Secure Shell Commands

This module describes the Cisco IOS XR software commands used to configure Secure Shell (SSH).

For detailed information about SSH concepts, configuration tasks, and examples, see the *Implementing Secure Shell on* the Cisco ASR 9000 Series Router Software configuration module in the *System Security Configuration Guide for Cisco ASR 9000 Series Routers*.

clear ssh

To terminate an incoming or outgoing Secure Shell (SSH) connection, use the **clear ssh** command.

clear ssh {*session-id* | **outgoing** *session-id*}

Syntax Description	

session-id	Session ID number of an incoming connection as displayed in the **show ssh** command output. Range is from 0 to 1024.
outgoing *session-id*	Specifies the session ID number of an outgoing connection as displayed in the **show ssh** command output. Range is from 1 to 10.

Command Default None

Command Modes EXEC

Command History

Release	Modification
Release 3.7.2	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **clear ssh** command to disconnect incoming or outgoing SSH connections. Incoming connections are managed by the SSH server running on the local networking device. Outgoing connections are initiated from the local networking device.

To display the session ID for a connection, use the **show ssh** command.

Task ID

Task ID	Operations
crypto	execute

Examples In the following example, the **show ssh** command is used to display all incoming and outgoing connections to the router. The **clear ssh** command is then used to terminate the incoming session with the ID number 0.

```
RP/0/RSP0/CPU0:router# show ssh

SSH version: Cisco-2.0
session    pty location    state       userid    host       ver
-----------------------------------------------------------------
Incoming sessions
0         vty0 0/33/1  SESSION_OPEN   cisco    172.19.72.182   v2
1         vty1 0/33/1  SESSION_OPEN   cisco    172.18.0.5      v2
2         vty2 0/33/1  SESSION_OPEN   cisco    172.20.10.3     v1
3         vty3 0/33/1  SESSION_OPEN   cisco    3333::50        v2
```

```
Outgoing sessions
1               0/33/1  SESSION_OPEN   cisco   172.19.72.182   v2
2               0/33/1  SESSION_OPEN   cisco   3333::50        v2

RP/0/RSP0/CPU0:router# clear ssh 0
```

The following output is applicable for the **clear ssh** command starting IOS-XR 5.3.2 releases and later.

```
RP/0/RSP0/CPU0:router# show ssh
SSH version : Cisco-2.0


id  chan pty     location        state          userid   host            ver
authentication connection type
-----------------------------------------------------------------------------------------------
Incoming sessions
0   1   vty0    0/RSP0/CPU0    SESSION_OPEN   lab      12.22.57.75         v2
rsa-pubkey     Command-Line-Interface
0   2   vty1    0/RSP0/CPU0    SESSION_OPEN   lab      12.22.57.75         v2
rsa-pubkey     Command-Line-Interface
0   3           0/RSP0/CPU0    SESSION_OPEN   cisco    12.22.57.75         v2
rsa-pubkey     Sftp-Subsystem
1       vty7   0/RSP0/CPU0    SESSION_OPEN   cisco    12.22.22.57      v1  password
        Command-Line-Interface
3   1           0/RSP0/CPU0    SESSION_OPEN   lab      12.22.57.75      v2  password
        Netconf-Subsystem
4   1   vty3    0/RSP0/CPU0    SESSION_OPEN   lab      192.168.1.55     v2  password
        Command-Line-Interface

Outgoing sessions
1               0/RSP0/CPU0    SESSION_OPEN   lab      192.168.1.51     v2  password

RP/0/RSP0/CPU0:router# clear ssh 0
```

Related Commands	Command	Description
	show ssh, on page 15	Displays the incoming and outgoing connections to the router.

clear netconf-yang agent session

To clear the specified netconf agent session, use the **clear netconf-yang agent session** in EXEC mode.

clear netconf-yang agent session *session-id*

Syntax Description

session-id	The session-id which needs to be cleared.

Command Default None

Command Modes EXEC mode

Command History

Release	Modification
Release 5.3.0	This command was introduced.

Usage Guidelines No specific guidelines impact the use of this command.

The **show netconf-yang clients** command can be used to get the required session-id(s).

Task ID

Task ID	Operation
config-services	read, write

Example

This example shows how to use the **clear netconf-yang agent session** command:

```
RP/0/RSP0/CPU0:router (config) #  clear netconf-yang agent session 32125
```

netconf-yang agent ssh

To enable netconf agent over SSH (Secure Shell) , use the **netconf-yang agent ssh** command in the global configuration mode. To disable netconf, use the **no** form of the command.

netconf-yang agent ssh
no netconf-yang agent ssh

Syntax Description	This command has no keywords or arguments.
Command Default	None
Command Modes	Global Configuration

Command History

Release	Modification
Release 5.3.0	This command was introduced.

Usage Guidelines SSH is currently the supported transport method for Netconf.

Task ID

Task ID	Operation
config-services	read, write

Example

This example shows how to use the **netconf-yang agent ssh** command:

```
RP/0/RSP0/CPU0:router (config) #  netconf-yang agent ssh
```

sftp

To start the secure FTP (SFTP) client, use the **sftp** command.

sftp [*username* **@** *host* **:** *remote-filenam* **e**] *source-filename dest-filename* [**source-interface** *type interface-path-id*] [**vrf** *vrf-name*]

Syntax Description		
username	(Optional) Name of the user performing the file transfer. The at symbol (@) following the username is required.	
hostname:remote-filename	(Optional) Name of the Secure Shell File Transfer Protocol (SFTP) server. The colon (:) following the hostname is required.	
source-filename	SFTP source, including the path.	
dest-filename	SFTP destination, including the path.	
source-interface	(Optional) Specifies the source IP address of a selected interface for all outgoing SSH connections.	
type	Interface type. For more information, use the question mark (**?**) online help function.	
interface-path-id	Physical interface or virtual interface.	
	Note	Use the **show interfaces** command in EXEC mode to see a list of all interfaces currently configured on the router.
	For more information about the syntax for the router, use the question mark (**?**) online help function.	
vrf *vrf-name*	Specifies the name of the VRF associated with the source interface.	

