500 and 6000 series switches, valid values are **atm**, **fastethernet**, **gigabitethernet**, and **port-channel**. For the Cisco 7600 series, valid values are **atm**,**ethernet**, **fastethernet**, **ge-wan**, **gigabitethernet**, **tengigabitethernet**, and **pos**.
fa	(Optional) Specifies the Fast Ethernet interface.
gi	(Optional) Specifies the Gigabit Ethernet interface.
slot / *port*	(Optional) Adds dynamic addresses to the module in slot 1 or 2. The slash mark is required.

atm *slot /port*	(Optional) Adds dynamic addresses to ATM module *slot /port* . Use 1 or 2 for the slot number. Use 0 as the port number. The slash mark is required.
vlan *vlan -id*	(Optional) Displays addresses for a specific VLAN. For the Cisco 2600, 3600, and 3700 series, valid values are from 1 to 1005; do not enter leading zeroes. Beginning with Cisco IOS Release 12.4(15)T, the valid VLAN ID range is from 1 to 4094. For the Catalyst 6500 and 6000 series switches and 7600 series, valid values are from 1 to 4094.
assigned	Specifies the assigned protocol entries.
ip	Specifies the IP protocol entries.
ipx	Specifies the IPX protocol entries.
other	Specifies the other protocol entries.
all	(Optional) Displays every instance of the specified MAC address in the forwarding table.
type / *number*	(Optional) Module and interface number.
module *number*	(Optional) Displays information about the MAC address table for a specific Distributed Forwarding Card (DFC) module.
aging-time	(Optional) Displays the aging time for the VLANs.
limit	Displays MAC-usage information.
multicast	Displays information about the multicast MAC address table entries only.
igmp-snooping	Displays the addresses learned by Internet Group Management Protocol (IGMP) snooping.
mld-snooping	Displays the addresses learned by Multicast Listener Discover version 2 (MLDv2) snooping.
user	Displays the manually entered (static) addresses.
notification mac-move	Displays the MAC-move notification status.
notification mac-move counter	(Optional) Displays the number of times a MAC has moved and the number of these instances that have occurred in the system.

vlan	(Optional) Specifies a VLAN to display. For the Catalyst 6500 and 6000 series switches and 7600 series, valid values are from 1 to 4094.
notification threshold	Displays the Counter-Addressable Memory (CAM) table utilization notification status.
notification change	Displays the MAC notification parameters and history table.
synchronize statistics	Displays information about the statistics collected on the switch processor or DFC.
unicast-flood	Displays unicast-flood information.

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
11.2(8)SA	This command was introduced.
11.2(8)SA3	This command was modified. The **aging-time** ,, **count**, **self** , and **vlan** *vlan-id* keywords and arguments were added.
11.2(8)SA5	This command was modified. The **atm***slot*/*port* keyword-argument pair was added.
12.2(2)XT	This command was modified. This command was implemented on Cisco 2600, 3600, and 3700 series routers.
12.1(8a)EW	This command was modified. This command was implemented on Catalyst 4500 series switches.
12.2(8)T	This command was integrated into Cisco IOS Release 12.2(8)T on Cisco 2600, 3600, and 3700 series routers.
12.2(11)T	This command was integrated into Cisco IOS Release 12.2(11)T.
12.2(14)SX	This command was modified. This command was implemented on the Supervisor Engine 720.

Release	Modification
12.2(17a)SX	This command was modified. For the Catalyst 6500 and 6000 series switches and 7600 series, this command was changed to support the following optional keywords and arguments: • **count module** *number* • **limit** [**vlan** *vlan-id* | **port** *number* | **interface** *interface-type* • **notification threshold** • **unicast-flood**
12.2(17d)SXB	This command was modified. Support for this command was added for the Supervisor Engine 2.
12.2(18)SXE	This command was modified. For the Catalyst 6500 and 6000 series switches and Cisco 7600 series, support was added for the **mld-snooping** keyword on the Supervisor Engine 720 only.
12.2(18)SXF	This command was modified. For the Catalyst 6500 and 6000 series switches and Cisco 7600 series, support was added for the **synchronizestatistics** keywords on the Supervisor Engine 720 only.
12.2(33)SRA	This command was modified. This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.4(15)T	This command was modified to extend the range of valid VLAN IDs to 1 to 4094 for specified platforms.
12.2(33)SXH	This command was modified. The **change** keyword was added.
12.2(33)SXI	This command was modified to add the **counter** keyword.
15.4(2)S	This command was implemented on the Cisco ASR 901 Series Aggregation Services Router.

Usage Guidelines

Cisco 2600, 3600, and 3700 Series Routers

The **show mac-address-table** command displays the MAC address table for the switch. Specific views can be defined by using the optional keywords and arguments. If more than one optional keyword is used, then all the conditions must be true for that entry to be displayed.

Catalyst 4500 Series Switches

For the MAC address table entries that are used by the routed ports, the routed port name, rather than the internal VLAN number, is displayed in the □vlan□ column.

Catalyst 6000 and 6500 Series Switches and Cisco 7600 Series Routers

If you do not specify a module number, the output of the **show mac-address-table** command displays information about the supervisor engine. To display information about the MAC address table of the DFCs, you must enter the module number or the **all** keyword.

The *mac-addr*value is a 48-bit MAC address. The valid format is H.H.H.

The interface *number* argument designates the module and port number. Valid values depend on the specified interface type and the chassis and module that are used. For example, if you specify a Gigabit Ethernet interface and have a 48-port 10/100BASE-T Ethernet module that is installed in a 13-slot chassis, valid values for the module number are from 1 to 13 and valid values for the port number are from 1 to 48.

The optional **module** *number* keyword-argument pair is supported only on DFC modules. The **module** *number*keyword-argument pair designate the module number.

Valid values for the *mac-group-address* argument are from 1 to 9.

The optional **count** keyword displays the number of multicast entries.

The optional **multicast** keyword displays the multicast MAC addresses (groups) in a VLAN or displays all statically installed or IGMP snooping-learned entries in the Layer 2 table.

The information that is displayed in the show mac-address-table unicast-flood command output is as follows:

- Up to 50 flood entries, shared across all the VLANs that are not configured to use the filter mode, can be recorded.
- The output field displays are defined as follows:
  - ALERT--Information is updated approximately every 3 seconds.
  - SHUTDOWN--Information is updated approximately every 3 seconds.

Note The information displayed on the destination MAC addresses is deleted as soon as the floods stop after the port shuts down.

- Information is updated each time that you install the filter. The information lasts until you remove the filter.

The dynamic entries that are displayed in the Learn field are always set to Yes.

The **show mac-address-table limit** command output displays the following information:

- The current number of MAC addresses.
- The maximum number of MAC entries that are allowed.
- The percentage of usage.

The show mac-address-table synchronize statistics command output displays the following information:

- Number of messages processed at each time interval.
- Number of active entries sent for synchronization.
- Number of entries updated, created, ignored, or failed.

Examples

The following is sample output from the**show mac-address-table** command:

```
Switch# show mac-address-table

Dynamic Addresses Count:                 9
Secure Addresses (User-defined) Count: 0
Static Addresses (User-defined) Count: 0
System Self Addresses Count:             41
Total MAC addresses:                     50
Non-static Address Table:
Destination Address  Address Type  VLAN  Destination Port
-------------------  ------------  ----  --------------------
0010.0de0.e289       Dynamic          1  FastEthernet0/1
0010.7b00.1540       Dynamic          2  FastEthernet0/5
0010.7b00.1545       Dynamic          2  FastEthernet0/5
0060.5cf4.0076       Dynamic          1  FastEthernet0/1
0060.5cf4.0077       Dynamic          1  FastEthernet0/1
0060.5cf4.1315       Dynamic          1  FastEthernet0/1
0060.70cb.f301       Dynamic          1  FastEthernet0/1
00e0.1e42.9978       Dynamic          1  FastEthernet0/1
00e0.1e9f.3900       Dynamic          1  FastEthernet0/1
```

Examples

The following example shows how to display the MAC address table entries that have a specific protocol type (in this case, “assigned”):

```
Switch# show mac-address-table protocol assigned

vlan   mac address     type    protocol  qos             ports
-----+---------------+--------+---------+---+--------------------------------
 200  0050.3e8d.6400  static   assigned  --  Switch
 100  0050.3e8d.6400  static   assigned  --  Switch
   5  0050.3e8d.6400  static   assigned  --  Switch
4092  0000.0000.0000  dynamic  assigned  --  Switch
   1  0050.3e8d.6400  static   assigned  --  Switch
   4  0050.3e8d.6400  static   assigned  --  Switch
4092  0050.f0ac.3058  static   assigned  --  Switch
4092  0050.f0ac.3059  dynamic  assigned  --  Switch
   1  0010.7b3b.0978  dynamic  assigned  --  Fa5/9
```

The following example shows the “other” output for the previous example:

```
Switch# show mac-address-table protocol other

Unicast Entries
 vlan   mac address     type        protocols               port
-------+---------------+--------+---------------------+--------------------
   1    0000.0000.0201   dynamic other                 FastEthernet6/15
   1    0000.0000.0202   dynamic other                 FastEthernet6/15
   1    0000.0000.0203   dynamic other                 FastEthernet6/15
   1    0000.0000.0204   dynamic other                 FastEthernet6/15
   1    0030.94fc.0dff    static ip,ipx,assigned,other  Switch
   2    0000.0000.0101   dynamic other                 FastEthernet6/16
   2    0000.0000.0102   dynamic other                 FastEthernet6/16
   2    0000.0000.0103   dynamic other                 FastEthernet6/16
   2    0000.0000.0104   dynamic other                 FastEthernet6/16
Fa6/1   0030.94fc.0dff    static ip,ipx,assigned,other  Switch
Fa6/2   0030.94fc.0dff    static ip,ipx,assigned,other  Switch
Multicast Entries
 vlan    mac address     type    ports
-------+---------------+-------+-----------------------------------------------
   1    ffff.ffff.ffff   system Switch,Fa6/15
   2    ffff.ffff.ffff   system Fa6/16
1002    ffff.ffff.ffff   system
1003    ffff.ffff.ffff   system
```

```
1004    ffff.ffff.ffff   system
1005    ffff.ffff.ffff   system
Fa6/1   ffff.ffff.ffff   system Switch,Fa6/1
Fa6/2   ffff.ffff.ffff   system Switch,Fa6/2
```

Examples

The following is sample output from the**show mac-address-table**command:

```
Switch# show mac-address-table

Dynamic Addresses Count:                9
Secure Addresses (User-defined) Count: 0
Static Addresses (User-defined) Count: 0
System Self Addresses Count:            41
Total MAC addresses:                    50
Non-static Address Table:
Destination Address  Address Type  VLAN  Destination Port
-------------------  ------------  ----  --------------------
0010.0de0.e289       Dynamic          1  FastEthernet0/1
0010.7b00.1540       Dynamic          2  FastEthernet0/5
0010.7b00.1545       Dynamic          2  FastEthernet0/5
0060.5cf4.0076       Dynamic          1  FastEthernet0/1
0060.5cf4.0077       Dynamic          1  FastEthernet0/1
0060.5cf4.1315       Dynamic          1  FastEthernet0/1
0060.70cb.f301       Dynamic          1  FastEthernet0/1
00e0.1e42.9978       Dynamic          1  FastEthernet0/1
00e0.1e9f.3900       Dynamic          1  FastEthernet0/1
```

Note In a distributed Encoded Address Recognition Logic (EARL) switch, the asterisk (*) indicates a MAC address that is learned on a port that is associated with this EARL.

