



Managing Configuration Files Configuration Guide, Cisco IOS XE Release 3SE (Cisco WLC 5700 Series)

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CHAPTER

1

Managing Configuration Files

Creating, loading, and maintaining configuration files enable you to generate a set of user-configured commands to customize the functionality of your Cisco routing device. For a complete description of the configuration file management commands, refer to the *Cisco IOS Configuration Fundamentals Command Reference*.

- [Finding Feature Information, page 1](#)
- [Prerequisites for Managing Configuration Files, page 1](#)
- [Restrictions for Managing Configuration Files, page 2](#)
- [Information About Managing Configuration Files, page 2](#)
- [How to Manage Configuration File Information, page 7](#)
- [Additional References, page 27](#)

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see [Bug Search Tool](#) and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Prerequisites for Managing Configuration Files

- You should have at least a basic familiarity with the Cisco IOS environment and the command-line interface.
- You should have at least a minimal configuration running on your system. You can create a basic configuration file using the **setup** command (see [Using Setup Mode to Configure a Cisco Networking Device](#) for details).

Restrictions for Managing Configuration Files

- Many of the Cisco IOS commands described in this document are available and function only in certain configuration modes on the router.

Information About Managing Configuration Files

Types of Configuration Files

Configuration files contain the Cisco IOS software commands used to customize the functionality of your Cisco routing device (router, access server, switch, and so on). Commands are parsed (translated and executed) by the Cisco IOS software when the system is booted (from the startup-config file) or when you enter commands at the CLI in a configuration mode.

Startup configuration files (startup-config) are used during system startup to configure the software. Running configuration files (running-config) contain the current configuration of the software. The two configuration files can be different. For example, you may want to change the configuration for a short time period rather than permanently. In this case, you would change the running configuration using the **configure terminal EXEC** command but not save the configuration using the **copy running-config startup-config EXEC** command.

To change the running configuration, use the **configure terminal** command, as described in the “Modifying the Configuration File at the CLI” section. As you use the Cisco IOS configuration modes, commands generally are executed immediately and are saved to the running configuration file either immediately after you enter them or when you exit a configuration mode.

To change the startup configuration file, you can either save the running configuration file to the startup configuration using the **copy running-config startup-config EXEC** command or copy a configuration file from a file server to the startup configuration (see the “Copying a Configuration File from a TFTP Server to the Router” section for more information).

Configuration Mode and Selecting a Configuration Source

To enter configuration mode on the router, enter the **configure** command at the privileged EXEC prompt. The Cisco IOS software responds with the following prompt asking you to specify the terminal, memory, or a file stored on a network server (network) as the source of configuration commands:

```
Configuring from terminal, memory, or network [terminal]?
```

Configuring from the terminal allows you to enter configuration commands at the command line, as described in the following section. Configuring from memory loads the startup configuration file. See the “Reexecuting the Configuration Commands in the Startup Configuration File” section for more information. Configuring from the network allows you to load and execute configuration commands over the network. See the “Copying a Configuration File from a TFTP Server to the Router” section for more information.

Configuration File Changes Using the CLI

The Cisco IOS software accepts one configuration command per line. You can enter as many configuration commands as you want. You can add comments to a configuration file describing the commands you have entered. Precede a comment with an exclamation point (!). Because comments are *not* stored in NVRAM or in the active copy of the configuration file, comments do not appear when you list the active configuration with the **show running-config** or **more system:running-config EXEC** command. Comments do not display when you list the startup configuration with the **show startup-config** or **more nvram:startup-config EXEC** mode command. Comments are stripped out of the configuration file when it is loaded onto the router. However, you can list the comments in configuration files stored on a File Transfer Protocol (FTP), remote copy protocol (rcp), or Trivial File Transfer Protocol (TFTP) server. When you configure the software using the CLI, the software executes the commands as you enter them.

Location of Configuration Files

Configuration files are stored in the following locations:

- The running configuration is stored in RAM.
- On all platforms except the Class A Flash file system platforms, the startup configuration is stored in nonvolatile random-access memory (NVRAM).
- On Class A Flash file system platforms, the startup configuration is stored in the location specified by the CONFIG_FILE environment variable. The CONFIG_FILE variable defaults to NVRAM and can be a file in the following file systems:
 - **nvram:** (NVRAM)

Copy Configuration Files from a Network Server to the Router

You can copy configuration files from a TFTP, rcp, or FTP server to the running configuration or startup configuration of the router. You may want to perform this function for one of the following reasons:

- To restore a backed-up configuration file.
- To use the configuration file for another router. For example, you may add another router to your network and want it to have a similar configuration to the original router. By copying the file to the new router, you can change the relevant parts rather than re-creating the whole file.
- To load the same configuration commands on to all the routers in your network so that all the routers have similar configurations.

The **copy {ftp | rcp | tftp:system:running-config EXEC}** command loads the configuration files into the router as if you were typing the commands in at the command line. The router does not erase the existing running configuration before adding the commands. If a command in the copied configuration file replaces a command in the existing configuration file, the existing command will be erased. For example, if the copied configuration file contains a different IP address in a particular command than the existing configuration, the IP address in the copied configuration will be used. However, some commands in the existing configuration may not be replaced or negated. In this case, the resulting configuration file will be a mixture of the existing configuration file and the copied configuration file, with the copied configuration file having precedence.

In order to restore a configuration file to an exact copy of a file stored on a server, you need to copy the configuration file directly to the startup configuration (using the **copyftp:** | **rcp:** | **tftp:** } **nvrām:startup-config** command) and reload the router.

To copy configuration files from a server to a router, perform the tasks described in the following sections:

The protocol you use depends on which type of server you are using. The FTP and rcp transport mechanisms provide faster performance and more reliable delivery of data than TFTP. These improvements are possible because the FTP and rcp transport mechanisms are built on and use the TCP/IP stack, which is connection-oriented.

Copy a Configuration File from the Router to a TFTP Server

In some implementations of TFTP, you must create a dummy file on the TFTP server and give it read, write, and execute permissions before copying a file over it. Refer to your TFTP documentation for more information.

Copy a Configuration File from the Router to an FTP Server

You can copy a configuration file from the router to an FTP server.

Understanding the FTP Username and Password

The FTP protocol requires a client to send a remote username and password on each FTP request to a server. When you copy a configuration file from the router to a server using FTP, the Cisco IOS software sends the first valid username it encounters in the following sequence:

- 1 The username specified in the **copy EXEC** command, if a username is specified.
- 2 The username set by the **ip ftp username** global configuration command, if the command is configured.
- 3 Anonymous.

The router sends the first valid password it encounters in the following sequence:

- 1 The password specified in the **copy** command, if a password is specified.
- 2 The password set by the **ip ftp password** command, if the command is configured.
- 3 The router forms a password *username@routername.domain*. The variable *username* is the username associated with the current session, *routername* is the configured host name, and *domain* is the domain of the router.

The username and password must be associated with an account on the FTP server. If you are writing to the server, the FTP server must be properly configured to accept the FTP write request from the user on the router.

If the server has a directory structure, the configuration file or image is written to or copied from the directory associated with the username on the server. For example, if the system image resides in the home directory of a user on the server, specify that user name as the remote username.

Refer to the documentation for your FTP server for more information.

Use the **ip ftp username** and **ip ftp password** global configuration commands to specify a username and password for all copies. Include the username in the **copy EXEC** command if you want to specify a username for that copy operation only.

Copying Files Through a VRF

You can copy files through a VRF interface specified in the **copy** command. Specifying the VRF in the **copy** command is easier and more efficient because you can directly change the source interface without having the need to change the configuration via a change request.

The following example shows how to copy files through a VRF, using the **copy** command:

```
Device# copy scp: slot0: vrf test-vrf
Device# copy scp: slot0: vrf test-vrf
Address or name of remote host [10.1.2.3]?
Source username [ScpUser]?
Source filename [/auto/tftp-server/ScpUser/vrf_test.txt]?
Destination filename [vrf_test.txt]?
Getting the vrf name as test-vrf
Password:
Sending file modes: C0644 10 vrf_test.txt
!
223 bytes copied in 22.740 secs (10 bytes/sec)
```

Configuration Files Larger than NVRAM

To maintain a configuration file that exceeds size of NVRAM, you should be aware of the information in the following sections:

Compressing the Configuration File

The **servicecompress-config** global configuration command specifies that the configuration file be stored compressed in NVRAM. Once the configuration file has been compressed, the router functions normally. When the system is booted, it recognizes that the configuration file is compressed, expands it, and proceeds normally. The **morenvram:startup-config EXEC** command expands the configuration before displaying it.

Before you compress configuration files, refer to the appropriate hardware installation and maintenance publication. Verify that your system's ROMs support file compression. If not, you can install new ROMs that support file compression.

The size of the configuration must not exceed three times the NVRAM size. For a 128-KB size NVRAM, the largest expanded configuration file size is 384 KB.

The **servicecompress-config** global configuration command works only if you have Cisco IOS software Release 10 or later release boot ROMs. Installing new ROMs is a one-time operation and is necessary only if you do not already have Cisco IOS Release 10 in ROM. If the boot ROMs do not recognize a compressed configuration, the following message is displayed:

```
Boot ROMs do not support NVRAM compression Config NOT written to NVRAM
```

Loading the Configuration Commands from the Network

You can also store large configurations on FTP or TFTP servers and download them at system startup. To use a network server to store large configurations, see the "Copying a Configuration File from the Router to a TFTP Server" and "Configure the Router to Download Configuration Files" sections for more information on these commands.

Control of the Parser Cache

The Cisco IOS command-line parser in the Cisco IOS software performs the translation and execution (parsing) of command lines. The Parser Cache feature was developed to rapidly process large configuration files, thereby dramatically improving load time.

The Parser Cache feature allows the rapid recognition and translation of configuration lines in a configuration file that differ slightly from previously used configuration lines (for example, pvc 0/100, pvc 0/101, and so on) by dynamically creating, caching, and reusing simplified parse graphs. This improvement is useful primarily for configuration files that repeat similar commands hundreds or thousands of times, such as cases in which thousands of virtual circuits must be configured for subinterfaces, or hundreds of access lists must be configured. Performance will improve the most for those files in which the same commands are used repeatedly but the numerical arguments change from command to command.

The Parser Cache is enabled by default on all platforms using Cisco IOS Release 12.1(5)T and later releases. However, users with Cisco devices that do not require large configuration files may want to disable the Parser Cache to free the resources used by this feature. (Memory used by this feature depends on the size of the configuration files parsed, but is generally less than 512 KB.)

There are several ways to control the parser cache (these are all optional):

- Clearing the Parser Cache--To free resources or to reset the parser cache memory, you may wish to clear the parse entries and hit/miss statistics stored by the Parser Cache feature
- Disabling the Parser Cache--The Parser Cache feature is enabled by default. To disable the Parser Cache feature, use the `no parser cache` command in global configuration mode. When the parser cache is disabled, the `no parser cache` command line is written to the running configuration file. If you wish to disable the parser cache to free system resources, you should clear the parser cache before issuing the `no parser cache` command. You will not be able to clear the parser cache after disabling it.
- Reenabling the Parser Cache--To reenabte the Parser Cache feature after disabling it, use the `parser cache` command in global configuration mode
- Monitoring the Parser--Statistics about the last configuration file parsed are kept in the system memory, along with hit/miss statistics on the commands parsed by the Parser Cache feature. "Hits" and "misses" refer to the matches that the parser cache was able to make to similar commands used previously in the configuration session. Those commands that are matched ("hits") be parsed more efficiently. The parser cache cannot improve the parse time for those commands it was unable to match ("misses").