Command Default If no *username* argument is provided, the login name on the router is used. If no *hostname* argument is provided, the file is considered local.

Command Modes EXEC

Command History

Release	Modification
Release 3.7.2	This command was introduced.

Usage Guidelines To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

SFTP provides for the secure (and authenticated) copying of files between a router and a remote host. Like the **copy** command, the **sftp** command can be invoked only in EXEC mode.

If a username is not provided, the login name on the router is used as the default. If a host name is not provided, the file is considered local.

If the source interface is specified in the **sftp** command, the **sftp** interface takes precedence over the interface specified in the **ssh client source-interface** command.

When the file destination is a local path, all of the source files should be on remote hosts, and vice versa.

When multiple source files exist, the destination should be a preexisting directory. Otherwise, the destination can be either a directory name or destination filename. The file source cannot be a directory name.

If you download files from different remote hosts, that is, the source points to different remote hosts, the SFTP client spawns SSH instances for each host, which may result in multiple prompts for user authentication.

Task ID

Task ID	Operations
crypto	execute
basic-services	execute

Examples

In the following example, user *abc* is downloading the file *ssh.diff* from the SFTP server *ena-view1* to *disk0:*

```
RP/0/RSP0/CPU0:router#sftp abc@ena-view1:ssh.diff disk0
```

In the following example, user *abc* is uploading multiple files from disk 0:/sam_* to /users/abc/ on a remote SFTP server called ena-view1:

```
RP/0/RSP0/CPU0:router# sftp disk0:/sam_* abc@ena-view1:/users/abc/
```

In the following example, user *admin* is downloading the file *run* from *disk0a:* to *disk0:/v6copy* on a local SFTP server using an IPv6 address:

```
RP/0/RSP0/CPU0:router#sftp admin@[2:2:2::2]:disk0a:/run disk0:/V6copy
Connecting to 2:2:2::2...
Password:

disk0a:/run
  Transferred 308413 Bytes
  308413 bytes copied in 0 sec (338172)bytes/sec

RP/0/RSP0/CPU0:router#dir disk0:/V6copy

Directory of disk0:

70144       -rwx  308413      Sun Oct 16 23:06:52 2011  V6copy

2102657024 bytes total (1537638400 bytes free)
```

In the following example, user *admin* is uploading the file *v6copy* from *disk0:* to *disk0a:/v6back* on a local SFTP server using an IPv6 address:

```
RP/0/RSP0/CPU0:router#sftp disk0:/V6copy admin@[2:2:2::2]:disk0a:/v6back
Connecting to 2:2:2::2...
Password:

/disk0:/V6copy
  Transferred 308413 Bytes
```

```
    308413 bytes copied in 0 sec (421329)bytes/sec

RP/0/RSP0/CPU0:router#dir disk0a:/v6back

Directory of disk0a:

66016      -rwx  308413       Sun Oct 16 23:07:28 2011   v6back

2102788096 bytes total (2098987008 bytes free)
```

In the following example, user *admin* is downloading the file *sampfile* from *disk0:* to
disk0a:/sampfile_v4 on a local SFTP server using an IPv4 address:

```
RP/0/RSP0/CPU0:router#sftp admin@2.2.2.2:disk0:/sampfile disk0a:/sampfile_v4
Connecting to 2.2.2.2...
Password:

disk0:/sampfile
  Transferred 986 Bytes
  986 bytes copied in 0 sec (493000)bytes/sec

RP/0/RSP0/CPU0:router#dir disk0a:/sampfile_v4

Directory of disk0a:

131520      -rwx  986         Tue Oct 18 05:37:00 2011   sampfile_v4

502710272 bytes total (502001664 bytes free)
```

In the following example, user *admin* is uploading the file *sampfile_v4* from *disk0a:* to
disk0:/sampfile_back on a local SFTP server using an IPv4 address:

```
RP/0/RSP0/CPU0:router#sftp disk0a:/sampfile_v4 admin@2.2.2.2:disk0:/sampfile_back
Connecting to 2.2.2.2...
Password:

disk0a:/sampfile_v4
  Transferred 986 Bytes
  986 bytes copied in 0 sec (564000)bytes/sec

RP/0/RSP0/CPU0:router#dir disk0:/sampfile_back

Directory of disk0:

121765      -rwx  986         Tue Oct 18 05:39:00 2011   sampfile_back

524501272 bytes total (512507614 bytes free)
```

Related Commands	Command	Description
	ssh client source-interface, on page 24	Specifies the source IP address of a selected interface for all outgoing SSH connections.
	ssh client vrf, on page 26	Configures a new VRF for use by the SSH client.

sftp (Interactive Mode)

To enable users to start the secure FTP (SFTP) client, use the **sftp** command.

sftp [*username* **@** *host* **:** *remote-filenam* **e**] [**source-interface** *type interface-path-id*] [**vrf** *vrf-name*]

Syntax Description		
	username	(Optional) Name of the user performing the file transfer. The at symbol (@) following the username is required.
	hostname:remote-filename	(Optional) Name of the Secure Shell File Transfer Protocol (SFTP) server. The colon (:) following the hostname is required.
	source-interface	(Optional) Specifies the source IP address of a selected interface for all outgoing SSH connections.
	type	Interface type. For more information, use the question mark (**?**) online help function.
	interface-path-id	Physical interface or virtual interface.
		Note Use the **show interfaces** command in EXEC mode to see a list of all interfaces currently configured on the router.
		For more information about the syntax for the router, use the question mark (**?**) online help function.
	vrf *vrf-name*	Specifies the name of the VRF associated with the source interface.