The following example shows how to display the information about the MAC address table for a specific MAC address with a Supervisor Engine 720:

```
Switch# show mac-address-table address 001.6441.60ca

Codes: * - primary entry
  vlan   mac address     type    learn qos            ports
------+----------------+--------+-----+---+--------------------------
Supervisor:
*  ---  0001.6441.60ca    static  No    --  Router
```

The following example shows how to display MAC address table information for a specific MAC address with a Supervisor Engine 720:

```
Router# show mac-address-table address 0100.5e00.0128

Legend: * - primary entry
        age - seconds since last seen
        n/a - not available
  vlan   mac address     type    learn     age              ports
------+----------------+--------+-----+----------+--------------------------
Supervisor:
*   44  0100.5e00.0128    static  Yes          -   Fa6/44,Router
*    1  0100.5e00.0128    static  Yes          -   Router
Module 9:
*   44  0100.5e00.0128    static  Yes          -   Fa6/44,Router
*    1  0100.5e00.0128    static  Yes          -   Router
```

The following example shows how to display the currently configured aging time for all VLANs:

```
Switch# show mac-address-table aging-time

Vlan    Aging Time
```

```
----    ----------
*100     300
200     1000
```

The following example shows how to display the entry count for a specific slot:

```
Switch# show mac-address-table count module 1

MAC Entries on slot 1 :
Dynamic Address Count:                4
Static Address (User-defined) Count:  25
Total MAC Addresses In Use:           29
Total MAC Addresses Available:        131072
```

The following example shows how to display the information about the MAC address table for a specific interface with a Supervisor Engine 720:

```
Switch# show mac-address-table interface fastethernet 6/45

Legend: * - primary entry
        age - seconds since last seen
        n/a - not available
  vlan   mac address     type    learn     age              ports
------+----------------+--------+-----+----------+--------------------------
*   45  00e0.f74c.842d   dynamic  Yes          5   Fa6/45
```

Note A leading asterisk (*) indicates entries from a MAC address that was learned from a packet coming from an outside device to a specific module.

The following example shows how to display the limit information for a specific slot:

```
Switch# show mac-address-table limit vlan 1 module 1

vlan    switch   module    action      maximum  Total entries  flooding
-------+--------+---------+-----------+--------+--------------+------------
1          1        7       warning      500      0              enabled
1          1        11      warning      500      0              enabled
1          1        12      warning      500      0              enabled

Router#show mac-address-table limit vlan 1 module 2

vlan    switch   module    action      maximum  Total entries  flooding
-------+--------+---------+-----------+--------+--------------+------------
1          2         7      warning      500      0              enabled
1          2         9      warning      500      0              enabled
```

The following example shows how to display the MAC-move notification status:

```
Switch# show mac-address-table notification mac-move

MAC Move Notification: Enabled
```

The following example shows how to display the MAC move statistics:

```
Router# show mac-address-table notification mac-move counter

-------------------------------------------------------------------------------------
Vlan Mac Address From Mod/Port To Mod/Port Count
---- ----------------- ---------------------- ---------------------- ------------
1 00-01-02-03-04-01 2/3 3/1 10
20 00-01-05-03-02-01 5/3 5/1 20
```

The following example shows how to display the CAM-table utilization-notification status:

```
Router# show mac-address-table notification threshold

Status limit Interval
------------+-----------+-------------
enabled 1 120
```

The following example shows how to display the MAC notification parameters and history table:

```
Switch# show mac-address-table notification change

MAC Notification Feature is Disabled on the switch
MAC Notification Flags For All Ethernet Interfaces :
----------------------------------------------------
Interface                   MAC Added Trap MAC Removed Trap
--------------------        -------------- ----------------
```

The following example shows how to display the MAC notification parameters and history table for a specific interface:

```
Switch# show mac-address-table notification change interface gigabitethernet5/2

MAC Notification Feature is Disabled on the switch
Interface                   MAC Added Trap MAC Removed Trap
--------------------        -------------- ----------------
GigabitEthernet5/2          Disabled       Disabled
```

The following example shows how to display unicast-flood information:

```
Switch# show mac-address-table unicast-flood

> > Unicast Flood Protection status: enabled
> >
> > Configuration:
> > vlan Kfps action timeout
> > ------+----------+-----------------+----------
> > 2 2 alert none
> >
> > Mac filters:
> > No. vlan source mac addr. installed
> > on time left (mm:ss)
> >
> >-----+------+-----------------+------------------------------+------------------
> >
> > Flood details:
> > Vlan source mac addr. destination mac addr.
> >
> >------+---------------+--------------------------------------------------
> > 2 0000.0000.cafe 0000.0000.bad0, 0000.0000.babe,
> > 0000.0000.bac0
> > 0000.0000.bac2, 0000.0000.bac4,
> > 0000.0000.bac6
> > 0000.0000.bac8
> > 2 0000.0000.caff 0000.0000.bad1, 0000.0000.babf,
> > 0000.0000.bac1
> > 0000.0000.bac3, 0000.0000.bac5,
> > 0000.0000.bac7
> > 0000.0000.bac9
```

The following example shows how to display the information about the MAC-address table for a specific VLAN:

```
Switch#show mac-address-table vlan 100

vlan   mac address     type    protocol  qos             ports
-----+---------------+--------+---------+---+--------------------------------
```

```
 100  0050.3e8d.6400  static   assigned  --  Router
 100  0050.7312.0cff  dynamic        ip  --  Fa5/9
 100  0080.1c93.8040  dynamic        ip  --  Fa5/9
 100  0050.3e8d.6400  static        ipx  --  Router
 100  0050.3e8d.6400  static      other  --  Router
 100  0100.0cdd.dddd  static      other  --  Fa5/9,Router,Switch
 100  00d0.5870.a4ff  dynamic        ip  --  Fa5/9
 100  00e0.4fac.b400  dynamic        ip  --  Fa5/9
 100  0100.5e00.0001  static         ip  --  Fa5/9,Switch
 100  0050.3e8d.6400  static         ip  --  Router
```

The following example shows how to display the information about the MAC address table for MLDv2 snooping:

```
Switch# show mac-address-table multicast mld-snooping

vlan mac address type learn qos ports
-----+---------------+--------+-----+---+--------------------------------
--- 3333.0000.0001 static Yes - Switch,Stby-Switch
--- 3333.0000.000d static Yes - Fa2/1,Fa4/1,Router,Switch
--- 3333.0000.0016 static Yes - Switch,Stby-Switch
```

The table below describes the significant fields shown in the displays.

Table 12: show mac-address-table Field Descriptions

Field	Description
Dynamic Addresses Count	Total number of dynamic addresses in the MAC address table.
Secure Addresses (User-defined) Count	Total number of secure addresses in the MAC address table.
Static Addresses (User-defined) Count	Total number of static addresses in the MAC address table.
System Self Addresses Count	Total number of addresses in the MAC address table.
Total MAC addresses	Total MAC addresses in the MAC address table.
Destination Address	Destination addresses present in the MAC address table.
Address Type	Address type: static or dynamic.
VLAN	VLAN number.
Destination Port	Destination port information present in the MAC address table.
mac address	The MAC address of the entry.
protocol	Protocol present in the MAC address table.

Field	Description
qos	Quality of service associated with the MAC address table.
ports	Port type.
age	The time in seconds since last occurrence of the interface.
Aging Time	Aging time for entries.
module	Module number.
action	Type of action.
flooding	Status of the flooding.

Related Commands

Command	Description
clear mac-address-table	Deletes entries from the MAC address table.
mac-address-table aging-time	Configures the aging time for entries in the Layer 2 table.
mac-address-table limit	Enables MAC limiting.
mac-address-table notification mac-move	Enables MAC-move notification.
mac-address-table static	Adds static entries to the MAC address table or configures a static MAC address with IGMP snooping disabled for that address.
mac-address-table synchronize	Synchronizes the Layer 2 MAC address table entries across the PFC and all the DFCs.
show mac-address-table static	Displays only static MAC address table entries.

show parameter-map type consent through show users

show port-security

To display information about the port-security setting in EXEC command mode, use the **show port-security** command.

show port-security [**interface** *interface interface-number*]

show port-security [**interface** *interface interface-number*] {**address**| **vlan**}

Syntax Description

interface *interface*	(Optional) Specifies the interface type; possible valid values are **ethernet**, **fastethernet**, **gigabitethernet**, and **longreachethernet**.
interface-number	Interface number. Valid values are 1 to 6.
address	Displays all the secure MAC addresses that are configured on all the switch interfaces or on a specified interface with aging information for each address.
vlan	Virtual LAN.

Command Default

This command has no default settings.

Command Modes

EXEC

Command History

Release	Modification
12.2(14)SX	Support for this command was introduced on the Supervisor Engine 720.
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was extended to Release 12.2(17d)SXB.
12.2(18)SXE	The **address** keyword was added to display the maximum number of MAC addresses configured per VLAN on a trunk port on the Supervisor Engine 720 only.
12.2(33)SRA	This command was integrated into Cisco IOS release 12.(33)SRA.

Usage Guidelines

The **vlan** keyword is supported on trunk ports only and displays per-Vlan maximums set on a trunk port.

The *interface-number* argument designates the module and port number. Valid values for *interface-number* depend on the specified interface type and the chassis and module that are used. For example, if you specify a Gigabit Ethernet interface and have a 48-port 10/100BASE-T Ethernet module that is installed in a 13-slot chassis, valid values for the module number are from 1 to 13 and valid values for the port number are from 1 to 48.