Configure the Router to Download Configuration Files

You can configure the router to load one or two configuration files at system startup. The configuration files are loaded into memory and read in as if you were typing the commands at the command line. Thus, the configuration for the router will be a mixture of the original startup configuration and the one or two downloaded configuration files.

Network Versus Host Configuration Files

For historical reasons, the first file the router downloads is called the network configuration file. The second file the router downloads is called the host configuration file. Two configuration files can be used when all of the routers on a network use many of the same commands. The network configuration file contains the

standard commands used to configure all of the routers. The host configuration files contain the commands specific to one particular host. If you are loading two configuration files, the host configuration file should be the configuration file you want to have precedence over the other file. Both the network and host configuration files must reside on a network server reachable via TFTP, rcp, or FTP, and must be readable.

How to Manage Configuration File Information

Displaying Configuration File Information

To display information about configuration files, complete the tasks in this section:

SUMMARY STEPS

1. **enable**
2. **show boot**
3. **more *file-url***
4. **show running-config**
5. **show startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Device> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	show boot Example: Device# show boot	Lists the contents of the BOOT environment variable, the name of the configuration file pointed to by the CONFIG_FILE environment variable, and the contents of the BOOTLDR environment variable.
Step 3	more <i>file-url</i> Example: Device# more 10.1.1.1	Displays the contents of a specified file.
Step 4	show running-config Example: Device# show running-config	Displays the contents of the running configuration file. (Command alias for the more system:running-config command.)

	Command or Action	Purpose
Step 5	show startup-config Example: <pre>Device# show startup-config</pre>	Displays the contents of the startup configuration file. (Command alias for the more nvram:startup-config command.) On all platforms except the Class A Flash file system platforms, the default startup-config file usually is stored in NVRAM. On the Class A Flash file system platforms, the CONFIG_FILE environment variable points to the default startup-config file. The CONFIG_FILE variable defaults to NVRAM.

Modifying the Configuration File at the CLI

The Cisco IOS software accepts one configuration command per line. You can enter as many configuration commands as you want. You can add comments to a configuration file describing the commands you have entered. Precede a comment with an exclamation point (!). Because comments are *not* stored in NVRAM or in the active copy of the configuration file, comments do not appear when you list the active configuration with the **show running-config** or **more system:running-config EXEC** command. Comments do not display when you list the startup configuration with the **showstartup-config** or **more nvram:startup-config EXEC** mode command. Comments are stripped out of the configuration file when it is loaded onto the router. However, you can list the comments in configuration files stored on a File Transfer Protocol (FTP), remote copy protocol (rcp), or Trivial File Transfer Protocol (TFTP) server. When you configure the software using the CLI, the software executes the commands as you enter them. To configure the software using the CLI, use the following commands beginning in privileged EXEC mode:

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. Do one of the following:
 - **end**
 - **^Z**
4. **copy system:running-config nvram:startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: <pre>Device> enable</pre>	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.

	Command or Action	Purpose
Step 2	configure terminal Example: Device# <code>configure terminal</code>	Enters global configuration mode. Enter the necessary configuration commands. The Cisco IOS documentation set describes configuration commands organized by technology.
Step 3	Do one of the following: <ul style="list-style-type: none"> • end • ^Z Example: Device(config)# <code>end</code>	Ends the configuration session and exits to EXEC mode. Note When you press the Ctrl and Z keys simultaneously, ^Z is displayed to the screen.
Step 4	copy system:running-config nvram:startup-config Example: Device# <code>copy system:running-config nvram:startup-config</code>	Saves the running configuration file as the startup configuration file. You may also use the copy running-config startup-config command alias, but you should be aware that this command is less precise. On most platforms, this command saves the configuration to NVRAM. On the Class A Flash file system platforms, this step saves the configuration to the location specified by the CONFIG_FILE environment variable (the default CONFIG_FILE variable specifies that the file should be saved to NVRAM).

Examples

In the following example, the Device prompt name of the Device is configured. The comment line, indicated by the exclamation mark (!), does not execute any command. The **hostname** command is used to change the Device name from Device to new_name. By pressing Ctrl-Z (^Z) or entering the **end** command, the user quits configuration mode. The **copy system:running-config nvram:startup-config** command saves the current configuration to the startup configuration.

```
Device# configure terminal
Device(config)# !The following command provides the Device host name.
Device(config)# hostname new_name
new_name(config)# end
new_name# copy system:running-config nvram:startup-config
```

When the startup configuration is NVRAM, it stores the current configuration information in text format as configuration commands, recording only nondefault settings. The memory is checksummed to guard against corrupted data.



Note

Some specific commands might not get saved to NVRAM. You will need to enter these commands again if you reboot the machine. These commands are noted in the documentation. We recommend that you keep a list of these settings so that you can quickly reconfigure your Device after rebooting.

Copying a Configuration File from the Router to a TFTP Server

To copy configuration information on a TFTP network server, complete the tasks in this section:

SUMMARY STEPS

1. **enable**
2. **copy system:running-config tftp: [[[//location]/directory]/filename]**
3. **copy nvram:startup-config tftp: [[[//location]/directory]/filename]**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Device> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	copy system:running-config tftp: [[[//location]/directory]/filename] Example: Device# copy system:running-config tftp: //server1/topdir/file10	Copies the running configuration file to a TFTP server.
Step 3	copy nvram:startup-config tftp: [[[//location]/directory]/filename] Example: Device# copy nvram:startup-config tftp: //server1/1stidir/file10	Copies the startup configuration file to a TFTP server.

Examples

The following example copies a configuration file from a Device to a TFTP server:

```
Tokyo# copy system:running-config tftp://172.16.2.155/tokyo-config
Write file tokyo-config on host 172.16.2.155? [confirm] y
Writing tokyo-config!!! [OK]
```

What to Do Next

After you have issued the **copy** command, you may be prompted for additional information or for confirmation of the action. The prompting will depend on how much information you provide in the **copy** command and the current setting of the **fileprompt** global configuration command.

Copying a Configuration File from the Router to the FTP Server

To copy a startup configuration file or a running configuration file from the router to an FTP server, complete the following tasks:

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip ftp username *username***
4. **ip ftp password *password***
5. **end**
6. Do one of the following:
 - **copy system:running-config ftp:** `[[[//[username [:password]@]location/directory]/filename]`
 -
 -
 - **copy nvram:startup-config ftp:** `[[[//[username [:password]@]location/directory]/filename]`

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Device> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	configure terminal Example: Device# configure terminal	Enters global configuration mode.
Step 3	ip ftp username <i>username</i> Example: Device(config)# ip ftp username user1	(Optional) Specifies the default remote username.
Step 4	ip ftp password <i>password</i> Example: Device(config)# ip ftp password guessme	(Optional) Specifies the default password.

	Command or Action	Purpose
Step 5	end Example: Device(config)# end	(Optional) Exits global configuration mode. This step is required only if you override the default remote username or password (see Steps 2 and 3).
Step 6	Do one of the following: <ul style="list-style-type: none"> • copy system:running-config ftp: [[[/[username]:password]@]location/directory]/filename] • • • copy nvram:startup-config ftp: [[[/[username]:password]@]location/directory]/filename] Example: Device# copy system:running-config ftp://user1:guessme@company.com /dir10/file1	Copies the running configuration or startup configuration file to an FTP server.

Examples

Storing a Running Configuration File on an FTP Server

The following example copies the running configuration file named rtr2-config to the netadmin1 directory on the remote host with an IP address of 172.16.101.101:

```
Device# copy system:running-config ftp://netadmin1:mypass@172.16.101.101/Rtr2-config
Write file rtr2-config on host 172.16.101.101?[confirm]
Building configuration...[OK]
Connected to 172.16.101.101
Device#
```

Storing a Startup Configuration File on an FTP Server

The following example shows how to store a startup configuration file on a server by using FTP to copy the file:

```
Rtr2# configure terminal
Rtr2(config)# ip ftp username netadmin2
Rtr2(config)# ip ftp password mypass
Rtr2(config)# end
Rtr2# copy nvram:startup-config ftp:
```

```

Remote host[]? 172.16.101.101

Name of configuration file to write [rtr2-config]?
Write file rtr2-config on host 172.16.101.101?[confirm]
![OK]

```

What to Do Next

After you have issued the **copy EXEC** command, you may be prompted for additional information or for confirmation of the action. The prompting will depend on how much information you provide in the **copy** command and the current setting of the **fileprompt** global configuration command.

Copying a Configuration File from a TFTP Server to the Router

To copy a configuration file from a TFTP server to the Device, complete the tasks in this section:

SUMMARY STEPS

1. **enable**
2. **copy tftp: [[[//location]/directory]/filename] system:running-config**
3. **copy tftp: [[[//location]/directory]/filename] nvram:startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	<p>enable</p> <p>Example:</p> <pre>Device> enable</pre>	<p>Enables privileged EXEC mode.</p> <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	<p>copy tftp: [[[//location]/directory]/filename] system:running-config</p> <p>Example:</p> <pre>Device# copy tftp://server1/dir10/datasource system:running-config</pre>	<p>Copies a configuration file from a TFTP server to the running configuration.</p>
Step 3	<p>copy tftp: [[[//location]/directory]/filename] nvram:startup-config</p> <p>Example:</p> <pre>Device# copy tftp://server1/dir10/datasource nvram:startup-config</pre>	<p>Copies a configuration file from a TFTP server to the startup configuration.</p>

Examples

In the following example, the software is configured from the file named `tokyo-config` at IP address 172.16.2.155:

```
Device1# copy tftp://172.16.2.155/tokyo-config system:running-config
Configure using tokyo-config from 172.16.2.155? [confirm] y
Booting tokyo-config from 172.16.2.155:!!! [OK - 874/16000 bytes]
```

What to Do Next

After you have issued the `copy EXEC` command, you may be prompted for additional information or for confirmation of the action. The prompting will depend on how much information you provide in the `copy` command and the current setting of the `fileprompt` global configuration command.

Copying a Configuration File from an FTP Server to the Router

To copy a configuration file from an FTP server to the running configuration or startup configuration, complete the tasks in this section:

SUMMARY STEPS

1. `enable`
2. `configure terminal`
3. `ip ftp username username`
4. `ip ftp password password`
5. `end`
6. `copy ftp: [[[//[username [:password]@]location]/directory]/filename]system:running-config`

DETAILED STEPS

	Command or Action	Purpose
Step 1	<p><code>enable</code></p> <p>Example:</p> <pre>Device> enable</pre>	<p>Enables privileged EXEC mode.</p> <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	<p><code>configure terminal</code></p> <p>Example:</p> <pre>Device# configure terminal</pre>	<p>(Optional) Allows you to enter global configuration mode. This step is required only if you want to override the default remote username or password (see Steps 2 and 3).</p>

	Command or Action	Purpose
Step 3	<p>ip ftp username <i>username</i></p> <p>Example:</p> <pre>Device(config)# ip ftp username user1</pre>	(Optional) Specifies the default remote username.
Step 4	<p>ip ftp password <i>password</i></p> <p>Example:</p> <pre>Device(config)# ip ftp password guessme</pre>	(Optional) Specifies the default password.
Step 5	<p>end</p> <p>Example:</p> <pre>Device(config)# end</pre>	(Optional) Exits global configuration mode. This step is required only if you override the default remote username or password (see Steps 2 and 3).
Step 6	<p>copy ftp: [[[//[<i>username</i> [:<i>password</i>]@]<i>location</i>]/<i>directory</i>]/<i>filename</i>]system:running-config</p> <p>Example:</p> <p>Example:</p> <p>or</p> <p>Example:</p> <pre>copy ftp: [[[//[<i>username</i> [:<i>password</i>]<i>@</i>]<i>location/directory</i>]/<i>filename</i>] nvram:startup-config</pre> <p>Example:</p> <pre>Device# copy ftp://user1:guessme@company.com /dir10/datasource nvram:startup-config</pre>	Using FTP, copies the configuration file from a network server to running memory or the startup configuration.