Command Default
If no *username* argument is provided, the login name on the router is used. If no *hostname* argument is provided, the file is considered local.

Command Modes
EXEC

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines
To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The SFTP client, in the interactive mode, creates a secure SSH channel where the user can enter any supported command. When a user starts the SFTP client in an interactive mode, the SFTP client process creates a secure SSH channel and opens an editor where user can enter any supported command.

More than one request can be sent to the SFTP server to execute the commands. While there is no limit on the number of 'non-acknowledged' or outstanding requests to the server, the server might buffer or queue these requests for convenience. Therefore, there might be a logical sequence to the order of requests.

The following unix based commands are supported in the interactive mode:

- bye

- **cd** *<path>*
- **chmod** *<mode> <path>*
- exit
- **get** *<remote-path> [local-path]*
- help
- **ls** *[-alt] [path]*
- **mkdir <path>**
- **put** *<local-path> [remote-path]*
- pwd
- quit
- **rename <old-path> <new-path>**
- **rmdir <path>**
- **rm <path>**

The following commands are not supported:

- lcd, lls, lpwd, lumask, lmkdir
- ln, symlink
- chgrp, chown
- !, !command
- ?
- mget, mput

Task ID

Task ID	Operations
crypto	execute
basic-services	execute

Examples

In the following example, user *admin* is downloading and uploading a file from/to an external SFTP server using an IPv6 address:

```
RP/0/RSP0/CPU0:router#sftp admin@[2:2:2::2]

Connecting to 2:2:2::2...
Password:
sftp> pwd
Remote working directory: /
sftp> cd /auto/tftp-server1-users5/admin
sftp> get frmRouter /disk0:/frmRouterdownoad

/auto/tftp-server1-users5/admin/frmRouter
  Transferred 1578 Bytes
  1578 bytes copied in 0 sec (27684)bytes/sec
sftp> put /disk0:/frmRouterdownoad againtoServer

/disk0:/frmRouterdownoad
  Transferred 1578 Bytes
  1578 bytes copied in 0 sec (14747)bytes/sec
sftp>
```

In the following example, user *abc* is downloading and uploading a file from/to an external SFTP server using an IPv4 address:

```
RP/0/RSP0/CPU0:router#sftp abc@2.2.2.2
Connecting to 2.2.2.2...
Password:
sftp> pwd
Remote working directory: /
sftp> cd /auto/tftp-server1-users5/abc
sftp> get frmRouter /disk0:/frmRouterdownoad

/auto/tftp-server1-users5/abc/frmRouter
  Transferred 1578 Bytes
  1578 bytes copied in 0 sec (27684)bytes/sec
sftp> put /disk0:/frmRouterdownoad againtoServer

/disk0:/frmRouterdownoad
  Transferred 1578 Bytes
  1578 bytes copied in 0 sec (14747)bytes/sec
sftp>
```

Related Commands

Command	Description
ssh client source-interface, on page 24	Specifies the source IP address of a selected interface for all outgoing SSH connections.
ssh client vrf, on page 26	Configures a new VRF for use by the SSH client.

show netconf-yang clients

To display the client details for netconf-yang, use the **show netconf-yang clients** command in EXEC mode.

show netconf-yang clients

Syntax Description　　This command has no keywords or arguments.

Command Default　　None

Command Modes　　EXEC

Command History

Release	Modification
Release 5.3.0	This command was introduced.

Usage Guidelines　　No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
config-services	read

Example

This example shows how to use the **show netconf-yang clients** command:

```
RP/0/RSP0/CPU0:router (config) # sh netconf-yang clients
Netconf clients
client session ID|   NC version|    client connect time|        last OP time|        last
OP type|    <lock>|
 22969|                  1.1|          0d  0h  0m  2s|          11:11:24|
close-session|       No|
 15389|                  1.1|          0d  0h  0m  1s|          11:11:25|
get-config|       No|
```

Table 1: Field descriptions

Field name	Description
Client session ID	Assigned session identifier
NC version	Version of the Netconf client as advertised in the hello message
Client connection time	Time elapsed since the client was connected
Last OP time	Last operation time
Last OP type	Last operation type
Lock (yes or no)	To check if the session holds a lock on the configuration datastore

show netconf-yang statistics

To display the statistical details for netconf-yang, use the **show netconf-yang statistics** command in EXEC mode.

show netconf-yang statistics

Syntax Description	This command has no keywords or arguments.
Command Default	None
Command Modes	EXEC

Command History

Release	Modification
Release 5.3.0	This command was introduced.

Usage Guidelines No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
config-services	read