Examples

This example shows the output from the **show port-security** command when you do not enter any options:

```
Router# show port-security
Secure Port      MaxSecureAddr  CurrentAddr  SecurityViolation  Security
Action
                     (Count)        (Count)      (Count)
------------------------------------------------------------------------------

     Fa5/1           11            11            0            Shutdown
     Fa5/5           15            5             0            Restrict
     Fa5/11          5             4             0            Protect
------------------------------------------------------------------------------

Total Addresses in System: 21
Max Addresses limit in System: 128
Router#
```

This example shows how to display port-security information for a specified interface:

```
Router# show port-security interface fastethernet 5/1
Port Security: Enabled
Port status: SecureUp
Violation mode: Shutdown
Maximum MAC Addresses: 11
Total MAC Addresses: 11
Configured MAC Addresses: 3
Aging time: 20 mins
Aging type: Inactivity
SecureStatic address aging: Enabled
Security Violation count: 0
Router#
```

This example show how to display all the secure MAC addresses that are configured on all the switch interfaces or on a specified interface with aging information for each address:

```
Router# show port-security address
Default maximum: 10
VLAN Maximum Current
1    5       3
2    4       4
3    6       4
Router#
```

Related Commands

Command	Description
clear port-security	Deletes configured secure MAC addresses and sticky MAC addresses from the MAC address table.

show privilege

To display your current level of privilege, use the **show privilege** command in EXEC mode.

show privilege

Syntax Description

This command has no arguments or keywords.

Command Modes

EXEC

Command History

Release	Modification
10.3	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS release 12.(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.

Examples

The following example shows sample output from the **show privilege** command. The current privilege level is 15.

```
Router# show privilege
Current privilege level is 15
```

Related Commands

Command	Description
enable password	Sets a local password to control access to various privilege levels.
enable secret	Specifies an additional layer of security over the **enable password** command.

show radius statistics

To display the RADIUS statistics for accounting and authentication packets, use the **show radius statistics** command in user EXEC or privileged EXEC mode.

show radius statistics

Syntax Description

This command has no arguments or keywords.

Command Modes

User EXEC (>) Privileged EXEC (#)

Command History

Release	Modification
12.1(3)T	This command was introduced.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.
15.1(1)S	This command was integrated into Cisco IOS Release 15.1(1)S. Support for the CISCO-RADIUS-EXT-MIB was added.
15.1(4)M	This command was modified. Support for the CISCO-RADIUS-EXT-MIB was added.

Usage Guidelines

The values in queue related fields (Maximum inQ length:, Maximum waitQ length:, and Maximum doneQ length:) of the **show radius statistics** command is shown as NA in vEWLC, as these queue related information is applicable only in IOS.

Examples

The following is sample output from the **show radius statistics** command:

```
Router# show radius statistics
                                Auth.      Acct.       Both
Maximum inQ length:              NA         NA         1
Maximum waitQ length:            NA         NA         2
Maximum doneQ length:            NA         NA         1
Total responses seen:            33         67         100
Packets with responses:          33         67         100
Packets without responses:       0          0          0
Access Rejects           :       0
Average response delay(ms) :     1331       124        523
Maximum response delay(ms):      5720       4800       5720
Number of Radius timeouts:       8          2          10
Duplicate ID detects:            0          0           0
Buffer Allocation Failures:      0          0           0
Maximum Buffer Size (bytes):     156        327         327
```

```
Malformed Responses        :     0          0          0
Bad Authenticators         :     0          0          0
Source Port Range: (2 ports only)
1645 - 1646
Last used Source Port/Identifier:
1645/33
1646/69
```

The table below describes significant fields shown in the display.

Table 13: show radius statistics Field Descriptions

Field	Description
Auth.	Statistics for authentication packets.
Acct.	Statistics for accounting packets.
Both	Combined statistics for authentication and accounting packets.
Maximum inQ length	Maximum number of entries allowed in the queue that holds the RADIUS messages not yet sent.
Maximum waitQ length	Maximum number of entries allowed in the queue that holds the RADIUS messages that have been sent and are waiting for a response.
Maximum doneQ length	Maximum number of entries allowed in the queue that holds the messages that have received a response and will be forwarded to the code that is waiting for the messages.
Total responses seen	Number of RADIUS responses seen from the server. In addition to the expected packets, the number includes repeated packets and packets that do not have a matching message in the waitQ.
Packets with responses	Number of packets that received a response from the RADIUS server.
Packets without responses	Number of packets that never received a response from any RADIUS server.
Access Rejects	Number of times access requests have been rejected by a RADIUS server.
Average response delay	Average time, in milliseconds (ms), from when the packet was first transmitted to when it received a response. If the response timed out and the packet was sent again, this value includes the timeout. If the packet never received a response, this value is not included in the average.

Field	Description
Maximum response delay	Maximum delay, in ms, observed while gathering the average response delay information.
Number of RADIUS timeouts	Number of times a server did not respond and the RADIUS server re-sent the packet.
Duplicate ID detects	RADIUS has a maximum of 255 unique IDs. In some instances, there can be more than 255 outstanding packets. When a packet is received, the doneQ is searched from the oldest entry to the youngest. If the IDs are the same, further techniques are used to see if this response matches this entry. If this response does not match, the duplicate ID detect counter is increased.
Buffer Allocation Failures	Number of times the buffer failed to get allocated.
Maximum Buffer Size (bytes)	Displays the maximum size of the buffer.
Malformed Responses	Number of corrupted responses, mostly due to bad authenticators.
Bad Authenticators	Number of authentication failures due to shared secret mismatches.
Source Port Range: (2 ports only)	Displays the port numbers.
Last used Source Port/Identifier	Ports that were last used by the RADIUS server for authentication.

The fields in the output are mapped to Simple Network Management Protocol (SNMP) objects in the CISCO-RADIUS-EXT-MIB and are used in SNMP reporting. The first line of the report is mapped to the CISCO-RADIUS-EXT-MIB as follows:

- Maximum inQ length maps to creClientTotalMaxInQLength
- Maximum waitQ length maps to creClientTotalMaxWaitQLength
- Maximum doneQ length maps to creClientTotalMaxDoneQLength

The field "Both" in the output can be derived from the authentication and accounting MIB objects. The calculation formula for each field, as displayed in the output, is given in the table below.

Table 14: Calculation Formula for the Both field in show radius statistics Command Output

show radius statistics Command Output Data	Calculation Formula for the Both Field
Maximum inQ length	creClientTotalMaxInQLength

show radius statistics Command Output Data	Calculation Formula for the Both Field
Maximum waitQ length	creClientTotalWaitQLength
Maximum doneQ length	creClientDoneQLength
Total responses seen	creAuthClientTotalResponses + creAcctClientTotalResponses
Packets with responses	creAuthClientTotalPacketsWithResponses + creAcctClientTotalPacketsWithResponses
Packets without responses	creAuthClientTotalPacketsWithoutResponses + creAcctClientTotalPacketsWithoutResponses
Access Rejects	creClientTotalAccessRejects
Average response delay	creClientAverageResponseDelay
Maximum response delay	MAX(creAuthClientMaxResponseDelay, creAcctClientMaxResponseDelay)
Number of RADIUS timeouts	creAuthClientTimeouts + creAcctClientTimeouts
Duplicate ID detects	creAuthClientDupIDs + creAcctClientDupIDs
Buffer Allocation Failures	creAuthClientBufferAllocFailures + creAcctClientBufferAllocFailures
Maximum Buffer Size (bytes)	MAX(creAuthClientMaxBufferSize, creAcctClientMaxBufferSize)
Malformed Responses	creAuthClientMalformedResponses + creAcctClientMalformedResponses
Bad Authenticators	creAuthClientBadAuthenticators + creAcctClientBadAuthenticators

Mapping the following set of objects listed in the CISCO-RADIUS-EXT-MIB map to fields displayed by the **show radius statistics**command is straightforward. For example, the creClientLastUsedSourcePort field corresponds to the Last used Source Port/Identifier portion of the report, creAuthClientBufferAllocFailures corresponds to the Buffer Allocation Failures for authentication packets, creAcctClientBufferAllocFailure corresponds to the Buffer Allocation Failures for accounting packets, and so on.

- creClientTotalMaxInQLength
- creClientTotalMaxWaitQLength
- creClientTotalMaxDoneQLength
- creClientTotalAccessRejects

- creClientTotalAverageResponseDelay
- creClientSourcePortRangeStart
- creClientSourcePortRangeEnd
- creClientLastUsedSourcePort
- creClientLastUsedSourceId
- creAuthClientBadAuthenticators
- creAuthClientUnknownResponses
- creAuthClientTotalPacketsWithResponses
- creAuthClientBufferAllocFailures
- creAuthClientTotalResponses
- creAuthClientTotalPacketsWithoutResponses
- creAuthClientAverageResponseDelay
- creAuthClientMaxResponseDelay
- creAuthClientMaxBufferSize
- creAuthClientTimeouts
- creAuthClientDupIDs
- creAuthClientMalformedResponses
- creAuthClientLastUsedSourceId
- creAcctClientBadAuthenticators
- creAcctClientUnknownResponses
- creAcctClientTotalPacketsWithResponses
- creAcctClientBufferAllocFailures
- creAcctClientTotalResponses
- creAcctClientTotalPacketsWithoutResponses
- creAcctClientAverageResponseDelay
- creAcctClientMaxResponseDelay
- creAcctClientMaxBufferSize
- creAcctClientTimeouts
- creAcctClientDupIDs
- creAcctClientMalformedResponses
- creAcctClientLastUsedSourceId

To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs .

Related Commands

Command	Description
radius-server host	Specifies a RADIUS server host.
radius-server retransmit	Specifies how many times the Cisco IOS software searches the list of RADIUS server hosts before giving up.
radius-server timeout	Sets the interval for which a router waits for a server host to reply.

show ssh

To display the status of Secure Shell (SSH) server connections on the router, use the **show ssh** command in user EXEC or privileged EXEC mode.

show ssh vty [*ssh-number*]

Syntax Description

vty	Displays virtual terminal line (VTY) connection details.
ssh-number	(Optional) The number of SSH server connections on the router. Range is from 0 to 1510. The default value is 0.

Command Modes

User Exec (>) Privileged EXEC (#)

Command History

Release	Modification
12.1(15)T	This command was introduced.
12.2(33)SRA	This command was modified. It was integrated into Cisco IOS Release 12.2(33)SRA.
12.2(33)SXI	This command was modified. It was integrated into Cisco IOS Release 12.2(33)SXI.
Cisco IOS XE Release 2.1	This command was modified. It was integrated into Cisco IOS XE Release 2.1.