Examples

Copy FTP Running-Config

The following example copies a host configuration file named `host1-config` from the `netadmin1` directory on the remote server with an IP address of `172.16.101.101`, and loads and runs those commands on the Device:

```
Device# copy rcp://netadmin1:mypass@172.16.101.101/host1-config system:running-config

Configure using host1-config from 172.16.101.101? [confirm]
Connected to 172.16.101.101
Loading 1112 byte file host1-config:[OK]
Device#
%SYS-5-CONFIG: Configured from host1-config by ftp from 172.16.101.101
```

Copy FTP Startup-Config

The following example specifies a remote username of `netadmin1`. Then it copies the configuration file named `host2-config` from the `netadmin1` directory on the remote server with an IP address of `172.16.101.101` to the startup configuration.

```
Rtr2# configure terminal
Rtr2(config)# ip ftp username
netadmin1
Rtr2(config)# ip ftp password
mypass
Rtr2(config)# end
Rtr2# copy ftp: nvram:startup-config
Address of remote host [255.255.255.255]? 172.16.101.101
Name of configuration file[rtr2-config]? host2-config
Configure using host2-config from 172.16.101.101?[confirm]
Connected to 172.16.101.101
Loading 1112 byte file host2-config:[OK]
[OK]
Rtr2#
%SYS-5-CONFIG_NV:Non-volatile store configured from host2-config by ftp from 172.16.101.101
```

What to Do Next

After you have issued the `copy EXEC` command, you may be prompted for additional information or for confirmation of the action. The prompting will depend on how much information you provide in the `copy` command and the current setting of the `fileprompt` global configuration command.

Maintaining Configuration Files Larger than NVRAM

To maintain a configuration file that exceeds size of NVRAM, perform the tasks described in the following sections:

Compressing the Configuration File

To compress configuration files, complete the tasks in this section:

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **service compress-config**
4. **end**
5. Do one of the following:
 - Use FTP, rcp, or TFTP to copy the new configuration.
 - **configure terminal**
6. **copy system:running-config nvram:startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	<p>enable</p> <p>Example:</p> <pre>Device> enable</pre>	<p>Enables privileged EXEC mode.</p> <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	<p>configure terminal</p> <p>Example:</p> <pre>Device# configure terminal</pre>	<p>Enters global configuration mode.</p>
Step 3	<p>service compress-config</p> <p>Example:</p> <pre>Device(config)# service compress-config</pre>	<p>Specifies that the configuration file be compressed.</p>
Step 4	<p>end</p> <p>Example:</p> <pre>Device(config)# end</pre>	<p>Exits global configuration mode.</p>
Step 5	<p>Do one of the following:</p> <ul style="list-style-type: none"> • Use FTP, rcp, or TFTP to copy the new configuration. • configure terminal <p>Example:</p> <pre>Device# configure terminal</pre>	<p>Enters the new configuration:</p> <ul style="list-style-type: none"> • If you try to load a configuration that is more than three times larger than the NVRAM size, the following error message is displayed: <p>“[buffer overflow - <i>file-size</i> /<i>buffer-size</i> bytes].”</p>

	Command or Action	Purpose
Step 6	copy system:running-config nvram:startup-config Example: Device(config)# copy system:running-config nvram:startup-config	When you have finished changing the running-configuration, saves the new configuration.

Examples

The following example compresses a 129-KB configuration file to 11 KB:

```
Device# configure terminal
Device(config)# service compress-config
Device(config)# end
Device# copy tftp://172.16.2.15/tokyo-config system:running-config
Configure using tokyo-config from 172.16.2.155? [confirm] y
Booting tokyo-config from 172.16.2.155:!!! [OK - 874/16000 bytes]
Device# copy system:running-config nvram:startup-config

Building configuration...
Compressing configuration from 129648 bytes to 11077 bytes
[OK]
```

Managing the Parser Cache

To control the Parser Cache feature, perform the tasks described in the following sections. All of these tasks are optional:

Clearing the Parser Cache

To clear the information stored by the Parser Cache feature, complete the task in this section:

SUMMARY STEPS

1. enable
2. clear parser cache

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable	Enables privileged EXEC mode.

	Command or Action	Purpose
	Example: Device> enable	<ul style="list-style-type: none"> Enter your password if prompted.
Step 2	clear parser cache Example: Device# clear parser cache	Clears the parse cache entries and hit/miss statistics stored for the Parser Cache feature.

Disabling the Parser Cache

The Parser Cache feature is enabled by default. To disable the Parser Cache feature, complete the task in this section:

SUMMARY STEPS

- enable
- configure terminal
- no parser cache

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Device> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> Enter your password if prompted.
Step 2	configure terminal Example: Device# configure terminal	Enters global configuration mode.
Step 3	no parser cache Example: Device(config)# no parser cache	Disables the Parser Cache feature: <ul style="list-style-type: none"> When the parser cache is disabled, the noparsercache command line is written to the running configuration file. If you wish to disable the parser cache to free system resources, you should clear the parser cache before issuing the noparsercache command. You will not be able to clear the parser cache after disabling it.

Command or Action	Purpose
-------------------	---------

Reenabling the Parser Cache

To reenable the Parser Cache feature after disabling it, complete the task in this section:

SUMMARY STEPS

1. `enable`
2. `configure terminal`
3. `parser cache`

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Device> enable	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	configure terminal Example: Device# configure terminal	Enters global configuration mode.
Step 3	parser cache Example: Device(config)# parser cache	Enables the Parser Cache feature.

What to Do Next

The `show parser statistics` command displays two sets of data, as follows:

- The number of commands in the configuration file that was last copied into the running configuration, and the time it took for the system to parse them (a configuration file can be loaded into the running configuration at system startup, or by issuing commands such as the `copy source running-config EXEC` command).
- The status of the parser cache (enabled or disabled) and the number of command matches (hits or misses) since the system was started or since the parser cache was cleared.

Copying Configuration Files from Flash Memory to the Startup or Running Configuration

To copy a configuration file from Flash memory directly to your startup configuration in NVRAM or your running configuration, enter one of the commands in Step 2:

SUMMARY STEPS

1. **enable**
2. Do one of the following:
 - **copy filesystem** : [partition-number:][filename] **nvrn:startup-config**
 - **copy filesystem** : [partition-number:][filename] **system:running-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	<p>enable</p> <p>Example:</p> <pre>Device> enable</pre>	<p>Enables privileged EXEC mode.</p> <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	<p>Do one of the following:</p> <ul style="list-style-type: none"> • copy filesystem : [partition-number:][filename] nvrn:startup-config • copy filesystem : [partition-number:][filename] system:running-config <p>Example:</p> <pre>Device# copy slot0:4:ios-upgrade-1 nvrn:startup-config</pre>	<p>Loads a configuration file directly into NVRAM.</p> <p>or</p> <p>Copies a configuration file to your running configuration.</p> <p>Note Slot 0 is not applicable for Cisco ASR 900 RSP3 Module. Use bootflash or USB.</p>

Examples

The following example copies the file named ios-upgrade-1 from partition 4 of the Flash memory PC Card in slot 0 to the router startup configurations:

```
Device# copy slot0:4:ios-upgrade-1 nvrn:startup-config

Copy '
ios-upgrade-1
' from flash device
as 'startup-config' ? [yes/no] yes
```



[OK]

Note

Slot 0 is not applicable for Cisco ASR 900 RSP3 Module. Use bootflash or USB.

Copying a Configuration File from an FTP Server to Flash Memory Devices

To copy a configuration file from an FTP server to a Flash memory device, complete the task in this section:

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip ftp username *username***
4. **ip ftp password *password***
5. **end**
6. **copy ftp: [[[//[*username:password@*]*location*]/*directory*]/*filename*]**
flash-filesystem:[*partition-number*]:]*filename*]

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Device> enable	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	configure terminal Example: Device# configure terminal	(Optional) Enters global configuration mode. This step is required only if you override the default remote username or password (see Steps 3 and 4).
Step 3	ip ftp username <i>username</i> Example: Device(config)# ip ftp username user1	(Optional) Specifies the remote username.
Step 4	ip ftp password <i>password</i> Example: Device(config)# ip ftp password guessme	(Optional) Specifies the remote password.

	Command or Action	Purpose
Step 5	end Example: Device(config)# end	(Optional) Exits configuration mode. This step is required only if you override the default remote username (see Steps 3 and 4).
Step 6	copy ftp: [[[/[username:password@]location]/directory]/filename] <i>flash-filesystem:[partition-number:]</i> [filename] Example: Device> copy ftp:router-config slot0:new-config	Copies the configuration file from a network server to the Flash memory device using FTP.

What to Do Next

After you have issued the **copy EXEC** command, you may be prompted for additional information or for confirmation of the action. The prompting will depend on how much information you provide in the **copy** command and the current setting of the **fileprompt** global configuration command.

Copying a Configuration File from an rcp Server to Flash Memory Devices

To copy a configuration file from an rcp server to a Flash memory device, complete the tasks in this section:

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip rcmd remote-username** *username*
4. **end**
5. **copy rcp:** [[[/[username@]location]/directory]/filename]*flash-filesystem:[partition-number:]*[filename]

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Device> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.

	Command or Action	Purpose
Step 2	configure terminal Example: Device# configure terminal	(Optional) Enters global configuration mode. This step is required only if you override the default remote username or password (see Steps 3 and 4).
Step 3	ip rcmd remote-username <i>username</i> Example: Device(config)# ip rcmd remote-username user1	(Optional) Specifies the remote username.
Step 4	end Example: Device(config)# end	(Optional) Exits configuration mode. This step is required only if you override the default remote username or password (see Steps 3 and 4).
Step 5	copy rcp: [[[//[<i>username@</i>]/<i>location</i>]/<i>directory</i>]/<i>filename</i>] flash-filesystem:[<i>partition-number</i>:][<i>filename</i>] Example: Device# copy rcp:router-config slot0:new-config	Copies the configuration file from a network server to the Flash memory device using rcp. Reply to any router prompts for additional information or confirmation. The prompting will depend on how much information you provide in the copy command and the current setting of the fileprompt command.

Copying a Configuration File from a TFTP Server to Flash Memory Devices

To copy a configuration file from a TFTP server to a Flash memory device, complete the task in this section:

SUMMARY STEPS

1. **enable**
2. **copy tftp: [[[//[*location*]/*directory*]/*filename*] flash-filesystem:[*partition-number*:][*filename*]**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Device> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.