Example

This example shows how to use the **show netconf-yang statistics** command:

```
RP/0/RSP0/CPU0:router (config) #  sh netconf-yang statistics
Summary statistics
                         # requests|           total time|  min time per request|    max
 time per request|   avg time per request|
other                            0|     0h  0m  0s   0ms|      0h  0m  0s   0ms|
 0h  0m  0s  0ms|      0h  0m  0s   0ms|
close-session                    4|     0h  0m  0s   3ms|      0h  0m  0s   0ms|
 0h  0m  0s  1ms|      0h  0m  0s   0ms|
kill-session                     0|     0h  0m  0s   0ms|      0h  0m  0s   0ms|
 0h  0m  0s  0ms|      0h  0m  0s   0ms|
get-schema                       0|     0h  0m  0s   0ms|      0h  0m  0s   0ms|
 0h  0m  0s  0ms|      0h  0m  0s   0ms|
get                              0|     0h  0m  0s   0ms|      0h  0m  0s   0ms|
 0h  0m  0s  0ms|      0h  0m  0s   0ms|
get-config                       1|     0h  0m  0s   1ms|      0h  0m  0s   1ms|
 0h  0m  0s  1ms|      0h  0m  0s   1ms|
edit-config                      3|     0h  0m  0s   2ms|      0h  0m  0s   0ms|
 0h  0m  0s  1ms|      0h  0m  0s   0ms|
commit                           0|     0h  0m  0s   0ms|      0h  0m  0s   0ms|
 0h  0m  0s  0ms|      0h  0m  0s   0ms|
cancel-commit                    0|     0h  0m  0s   0ms|      0h  0m  0s   0ms|
 0h  0m  0s  0ms|      0h  0m  0s   0ms|
lock                             0|     0h  0m  0s   0ms|      0h  0m  0s   0ms|
 0h  0m  0s  0ms|      0h  0m  0s   0ms|
unlock                           0|     0h  0m  0s   0ms|      0h  0m  0s   0ms|
 0h  0m  0s  0ms|      0h  0m  0s   0ms|
discard-changes                  0|     0h  0m  0s   0ms|      0h  0m  0s   0ms|
```

```
 0h  0m  0s   0ms|        0h  0m  0s   0ms|
validate                       0|        0h  0m  0s   0ms|        0h  0m  0s   0ms|
 0h  0m  0s   0ms|        0h  0m  0s   0ms|
xml parse                      8|        0h  0m  0s   4ms|        0h  0m  0s   0ms|
 0h  0m  0s   1ms|        0h  0m  0s   0ms|
netconf processor              8|        0h  0m  0s   6ms|        0h  0m  0s   0ms|
 0h  0m  0s   1ms|        0h  0m  0s   0ms|
```

Table 2: Field descriptions

Field name	Description
Requests	Total number of processed requests of a given type
Total time	Total processing time of all requests of a given type
Min time per request	Minimum processing time for a request of a given type
Max time per request	Maximum processing time for a request of a given type
Avg time per request	Average processing time for a request type

show ssh

To display all incoming and outgoing connections to the router, use the **show ssh** command.

show ssh

Syntax Description

This command has no keywords or arguments.

Command Default

None

Command Modes

EXEC

Command History

Release	Modification
Release 3.7.2	This command was introduced.
Release 5.3.2	The command output was enhanced to reflect multichannel and subsystem support for ssh.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **show ssh** command to display all incoming and outgoing Secure Shell (SSH) Version 1 (SSHv1) and SSH Version 2 (SSHv2) connections.

Task ID

Task ID	Operations
crypto	read

Examples

This is sample output from the **show ssh** command when SSH is enabled:

```
RP/0/RSP0/CPU0:router# show ssh

SSH version : Cisco-2.0

id  pty   location    state       userid   host       ver     authentication
-----------------------------------------------------------------------------------------------------
Incoming sessions

Outgoing sessions
1         0/3/CPU0    SESSION_OPEN    lab     12.22.57.    v2         password
2         0/3/CPU0    SESSION_OPEN    lab     12.22.57.75  v2         keyboard-interactive
```

The following output is applicable for the **show ssh** command starting IOS-XR 5.3.2 releases and later.

```
RP/0/RSP0/CPU0:router# show ssh
SSH version : Cisco-2.0
```

```
id  chan pty     location       state         userid   host               ver
authentication connection type
-----------------------------------------------------------------------------------------------
Incoming sessions
0   1    vty0   0/RSP0/CPU0   SESSION_OPEN   lab      12.22.57.75        v2
rsa-pubkey    Command-Line-Interface
0   2    vty1   0/RSP0/CPU0   SESSION_OPEN   lab      12.22.57.75        v2
rsa-pubkey    Command-Line-Interface
0   3           0/RSP0/CPU0   SESSION_OPEN   cisco    12.22.57.75        v2
rsa-pubkey    Sftp-Subsystem
1        vty7   0/RSP0/CPU0   SESSION_OPEN   cisco    12.22.22.57        v1  password
         Command-Line-Interface
3   1           0/RSP0/CPU0   SESSION_OPEN   lab      12.22.57.75        v2  password
         Netconf-Subsystem
4   1    vty3   0/RSP0/CPU0   SESSION_OPEN   lab      192.168.1.55       v2  password
         Command-Line-Interface

Outgoing sessions
1               0/RSP0/CPU0   SESSION_OPEN   lab      192.168.1.51       v2  password
```

This table describes significant fields shown in the display.

Table 3: show ssh Field Descriptions

Field	Description
id	Session identifier for the incoming and outgoing SSH connections.
chan	Channel identifier for incoming (v2) SSH connections. NULL for SSH v1 sessions.
pty	pty-id allocated for the incoming session. Null for outgoing SSH connection.
location	Specifies the location of the SSH server for an incoming connection. For an outgoing connection, location specifies from which route processor the SSH session is initiated.
state	The SSH state that the connection is currently in.
userid	Authentication, authorization and accounting (AAA) username used to connect to or from the router.
host	IP address of the remote peer.
ver	Specifies if the connection type is SSHv1 or SSHv2.
authentication	Specifies the type of authentication method chosen by the user.
connection type	Specifies which application is performed over this connection (Command-Line-Interface, Remote-Command, Scp, Sftp-Subsystem, or Netconf-Subsystem)

Related Commands

Command	Description
show sessions	Displays information about open Telnet or rlogin connections. For more information, see the *System Management Command Reference for Cisco ASR 9000 Series Routers*

Command	Description
show ssh session details, on page 18	Displays the details for all the incoming and outgoing SSHv2 connections, to the router.

show ssh session details

To display the details for all incoming and outgoing Secure Shell Version 2 (SSHv2) connections, use the **show ssh session details** command.

show ssh session details

Syntax Description	This command has no keywords or arguments.
Command Default	None
Command Modes	EXEC

Command History

Release	Modification
Release 3.7.2	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **show ssh session details** command to display a detailed report of the SSHv2 connections to or from the router, including the cipher chosen for the specific session.