Usage Guidelines

Use the **show ssh** command to display the status of the SSH connections on your router. This command does not display any SSH configuration data. Use the **show ip ssh** command for SSH configuration information such as timeouts and retries.

Examples

The following is sample output from the **show ssh** command with SSH enabled:

```
Router# show ssh
Connection     Version      Encryption     State                Username
0               1.5         3DES           Session Started       guest
```

The table below describes the significant fields shown in the display.

Table 15: show ssh Field Descriptions

Field	Description
Connection	Number of SSH connections on the router.
Version	Version number of the SSH terminal.
Encryption	Type of transport encryption.
State	The status of SSH connection to indicate if the session has started or stopped.
Username	Uesrname to log in to the SSH.

Related Commands

Command	Description
show ip ssh	Displays version and configuration data for SSH.

showvlangroupthroughswitchportport-security violation

single-connection

To enable all TACACS packets to be sent to the same server using a single TCP connection, use the **single-connection**command in TACACS+ server configuration mode. To disable this feature, use the **no** form of this command.

single-connection

no single-connection

Syntax Description

This command has no arguments or keywords.

Command Default

TACACS packets are not sent on a single TCP connection.

Command Modes

TACACS+ server configuration (config-server-tacacs)

Command History

Release	Modification
Cisco IOS XE Release 3.2S	This command was introduced.

Usage Guidelines

Use the **single-connection** command to multiplex all TACACS packets to the same server over a single TCP connection.

Examples

The following example shows how to multiplex all TACACS packets over a single TCP connection to the TACACS server:

```
Router (config)# tacacs server server1
Router(config-server-tacacs)# single-connection
```

Related Commands

Command	Description
tacacs server	Configures the TACACS+ server for IPv6 or IPv4 and enters config server tacacs mode.

source

To sequentially number the source address, use the **source** command in IKEv2 FlexVPN client profile configuration mode. To remove the sequence, use the **no** form of this command.

source *sequence interface* **track** *track-number*

no source *sequence*

Syntax Description

sequence	Assigns a sequence number.
interface	Interface type and number.
track *track-number*	Tracks the source address with a track number.

Command Default

The track status is always up.

Command Modes

IKEv2 FlexVPN client profile configuration (config-ikev2-flexvpn)

Command History

Release	Modification
15.2(1)T	This command was introduced.
Cisco IOS XE Release 3.7S	This command was integrated into Cisco IOS XE Release 3.7S.

Usage Guidelines

Before you enable this command, you must configure the **crypto ikev2 client flexvpn** command.

The source address is the one with the lowest sequence number for which track object is in the UP state only if the source IP address is available in the tunnel VRF of the tunnel interface. If a session is UP for a source, the source is said to be a "Current active source".

Note Any changes to this command terminates the active session.

Examples

The following example shows how to define a static peer:

```
Router(config)# crypto ikev2 client flexvpn client1
Router(config-ikev2-flexvpn)# source 1 Ethernet 0/1 track 11
```

Related Commands

Command	Description
crypto ikev2 client flexvpn	Defines an IKEv2 FlexVPN client profile.

ssh

To start an encrypted session with a remote networking device, use the **ssh** command in user EXEC or privileged EXEC mode.

ssh [**-v** {**1**| **2**}| **-c** {**aes128-ctr**| **aes192-ctr**| **aes256-ctr**| **aes128-cbc**| **3des**| **aes192-cbc**| **aes256-cbc**}| **-l** *user-id*| **-l** *user-id*:*vrf-name number ip-address ip-address*| **-l** *user-id*:*rotary number ip-address*| **-m** {**hmac-md5-128**| **hmac-md5-96**| **hmac-sha1-160**| **hmac-sha1-96**}| **-o numberofpasswordprompts** *n* | **-p** *port-num*] {*ip-addr* |*hostname* [**command**| **-vrf**]

Syntax Description

-v	(Optional) Specifies the version of Secure Shell (SSH) to use to connect to the server. • **1**--Connects using SSH Version 1. • **2**--Connects using SSH Version 2.
-c {aes128-ctr | aes192-ctr | aes256-ctr | aes128-cbc | 3des | aes192-cbc | aes256-cbc}	(Optional) Specifies the crypto algorithms Data Encryption Standard (DES), Triple DES (3DES), or Advanced Encryption Standard (AES) to use for encrypting data. AES algorithms are **aes128-ctr**, **aes192-ctr**, **aes256-ctr**, **aes128-cbc**, **aes192-cbc**, and **aes256-cbc**. • To use SSH Version 1, you must have an encryption image running on the device. Cisco software images that include encryption have the designators “k8” (DES) or “k9” (3DES). • SSH Version 2 supports only the following crypto algorithms: **aes128-ctr**, **aes192-ctr**, **aes256-ctr**, **aes128-cbc**, **aes192-cbc**, **aes256-cbc**, and **3des**. SSH Version 2 is supported only in 3DES images. • If you do not specify the **-c** keyword, during negotiation the remote networking device sends all the supported crypto algorithms. • If you configure the**-c** keyword and the server does not support the argument that you have shown (**des**, **3des**, **aes128-ctr**, **aes192-ctr**, **aes256-ctr**, **aes128-cbc**, **aes192-cbc**, or **aes256-cbc**), the remote networking device closes the connection.

-l *user-id*	(Optional) Specifies the user ID to use when logging in on the remote networking device running the SSH server. If no user ID is specified, the default is the current user ID.
-l *user-id* **:** *vrf-namenumber ip-address*	(Optional) Specifies the user ID when configuring reverse SSH by including port information in the *user-id* field. • **:** --Signifies that a VRF name, number, and terminal IP address will follow the user ID. • *vrf-name* --User-specific VRF. • *number* --Terminal or auxiliary line number. • *ip-address* --IP address of the terminal server. **Note** The *user-id* argument and **:** *number ip-address* delimiter and arguments must be used if you are configuring reverse SSH by including port information in the *user-id* field (a method that is easier than the longer method of listing each terminal or auxiliary line on a separate command configuration line).The VRF name allows SSH to establish sessions with hosts whose addresses are in a VRF instance.
-l *user-id* **:rotary** *number ip-address*	(Optional) Specifies that the terminal lines are to be grouped under the rotary group for reverse SSH. • **:rotary** --Signifies that a rotary group number and terminal IP address will follow. • *number* --Terminal or auxiliary line number. • *ip-address* --IP address of the terminal server. **Note** The *user-id* argument and the **:rotary** *number ip-address* delimiter and arguments must be used if you are configuring reverse SSH by including rotary information in the *user-id* field (a process that is easier than the longer process of listing each terminal or auxiliary line on a separate command configuration line).

-m {**hmac-md5-128** | **hmac-md5-96** | **hmac-sha1-160** | **hmac-sha1-96**}	(Optional) Specifies a Hashed Message Authentication Code (HMAC) algorithm. • SSH Version 1 does not support HMACs. • If you do not specify the **-m** keyword, the remote device sends all the supported HMAC algorithms during negotiation. If you specify the **-m** keyword and the server does not support the algorithm that you have shown (**hmac-md5-128**, **hmac-md5-96**, **hmac-sha1-160**, and **hmac-sha1-96**), the remote device closes the connection.
-o numberofpasswordprompts *n*	(Optional) Specifies the number of password prompts that the software generates before ending the session. The SSH server may also apply a limit to the number of attempts. If the limit set by the server is less than the value specified by the **-o numberofpasswordprompts** keyword, the limit set by the server takes precedence. The default is 3 attempts, which is also the Cisco IOS SSH server default. The range of values is from 1 to 5.
-p *port-num*	(Optional) Indicates the desired port number for the remote host. The default port number is 22.
ip-addr | *hostname*	Specifies the IPv4 or IPv6 address or hostname of the remote networking device.
command	(Optional) Specifies the Cisco IOS command that you want to run on the remote networking device. If the remote host is not running Cisco IOS software, this may be any command recognized by the remote host. If the command includes spaces, you must enclose the command in quotation marks.
-vrf	(Optional) Adds VRF awareness to SSH client-side functionality. The VRF instance name in the client is provided with the IP address to look up the correct routing table and establish a connection.

Command Modes

User EXEC (>)

Privileged EXEC (#)

Command History

Release	Modification
12.1(3)T	This command was introduced.
12.2(8)T	This command was modified. Support for IPv6 addresses was added.
12.0(21)ST	This command was modified. IPv6 address support was integrated into Cisco IOS Release 12.0(21)ST.
12.0(22)S	This command was modified. IPv6 address support was integrated into Cisco IOS Release 12.0(22)S.
12.2(14)S	This command was modified. IPv6 address support was integrated into Cisco IOS Release 12.2(14)S.
12.2(17a)SX	This command was integrated into Cisco IOS Release 12.2(17a)SX.
12.3(7)T	This command was modified to include Secure Shell Version 2 support. The **-c** keyword was expanded to include support for the following cryptic algorithms: aes128-cbc, aes192-cbc, and aes256-cbc. The **-m** keyword was added, with the following algorithms: hmac-md5, hmac-md5-96, hmac-sha1, and hmac-sha1-96. The **-v**keyword and **1** and **2** arguments were added.
12.2(25)S	This command was integrated into Cisco IOS Release 12.2(25)S.
12.3(11)T	The **-l** *userid***:***number ip-address and* **-l** *userid***:rotary** *number ip-address* keyword and argument options were added.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.2(25)SG	This command was integrated into Cisco IOS Release 12.2(25)SG.
12.3(7)JA	This command was integrated into Cisco IOS Release 12.3(7)JA.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
12.0(32)SY	This command was integrated into Cisco IOS Release 12.0(32)SY.
12.2(33)SXH	This command was integrated into Cisco IOS Release 12.2(33)SXH.
12.4(20)T	The**-l** *userid***:***vrfname number ip-address* keyword and argument options were added
Cisco IOS XE Release 2.4	This command was integrated into Cisco IOS XE Release 2.4.
15.3(2)S	This command was modified. SSH version 2 supports counter-based AES encryption for 128-, 192-, and 256-bit key length.
Cisco IOS XE Release 3.9S	This command was modified. SSH version 2 supports counter-based AES encryption for 128-, 192-, and 256-bit key length.

Release	Modification
15.2(2)SA2	This command was implemented on the Cisco ME 2600X Series Ethernet Access Switches.

Usage Guidelines

The **ssh** command enables a Cisco device to make a secure, encrypted connection to another Cisco device running an SSH Version 1 or Version 2 server. This connection provides functionality that is similar to that of an outbound Telnet connection except that the connection is encrypted. With authentication and encryption, the SSH client allows for a secure communication over an insecure network.