	Command or Action	Purpose
Step 2	<p>copy tftp: [[[//location]/directory][filename] flash-filesystem:[partition-number:][filename]</p> <p>Example:</p> <pre>Device# copy tftp:router-config slot0:new-config</pre>	<p>Copies the file from a TFTP server to the Flash memory device. Reply to any Device prompts for additional information or confirmation. The prompting will depending on how much information you provide in the copy command and the current setting of the fileprompt command.</p>

Examples

The following example shows the copying of the configuration file named Device-config from a TFTP server to the Flash memory card inserted in slot 0 of the Network Processing Engine (NPE) or Route Switch Processor (RSP) card of a Cisco 7500 series Device. The copied file is renamed new-config.

```
Device# copy tftp:router-config slot0:new-config
```

Reexecuting the Configuration Commands in the Startup Configuration File

To reexecute the commands located in the startup configuration file, complete the task in this section:

SUMMARY STEPS

1. enable
2. configure memory

DETAILED STEPS

	Command or Action	Purpose
Step 1	<p>enable</p> <p>Example:</p> <pre>Device> enable</pre>	<p>Enables privileged EXEC mode.</p> <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	<p>configure memory</p> <p>Example:</p> <pre>Device# configure memory</pre>	<p>Reexecutes the configuration commands located in the startup configuration file .</p>

Clearing the Startup Configuration

You can clear the configuration information from the startup configuration. If you reboot the router with no startup configuration, the router will enter the Setup command facility so that you can configure the router from scratch. To clear the contents of your startup configuration, complete the task in this section:

SUMMARY STEPS

1. `enable`
2. `erase nvram`

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Device> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	erase nvram Example: Device# erase nvram	Clears the contents of your startup configuration. <p>Note For all platforms except the Class A Flash file system platforms, this command erases NVRAM. The startup configuration file cannot be restored once it has been deleted. On Class A Flash file system platforms, when you use the erasestartup-configEXEC command, the Device erases or deletes the configuration pointed to by CONFIG_FILE environment variable. If this variable points to NVRAM, the Device erases NVRAM. If the CONFIG_FILE environment variable specifies a Flash memory device and configuration filename, the Device deletes the configuration file. That is, the Device marks the file as “deleted,” rather than erasing it. This feature allows you to recover a deleted file.</p>

Deleting a Specified Configuration File

To delete a specified configuration on a specific Flash device, complete the task in this section:

SUMMARY STEPS

1. `enable`
2. `delete flash-filesystem : filename`

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Device> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	delete <i>flash-filesystem</i> : <i>filename</i> Example: Device# delete slot0:myconfig	Deletes a specified configuration file on a specified Flash device. Note On Class A and B Flash file systems, when you delete a specific file in Flash memory, the system marks the file as deleted, allowing you to later recover a deleted file using the undelete EXEC command. Erased files cannot be recovered. To permanently erase the configuration file, use the squeeze EXEC command. On Class C Flash file systems, you cannot recover a file that has been deleted. If you attempt to erase or delete the configuration file specified by the CONFIG_FILE environment variable, the system prompts you to confirm the deletion.

Additional References

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Command List, All Releases
Cisco IOS configuration commands	Cisco IOS Configuration Fundamentals Command Reference

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html



Configuration Generation Performance Enhancement

The Configuration Generation Performance Enhancement feature assists configuration management by enabling faster collection of running configuration file information. This feature is especially useful in managing large networks with numerous interfaces configured.

- [Finding Feature Information, page 29](#)
- [Restrictions for Configuration Generation Performance Enhancement, page 29](#)
- [Information About Configuration Generation Performance Enhancement, page 30](#)
- [How to Configure the Configuration Generation Performance Enhancement, page 30](#)
- [Configuration Examples for the Configuration Generation Performance Enhancement, page 31](#)
- [Additional References, page 32](#)
- [Feature Information for Configuration Generation Performance Enhancement, page 34](#)

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see [Bug Search Tool](#) and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Restrictions for Configuration Generation Performance Enhancement

The device on which the Configuration Generation Performance Enhancement feature is used must have enough memory available to store (cache) a large interface configuration file. For example, if the interface

configurations take up 15 KB of memory, using this feature would require having an additional 15 KB of memory space available.

Information About Configuration Generation Performance Enhancement

Cisco IOS XE Software Configuration Storage

In the Cisco IOS XE software configuration model, the configuration state is maintained in a distributed manner, with each component storing its own configuration state. To retrieve configuration information, the software must poll every component to collect the distributed information. This configuration state retrieval operation is performed by a process known as nonvolatile generation (NVGEN), and it is used by command-line interface (CLI) commands such as **show running-configuration**, **write memory**, and **copy system:running-configuration** to display or copy the running system configuration. When invoked, NVGEN queries each system component and each instance of interface or other configuration objects. A running configuration file is constructed as NVGEN traverses the system performing these queries.

Benefits of the Configuration Generation Performance Enhancement

Before the Configuration Generation Performance Enhancement feature was introduced, NVGEN always had to query the entire system and could generate only a total configuration. The time required to process the running configuration creates performance problems for configuration management, because completion of the NVGEN operation can take many minutes.

The Configuration Generation Performance Enhancement feature reduces the execution time for NVGEN processes and is especially useful for managing large configuration files that contain numerous interface configurations. This feature provides faster execution of commands that process the running system configuration by caching interface configuration information in system memory, and by retrieving only configuration information that has changed.

How to Configure the Configuration Generation Performance Enhancement

Configuring the Configuration Generation Performance Enhancement

Perform this task to enable the Configuration Generation Performance Enhancement.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **parser config cache interface**
4. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Device> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	configure terminal Example: Device# configure terminal	Enters global configuration mode.
Step 3	parser config cache interface Example: Device(config)# parser config cache interface	Reduces the time required for the CLI to execute commands that manage the running system configuration, especially for large configuration files.
Step 4	end Example: Device(config)# end	Exits global configuration mode and returns to privileged EXEC mode.

Configuration Examples for the Configuration Generation Performance Enhancement

Configuring the Configuration Generation Performance Enhancement Example

The following example shows how to enable the Configuration Generation Performance Enhancement feature:

```
Device(config)# parser config cache interface
```

Verifying the Configuration Generation Performance Enhancement Example

You can verify that the **parserconfigcacheinterface** command has been enabled by checking for the command in the system configuration file displayed when you enter the **showrunning-configuration EXEC** command.



Note

The first time you display the configuration file, you will not see much evidence of improvement in performance because the interface cache will be filled up. However, you will notice performance improvements when you enter subsequent NVGEN-type commands such as the **showrunning-config EXEC** command. Each time the interface configuration changes, the cache of the specified interface is flushed. The other interface data remains cached as before. Entering an NVGEN-type command after modifying the interface configuration will once again not show much evidence of improvement until the next NVGEN-type command is entered.

```
Device# show running-config
!
!
parser config cache interface
!
!
```

Additional References

The following sections provide references related to the Configuration Partitioning feature.

Related Documents

Related Topic	Document Title
Running configuration performance enhancement-- parserconfigcache for interfaces.	Configuration Generation Performance Enhancement
Provisioning of customer services, Config Rollback, Config Locking, and configuration access control	Contextual Configuration Diff Utility
Configuration management--Config change logging.	Configuration Change Notification and Logging
Configuration management --Quick-save for config change logging ¹ .	Configuration Logger Persistency
Cisco IOS software configuration access control and config session locking ("Config Lock").	Exclusive Configuration Change Access and Access Session Locking

¹ The "Configuration Logger Persistency" feature allows saving just the commands entered since the last startup-config file was generated, rather than saving the entire startup configuration.

Standards

Standard	Title
No standards are associated with this feature.	--

MIBs

MIB	MIBs Link
No new or modified MIBs are supported by this feature, and support for existing MIBs has not been modified by this feature.	--

RFCs

RFC	Title
No new or modified RFCs are supported by this feature, and support for existing RFCs has not been modified by this feature.	--

Technical Assistance

Description	Link
<p>The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies.</p> <p>To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds.</p> <p>Access to most tools on the Cisco Support website requires a Cisco.com user ID and password..</p>	http://www.cisco.com/techsupport

Feature Information for Configuration Generation Performance Enhancement

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to [http://www.cisco.com/go/featurenavigator](#). An account on Cisco.com is not required.

Table 1: Feature Information for the Configuration Generation Performance Enhancement Feature

Feature Name	Releases	Feature Information
Configuration Generation Performance Enhancement	Cisco IOS XE Release 3.3SE	<p>The Configuration Generation Performance Enhancement feature assists configuration management by enabling faster collection of running configuration file information. This feature is especially useful in managing large networks with numerous interfaces configured.</p> <p>In Cisco IOS XE Release 3.3SE, this feature is supported on Cisco 5700 Wireless LAN Controllers.</p> <p>Commands associated with this feature:</p> <ul style="list-style-type: none"> • parser config cache interface • parser config partition • parser cache



Configuration Replace and Configuration Rollback

The Configuration Replace and Configuration Rollback feature provides the capability to replace the current running configuration with any saved Cisco IOS configuration file. This functionality can be used to revert to a previous configuration state, effectively rolling back any configuration changes that were made since that configuration file was saved.

- [Finding Feature Information, page 35](#)
- [Prerequisites for Configuration Replace and Configuration Rollback, page 36](#)
- [Restrictions for Configuration Replace and Configuration Rollback, page 36](#)
- [Information About Configuration Replace and Configuration Rollback, page 37](#)
- [How to Use Configuration Replace and Configuration Rollback, page 39](#)
- [Configuration Examples for Configuration Replace and Configuration Rollback, page 46](#)
- [Additional References, page 48](#)
- [Feature Information for Configuration Replace and Configuration Rollback, page 50](#)

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see [Bug Search Tool](#) and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Prerequisites for Configuration Replace and Configuration Rollback

The format of the configuration files used as input by the Configuration Replace and Configuration Rollback feature must comply with standard Cisco software configuration file indentation rules as follows:

- Start all commands on a new line with no indentation, unless the command is within a configuration submode.
- Indent commands within a first-level configuration submode one space.
- Indent commands within a second-level configuration submode two spaces.
- Indent commands within subsequent submodes accordingly.

These indentation rules describe how the software creates configuration files for such commands as **show running-config** or **copy running-config destination-url**. Any configuration file generated on a Cisco device complies with these rules.

Free memory larger than the combined size of the two configuration files (the current running configuration and the saved replacement configuration) is required.

Restrictions for Configuration Replace and Configuration Rollback

If the device does not have free memory larger than the combined size of the two configuration files (the current running configuration and the saved replacement configuration), the configuration replace operation is not performed.

Certain Cisco configuration commands such as those pertaining to physical components of a networking device (for example, physical interfaces) cannot be added or removed from the running configuration. For example, a configuration replace operation cannot remove the **interface ethernet 0** command line from the current running configuration if that interface is physically present on the device. Similarly, the **interface ethernet 1** command line cannot be added to the running configuration if no such interface is physically present on the device. A configuration replace operation that attempts to perform these types of changes results in error messages indicating that these specific command lines failed.

In very rare cases, certain Cisco configuration commands cannot be removed from the running configuration without reloading the device. A configuration replace operation that attempts to remove this type of command results in error messages indicating that these specific command lines failed.