Task ID

Task ID	Operations
crypto	read

Examples

The following is sample output from the **show ssh session details** command to display the details for all the incoming and outgoing SSHv2 connections:

```
RP/0/RSP0/CPU0:router# show ssh session details

id  key-exchange              pubkey   incipher   outcipher   inmac       outmac

--------------------------------------------------------------------------------
Incoming Session
0  diffie-hellman-group14    ssh-rsa  aes128-ctr  aes128-ctr  hmac-sha1   hmac-sha1
1  ecdh-sha2-nistp521        ssh-rsa  aes256-ctr  aes256-ctr  hmac-sha2-512 hmac-sha2-512
```

This table describes the significant fields shown in the display.

Table 4: show ssh session details Field Descriptions

Field	Description
session	Session identifier for the incoming and outgoing SSH connections.

Field	Description
key-exchange	Key exchange algorithm chosen by both peers to authenticate each other.
pubkey	Public key algorithm chosen for key exchange.
incipher	Encryption cipher chosen for the Rx traffic.
outcipher	Encryption cipher chosen for the Tx traffic.
inmac	Authentication (message digest) algorithm chosen for the Rx traffic.
outmac	Authentication (message digest) algorithm chosen for the Tx traffic.

Related Commands

Command	Description
show sessions	Displays information about open Telnet or rlogin connections.
show ssh, on page 15	Displays all the incoming and outgoing connections to the router.

ssh

To start the Secure Shell (SSH) client connection and enable an outbound connection to an SSH server, use the **ssh** command.

ssh [**vrf vrf-name**] {**ipv4-address** | **ipv6-address** | **hostname**} [**username** *user-id*] [**cipher aes** {**128-ctr** | **192-ctr** | **256-ctr** | **128-gcm** | **256-gcm**}][**source-interface** *type interface-path-id*][**command***command-name*]

Syntax Description		
	ipv4-address	IPv4 address in A:B:C:D format.
	ipv6-address	IPv6 address in X:X::X format.
	hostname	Hostname of the remote node. If the hostname has both IPv4 and IPv6 addresses, the IPv6 address is used.
	username*user-id*	(Optional) Specifies the username 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.
	cipher aes	SSHv2 supports only AES (protocol supports only ciphers greater than or equal to 128 bits)
	source interface	(Optional) Specifies the source IP address of a selected interface for all outgoing SSH connections.
	type	Interface type. For more information, use the question mark (**?**)online help function.
	interface-path-id	Physical interface or virtual interface.
		Note Use the**showinterfaces** command in EXEC mode to see a list of all interfaces currently configured on the router.
		For more information about the syntax for the router, use the question mark(**?**)online help function.
	command	(Optional) Specifies a remote command. Adding this keyword prompts the SSHv2 server to parse and execute the**ssh**command in non-interactive mode instead of initiating the interactive session.

Command Default	None
Command Modes	EXEC

Command History	**Release**	**Modification**
	Release 3.7.2	This command was introduced.
	Release 3.9.1	Support for the **command** keyword was added.
	Release 6.2.1	Cipher suite SSHv2 supports only AES (protocol supports only ciphers greater than or equal to 128 bits)

Usage Guidelines	To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **ssh** command to make an outbound client connection. The SSH client tries to make an SSHv2 connection to the remote peer. If the remote peer supports only the SSHv1 server, it internally spawns an SSHv1 connection to the remote server. The process of the remote peer version detection and spawning the appropriate client connection is transparent to the user.

If the **source-interface** keyword is specified in the **ssh** command, the **ssh** interface takes precedence over the interface specified in the **ssh client source-interface** ssh client source-interface, on page 24 command.

Use the **command** keyword to enable the SSHv2 server to parse and execute the **ssh** command in non-interactive mode instead of initiating an interactive session.

Task ID

Task ID	Operations
crypto	execute
basic-services	execute

Examples

The following sample output is from the **ssh** command to enable an outbound SSH client connection:

```
RP/0/RSP0/CPU0:router# ssh remote-host   username userabc

Password:
Remote-host>
```

Related Commands

Command	Description
show ssh, on page 15	Displays all the incoming and outgoing connections to the router.

ssh client knownhost

To authenticate a server public key (pubkey), use the **ssh client knownhost** command. To disable authentication of a server pubkey, use the **no** form of this command.

ssh client knownhost device : / filename
no ssh client knownhost device : / filename

Syntax Description	*device:/ filename* Complete path of the filename (for example, slot0:/server_pubkey). The colon (:) and slash (/) are required.

Command Default   None

Command Modes   Global configuration

Command History

Release	Modification
Release 3.7.2	This command was introduced.

Usage Guidelines   To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The *server pubkey* is a cryptographic system that uses two keys at the client end—a public key known to everyone and a private, or secret, key known only to the owner of the keys. In the absence of certificates, the server pubkey is transported to the client through an out-of-band secure channel. The client stores this pubkey in its local database and compares this key against the key supplied by the server during the early stage of key negotiation for a session-building handshake. If the key is not matched or no key is found in the local database of the client, users are prompted to either accept or reject the session.

The operative assumption is that the first time the server pubkey is retrieved through an out-of-band secure channel, it is stored in the local database. This process is identical to the current model adapted by Secure Shell (SSH) implementations in the UNIX environment.