Note SSH Version 1 is supported on DES (56-bit) and 3DES (168-bit) data encryption software images only. In DES software images, DES is the only encryption algorithm available. In 3DES software images, both DES and 3DES encryption algorithms are available.

- SSH Version 2 supports only the following crypto algorithms: aes128-ctr, aes192-ctr, aes256-ctr, aes128-cbc, aes192-cbc, and aes256-cbc. SSH Version 2 is supported only in 3DES images.
- SSH Version 1 does not support HMAC algorithms.

Examples

The following example illustrates the initiation of a secure session between the local device and the remote host HQhost to run the **show users** command. The result of the **show users** command is a list of valid users who are logged in to HQhost. The remote host will prompt for the adminHQ password to authenticate the user adminHQ. If the authentication step is successful, the remote host will return the result of the **show users** command to the local device and will then close the session.

```
Device# ssh -l adminHQ HQhost "show users"
```

The following example illustrates the initiation of a secure session between the local device and the edge device HQedge to run the **show ip route** command. In this example, the edge device prompts for the adminHQ password to authenticate the user. If the authentication step is successful, the edge device will return the result of the **show ip route** command to the local device.

```
Device#ssh -l adminHQ HQedge "show ip route"
```

The following example shows the SSH client using 3DES to initiate a secure remote command connection with the HQedge device. The SSH server running on HQedge authenticates the session for the admin7 user on the HQedge device using standard authentication methods. The HQedge device must have SSH enabled for authentication to work.

```
Device# ssh -l admin7 -c 3des -o numberofpasswordprompts 5 HQedge
```

The following example shows a secure session between the local device and a remote IPv6 device with the address 2001:DB8:0000:FFFF:FFFF:FFFF:FFFF:FFFF to run the **show running-config** command. In this example, the remote IPv6 device prompts for the adminHQ password to authenticate the user. If the authentication step is successful, the remote IPv6 device will return the result of the **show running-config** command to the local device and will then close the session.

```
Device# ssh -l adminHQ 2001:DB8:0000:FFFF:FFFF:FFFF:FFFF:FFFF "show running-config"
```

The following example shows an SSH Version 2 session using the crypto algorithm aes256-ctr and an HMAC of hmac-sha1-96. The user ID is user2 and the IP address is 10.76.82.24.

```
Device# ssh -v 2 -c aes256-ctr -m hmac-sha1-96 -l user2 10.76.82.24
```

The following example shows how to configure reverse SSH on the SSH client:

```
Device# ssh -l lab:1 device.example.com
```

The following command shows how to connect reverse SSH to the first free line in the rotary group:

```
Device# ssh -l lab:rotary1 device.example.com
```

Related Commands

Command	Description
ip ssh	Configures SSH server control parameters on the device.
show ip route	Displays the contents of the routing table.
show ip ssh	Displays the version and configuration data for SSH.
show running-config	Displays the contents of the running configuration file.
show ssh	Displays the status of SSH server connections.
show users	Displays information about the active lines on a device.

switchport port-security

To enable port security on an interface, use the **switchport port-security** command in interface configuration mode. To disable port security, use the **no** form of this command.

switchport port-security

no switchport port-security

Syntax Description

This command has no keywords or arguments.

Command Default

Disabled

Command Modes

Interface configuration

Command History

Release	Modification
12.2(14)SX	Support for this command was introduced on the Supervisor Engine 720.
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was extended to Release 12.2(17d)SXB.
12.2(18)SXE	This command was changed as follows on the Supervisor Engine 720: • With Release 12.2(18)SXE and later releases, port security is supported on nonnegotiating trunks. • With Release 12.2(18)SXE and later releases, port security is supported on IEEE 802.1Q tunnel ports.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.

Usage Guidelines

Follow these guidelines when configuring port security:

- With Release 12.2(18)SXE and later releases, port security is supported on nonnegotiating trunks.
- With Release 12.2(18)SXE and later releases, port security is supported on IEEE 802.1Q tunnel ports.
- Port security does not support Switch Port Analyzer (SPAN) destination ports.
- Port security does not support EtherChannel port-channel interfaces.
- With Cisco IOS Release 12.2(33)SXH and later releases, you can configure port security and 802.1X port-based authentication on the same port. With releases earlier than Cisco IOS Release 12.2(33)SXH:
  - If you try to enable 802.1X port-based authentication on a secure port, an error message appears and 802.1X port-based authentication is not enabled on the port.

- If you try to enable port security on a port configured for 802.1X port-based authentication, an error message appears and port security is not enabled on the port.

Examples

This example shows how to enable port security:

```
Device(config-if)# switchport port-security
```

This example shows how to disable port security:

```
Device(config-if)# no switchport port-security
```

Related Commands

Command	Description
show port-security	Displays information about the port-security setting.

tacacs-server administration through title-color

tacacs server

To configure the TACACS+ server for IPv6 or IPv4 and enter TACACS+ server configuration mode, use the **tacacs server**command in global configuration mode. To remove the configuration, use the **no** form of this command.

tacacs server *name*

no tacacs server

Syntax Description

name	Name of the private TACACS+ server host.

Command Default

No TACACS+ server is configured.

Command Modes

Global configuration (config)

Command History

Release	Modification
Cisco IOS XE Release 3.2S	This command was introduced.

Usage Guidelines

The **tacacs server** command configures the TACACS server using the *name* argument and enters TACACS+ server configuration mode. The configuration is applied once you have finished configuration and exited TACACS+ server configuration mode.

Examples

The following example shows how to configure the TACACS server using the name server1 and enter TACACS+ server configuration mode to perform further configuration:

```
Router(config)# tacacs server server1
Router(config-server-tacacs)#
```

Related Commands

Command	Description
address ipv6 (TACACS+)	Configures the IPv6 address of the TACACS+ server.
key (TACACS+)	Configures the per-server encryption key on the TACACS+ server.
port (TACACS+)	Specifies the TCP port to be used for TACACS+ connections.

Command	Description
send-nat-address (TACACS+)	Sends a client's post-NAT address to the TACACS+ server.
single-connection **(TACACS+)**	Enables all TACACS packets to be sent to the same server using a single TCP connection.
timeout **(TACACS+)**	Configures the time to wait for a reply from the specified TACACS server.

tacacs-server host

To specify a TACACS+ host, use the **tacacs-server host** command in global configuration mode. To delete the specified name or address, use the **no** form of this command.

tacacs-server host {*hostname* | *host-ip-address*} [**key** *string*] [**[nat]** [**port** [*integer*]] **[single-connection]** [**timeout** [*integer*]]]

no tacacs-server host {*hostname* | *host-ip-address*}

Syntax Description

hostname	Name of the host.
host-ip-address	IP address of the host.
key	(Optional) Specifies an authentication and encryption key. This must match the key used by the TACACS+ daemon. Specifying this key overrides the key set by the global command **tacacs-server key** for this server only.
string	(Optional) Character string specifying authentication and encryption key. The *string* can be **0** (specifies that an unencrypted key follows), **6** (specifies that an advanced encryption scheme [AES] encrypted key follows), **7** (specifies that a hidden key follows), or a line specifying the unencrypted (clear-text) server key.
nat	(Optional) Port Network Address Translation (NAT) address of the client is sent to the TACACS+ server.
port	(Optional) Specifies a TACACS+ server port number. This option overrides the default, which is port 49.
integer	(Optional) Port number of the server. Valid port numbers range from 1 through 65535.
single-connection	(Optional) Maintains a single open connection between the router and the TACACS+ server.
timeout	(Optional) Specifies a timeout value. This overrides the global timeout value set with the **tacacs-server timeout** command for this server only.
integer	(Optional) Integer value, in seconds, of the timeout interval. The value is from 1 through 1000.

Command Default No TACACS+ host is specified.

Command Modes Global configuration (config)

Command History

Release	Modification
10.0	This command was introduced.
12.1(11), 12.2(6)	This command was modified. The **nat** keyword was added.
12.2(8)T	This command was modified. The **nat** keyword was added.
12.2(33)SRA	This command was integrated into Cisco IOS release 12.(33)SRA.
12.2SX	This command is supported in the Cisco IOS Release 12.2SX train. Support in a specific 12.2SX release of this train depends on your feature set, platform, and platform hardware.
15.4(1)T	This command was modified. The **6** keyword was added.

Usage Guidelines You can use multiple **tacacs-server host** commands to specify additional hosts. The Cisco IOS software searches for hosts in the order in which you specify them. Use the **port**, **timeout**, **key**, **single-connection**, and **nat** keywords only when running a AAA/TACACS+ server.

Because some of the parameters of the **tacacs-server host** command override global settings made by the **tacacs-server timeout** and **tacacs-server key** commands, you can use this command to enhance security on your network by uniquely configuring individual routers.

The **single-connection** keyword specifies a single connection (only valid with CiscoSecure Release 1.0.1 or later). Rather than have the router open and close a TCP connection to the server each time it must communicate, the single-connection option maintains a single open connection between the router and the server. The single connection is more efficient because it allows the server to handle a higher number of TACACS operations.

Use the **password encryption aes** command to configure type 6 AES encrypted keys.

Examples The following example shows how to specify a TACACS+ host named Sea_Change:

```
Device> enable
Device# configure terminal
Device(config)# aaa new-model
Device(config)# tacacs-server host Sea_Change
```

The following example shows how to specify that, for authentication, authorization, and accounting (AAA) confirmation, the router consults the TACACS+ server host named Sea_Cure on port number 51. The timeout value for requests on this connection is three seconds; the encryption key is a_secret.

```
Device> enable
Device# configure terminal
```

```
Device(config)# aaa new-model
Device(config)# tacacs-server host Sea_Cure port 51 timeout 3 key a_secret
```

Related Commands

Command	Description
aaa accounting	Enables AAA accounting of requested services for billing or security.
aaa authentication	Specifies or enables AAA authentication.
aaa authorization	Sets parameters that restrict user access to a network.
password encryption aes	Enables a type 6 encrypted preshared key.
ppp	Starts an asynchronous connection using PPP.
slip	Starts a serial connection to a remote host using SLIP.
tacacs-server key	Sets the authentication encryption key used for all TACACS+ communications between the access server and the TACACS+ daemon.

telnet

To log in to a host that supports Telnet, use the **telnet** command in user EXEC or privileged EXEC mode.

telnet *host* [*port*] [*keyword*]

Syntax Description

host	A hostname or an IP address.
port	(Optional) A decimal TCP port number, or port name; the default is the Telnet router port (decimal 23) on the host.
keyword	(Optional) One of the keywords listed in the table below.