Information About Configuration Replace and Configuration Rollback

Configuration Archive

The Cisco IOS configuration archive is intended to provide a mechanism to store, organize, and manage an archive of Cisco IOS configuration files to enhance the configuration rollback capability provided by the **configurereplace** command. Before this feature was introduced, you could save copies of the running configuration using the **copyrunning-configdestination-url** command, storing the replacement file either locally or remotely. However, this method lacked any automated file management. On the other hand, the Configuration Replace and Configuration Rollback feature provides the capability to automatically save copies of the running configuration to the Cisco IOS configuration archive. These archived files serve as checkpoint configuration references and can be used by the **configurereplace** command to revert to previous configuration states.

The **archiveconfig** command allows you to save Cisco IOS configurations in the configuration archive using a standard location and filename prefix that is automatically appended with an incremental version number (and optional timestamp) as each consecutive file is saved. This functionality provides a means for consistent identification of saved Cisco IOS configuration files. You can specify how many versions of the running configuration are kept in the archive. After the maximum number of files are saved in the archive, the oldest file is automatically deleted when the next, most recent file is saved. The **showarchive** command displays information for all configuration files saved in the Cisco IOS configuration archive.

The Cisco IOS configuration archive, in which the configuration files are stored and available for use with the **configurereplace** command, can be located on the following file systems:

- If your platform has disk0--disk0:, disk1:, ftp:, pram:, rcp:, slavedisk0:, slavedisk1:, or tftp:
- If your platform does not have disk0--ftp:, http:, pram:, rcp:, or tftp:

Configuration Replace

The **configurereplace** command provides the capability to replace the current running configuration with any saved Cisco IOS configuration file. This functionality can be used to revert to a previous configuration state, effectively rolling back any configuration changes that were made since the previous configuration state was saved.

When using the **configurereplace** command, you must specify a saved Cisco IOS configuration as the replacement configuration file for the current running configuration. The replacement file must be a complete configuration generated by a Cisco IOS device (for example, a configuration generated by the **copyrunning-configdestination-url** command), or, if generated externally, the replacement file must comply with the format of files generated by Cisco IOS devices. When the **configurereplace** command is entered, the current running configuration is compared with the specified replacement configuration and a set of diffs is generated. The algorithm used to compare the two files is the same as that employed by the **showarchiveconfigdifferences** command. The resulting diffs are then applied by the Cisco IOS parser to achieve the replacement configuration state. Only the diffs are applied, avoiding potential service disruption from reapplying configuration commands that already exist in the current running configuration. This algorithm effectively handles configuration changes to order-dependent commands (such as access lists) through a

multiple pass process. Under normal circumstances, no more than three passes are needed to complete a configuration replace operation, and a limit of five passes is performed to preclude any looping behavior.

The Cisco IOS **copysource-urlrunning-config** command is often used to copy a stored Cisco IOS configuration file to the running configuration. When using the **copysource-urlrunning-config** command as an alternative to the **configurereplacetarget-url** command, the following major differences should be noted:

- The **copysource-urlrunning-config** command is a merge operation and preserves all the commands from both the source file and the current running configuration. This command does not remove commands from the current running configuration that are not present in the source file. In contrast, the **configurereplacetarget-url** command removes commands from the current running configuration that are not present in the replacement file and adds commands to the current running configuration that need to be added.
- The **copysource-urlrunning-config** command applies every command in the source file, whether or not the command is already present in the current running configuration. This algorithm is inefficient and, in some cases, can result in service outages. In contrast, the **configurereplacetarget-url** command only applies the commands that need to be applied--no existing commands in the current running configuration are reapplied.
- A partial configuration file may be used as the source file for the **copysource-urlrunning-config** command, whereas a complete Cisco IOS configuration file must be used as the replacement file for the **configurereplacetarget-url** command.

In Cisco IOS Release 12.2(25)S and 12.3(14)T, a locking feature for the configuration replace operation was introduced. When the **configurereplace** command is used, the running configuration file is locked by default for the duration of the configuration replace operation. This locking mechanism prevents other users from changing the running configuration while the replacement operation is taking place, which might otherwise cause the replacement operation to terminate unsuccessfully. You can disable the locking of the running configuration by using the **no**lock keyword when issuing the **configurereplace** command.

The running configuration lock is automatically cleared at the end of the configuration replace operation. You can display any locks that may be currently applied to the running configuration using the **showconfigurationlock** command.



Note

In a scenario when you are performing a configuration replace using a configuration that is not sourced from IOS (such as a custom written configuration) if the login banner has a delimiter that is not the EXT character (ASCII code 003), the banner configuration is rejected and not included in the replaced configuration. Non-working delimiters include ^C, %, #, CC etc.

Configuration Rollback

The concept of rollback comes from the transactional processing model common to database operations. In a database transaction, you might make a set of changes to a given database table. You then must choose whether to commit the changes (apply the changes permanently) or to roll back the changes (discard the changes and revert to the previous state of the table). In this context, rollback means that a journal file containing a log of the changes is discarded, and no changes are applied. The result of the rollback operation is to revert to the previous state, before any changes were applied.

The **configurereplace** command allows you to revert to a previous configuration state, effectively rolling back changes that were made since the previous configuration state was saved. Instead of basing the rollback

operation on a specific set of changes that were applied, the Cisco IOS configuration rollback capability uses the concept of reverting to a specific configuration state based on a saved Cisco IOS configuration file. This concept is similar to the database idea of saving a checkpoint (a saved version of the database) to preserve a specific state.

If the configuration rollback capability is desired, you must save the Cisco IOS running configuration before making any configuration changes. Then, after entering configuration changes, you can use that saved configuration file to roll back the changes (using the **configurereplace** *target-url* command). Furthermore, since you can specify any saved Cisco IOS configuration file as the replacement configuration, you are not limited to a fixed number of rollbacks, as is the case in some rollback models based on a journal file.

Configuration Rollback Confirmed Change Operation

The Configuration Rollback Confirmed Change feature enables an added criterion of a confirmation to configuration changes. This functionality enables a rollback to occur if a confirmation of the requested changes is not received in a configured time frame. Command failures can also be configured to trigger a configuration rollback.

The following steps outline how this process is achieved:

- 1 A new option allows you to request confirmation (a confirmation time limit must be supplied) of the configuration changes.
- 2 You must enter the confirmation command. If no confirmation is entered within the requested time limit, the configuration reverts to its previous state.

Benefits of Configuration Replace and Configuration Rollback

- Allows you to revert to a previous configuration state, effectively rolling back configuration changes.
- Allows you to replace the current running configuration file with the startup configuration file without having to reload the router or manually undo CLI changes to the running configuration file, therefore reducing system downtime.
- Allows you to revert to any saved Cisco IOS configuration state.
- Simplifies configuration changes by allowing you to apply a complete configuration file to the router, where only the commands that need to be added or removed are affected.
- When using the **configure replace** command as an alternative to the **copy source-url running-config** command, increases efficiency and prevents risk of service outages by not reapplying existing commands in the current running configuration.

How to Use Configuration Replace and Configuration Rollback

Creating a Configuration Archive

No prerequisite configuration is needed to use the **configurereplace** command. Using the **configurereplace** command in conjunction with the Cisco IOS configuration archive and the **archiveconfig** command is optional

but offers significant benefit for configuration rollback scenarios. Before using the **archiveconfig** command, the configuration archive must be configured. Perform this task to configure the characteristics of the configuration archive.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **archive**
4. **path *url***
5. **maximum *number***
6. **time-period *minutes***
7. **end**
8. **archive config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Device> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	configure terminal Example: Device# configure terminal	Enters global configuration mode.
Step 3	archive Example: Device(config)# archive	Enters archive configuration mode.
Step 4	path <i>url</i> Example: Device(config-archive)# path flash:myconfig	Specifies the location and filename prefix for the files in the Cisco IOS configuration archive. <p>Note If a directory is specified in the path instead of file, the directory name must be followed by a forward slash as follows: path flash:/directory/. The forward slash is not necessary after a filename; it is only necessary when specifying a directory.</p>
Step 5	maximum <i>number</i> Example: Device(config-archive)# maximum 14	(Optional) Sets the maximum number of archive files of the running configuration to be saved in the Cisco IOS configuration archive. <ul style="list-style-type: none"> • The <i>number</i> argument is the maximum number of archive files of the running configuration to be saved in the Cisco IOS configuration archive. Valid values are from 1 to 14. The default is 10.

	Command or Action	Purpose
		<p>Note Before using this command, you must configure the path command to specify the location and filename prefix for the files in the Cisco IOS configuration archive.</p>
Step 6	<p>time-period <i>minutes</i></p> <p>Example:</p> <pre>Device(config-archive) # time-period 10</pre>	<p>(Optional) Sets the time increment for automatically saving an archive file of the current running configuration in the Cisco IOS configuration archive.</p> <ul style="list-style-type: none"> The minutes argument specifies how often, in minutes, to automatically save an archive file of the current running configuration in the Cisco IOS configuration archive. <p>Note Before using this command, you must configure the path command to specify the location and filename prefix for the files in the Cisco IOS configuration archive.</p>
Step 7	<p>end</p> <p>Example:</p> <pre>Device(config-archive) # end</pre>	Exits to privileged EXEC mode.
Step 8	<p>archive config</p> <p>Example:</p> <pre>Device# archive config</pre>	<p>Saves the current running configuration file to the configuration archive.</p> <p>Note The path command must be configured before using this command.</p>

Performing a Configuration Replace or Configuration Rollback Operation

Perform this task to replace the current running configuration file with a saved Cisco IOS configuration file.



Note

You must create a configuration archive before performing this procedure. See [Creating a Configuration Archive](#) for detailed steps. The following procedure details how to return to that archived configuration in the event of a problem with the current running configuration.

SUMMARY STEPS

1. **enable**
2. **configure replace** *target-url* [**nolock**] [**list**] [**force**] [**ignorecase**] [**reverttrigger**[**error**]/**timer***minutes*]**timeminutes**
3. **configure revert** {**now** |**timer**{*minutes*|*idleminutes*}}
4. **configure confirm**
5. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	<p>enable</p> <p>Example:</p> <pre>Device> enable</pre>	<p>Enables privileged EXEC mode.</p> <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	<p>configure replace <i>target-url</i> [nolock] [list] [force] [ignorecase] [reverttrigger[error]/timerminutes]timeminutes</p> <p>Example:</p> <pre>Device# configure replace flash:myconfig-1 list time 30</pre>	<p>Replaces the current running configuration file with a saved Cisco IOS configuration file.</p> <ul style="list-style-type: none"> • The <i>target-url</i> argument is a URL (accessible by the Cisco IOS file system) of the saved Cisco IOS configuration file that is to replace the current running configuration, such as the configuration file created using the archiveconfig command. • The list keyword displays a list of the command lines applied by the Cisco IOS software parser during each pass of the configuration replace operation. The total number of passes performed is also displayed. • The force keyword replaces the current running configuration file with the specified saved Cisco IOS configuration file without prompting you for confirmation. • The timeminutes keyword and argument specify the time (in minutes) within which you must enter the configureconfirm command to confirm replacement of the current running configuration file. If the configureconfirm command is not entered within the specified time limit, the configuration replace operation is automatically reversed (in other words, the current running configuration file is restored to the configuration state that existed prior to entering the configurereplace command). • The nolock keyword disables the locking of the running configuration file that prevents other users from changing the running configuration during a configuration replace operation. • The reverttrigger keywords set the following triggers for reverting to the original configuration: <ul style="list-style-type: none"> • error--Reverts to the original configuration upon error. • timerminutes--Reverts to the original configuration if specified time elapses. • The ignorecase keyword allows the configuration to ignore the case of the confirmation command.