Task ID

Task ID	Operations
crypto	read, write

Examples   The following sample output is from the **ssh client knownhost** command:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ssh client knownhost disk0:/ssh.knownhost
RP/0/RSP0/CPU0:router(config)# commit
RP/0/RSP0/CPU0:router# ssh host1 username user1234
Host key not found from the list of known hosts.
Are you sure you want to continue connecting (yes/no)? yes
Password:
```

```
RP/0/RSP0/CPU0:host1# exit
RP/0/RSP0/CPU0:router# ssh host1 username user1234
```

ssh client source-interface

To specify the source IP address of a selected interface for all outgoing Secure Shell (SSH) connections, use the **ssh client source-interface** command. To disable use of the specified interface IP address, use the **no** form of this command.

ssh client source-interface *type interface-path-id*
no ssh client source-interface *type interface-path-id*

Syntax Description	*type*	Interface type. For more information, use the question mark (?) online help function.
	interface-path-id	Physical interface or virtual interface.

		Note	Use the **show interfaces** command to see a list of all interfaces currently configured on the router.

For more information about the syntax for the router, use the question mark (**?**) online help function.

Command Default   No source interface is used.

Command Modes   Global configuration mode

Command History

Release	Modification
Release 3.7.2	This command was introduced.

Usage Guidelines   To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **ssh client source-interface** command to set the IP address of the specified interface for all outgoing SSH connections. If this command is not configured, TCP chooses the source IP address when the socket is connected, based on the outgoing interface used—which in turn is based on the route required to reach the server. This command applies to outbound shell over SSH as well as Secure Shell File Transfer Protocol (SFTP) sessions, which use the ssh client as a transport.

The source-interface configuration affects connections only to the remote host in the same address family. The system database (Sysdb) verifies that the interface specified in the command has a corresponding IP address (in the same family) configured.

Task ID

Task ID	Operations
crypto	read, write

Examples   The following example shows how to set the IP address of the Management Ethernet interface for all outgoing SSH connections:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ssh client source-interface MgmtEth 0/RSP0/CPU0/0
```

ssh client vrf

To configure a new VRF for use by the SSH client, use the **ssh client vrf** command. To remove the specified VRF, use the **no** form of this command.

ssh client vrf *vrf-name*
no ssh client vrf *vrf-name*

Syntax Description	*vrf-name* Specifies the name of the VRF to be used by the SSH client.

Command Default	None

Command Modes	Global configuration

Command History

Release	Modification
Release 3.8.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

An SSH client can have only one VRF.

If a specific VRF is not configured for the SSH client, the default VRF is assumed when applying other SSH client-related commands, such as ssh client knownhost, on page 22 or ssh client source-interface, on page 24.

Task ID

Task ID	Operations
crypto	read, write

Examples

The following example shows the SSH client being configured to start with the specified VRF:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ssh client vrf green
```

Related Commands

Command	Description
ssh client dscp <value from 0 - 63>	SSH Client supports setting DSCP value in the outgoing packets. If not configured, the default DSCP value set in packets is 16 (for both client and server).

ssh server

To bring up the Secure Shell (SSH) server and to configure one or more VRFs for its use, use the **ssh server** command. To stop the SSH server from receiving any further connections for the specified VRF, use the **no** form of this command. Optionally ACLs for IPv4 and IPv6 can be used to restrict access to the server before the port is opened.

ssh server vrf *vrf-name* [**ipv4 access-list** *ipv4 access list name*] [**ipv6 access-list** *ipv6 access list name*]]
ssh server v2
no ssh server [{**vrf** *vrf name* | **v2**}]

Syntax Description		
vrf *vrf-name*	Specifies the name of the VRF to be used by the SSH server. The maximum VRF length is 32 characters.	
	Note	If no VRF is specified, the default VRF is assumed.
ipv4 access-list *access list namr*	Configures an IPv4 access-list for access restrictions to the ssh server.	
ipv6 access-list *access list name*	Configures an IPv6 access-list for access restrictions to the ssh server	
v2	Forces the SSH server version to be of only version 2.	

Command Default

The default SSH server version is 2 (SSHv2), which falls back to 1 (SSHv1) if the incoming SSH client connection is set to SSHv1.

Command Modes

Global configuration

Command History

Release	Modification
Release 3.7.2	This command was introduced.
Release 3.8.0	The **vrf** keyword was supported.
Release 4.0	The ipv4 / ipv6 access-list keywords are supported.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

An SSH server must be configured at minimum for one VRF. If you delete all configured VRFs, including the default, the SSH server process stops. If you do not configure a specific VRF for the SSH client when applying other commands, such as **ssh client knownhost** or **ssh client source-interface,** the default VRF is assumed.

The SSH server listens for an incoming client connection on port 22. This server handles both Secure Shell Version 1 (SSHv1) and SSHv2 incoming client connections for both IPv4 and IPv6 address families. To accept only Secure Shell Version 2 connections, use the command.

To verify that the SSH server is up and running, use the **show process sshd** command.

Task ID

Task ID	Operations
crypto	read, write

Examples

In the following example, the SSH server is brought up to receive connections for VRF "green":

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ssh server
```