Command Modes

User EXEC Privileged EXEC

Command History

Release	Modification
10.0	This command was introduced.
12.0(21)ST	The **/ipv4** and **/ipv6** keywords were added.
12.1	The **/quiet** keyword was added.
12.2(2)T	The **/ipv4** and **/ipv6** keywords were added.
12.0(22)S	This command was integrated into Cisco IOS Release 12.0(22)S.
12.2(14)S	This command was integrated into Cisco IOS Release 12.2(14)S.
12.2(28)SB	This command was integrated into Cisco IOS Release 12.2(28)SB.
12.2(25)SG	This command was integrated into Cisco IOS Release 12.2(25)SG.
12.2(33)SXH	This command was integrated into Cisco IOS Release 12.2(33)SXH.
Cisco IOS XE Release 2.1	This command was introduced on Cisco ASR 1000 Series Routers.

Usage Guidelines

The table below lists the optional **telnet** command keywords.

Table 16: telnet Keyword Options

Option	Description
/debug	Enables Telnet debugging mode.
/encrypt kerberos	Enables an encrypted Telnet session. This keyword is available only if you have the Kerberized Telnet subsystem. If you authenticate using Kerberos Credentials, the use of this keyword initiates an encryption negotiation with the remote server. If the encryption negotiation fails, the Telnet connection will be reset. If the encryption negotiation is successful, the Telnet connection will be established, and the Telnet session will continue in encrypted mode (all Telnet traffic for the session will be encrypted).
/ipv4	Specifies version 4 of the IP protocol. If a version of the IP protocol is not specified in a network that supports both the IPv4 and IPv6 protocol stacks, IPv6 is attempted first and is followed by IPv4.
/ipv6	Specifies version 6 of the IP protocol. If a version of the IP protocol is not specified in a network that supports both the IPv4 and IPv6 protocol stacks, IPv6 is attempted first and is followed by IPv4.
/line	Enables Telnet line mode. In this mode, the Cisco IOS software sends no data to the host until you press the **Enter** key. You can edit the line using the standard Cisco IOS software command-editing characters. The **/line** keyword is a local switch; the remote router is not notified of the mode change.
/noecho	Disables local echo.
/quiet	Prevents onscreen display of all messages from the Cisco IOS software.
/route: *path*	Specifies loose source routing. The *path* argument is a list of hostnames or IP addresses that specify network nodes and ends with the final destination.
/source-interface	Specifies the source interface.

Option	Description
/stream	Turns on *stream* processing, which enables a raw TCP stream with no Telnet control sequences. A stream connection does not process Telnet options and can be appropriate for connections to ports running UNIX-to-UNIX Copy Program (UUCP) and other non-Telnet protocols.
port-number	Port number.
bgp	Border Gateway Protocol.
chargen	Character generator.
cmd *rcmd*	Remote commands.
daytime	Daytime.
discard	Discard.
domain	Domain Name Service.
echo	Echo.
exec	EXEC.
finger	Finger.
ftp	File Transfer Protocol.
ftp-data	FTP data connections (used infrequently).
gopher	Gopher.
hostname	Hostname server.
ident	Ident Protocol.
irc	Internet Relay Chat.
klogin	Kerberos login.
kshell	Kerberos shell.
login	Login (rlogin).
lpd	Printer service.
nntp	Network News Transport Protocol.

Option	Description
pim-auto-rp	Protocol Independent Multicast (PIM) auto-rendezvous point (RP).
node	Connect to a specific Local-Area Transport (LAT) node.
pop2	Post Office Protocol v2.
pop3	Post Office Protocol v3.
port	Destination local-area transport (LAT) port name.
smtp	Simple Mail Transfer Protocol.
sunrpc	Sun Remote Procedure Call.
syslog	Syslog.
tacacs	Specifies TACACS security.
talk	Talk (517).
telnet	Telnet (23).
time	Time (37).
uucp	UNIX-to-UNIX Copy Program (540).
whois	Nickname (43).
www	World Wide Web (HTTP, 80).

With the Cisco IOS implementation of TCP/IP, you are not required to enter the **connect** or **telnet** command to establish a terminal connection. You can enter only the learned hostname--as long as the following conditions are met:

- The hostname is different from a command word for the router.
- The preferred transport protocol is set to **telnet**.

To display a list of the available hosts, use the **show hosts** command. To display the status of all TCP connections, use the **show tcp** command.

The Cisco IOS software assigns a logical name to each connection, and several commands use these names to identify connections. The logical name is the same as the hostname, unless that name is already in use, or you change the connection name with the **name-connection** EXEC command. If the name is already in use, the Cisco IOS software assigns a null name to the connection.

The Telnet software supports special Telnet commands in the form of Telnet sequences that map generic terminal control functions to operating system-specific functions. To issue a special Telnet command, enter the escape sequence and then a command character. The default escape sequence is Ctrl-^ (press and hold the Ctrl and Shift keys and the 6 key). You can enter the command character as you hold down Ctrl or with Ctrl released; you can use either uppercase or lowercase letters. The table below lists the special Telnet escape sequences.

Table 17: Special Telnet Escape Sequences

Escape Sequence[1]	Purpose
Ctrl-^ b	Break
Ctrl-^ c	Interrupt Process (IP and IPv6)
Ctrl-^ h	Erase Character (EC)
Ctrl-^ o	Abort Output (AO)
Ctrl-^ t	Are You There? (AYT)
Ctrl-^ u	Erase Line (EL)

1 The caret (^) symbol refers to Shift-6 on your keyboard.

At any time during an active Telnet session, you can list the Telnet commands by pressing the escape sequence keys followed by a question mark at the system prompt: **Ctrl-^ ?**

A sample of this list follows. In this sample output, the first caret (^) symbol represents the Ctrl key, and the second caret represents Shift-6 on your keyboard:

```
router> ^^?
[Special telnet escape help]
^^B  sends telnet BREAK
^^C  sends telnet IP
^^H  sends telnet EC
^^O  sends telnet AO
^^T  sends telnet AYT
^^U  sends telnet EL
```

You can have several concurrent Telnet sessions open and switch among them. To open a subsequent session, first suspend the current connection by pressing the escape sequence (Ctrl-Shift-6 then x [Ctrl^x] by default) to return to the system command prompt. Then open a new connection with the **telnet** command.

To terminate an active Telnet session, enter any of the following commands at the prompt of the device to which you are connecting:

- **close**
- **disconnect**
- **exit**
- **logout**
- **quit**

Examples

The following example establishes an encrypted Telnet session from a router to a remote host named host1:

```
router>

telnet host1 /encrypt kerberos
```

The following example routes packets from the source system host1 to example.com, then to 10.1.0.11, and finally back to *host1* :

```
router>
telnet host1 /route:example.com 10.1.0.11 host1
```

The following example connects to a host with the logical name host1:

```
router>
host1
```

The following example suppresses all onscreen messages from the Cisco IOS software during login and logout:

```
router>

telnet host2 /quiet
```

The following example shows the limited messages displayed when connection is made using the optional **/quiet** keyword:

```
login:User2
Password:
         Welcome to OpenVMS VAX version V6.1 on node CRAW
     Last interactive login on Tuesday, 15-DEC-1998 11:01
     Last non-interactive login on Sunday,  3-JAN-1999 22:32
Server3)logout
    User2        logged out at  16-FEB-2000 09:38:27.85
```

Related Commands

Command	Description
connect	Logs in to a host that supports Telnet, rlogin, or LAT.
kerberos clients mandatory	Causes the **rsh**, **rcp**, **rlogin**, and **telnet** commands to fail if they cannot negotiate the Kerberos Protocol with the remote server.
name connection	Assigns a logical name to a connection.
rlogin	Logs in to a UNIX host using rlogin.
show hosts	Displays the default domain name, the style of name lookup service, a list of name server hosts, and the cached list of hostnames and addresses.
show tcp	Displays the status of TCP connections.

test aaa group

To associate a dialed number identification service (DNIS) or calling line identification (CLID) user profile with the record that is sent to the RADIUS server or to manually test load-balancing server status, use the **test aaa group** command in privileged EXEC mode.

DNIS and CLID User Profile

test aaa group {*group-name*| **radius**} *username password* **new-code** [**profile** *profile-name*]

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test aaa group *group-name* [**server** *ip-address*] [**auth-port** *port-number*] [**acct-port** *port-number*] *username password* **new-code** [**count** *requests*] [**rate** *requests-per-second*] [**blocked** {**yes**| **no**}]

Syntax Description

group-name	Subset of RADIUS servers that are used, as defined by the server group group-name.
radius	Uses RADIUS servers for authentication.
username	Name for the test user. **Caution** If you use this command to manually test RADIUS load-balancing server state, it is recommended that a test user, one that is not defined on the RADIUS server, be used to protect against security issues that may arise if the test user is not correctly configured.
password	Password.
new-code	Code path through the new code, which supports a CLID or DNIS user profile association with a RADIUS server.
profile *profile-name*	(Optional) Identifies the user profile specified in the aaa user profile command. To associate a user profile with the RADIUS server, you must identify the user profile name.
server *ip-address*	(Optional) For RADIUS server load balancing, specifies to which server in the server group the test packets will be sent.
auth-port	(Optional) User Datagram Protocol (UDP) destination port for authentication requests.

port-number	(Optional) Port number for authentication requests; the host is not used for authentication if set to 0. If unspecified, the port number defaults to 1646.
acct-port	(Optional) UDP destination port for accounting requests.
port-number	(Optional) Port number for accounting requests; the host is not used for accounting if set to 0. If unspecified, the port number defaults to 1646.
count *requests*	(Optional) Number of authentication and accounting requests that are to be sent to the server for each port. Range: 1 to 50000. Default: 1.
rate *requests-per-second*	(Optional) Number of requests per second that are to be sent to the server. Range: 1 to 1000. Default: 10.
blocked {**yes** | **no**}	(Optional) Specifies whether the request is sent in blocking or nonblocking mode. If the **blocked** keyword is not used and one request is sent, the default is **yes**; if more than one request is sent, the default is **no**.

Command Default

DNIS or CLID attribute values are not sent to the RADIUS server.

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RADIUS server load-balancing server status manual testing does not occur.

Command Modes

Privileged EXEC (#)

Command History

Release	Modification
12.2(4)T	This command was introduced.
12.2(28)SB	The following keywords and arguments were added for configuring RADIUS load balancing manual testing functionality: **server** *ip-address*, **auth-port** *port-number*, **acct-port** *port-number*, **count** *request*, **rate** *requests-per-second*, **blocked**.
12.4(11)T	This command was integrated into Cisco IOS Release 12.4(11)T.
12.2(31)ZV1	This command was enhanced to show user attributes returned from RADIUS authentication when authentication is successful.