	Command or Action	Purpose
Step 3	<p>configure revert {now timer{minutes idleminutes}}</p> <p>Example:</p> <pre>Device# configure revert now</pre> <p>Example:</p>	<p>(Optional) To cancel the timed rollback and trigger the rollback immediately, or to reset parameters for the timed rollback, use the configure revert command in privileged EXEC mode.</p> <ul style="list-style-type: none"> • now --Triggers the rollback immediately. • timer --Resets the configuration revert timer. <ul style="list-style-type: none"> • Use the <i>minutes</i> argument with the timer keyword to specify a new revert time in minutes. • Use the idle keyword along with a time in minutes to set the maximum allowable time period of no activity before reverting to the saved configuration.
Step 4	<p>configure confirm</p> <p>Example:</p> <pre>Device# configure confirm</pre>	<p>(Optional) Confirms replacement of the current running configuration file with a saved Cisco IOS configuration file.</p> <p>Note Use this command only if the timeseconds keyword and argument of the configure replace command are specified.</p>
Step 5	<p>exit</p> <p>Example:</p> <pre>Device# exit</pre>	Exits to user EXEC mode.

Monitoring and Troubleshooting the Feature

Perform this task to monitor and troubleshoot the Configuration Replace and Configuration Rollback feature.

SUMMARY STEPS

1. **enable**
2. **show archive**
3. **debug archive versioning**
4. **debug archive config timestamp**
5. **exit**

DETAILED STEPS

-
- Step 1** **enable**
Use this command to enable privileged EXEC mode. Enter your password if prompted. For example:

Example:

```
Device> enable
Device#
```

Step 2 **show archive**

Use this command to display information about the files saved in the Cisco IOS configuration archive. For example:

Example:

```
Device# show archive
There are currently 1 archive configurations saved.
The next archive file will be named flash:myconfig-2
Archive # Name
0
1      flash:myconfig-1 <- Most Recent
2
3
4
5
6
7
8
9
10
11
12
13
14
```

The following is sample output from the **showarchive** command after several archive files of the running configuration have been saved. In this example, the maximum number of archive files to be saved is set to three.

Example:

```
Device# show archive
There are currently 3 archive configurations saved.
The next archive file will be named flash:myconfig-8
Archive # Name
0
1      :Deleted
2      :Deleted
3      :Deleted
4      :Deleted
5      flash:myconfig-5
6      flash:myconfig-6
7      flash:myconfig-7 <- Most Recent
8
9
10
11
12
13
14
```

Step 3 **debug archive versioning**

Use this command to enable debugging of the Cisco IOS configuration archive activities to help monitor and troubleshoot configuration replace and rollback. For example:

Example:

```
Device# debug archive versioning
Jan  9 06:46:28.419:backup_running_config
Jan  9 06:46:28.419:Current = 7
Jan  9 06:46:28.443:Writing backup file flash:myconfig-7
Jan  9 06:46:29.547: backup worked
```

Step 4 **debug archive config timestamp**

Use this command to enable debugging of the processing time for each integral step of a configuration replace operation and the size of the configuration files being handled. For example:

Example:

```
Device# debug archive config timestamp
Device# configure replace flash:myconfig force
Timing Debug Statistics for IOS Config Replace operation:
      Time to read file slot0:sample_2.cfg = 0 msec (0 sec)
      Number of lines read:55
      Size of file          :1054
Starting Pass 1
      Time to read file system:running-config = 0 msec (0 sec)
      Number of lines read:93
      Size of file          :2539
      Time taken for positive rollback pass = 320 msec (0 sec)
      Time taken for negative rollback pass = 0 msec (0 sec)
      Time taken for negative incremental diffs pass = 59 msec (0 sec)
      Time taken by PI to apply changes = 0 msec (0 sec)
      Time taken for Pass 1 = 380 msec (0 sec)
Starting Pass 2
      Time to read file system:running-config = 0 msec (0 sec)
      Number of lines read:55
      Size of file          :1054
      Time taken for positive rollback pass = 0 msec (0 sec)
      Time taken for negative rollback pass = 0 msec (0 sec)
      Time taken for Pass 2 = 0 msec (0 sec)
Total number of passes:1
Rollback Done
```

Step 5 **exit**

Use this command to exit to user EXEC mode. For example:

Example:

```
Device# exit
Device>
```

Configuration Examples for Configuration Replace and Configuration Rollback

Creating a Configuration Archive Example

The following example shows how to perform the initial configuration of the Cisco IOS configuration archive. In this example, flash:myconfig is specified as the location and filename prefix for the files in the configuration archive and a value of 10 is set as the maximum number of archive files to be saved.

```
configure terminal
!
archive
 path flash:myconfig
 maximum 10
end
```

Replacing the Current Running Configuration with a Saved Cisco IOS Configuration File Example

The following example shows how to replace the current running configuration with a saved Cisco IOS configuration file named flash:myconfig. The **configure replace** command interactively prompts you to confirm the operation.

```
Device# configure replace flash:myconfig
This will apply all necessary additions and deletions
to replace the current running configuration with the
contents of the specified configuration file, which is
assumed to be a complete configuration, not a partial
configuration. Enter Y if you are sure you want to proceed. ? [no]: Y
Total number of passes: 1
Rollback Done
```

In the following example, the **list** keyword is specified in order to display the command lines that were applied during the configuration replace operation:

```
Device# configure replace flash:myconfig list
This will apply all necessary additions and deletions
to replace the current running configuration with the
contents of the specified configuration file, which is
assumed to be a complete configuration, not a partial
configuration. Enter Y if you are sure you want to proceed. ? [no]: Y
!Pass 1
!List of Commands:
no snmp-server community public ro
snmp-server community mystring ro

end
Total number of passes: 1
Rollback Done
```

Reverting to the Startup Configuration File Example

The following example shows how to revert to the Cisco IOS startup configuration file using the **configure replace** command. This example also shows the use of the optional **force** keyword to override the interactive user prompt.

```
Device# configure replace nvram:startup-config force
Total number of passes: 1
Rollback Done
```

Example: Performing a Configuration Replace Operation with the **configure confirm** Command

The following example shows the use of the **configure replace** command with the **time minutes** keyword and argument. You must enter the **configure confirm** command within the specified time limit to confirm replacement of the current running configuration file. If the **configure confirm** command is not entered within the specified time limit, the configuration replace operation is automatically reversed (in other words, the current running configuration file is restored to the configuration state that existed prior to entering the **configure replace** command).

```
Device# configure replace nvram:startup-config time 120
This will apply all necessary additions and deletions
to replace the current running configuration with the
contents of the specified configuration file, which is
assumed to be a complete configuration, not a partial
configuration. Enter Y if you are sure you want to proceed. ? [no]: Y
Total number of passes: 1
Rollback Done
Device# configure confirm
```

The following example shows the use of the **configure revert** command with the **timer** keyword. You must enter the **configure revert** command to cancel the timed rollback and trigger the rollback immediately, or to reset parameters for the timed rollback.

```
Device# configure revert timer 100
```

Performing a Configuration Rollback Operation Example

The following example shows how to make changes to the current running configuration and then roll back the changes. As part of the configuration rollback operation, you must save the current running configuration before making changes to the file. In this example, the **archiveconfig** command is used to save the current running configuration. The generated output of the **configure replace** command indicates that only one pass was performed to complete the rollback operation.



Note

Before using the **archiveconfig** command, you must configure the **path** command to specify the location and filename prefix for the files in the Cisco IOS configuration archive.

You first save the current running configuration in the configuration archive as follows:

```
archive config
```

You then enter configuration changes as shown in the following example:

```
configure terminal
!
user netops2 password rain
user netops3 password snow
exit
```

After having made changes to the running configuration file, assume you now want to roll back these changes and revert to the configuration that existed before the changes were made. The **showarchive** command is used to verify the version of the configuration to be used as a replacement file. The **configurereplace** command is then used to revert to the replacement configuration file as shown in the following example:

```
Device# show archive
There are currently 1 archive configurations saved.
The next archive file will be named flash:myconfig-2
Archive # Name
0
1 flash:myconfig-1 <- Most Recent
2
3
4
5
6
7
8
9
10
Device# configure replace flash:myconfig-1
Total number of passes: 1
Rollback Done
```

Additional References

The following sections provide references related to the Configuration Replace and Configuration Rollback feature.

Related Documents

Related Topic	Document Title
Configuration Locking	<i>Exclusive Configuration Change Access and Access Session Locking</i>
Commands for managing configuration files	<i>Cisco IOS Configuration Fundamentals Command Reference</i>
Information about managing configuration files	<i>Managing Configuration Files</i>
Using the Contextual Configuration Diff Utility feature	<i>Contextual Configuration Diff Utility</i>

Standards

Standards	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.	--

MIBs

MIBs	MIBs Link
No new or modified MIBs are supported by this feature, and support for existing MIBs has not been modified by this feature.	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

RFCs

RFCs	Title
No new or modified RFCs are supported by this feature, and support for existing RFCs has not been modified by this feature.	--

Technical Assistance

Description	Link
<p>The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies.</p> <p>To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds.</p> <p>Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.</p>	http://www.cisco.com/cisco/web/support/index.html

Feature Information for Configuration Replace and Configuration Rollback

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to [http://www.cisco.com/go/featurenavigator](#). An account on Cisco.com is not required.

Table 2: Feature Information for Configuration Replace and Configuration Rollback

Feature Name	Releases	Feature Information
Configuration Replace and Configuration Rollback	Cisco IOS XE Release 3.3SE	<p>The Configuration Replace and Configuration Rollback feature provides the capability to replace the current running configuration with any saved Cisco IOS configuration file. This functionality can be used to revert to a previous configuration state, rolling back any configuration changes that were made since that configuration file was saved.</p> <p>In Cisco IOS XE Release 3.3SE, this feature is supported on Cisco 5700 Wireless LAN Controllers.</p> <p>The following sections provide feature information:</p> <p>The following commands were modified by this feature: archive config, configure confirm, configure replace, debug archive config timestamp, debug archive versioning, maximum path (archive configuration), show archive, show configuration lock, time-period.</p>

Feature Name	Releases	Feature Information
Configuration Versioning	Cisco IOS XE Release 3.3SE	<p>The Configuration Versioning feature allows you to maintain and manage backup copies of the Cisco IOS running configuration on or off the device. The Configuration Replace feature uses the Configuration Versioning feature to provide a rollback to a saved copy of the running configuration.</p> <p>In Cisco IOS XE Release 3.3SE, this feature is supported on Cisco 5700 Wireless LAN Controllers.</p>
Exclusive Configuration Change Access	Cisco IOS XE Release 3.3SE	<p>The Exclusive Configuration Change Access feature (also called the Configuration Lock feature) allows you to have exclusive change access to the Cisco IOS running configuration, preventing multiple users from making concurrent configuration changes.</p> <p>The following command was modified by this feature and applies to the Configuration Replace and Configuration Rollback feature: show configuration lock.</p> <p>In Cisco IOS XE Release 3.3SE, this feature is supported on Cisco 5700 Wireless LAN Controllers.</p> <p>Refer to the separate module, Exclusive Configuration Change Access and Access Session Locking, for details</p>

Feature Name	Releases	Feature Information
Configuration Rollback Confirmed Change	Cisco IOS XE Release 3.3SE	<p>The Configuration Rollback Confirmed Change feature allows configuration changes to be performed with an optional requirement that they be confirmed.</p> <p>If this confirmation is not received, the configuration is returned to the state prior to the changes being applied.</p> <p>This mechanism provides a safeguard against inadvertent loss of connectivity between a network device and the user or management application due to configuration changes.</p> <p>In Cisco IOS XE Release 3.3SE, this feature is supported on Cisco 5700 Wireless LAN Controllers.</p> <p>The following sections provide information about this feature:</p> <p>The following commands were modified by this feature: configure confirm,configure replace,configure revert,configure terminal</p>



Contextual Configuration Diff Utility

The Contextual Configuration Diff Utility feature provides the ability to perform a line-by-line comparison of any two configuration files (accessible through the Cisco IOS XE Integrated File System [IFS]) and generate a list of the differences between them. The generated output includes information regarding configuration lines that have been added, modified, or deleted, and the configuration modes within which a changed configuration line exists.