Examples

In the following example, the SSH server is configured to use IPv4 ACLs:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ssh servervrf vrf nameipv4 access-list access list name
```

Related Commands

Command	Description
show processes	Displays information about the SSH server. For more information, see the *System Management Command Reference for Cisco ASR 9000 Series Routers*.
ssh server v2, on page 37	Forces the SSH server version to be only 2 (SSHv2).
ssh server dscp <value from 0 - 63>	SSH server supports setting DSCP value in the outgoing packets. If not configured, the default DSCP value set in packets is 16 (for both client and server).

ssh server rekey-time

To configure rekey of the ssh server key based on time. Use the **no** form of this command to remove the rekey interval.

ssh server rekey-time *time in minutes*
no ssh server rekey-time

Syntax Description	**rekey-time** *time in minutes* Specifies the rekey-time interval in minutes. The range is between 30 to 1440 minutes.
	Note If no time interval is specified, the default interval is considered to be 30 minutes.

Command Default None.

Command Modes Global configuration

Command History

Release	Modification
Release 6.2.1	This command was introduced.

Task ID

Task ID	Operations
crypto	read, write

Examples

In the following example, the SSH server rekey-interval of 450 minutes is used:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ssh server rekey-time 450
```

ssh server rekey-volume

To configure a volume-based rekey threshold for an SSH session. Use the **no** form of this command to remove the volume-based rekey threshold.

ssh server rekey-volume *data in megabytes*
no ssh server rekey-volume

Syntax Description		
rekey-volume *data in megabytes*	Specifies the volume-based rekey threshold in megabytes. The range is between 1024 to 4095 megabytes.	
	Note	If no volume threshold is specified, the default size is considered to be 1024 MB.

Command Default   None.

Command Modes   Global configuration

Command History

Release	Modification
Release 6.2.1	This command was introduced.

Task ID

Task ID	Operations
crypto	read, write

Examples

In the following example, the SSH server rekey-volume of 2048 minutes is used:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ssh server rekey-volume 2048
```

show ssh rekey

To display session rekey details such as session id, session rekey count, time to rekey, data to rekey, use the **show ssh rekey** command.

show ssh rekey

Command Default	None
Command Modes	EXEC

Command History

Release	Modification
Release 6.2.1	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The ssh rekey data is updated ten times between two consecutive rekeys.

Task ID

Task ID	Operations
crypto	read

Examples

The following sample output is from the **show ssh rekey** command:

```
# show ssh rekey

id    RekeyCount   TimeToRekey(min)     VolumeToRekey(MB)
----------------------------------------------------------
Incoming Session
0       8                59.5              1024.0
```

This table describes the fields shown in the display.

Table 5: show ssh rekey Field Descriptions

Field	Description
Rekey Count	Number of times the ssh rekey is generated.
TimeToRekey	Time remaining (in minutes) before the ssh rekey is regenerated based on the value set using the **ssh server rekey-time** command.

Field	Description
VolumeToRekey	Volume remaining (in megabytes) before the ssh rekey is regenerated based on the value set using the **ssh server rekey-volume** command.

ssh server logging

To enable SSH server logging, use the **ssh server logging** command. To discontinue SSH server logging, use the **no** form of this command.

ssh server logging
no ssh server logging

Syntax Description

This command has no keywords or arguments.

Command Default

None

Command Modes

Global configuration

Command History

Release	Modification
Release 3.8.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Only SSHv2 client connections are allowed.

Once you configure the logging, the following messages are displayed:

- Warning: The requested term-type is not supported
- SSH v2 connection from %s succeeded (*user:%s, cipher:%s, mac:%s, pty:%s*)

The warning message appears if you try to connect using an unsupported terminal type. Routers running the Cisco IOS XR software support only the vt100 terminal type.

The second message confirms a successful login.

Task ID

Task ID	Operations
crypto	read, write

Examples

The following example shows the initiation of an SSH server logging:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ssh server logging
```

Related Commands

Command	Description
ssh server, on page 27	Initiates the SSH server.

ssh server rate-limit

To limit the number of incoming Secure Shell (SSH) connection requests allowed per minute, use the **ssh server rate-limit** command. To return to the default value, use the **no** form of this command.

ssh server rate-limit *rate-limit*
no ssh server rate-limit

Syntax Description

rate-limit	Number of incoming SSH connection requests allowed per minute. Range is from 1 to 600.

Despite being configured in minute the implementation of rate-limit is per second, per sub-second or per several seconds.

There are two different behaviors for this command depending on whether the configured value is <120 or >=120.

- If the configured value is <120, it means 1 session is allowed within (60/configured value) second(s). Below are the examples based on the configured value, which is <120:

  - If you configure 30 sessions per minute it means 1 session every (60/30) = 2 seconds.

  - If you configure 60 sessions per minute it means 1 session every (60/60) = 1 second.

  - If you configure 80 sessions per minute it means 1 session every (60/80) = 0.75 second.

- If the configured value is >=120, it means n sessions are allowed within 1 second and it allows for these connections to be simultaneous (at the exact same time). Below are the examples based on the configured value, which is >=120:

  - If you configure 120 sessions per minute it means 2 sessions every 1 second (which can be simultaneous).

  - If you configure 180 sessions per minute it means 3 sessions every 1 second (which can be simultaneous).

  - If you configure 180 sessions per minute it means 3 sessions every 1 second (which can be simultaneous).

In all the above listed cases, if you exceed the allowed configured value the subsequent connection attempts will be refused.

The connection attempts are to the ssh server and not bound per interface or username.

Command Default

rate-limit: 60 connection requests per minute

Command Modes

Global Configuration mode

Command History

Release	Modification
Release 3.7.2	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **ssh server rate-limit** command to limit the incoming SSH connection requests to the configured rate. Any connection request beyond the rate limit is rejected by the SSH server. Changing the rate limit does not affect established SSH sessions.

If, for example, the *rate-limit* argument is set to 30, then 30 requests are allowed per minute, or more precisely, a two-second interval between connections is enforced.