Release	Modification
Cisco IOS XE Release 2.4	This command was integrated into Cisco IOS XE Release 2.4.

Usage Guidelines

The **test aaa group** command can be used to

- Associate a DNIS or CLID named user profile with the record that is sent to the RADIUS server, which can then access DNIS or CLID information when the server receives a RADIUS record.
- Verify RADIUS load-balancing server status.

Note The **test aaa group**command does not work with TACACS+.

Examples

The following example shows how to configure a dnis = dnisvalue user profile named prfl1 and associate it with a **test aaa group**command:

```
aaa user profile prfl1
  aaa attribute dnis
  aaa attribute dnis dnisvalue
  no aaa attribute clid
! Attribute not found.
  aaa attribute clid clidvalue
  no aaa attribute clid
  exit
!
! Associate the dnis user profile with the test aaa group command.
test aaa group radius user1 pass new-code profile prfl1
```

The following example shows the response from a load-balanced RADIUS server that is alive when the username "test" does not match a user profile. The server is verified alive when it issues an Access-Reject response to a AAA packet generated by the **test aaa group** command.

```
Router# test aaa group SG1 test lab new-code

00:06:07: RADIUS/ENCODE(00000000):Orig. component type = INVALID
00:06:07: RADIUS/ENCODE(00000000): dropping service type, "radius-server attribute 6
on-for-login-auth" is off
00:06:07: RADIUS(00000000): Config NAS IP: 192.0.2.4
00:06:07: RADIUS(00000000): sending
00:06:07: RADIUS/ENCODE: Best Local IP-Address 192.0.2.141 for Radius-Server 192.0.2.176
00:06:07: RADIUS(00000000): Send Access-Request to 192.0.2.176:1645 id 1645/1, len 50
00:06:07: RADIUS:  authenticator CA DB F4 9B 7B 66 C8 A9 - D1 99 4E 8E A4 46 99 B4
00:06:07: RADIUS:  User-Password       [2]   18  *
00:06:07: RADIUS:  User-Name           [1]   6   "test"
00:06:07: RADIUS:  NAS-IP-Address      [4]   6   192.0.2.141
00:06:07: RADIUS: Received from id 1645/1 192.0.2.176:1645, Access-Reject, len 44
00:06:07: RADIUS:  authenticator 2F 69 84 3E F0 4E F1 62 - AB B8 75 5B 38 82 49 C3
00:06:07: RADIUS:  Reply-Message       [18]  24
00:06:07: RADIUS:   41 75 74 68 65 6E 74 69 63 61 74 69 6F 6E 20 66  [Authentication ]
00:06:07: RADIUS:   61 69 6C 75 72 65                               [failure]
00:06:07: RADIUS(00000000): Received from id 1645/1
00:06:07: RADIUS/DECODE: Reply-Message fragments, 22, total 22 bytes
```

Examples

The following example shows the user attribute list that the RADIUS server returns when you issue the test aaa command and authentication is successful:

```
Router# test aaa group radius viral viral new-code blocked no
AAA/SG/TEST: Sending 1 Access-Requests @ 10/sec, 0 Accounting-Requests @ 10/sec
CLI-1#
AAA/SG/TEST: Testing Status
AAA/SG/TEST:      Authen Requests to Send    : 1
AAA/SG/TEST:      Authen Requests Processed  : 1
AAA/SG/TEST:      Authen Requests Sent       : 1
AAA/SG/TEST:      Authen Requests Replied    : 1
AAA/SG/TEST:      Authen Requests Successful : 1
AAA/SG/TEST:      Authen Requests Failed     : 0
AAA/SG/TEST:      Authen Requests Error      : 0
AAA/SG/TEST:      Authen Response Received   : 1
AAA/SG/TEST:      Authen No Response Received: 0
AAA/SG/TEST: Testing Status
AAA/SG/TEST:      Account Requests to Send    : 0
AAA/SG/TEST:      Account Requests Processed  : 0
AAA/SG/TEST:      Account Requests Sent       : 0
AAA/SG/TEST:      Account Requests Replied    : 0
AAA/SG/TEST:      Account Requests Successful : 0
AAA/SG/TEST:      Account Requests Failed     : 0
AAA/SG/TEST:      Account Requests Error      : 0
AAA/SG/TEST:      Account Response Received   : 0
AAA/SG/TEST:      Account No Response Received: 0
USER ATTRIBUTES
username             "Username:viral"
nas-ip-address       3.1.1.1
interface            "210"
service-type         1 [Login]
Framed-Protocol      3 [ARAP]
ssg-account-info     "S20.5.0.2"
ssg-command-code     0B 4C 32 54 50 53 55 52 46
Router
```

Related Commands

Command	Description
aaa attribute	Adds DNIS or CLID attribute values to a user profile.
aaa user profile	Creates a AAA user profile.
load-balance	Enables RADIUS server load-balancing for RADIUS-named server groups.
radius-server host	Enables RADIUS automated testing for load balancing.
radius-server load-balance	Enables RADIUS server load-balancing for the global RADIUS server group.

timeout (TACACS+)

To configure the time to wait for a reply from the specified TACACS server, use the **timeout**command in TACACS+ server configuration mode. To return to the command default, use the **no** form of this command.

timeout *seconds*

no timeout *seconds*

Syntax Description

seconds	(Optional) Amount of time, in seconds.

Command Default

Time to wait is 5 seconds.

Command Modes

TACACS+ server configuration (config-server-tacacs)

Command History

Release	Modification
Cisco IOS XE Release 3.2S	This command was introduced.

Usage Guidelines

Use the **timeout** command to set the time, in seconds, to wait for a reply from the TACACS server. If the **timeout** command is configured, the specified number of seconds overrides the default time of 5 seconds.

Examples

The following example shows how to configure the wait time to 10 seconds:

```
Router(config)# tacacs server server1
Router(config-server-tacacs)# timeout 10
```

Related Commands

Command	Description
tacacs server	Configures the TACACS+ server for IPv6 or IPv4 and enters TACACS server configuration mode.

traffic-export through zone security

username

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

username *name* [**aaa attribute list** *aaa-list-name*]

username *name* [**access-class** *access-list-number*]

username *name* [**autocommand** *command*]

username *name* [**callback-dialstring** *telephone-number*]

username *name* [**callback-line [tty]** *line-number* [*ending-line-number*]]

username *name* [**callback-rotary** *rotary-group-number*]

username *name* **[dnis]**

username *name* **[mac]**

username *name* **[nocallback-verify]**

username *name* **[noescape]**

username *name* **[nohangup]**

username *name* [**nopassword**| **password** *password*| **password** *encryption-type encrypted-password*]

username *name* [**one-time** {**password** {**0**| **7**| *password*}| **secret** {**0**| **5**| *password*}}]

username *name* [**password** *secret*]

username *name* [**privilege** *level*]

username *name* [**secret** {**0**| **5**| *password*}]

username *name* [**user-maxlinks** *number*]

username [lawful-intercept] *name* [**privilege** *privilege-level*| **view** *view-name*] **password** *password*

no username *name*

Syntax Description

name	Hostname, server name, user ID, or command name. The *name* argument can be only one word. Blank spaces and quotation marks are not allowed.
aaa attribute list *aaa-list-name*	Uses the specified authentication, authorization, and accounting (AAA) method list.
access-class *access-list-number*	(Optional) Specifies an outgoing access list that overrides the access list specified in the **access-class** command available in line configuration mode. It is used for the duration of the user's session.

autocommand *command*	(Optional) Causes the specified command to be issued automatically after the user logs in. When the command is complete, the session is terminated. Because the command can be any length and can contain embedded spaces, commands using the **autocommand** keyword must be the last option on the line.
callback-dialstring *telephone-number*	(Optional) For asynchronous callback only: permits you to specify a telephone number to pass to the DCE device.
callback-line *line-number*	(Optional) For asynchronous callback only: relative number of the terminal line (or the first line in a contiguous group) on which you enable a specific username for callback. Numbering begins with zero.
ending-line-number	(Optional) Relative number of the last line in a contiguous group on which you want to enable a specific username for callback. If you omit the keyword (such as **tty**), then line-number and ending-line-number are absolute rather than relative line numbers.
tty	(Optional) For asynchronous callback only: standard asynchronous line.
callback-rotary *rotary-group-number*	(Optional) For asynchronous callback only: permits you to specify a rotary group number on which you want to enable a specific username for callback. The next available line in the rotary group is selected. Range: 1 to 100.
dnis	Does not require a password when obtained via Dialed Number Identification Service (DNIS).
mac	Allows a MAC address to be used as the username for MAC filtering done locally.
nocallback-verify	(Optional) Specifies that the authentication is not required for EXEC callback on the specified line.
noescape	(Optional) Prevents a user from using an escape character on the host to which that user is connected.
nohangup	(Optional) Prevents Cisco IOS software from disconnecting the user after an automatic command (set up with the **autocommand** keyword) has completed. Instead, the user gets another EXEC prompt.

nopassword	No password is required for this user to log in. This is usually the most useful keyword to use in combination with the **autocommand** keyword.
password	Specifies the password to access the *name* argument. A password must be from 1 to 25 characters, can contain embedded spaces, and must be the last option specified in the **username** command.
password	Password that a user enters.
encryption-type	Single-digit number that defines whether the text immediately following is encrypted and if so, what type of encryption is used. Defined encryption types are 0, which means that the text immediately following is not encrypted, and 7, which means that the text is encrypted using a Cisco-defined encryption algorithm.
encrypted-password	Encrypted password that a user enters.
one-time	Specifies that the username and password is valid for only one time. This configuration is used to prevent default credentials from remaining in user configurations.
0	Specifies that an unencrypted password or secret (depending on the configuration) follows.
7	Specifies that a hidden password follows.
5	Specifies that a hidden secret follows.
secret	Specifies a secret for the user.
secret	For Challenge Handshake Authentication Protocol (CHAP) authentication: specifies the secret for the local router or the remote device. The secret is encrypted when it is stored on the local router. The secret can consist of any string of up to 11 ASCII characters. There is no limit to the number of username and password combinations that can be specified, allowing any number of remote devices to be authenticated.
privilege *privilege-level*	(Optional) Sets the privilege level for the user. Range: 1 to 15.
user-maxlinks *number*	Maximum number of inbound links allowed for a user.

lawful-intercept	(Optional) Configures lawful intercept users on a Cisco device.
name	Hostname, server name, user ID, or command name. The *name* argument can be only one word. Blank spaces and quotation marks are not allowed.
view *view-name*	(Optional) For CLI view only: associates a CLI view name, which is specified with the **parser view** command, with the local AAA database.
password *password*	Password to access the CLI view.