- [Finding Feature Information, page 53](#)
- [Prerequisites for Contextual Configuration Diff Utility, page 53](#)
- [Restrictions for Contextual Configuration Diff Utility, page 54](#)
- [Information About Contextual Configuration Diff Utility, page 54](#)
- [How to Use the Contextual Configuration Diff Utility, page 55](#)
- [Configuration Examples for the Contextual Configuration Diff Utility, page 56](#)
- [Additional References, page 60](#)
- [Feature Information for Contextual Configuration Diff Utility, page 61](#)

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see [Bug Search Tool](#) and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Prerequisites for Contextual Configuration Diff Utility

The format of the configuration files used for the Contextual Configuration Diff Utility feature must comply with standard Cisco IOS XE configuration file indentation rules as follows:

- Start all commands on a new line with no indentation, unless the command is within a configuration submode.
- Indent commands within a first-level configuration submode one space.
- Indent commands within a second-level configuration submode two spaces.
- Indent commands within subsequent submodes accordingly.

The router must have a contiguous block of memory larger than the combined size of the two configuration files being compared.

Restrictions for Contextual Configuration Diff Utility

If the device does not have a contiguous block of memory larger than the combined size of the two configuration files being compared, the diff operation fails.

Information About Contextual Configuration Diff Utility

Benefits of the Contextual Configuration Diff Utility

The Contextual Configuration Diff Utility feature provides the ability to perform a line-by-line comparison of any two configuration files (accessible through the Cisco IOS XE File System [IFS]) and generate a list of the differences between them. The generated output includes information regarding the following items:

- Configuration lines that have been added, modified, or deleted.
- Configuration modes within which a changed configuration line exists.
- Location changes of configuration lines that are order-sensitive. For example, the **ip access-list** and **community-lists** commands are order-sensitive commands dependent on where they are listed within a configuration file in relation to other Cisco IOS XE commands of similar type.

Contextual Configuration Diff Utility Output Format

Diff Operation

The Contextual Configuration Diff Utility feature uses the filenames of two configuration files as input. A diff operation is performed on the specified files and a list of differences between the two files is generated as output by using the **show archive config differences** command. Interpreting the output is dependent on the order in which the two files are specified in the command. In this section, we assume that the filename of the file entered first is file1 and the filename of the file entered second is file2. Each entry in the generated output list is prefixed with a unique text symbol to indicate the type of difference found. The text symbols and their meanings are as follows:

- A minus symbol (-) indicates that the configuration line exists in file1 but not in file2.
- A plus symbol (+) indicates that the configuration line exists in file2 but not in file1.

- An exclamation point (!) with descriptive comments identifies order-sensitive configuration lines whose location is different in file1 than in file2.

Incremental Diff Operation

Some applications require that the generated output of a diff operation contain configuration lines that are unmodified (in other words, without the minus and plus symbols). For these applications, an incremental diff operation can be performed by using the **show archive config incremental-diffs** command, which compares a specified configuration file to the running configuration file ().

When an incremental diff operation is performed, a list of the configuration lines that do not appear in the running configuration file (in other words, configuration lines that appear only in the specified file that is being compared to the running configuration file) is generated as output. An exclamation point (!) with descriptive comments identifies order-sensitive configuration lines whose location is different in the specified configuration file than in the running configuration file.

How to Use the Contextual Configuration Diff Utility

Performing a Line-by-Line File Comparison Using the Contextual Configuration Diff Utility

SUMMARY STEPS

1. **enable**
2. Enter one of the following:
 - **show archive config differences** *[file1 [file2]]*
 - **show archive config incremental-diffs** *file*
3. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Device> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	Enter one of the following: <ul style="list-style-type: none"> • show archive config differences <i>[file1 [file2]]</i> • show archive config incremental-diffs <i>file</i> or	Performs a line-by-line comparison of any two configuration files (accessible through the Cisco IOS File System and generates a list of the differences between them.

	Command or Action	Purpose
	<p>Example:</p> <pre>Device# show archive config differences running-config startup-config</pre> <p>Example:</p> <pre>Device# show archive config incremental-diffs nvram:startup-config</pre>	Performs a line-by-line comparison of a specified configuration file to the running configuration file and generates a list of the configuration lines that do not appear in the running configuration file.
Step 3	<p>exit</p> <p>Example:</p> <pre>Device# exit</pre>	Exits to user EXEC mode.

Configuration Examples for the Contextual Configuration Diff Utility

Diff Operation Example

In this example, a diff operation is performed on the running and startup configuration files. The table below shows the configuration files used for this example.

Table 3: Configuration Files Used for the Diff Operation Example

Running Configuration File	Startup Configuration File
<pre>no ip subnet-zero ip cef interface FastEthernet1/0 ip address 10.7.7.7 255.0.0.0 no ip route-cache no ip mroute-cache duplex half no ip classless snmp-server community public RO</pre>	<pre>ip subnet-zero ip cef ip name-server 10.4.4.4 voice dnis-map 1 dnis 111 interface FastEthernet1/0 no ip address no ip route-cache no ip mroute-cache shutdown duplex half ip default-gateway 10.5.5.5 ip classless access-list 110 deny ip any host 10.1.1.1 access-list 110 deny ip any host 10.1.1.2 access-list 110 deny ip any host 10.1.1.3 snmp-server community private RW</pre>

The following is sample output from the **show archive config differences** command. This sample output displays the results of the diff operation performed on the configuration files in the table below.

```
Device# show archive config differences system:running-config nvram:startup-config
+ip subnet-zero
+ip name-server 10.4.4.4
+voice dnis-map 1
```

```
+dnis 111
interface FastEthernet1/0
+no ip address
+shutdown
+ip default-gateway 10.5.5.5
+ip classless
+access-list 110 deny ip any host 10.1.1.1
+access-list 110 deny ip any host 10.1.1.2
+access-list 110 deny ip any host 10.1.1.3
+snmp-server community private RW
-no ip subnet-zero
interface FastEthernet1/0
-ip address 10.7.7.7 255.0.0.0
-no ip classless
-snmpp-server community public RO
```

Incremental Diff Operation Example

In this example, an incremental diff operation is performed on the startup and running configuration files. The table below shows the configuration files used for this example.

Table 4: Configuration Files Used for the Incremental Diff Operation Example

Startup Configuration File	Running Configuration File
<pre> ip subnet-zero ip cef ip name-server 10.4.4.4 voice dnis-map 1 dnis 111 interface FastEthernet1/0 no ip address no ip route-cache no ip mroute-cache shutdown duplex half ip default-gateway 10.5.5.5 ip classless access-list 110 deny ip any host 10.1.1.1 access-list 110 deny ip any host 10.1.1.2 access-list 110 deny ip any host 10.1.1.3 snmp-server community private RW </pre>	<pre> no ip subnet-zero ip cef interface FastEthernet1/0 ip address 10.7.7.7 255.0.0.0 no ip route-cache no ip mroute-cache duplex half no ip classless snmp-server community public RO </pre>

The following is sample output from the **show archive config incremental-diffs** command. This sample output displays the results of the incremental diff operation performed on the configuration files in the table below.

```

Device# show archive config incremental-diffs startup-config
ip subnet-zero
ip name-server 10.4.4.4
voice dnis-map 1

```

```

dnis 111
interface FastEthernet1/0
  no ip address
  shutdown
ip default-gateway 10.5.5.5
ip classless
  access-list 110 deny ip any host 10.1.1.1
  access-list 110 deny ip any host 10.1.1.2
  access-list 110 deny ip any host 10.1.1.3
snmp-server community private RW

```

Additional References

The following sections provide references related to the Configuration Partitioning feature.

Related Documents

Related Topic	Document Title
Running configuration performance enhancement-- parserconfigcache for interfaces.	Configuration Generation Performance Enhancement
Provisioning of customer services, Config Rollback, Config Locking, and configuration access control	Contextual Configuration Diff Utility
Configuration management--Config change logging.	Configuration Change Notification and Logging
Configuration management --Quick-save for config change logging ² .	Configuration Logger Persistency
Cisco IOS software configuration access control and config session locking ("Config Lock").	Exclusive Configuration Change Access and Access Session Locking

² The "Configuration Logger Persistency" feature allows saving just the commands entered since the last startup-config file was generated, rather than saving the entire startup configuration.

Standards

Standard	Title
No standards are associated with this feature.	--

MIBs

MIB	MIBs Link
No new or modified MIBs are supported by this feature, and support for existing MIBs has not been modified by this feature.	--

RFCs

RFC	Title
No new or modified RFCs are supported by this feature, and support for existing RFCs has not been modified by this feature.	--

Technical Assistance

Description	Link
<p>The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies.</p> <p>To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds.</p> <p>Access to most tools on the Cisco Support website requires a Cisco.com user ID and password..</p>	http://www.cisco.com/techsupport

Feature Information for Contextual Configuration Diff Utility

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to [http://www.cisco.com/featurenavigator](#). An account on Cisco.com is not required.

Table 5: Feature Information for Contextual Configuration Diff Utility

Feature Name	Releases	Feature Information
Contextual Configuration Diff Utility	Cisco IOS XE Release 2.1 Cisco IOS XE Release 3.3SE	<p>The Contextual Configuration Diff Utility feature provides the ability to perform a line-by-line comparison of any two configuration files and generate a list of the differences between them. The generated output includes information regarding configuration lines that have been added, modified, or deleted, and the configuration modes within which a changed configuration line exists.</p> <p>In Cisco IOS XE Release 2.1, this feature was introduced on Cisco ASR 1000 Series Routers.</p> <p>In Cisco IOS XE Release 3.3SE, this feature is supported on Cisco 5700 Wireless LAN Controllers.</p> <p>The following commands were modified by this feature: show archive config differences, show archive config incremental-diffs.</p>



Configuration Change Notification and Logging

The Configuration Change Notification and Logging (Config Log Archive) feature allows the tracking of configuration changes entered on a per-session and per-user basis by implementing an archive function. This archive saves *configuration logs* that track each configuration command that is applied, who applied the command, the parser return code (PRC) for the command, and the time the command was applied. This feature also adds a notification mechanism that sends asynchronous notifications to registered applications whenever the configuration log changes.