Task ID

Task ID	Operations
crypto	read, write

Examples

The following example shows how to set the limit of incoming SSH connection requests to 20 per minute:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ssh server rate-limit 20
```

ssh server session-limit

To configure the number of allowable concurrent incoming Secure Shell (SSH) sessions, use the **ssh server session-limit** command. To return to the default value, use the **no** form of this command.

ssh server session-limit *sessions*

Syntax Description

sessions	Number of incoming SSH sessions allowed across the router. The range is from 1 to 100.

Note	Although CLI output option has 1024, you are recommended to configure session-limit not more than 100. High session count may cause resource exhaustion .

Command Default

sessions: 64 per router

Command Modes

Global configuration

Command History

Release	Modification
Release 3.7.2	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **ssh server session-limit** command to configure the limit of allowable concurrent incoming SSH connections. Outgoing connections are not part of the limit.

Task ID

Task ID	Operations
crypto	read, write

Examples

The following example shows how to set the limit of incoming SSH connections to 50:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ssh server session-limit 50
```

ssh server v2

To force the SSH server version to be only 2 (SSHv2), use the **ssh server v2** command. To bring down an SSH server for SSHv2, use the **no** form of this command.

ssh server v2
no ssh server v2

Syntax Description   This command has no keywords or arguments.

Command Default   None

Command Modes   Global configuration

Command History

Release	Modification
Release 3.7.2	This command was introduced.

Usage Guidelines   To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Only SSHv2 client connections are allowed.

Task ID

Task ID	Operations
crypto	read, write

Examples   The following example shows how to initiate the SSH server version to be only SSHv2:

```
 RP/0/RSP0/CPU0:router#configure
RP/0/RSP0/CPU0:router(config)# ssh server v2
```

ssh server netconf port

To configure a port for the netconf SSH server, use the **ssh server netconf port** command in the global configuration mode. To return to the default port, use the **no** form of the command.

ssh server netconf port *port number*
no ssh server netconf port *port number*

Syntax Description	**port** *port-number* Port number for the netconf SSH server (default port number is 830).

Command Default	The default port number is 830.

Command Modes	Global configuration

Command History

Release	Modification
Release 5.3.0	This command was introduced.
Release 6.0	The **ssh server netconf** command is no longer auto completed to configure the default port. This command is now optional

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Starting with IOS-XR 6.0.0 it is no longer sufficient to configure a netconf port to enable netconf subsystem support. ssh server netconf needs to be at least configured for one vrf.

Task ID

Task ID	Operations
crypto	read, write

Examples

This example shows how to use the ssh server netconf port command with port 831:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ssh server netconf port 831
```

Related Commands

Command	Description
ssh server netconf	Configures the vrf(s), where netconf subsystem requests are to be received.

Command	Description
netconf-yang agent ssh	Configures the **ssh netconf-yang backend** for the netconf subsystem (Required to allow the system to service netconf-yang requests).
	For more information, see the *Cisco ASR 9000 Series Aggregation Services Router System Management Command Reference*.

ssh server netconf

To bring up the netconf subsystem support using a dedicated communication port with the Secure Shell (SSH) server and to configure one or more VRFs for its use, use the **ssh server netconf** command. To stop the SSH server from receiving any further netconf subsystem connections for the specified VRF, use the **no** form of this command.

Optionally ACLs for IPv4 and IPv6 can be used to restrict access to the netconf subsystem of the SSH server before the port is opened.

ssh server netconf [**vrf** *vrf name* [**ipv4 access-list** *access list name*] [**ipv6 access-list** *access list name*]]

no ssh server netconf [**vrf** *vrf name*]

Syntax Description

vrf name	Specifies the name of the VRF to be used by the netconf subsystem of the SSH server. The maximum VRF length is 32 characters. **Note** If no VRF is specified, the default VRF is assumed.
IPv4 access list name	Configures an IPv4 access-list for access restrictions to the netconf subsystem of the SSH server.
IPv6 access list name	Configures an IPv6 access-list for access restrictions to the netconf subsystem of the SSH server.

Command Default

If no vrf is specified, the command is auto expanded using the default vrf.

Command Modes

Global Configuration

Command History

Release	Modification
Release 5.3.0	This command was introduced.
Release 6.0.0	The **ssh server netconf** command is no longer auto completed to configure the default port. The **vrf** keyword was supported. Without parameter the command is now auto expanded to enable the netconf subsystem for vrf default. To start netconf subsystem support at least one vrf needs to be configured.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Netconf subsystem support of the SSH server must be configured at minimum for one VRF. If you delete all configured VRFs, including the default, the SSH server process stops serving the netconf subsystem requests. If you do not configure a specific VRF the default VRF is assumed. The SSH server listens for netconf subsystem connections an incoming client connection on the configured port (using ssh server netconf port) or port 8030 (as the iana assigned default port)

Netconf subsystem support is only available with Secure Shell Version 2 SSHv2 incoming client connections for both IPv4 and IPv6 address families. To verify that the SSH server is up and running, use the show process sshd command.

Task ID

Task ID	Operation
crypto	read, write

Example

This example shows how to use the **ssh server netconf vrf***vrf name* command:

```
RP/0/RSP0/CPU0:router (config) #  ssh server netconf vrf red
```

ssh timeout

To configure the timeout value for authentication, authorization, and accounting (AAA) user authentication, use the **ssh timeout** command. To set the timeout value to the default time, use the **no** form of this command.

ssh timeout *seconds*
no ssh timeout *seconds*

Syntax Description	*seconds* Time period (in seconds) for user authentication. The range is from 5 to 120.

Command Default   *seconds*: 30

Command Modes   Global configuration

Command History

Release	Modification
Release 3.7.2	This command was introduced.

Usage Guidelines   To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **ssh timeout** command to configure the timeout value for user authentication to AAA. If the user fails to authenticate itself within the configured time to AAA, the connection is aborted. If no value is configured, the default value of 30 seconds is used.

Task ID

Task ID	Operations
crypto	read, write

Examples   In the following example, the timeout value for AAA user authentication is set to 60 seconds:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ssh timeout 60
```