Command Default

No username-based authentication system is established.

Command Modes

Global configuration (config)

Command History

Release	Modification
10.0	This command was introduced.
11.1	This command was modified. The following keywords and arguments were added: • **callback-dialstring** *telephone-number* • **callback-rotary** *rotary-group-number* • **callback-line** [**tty**] *line-number* [*ending-line-number* • **nocallback-verify**
12.3(7)T	This command was modified. The following keywords and arguments were added: • **lawful-intercept** • **view** • *view-name*
12.2(33)SRB	This command was modified. The following keywords and arguments were integrated into Cisco IOS Release 12.2(33)SRB: • **lawful-intercept** • **view** • *view-name*

Release	Modification
12.2(33)SB	This command was modified. The following keywords and arguments were integrated into Cisco IOS Release 12.2(33)SB: • **lawful-intercept** • **view** • *view-name*
Cisco IOS XE Release 2.1	This command was integrated into Cisco IOS XE Release 2.1.
12.2(33)SXI	This command was integrated into Cisco IOS Release 12.2(33)SXI.
12.4	This command was modified. The following keywords were integrated into Cisco IOS Release 12.4: • **one-time** • **secret** • **0, 5, 7**
15.1(1)S	This command was modified. Support for the **nohangup** keyword was removed from Secure Shell (SSH).
Cisco IOS XE Release 3.2SE	This command was modified. The **mac** keyword was added.

Usage Guidelines

The **username** command provides username or password authentication, or both, for login purposes only.

Multiple **username** commands can be used to specify options for a single user.

Add a username entry for each remote system with which the local router communicates and from which it requires authentication. The remote device must have a username entry for the local router. This entry must have the same password as the local router's entry for that remote device.

This command can be useful for defining usernames that get special treatment. For example, you can use this command to define an "info" username that does not require a password but connects the user to a general purpose information service.

The **username** command is required as part of the configuration for CHAP. Add a username entry for each remote system from which the local router requires authentication.

Note To enable the local router to respond to remote CHAP challenges, one **username** *name* entry must be the same as the **hostname** entry that has already been assigned to the other router.

- To avoid the situation of a privilege level 1 user entering into a higher privilege level, configure a per-user privilege level other than 1 (for example, 0 or 2 through 15).

- Per-user privilege levels override virtual terminal privilege levels.

In Cisco IOS Release 15.1(1)S and later releases, the **nohangup** keyword is not supported with SSH. If the **username** *user* **autocommand** *command-name* command is configured and SSH is used, the session disconnects after executing the configured command once. This behavior with SSH is opposite to the Telnet behavior, where Telnet continuously asks for authentication and keeps executing the command until the user exits Telnet manually.

CLI and Lawful Intercept Views

Both CLI views and lawful intercept views restrict access to specified commands and configuration information. A lawful intercept view allows a user to secure access to lawful intercept commands that are held within the TAP-MIB, which is a special set of Simple Network Management Protocol (SNMP) commands that stores information about calls and users.

Users who are specified via the **lawful-intercept** keyword are placed in the lawful-intercept view, by default, if no other privilege level or view name has been explicitly specified.

If no value is specified for the *secret* argument and the **debug serial-interface** command is enabled, an error is displayed when a link is established and the CHAP challenge is not implemented. The CHAP debugging information is available using the **debug ppp negotiation , debug serial-interface ,** and **debug serial-packet** commands. For more information about **debug** commands, refer to the *Cisco IOS Debug Command Reference* .

Examples

The following example shows how to implement a service similar to the UNIX **who** command, which can be entered at the login prompt and lists the current users of the router:

```
username who nopassword nohangup autocommand show users
```

The following example shows how to implement an information service that does not require a password to be used. The command takes the following form:

```
username info nopassword noescape autocommand telnet nic.ddn.mil
```

The following example shows how to implement an ID that works even if all the TACACS+ servers break. The command takes the following form:

```
username superuser password superpassword
```

The following example shows how to enable CHAP on interface serial 0 of "server_l." It also defines a password for a remote server named "server_r."

```
hostname server_l
username server_r password theirsystem
interface serial 0
 encapsulation ppp
 ppp authentication chap
```

The following is output from the **show running-config** command displaying the passwords that are encrypted:

```
hostname server_l
username server_r password 7 121F0A18
interface serial 0
 encapsulation ppp
 ppp authentication chap
```

In the following example, a privilege level 1 user is denied access to privilege levels higher than 1:

```
username user privilege 0 password 0 cisco
username user2 privilege 2 password 0 cisco
```

The following example shows how to remove the username-based authentication for user2:

```
no username user2
```

Related Commands

Command	Description
arap callback	Enables an ARA client to request a callback from an ARA client.
callback forced-wait	Forces the Cisco IOS software to wait before initiating a callback to a requesting client.
debug ppp negotiation	Displays PPP packets sent during PPP startup, where PPP options are negotiated.
debug serial-interface	Displays information about a serial connection failure.
debug serial-packet	Displays more detailed serial interface debugging information than you can obtain using **debug serial interface** command.
ppp callback (DDR)	Enables a dialer interface that is not a DTR interface to function either as a callback client that requests callback or as a callback server that accepts callback requests.
ppp callback (PPP client)	Enables a PPP client to dial into an asynchronous interface and request a callback.
show users	Displays information about the active lines on the router.

username secret

To encrypt a user password with irreversible encryption, use the **username secret** command in global configuration mode.

username *name* **secret** {**0** *password* | **5** *secret-string* | **4** *secret-string* | **8** *secret-string* | **9** *secret-string*}

Syntax Description

name	Username.
0	Specifies an unencrypted secret.
password	Clear-text password.
5 *secret-string*	message digest alogrithm5 (MD5) encrypted secret text string, which is stored as the encrypted user password.
4 *secret-string*	Secure Hash Algorithm, 26-bits (SHA-256) encrypted secret text string, which is stored as the encrypted user password. **Note** NOTE: Effective with CSCue95644, the **4** keyword is deprecated.
8 *secret-string*	Password-Based Key Derivation Function 2 (PBKDF2) with SHA-256 hashed secret text string, which is stored as the hashed user password.
9 *secret-string*	Scrypt hashed secret text string, which is stored as the hashed user password.

Command Default

No username-based authentication system is established.

Command Modes

Global configuration (config)

Command History

Release	Modification
12.0(18)S	This command was introduced.
12.1(8a)E	This command was integrated into Cisco IOS Release 12.1(8a)E.
12.2(8)T	This command was integrated into Cisco IOS Release 12.2(8)T.
12.2(14)SX	Support for this command was introduced on the Supervisor Engine 720.

Release	Modification
12.2(17d)SXB	Support for this command on the Supervisor Engine 2 was extended to Cisco IOS Release 12.2(17d)SXB.
12.2(33)SRA	This command was integrated into Cisco IOS Release 12.2(33)SRA.
15.0(1)S	This command was integrated into Cisco IOS Release 15.0(1)S. Algorithm types **0**, **4**, and **5** were added.
15.1(1)SY	This command was integrated into Cisco IOS Release 15.1(1)SY.
15.3(3)M	This command was modified. • The **4** keyword was deprecated and support for type **8** and type **9** algorithms were added. • The warning message for the type **5** algorithm was removed. • The warning message for removal of support for the type **4** algorithm was added.
15.3(3)S	The command modifications were integrated into Cisco IOS Release 15.3(3)S.

Usage Guidelines

Use the **username secret** command to configure a username and MD5-encrypted user password. MD5 encryption is a strong encryption method that is not retrievable; thus, you cannot use MD5 encryption with protocols that require clear-text passwords, such as Challenge Handshake Authentication Protocol (CHAP).

The **username secret** command provides an additional layer of security over the username password. It also provides better security by encrypting the password using non reversible MD5 encryption and storing the encrypted text. The added layer of MD5 encryption is useful in environments in which the password crosses the network or is stored on a TFTP server.

Use MD5 as the encryption type if you paste into this command an encrypted password that you copied from a router configuration file.

Use this command to enable Enhanced Password Security for the specified, unretrievable username. This command enables MD5 encryption on the password. MD5 encryption is a strong encryption method. You cannot use MD5 encryption with protocols, such as CHAP, that require clear-text passwords.

This command can be useful for defining usernames that get special treatment. For example, you can use this command to define an “info” username that does not require a password but connects the user to a general-purpose information service.

With CSCue95644, you can use the **username secret** command to configure a username and hash the user password with MD5, PBKDF2 with SHA-256, or scrypt hashing algorithms.

Note If you use type 8 or type 9 passwords and then downgrade to an older version of Cisco IOS software that does not support type 8 and type 9 passwords, you must reconfigure the passwords to use type 5 hashing before downgrading. If not, you are locked out of the device and password recovery is required. If you are using an external AAA server to manage privilege levels, you are not locked out of the device.

The **username** command provides username or secret authentication for login purposes only. The *name* argument can be one word only. Spaces and quotation marks are not allowed. You can use multiple **username** commands to specify options for a single user.

Examples

The following example shows how to configure username "abc" and enable MD5 encryption on the clear-text password "xyz":

```
username abc secret 0 xyz
```

The following example shows how to configure username "cde" and enter an MD5 encrypted text string that is stored as the username password:

```
username cde secret 5 $1$feb0$a104Qd9UZ./Ak00KTggPD0
```

The following example shows how to configure username "xyz" and enter an MD5 encrypted text string that is stored as the username password:

```
username xyz secret 5 $1$feb0$a104Qd9UZ./Ak00KTggPD0
```

The following example shows the sample warning message that is displayed when a user enters the **username secret 4** *encrypted-password* command:

```
Device# configure terminal
Device(config)# username demo secret 4 tnhtc92DXBhelxjYk8LWJrPV36S2i4ntXrpb4RFmfqY

WARNING: Command has been added to the configuration but Type 4 passwords have been
deprecated.
Migrate to a supported password type

Device(config)# end
Device# show running-config | inc username

username demo secret 4 tnhtc92DXBhelxjYk8LWJrPV36S2i4ntXrpb4RFmfqY
```

Related Commands

Command	Description
enable password	Sets a local password to control access to various privilege levels.
enable secret	Specifies an additional layer of security over the enable password command.
username	Establishes a username-based authentication system.
username algorithm-type	Sets the algorithm type to hash a user password configured using the **username secret** command.