Before the introduction of the Configuration Change Notification and Logging feature, the only way to determine if the Cisco software configuration had changed was to save a copy of the running and startup configurations to a local computer and do a line-by-line comparison. This comparison method can identify changes that occurred, but does not specify the sequence in which the changes occurred, or the person responsible for the changes.

- [Finding Feature Information, page 63](#)
- [Restrictions for Configuration Change Notification and Logging, page 64](#)
- [Information About Configuration Change Notification and Logging, page 64](#)
- [How to Configure Configuration Change Notification and Logging, page 65](#)
- [Configuration Examples for Configuration Change Notification and Logging, page 71](#)
- [Additional References, page 72](#)
- [Feature Information for Configuration Change Notification and Logging, page 72](#)

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see [Bug Search Tool](#) and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Restrictions for Configuration Change Notification and Logging

- Only complete commands input in a configuration mode are logged.
- Commands that are part of a configuration file applied with the `copy` command are not logged.

Information About Configuration Change Notification and Logging

Configuration Log

The Configuration Change Notification and Logging feature tracks changes made to the Cisco software running configuration by maintaining a configuration log. This configuration log tracks changes initiated only through the CLI or HTTP. Only complete commands that result in the invocation of action routines are logged. The following types of entries are not logged:

- Commands that result in a syntax error message
- Partial commands that invoke the device help system

For each configuration command that is executed, the following information is logged:

- The command that was executed
- The configuration mode in which the command was executed
- The name of the user that executed the command
- The time at which the command was executed
- A configuration change sequence number
- Parser return codes for the command

You can display information from the configuration log by using the `show archive log config` command, with the exception of the parser return codes, which are for use by internal Cisco applications only.

Configuration Change Notifications and Config Change Logging

You can configure the Configuration Change and Notification Logging feature to send notification of configuration changes to the software system logging (syslog) process. Syslog notifications allow monitoring of the configuration log information without performing polling and information gathering tasks.

The Configuration Change Notification and Logging feature allows the tracking of configuration changes entered by users on a per-session and per-user basis. This tool allows administrators to track any configuration change made to the software running configuration, and identify the user that made that change.

Config Logger Enhancements for EAL4+ Certification

The Config Logger Enhancements for EAL4+ Certification feature ensures that the logging process meets the requirements set forth in the Conformance to Common Criteria, Evaluation Assurance Level 4+ (EAL4+) Firewall Protection Profiles. These enhancements include changes to meet the following requirements:

- If you change any logging parameters, those changes are logged. This is effected by the sending of a syslog message for each change to the running configuration from a copy operation (for example, **copy source running-config**).
- Modifications to the group of administrative users are logged; failure attempts for access to privileged EXEC mode (“enable” mode) are logged.



Note EAL Certification is not claimed by Cisco. These enhancements provide the groundwork for future certification.

The logging actions described above are disabled by default. To enable these logging characteristics, perform the task described in the “Configuring the Configuration Change Notification and Logging Feature” section in the “Configuration Change Notification and Logging” feature module.

How to Configure Configuration Change Notification and Logging

Configuring Configuration Change Notification and Logging

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **archive**
4. **log config**
5. **logging enable**
6. **logging size *entries***
7. **hidekeys**
8. **notify syslog**
9. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable	Enables privileged EXEC mode.

	Command or Action	Purpose
	<p>Example:</p> <pre>Device> enable</pre>	<ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	<p>configure terminal</p> <p>Example:</p> <pre>Device# configure terminal</pre>	Enters global configuration mode.
Step 3	<p>archive</p> <p>Example:</p> <pre>Device(config)# archive</pre>	Enters archive configuration mode.
Step 4	<p>log config</p> <p>Example:</p> <pre>Device(config-archive)# log config</pre>	Enters configuration change logger configuration mode.
Step 5	<p>logging enable</p> <p>Example:</p> <pre>Device(config-archive-log-config)# logging enable</pre>	<p>Enables the logging of configuration changes.</p> <ul style="list-style-type: none"> • Logging of configuration changes is disabled by default.
Step 6	<p>logging size <i>entries</i></p> <p>Example:</p> <pre>Device(config-archive-log-config)# logging size 200</pre>	<p>(Optional) Specifies the maximum number of entries retained in the configuration log.</p> <ul style="list-style-type: none"> • Valid values for the <i>entries</i> argument range from 1 to 1000. The default value is 100 entries. • When the configuration log is full, the oldest entry is deleted every time a new entry is added. <p>Note If a new log size is specified that is smaller than the current log size, the oldest log entries are immediately purged until the new log size is satisfied, regardless of the age of the log entries.</p>
Step 7	<p>hidekeys</p> <p>Example:</p> <pre>Device(config-archive-log-config)# hidekeys</pre>	<p>(Optional) Suppresses the display of password information in configuration log files.</p> <p>Note Enabling the hidekeys command increases security by preventing password information from being displayed in configuration log files.</p>

	Command or Action	Purpose
Step 8	notify syslog Example: Device(config-archive-log-config)# notify syslog	(Optional) Enables the sending of notifications of configuration changes to a remote syslog.
Step 9	end Example: Device(config-archive-log-config)# end	Returns to privileged EXEC mode.

Displaying Configuration Log Entries and Statistics

Perform this task to display entries from the configuration log or statistics about the memory usage of the configuration log. You can enter the commands in any order.

To display configuration log entries and to monitor the memory usage of the configuration log, the Configuration Change Notification and Logging feature provides the **show archive log config** command.

SUMMARY STEPS

1. **enable**
2. **show archive log config** *number* [*end-number*]
3. **show archive log config all provisioning**
4. **show archive log config statistics**
5. **exit**

DETAILED STEPS

Step 1 **enable**
Use this command to enable privileged EXEC mode. Enter your password if prompted. For example:

Example:

```
Device> enable
```

Step 2 **show archive log config** *number* [*end-number*]
Use this command to display configuration log entries by record numbers. If you specify a record number for the optional *end-number* argument, all log entries with record numbers in the range from the value entered for the *number* argument through the *end-number* argument are displayed. For example:

```
Device# show archive log config 1 2
```

```

idx   sess  user@line      Logged command
  1     1    user1@console  logging enable
  2     1    user1@console  logging size 200

```

Example:

This example displays configuration log entry numbers 1 and 2. The range for the *number* and *end-number* arguments is 1 to 2147483647.

Step 3 **show archive log config all provisioning**

Use this command to display all configuration log files as they would appear in a configuration file rather than in tabular format. For example:

Example:

```

Device# show archive log config all provisioning

archive
log config
logging enable
logging size 200

```

This display also shows the commands used to change configuration modes, which are required to correctly apply the logged commands.

Step 4 **show archive log config statistics**

Use this command to display memory usage information for the configuration. For example:

Example:

```

Device# show archive log config statistics

Config Log Session Info:
  Number of sessions being tracked: 1
  Memory being held: 3910 bytes
  Total memory allocated for session tracking: 3910 bytes
  Total memory freed from session tracking: 0 bytes
Config Log log-queue Info:
  Number of entries in the log-queue: 3
  Memory being held in the log-queue: 671 bytes
  Total memory allocated for log entries: 671 bytes
  Total memory freed from log entries:: 0 bytes

```

Step 5 **exit**

Use this command to exit to user EXEC mode. For example:

Example:

```

Device# exit
Device>

```

Clearing Configuration Log Entries

Entries from the configuration log can be cleared in one of two ways. The size of the configuration log can be reduced by using the **logging size** command, or the configuration log can be disabled and then reenabled with the **logging enable** command.

Clearing the Configuration Log by Resetting the Log Size

This task shows how to clear the configuration log by reducing the log size to 1, then resetting the log size to the desired value, by entering the **logging size** command twice.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **archive**
4. **log config**
5. **logging size** *entries*
6. **logging size** *entries*
7. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Device> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	configure terminal Example: Device# configure terminal	Enters global configuration mode.
Step 3	archive Example: Device(config)# archive	Enters archive configuration mode.
Step 4	log config Example: Device(config-archive)# log config	Enters configuration change logger configuration mode.

	Command or Action	Purpose
Step 5	logging size <i>entries</i> Example: Device(config-archive-log-config)# logging size 1	Specifies the maximum number of entries retained in the configuration log. Note Setting the size of the configuration log to 1 results in all but the most recent entry being purged.
Step 6	logging size <i>entries</i> Example: Device(config-archive-log-config)# logging size 200	Specifies the maximum number of entries retained in the configuration log. Note The size of the configuration log should be reset to the desired value after clearing the configuration log.
Step 7	end Example: Device(config-archive-log-config)# end	Exits to privileged EXEC mode.

Clearing the Configuration Log by Disabling the Configuration Log

SUMMARY STEPS

1. enable
2. configure terminal
3. archive
4. log config
5. no logging enable
6. logging enable
7. end

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Device> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.

	Command or Action	Purpose
Step 2	configure terminal Example: Device# configure terminal	Enters global configuration mode.
Step 3	archive Example: Device(config)# archive	Enters archive configuration mode.
Step 4	log config Example: Device(config-archive)# log config	Enters configuration change logger configuration mode.
Step 5	no logging enable Example: Device(config-archive-log-config)# no logging enable	Disables the logging of configuration changes. Note Disabling the configuration log results in all records being purged.
Step 6	logging enable Example: Device(config-archive-log-config)# logging enable	Enables the logging of configuration changes.
Step 7	end Example: Device(config-archive-log-config)# end	Exits to privileged EXEC mode.

Configuration Examples for Configuration Change Notification and Logging

Example: Configuring Configuration Change Notification and Logging

The following example shows how to enable configuration logging with a maximum of 200 entries in the configuration log. In the example, security is increased by suppressing the display of password information

in configuration log records with the **hidekeys** command, and syslog notifications are turned on with the **notify syslog** command.

```
configure terminal
archive
log config
logging enable
logging size 200
hidekeys
notify syslog
```

Additional References

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Command List, All Releases
Information about managing configuration files	“Managing Configuration Files” module in the <i>Managing Configuration Files Configuration Guide</i>
Commands for managing configuration files	Cisco IOS Configuration Fundamentals Command Reference

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for Configuration Change Notification and Logging

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to [http://www.cisco.com/go/featurenavigator](#). An account on Cisco.com is not required.

Table 6: Feature Information for Configuration Change Notification and Logging

Feature Name	Releases	Feature Information
Configuration Change Notification and Logging	Cisco IOS XE Release 3.3SE	<p>The Configuration Change Notification and Logging (Configuration Logging) feature allows the tracking of configuration changes entered on a per-session and per-user basis by implementing a configuration log. The configuration log tracks each configuration command that is applied, who applied the command, the parser return code for the command, and the time the command was applied. This feature also adds a notification mechanism that sends asynchronous notifications to registered applications whenever the configuration log changes.</p> <p>In Cisco IOS XE Release 3.3SE, this feature is supported on Cisco 5700 Wireless LAN Controllers.</p> <p>The following commands were introduced or modified: archive, hidekeys, log config, logging enable, logging size, notify syslog, show archive log config.</p>

