# Configuring the Scheduler

This chapter describes how to configure the scheduler on Cisco NX-OS devices.

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## Finding Feature Information

Your software release might not support all the features documented in this module. For the latest caveats and feature information, see the Bug Search Tool at https://bst.cloudapps.cisco.com/bugsearch and the release notes for your 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 "New and Changed Information"chapter or the Feature History table in this chapter.

## About the Scheduler

The scheduler allows you to define and set a timetable for maintenance activities such as the following:

- Quality of service (QoS) policy changes
- Data backup
- Saving a configuration

Jobs consist of a single command or multiple commands that define routine activities. Jobs can be scheduled one time or at periodic intervals.

The scheduler defines a job and its timetable as follows:

- Job—A routine task or tasks defined as a command list and completed according to a specified schedule.
- Schedule—The timetable for completing a job. You can assign multiple jobs to a schedule. A schedule is defined as either periodic or one-time only:
  - Periodic mode—A recurring interval that continues until you delete the job. You can configure the following types of intervals:
    - Daily—A job is completed once a day.
    - Weekly—A job is completed once a week.
    - Monthly—A job is completed once a month.
    - Delta—A job begins at the specified start time and then at specified intervals (days:hours:minutes).
  - One-time mode—A job is completed only once at a specified time.

## Remote User Authentication

Before starting a job, the scheduler authenticates the user who created the job. Since user credentials from a remote authentication are not retained long enough to support a scheduled job, you need to locally configure the authentication passwords for users who create jobs. These passwords are part of the scheduler configuration and are not considered a locally configured user.

Before starting the job, the scheduler validates the local password against the password from the remote authentication server.

## Logs

The scheduler maintains a log file containing the job output. If the size of the job output is greater than the size of the log file, the output is truncated.

## High Availability

Scheduled jobs remain available after a supervisor switchover or a software reload.

## Virtualization Support

Jobs are created in the virtual device context (VDC) that you are logged into. By default, Cisco NX-OS places you in the default VDC. For more information, see the *Cisco Nexus 7000 Series NX-OS Virtual Device Context Configuration Guide*.

# Prerequisites for the Scheduler

The scheduler has the following prerequisites:

- You must enable any conditional features before you can configure those features in a job.
- You must have a valid license installed for any licensed features that you want to configure in the job.

- You must have network-admin user privileges to configure a scheduled job.

# Guidelines and Limitations for the Scheduler

The scheduler has the following configuration guidelines and limitations:

- The scheduler can fail if it encounters one of the following while performing a job:
  - If the license has expired for a feature at the time the job for that feature is scheduled.
  - If a feature is disabled at the time when a job for that feature is scheduled.
  - If you have removed a module from a slot and a job for that slot is scheduled.
- Verify that you have configured the time. The scheduler does not apply a default timetable. If you create a schedule and assign jobs and do not configure the time, the job is not started.
- While defining a job, verify that no interactive or disruptive commands (for example, **copy bootflash:** *file* **ftp:** *URI*, **write erase**, and other similar commands) are specified because the job is started and conducted noninteractively.

# Default Settings for the Scheduler

This table lists the scheduler default settings.

| Parameters | Default |
|---|---|
| Scheduler state | Disabled |
| Log file size | 16 KB |

# Configuring the Scheduler

## Enabling or Disabling the Scheduler

You can enable the scheduler feature so that you can configure and schedule jobs, or you can disable the scheduler feature after it has been enabled.

### Procedure

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | switch# **configure terminal** | Enters global configuration mode. |
| **Step 2** | switch(config)# [**no**] **feature scheduler** | Enables or disables the scheduler. |
| **Step 3** | (Optional) switch(config)# **show scheduler config** | Displays the scheduler configuration. |

| | Command or Action | Purpose |
|---|---|---|
| **Step 4** | (Optional) switch(config)# **copy running-config startup-config** | Copies the running configuration to the startup configuration. |

# Defining the Scheduler Log File Size

You can configure the log file size for capturing jobs, schedules, and job output.

### Procedure

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | switch# **configure terminal** | Enters global configuration mode. |
| **Step 2** | switch(config)# **scheduler logfile size** *value* | Defines the scheduler log file size in kilobytes. The range is from 16 to 1024. The default is 16.<br>**Note**<br>If the size of the job output is greater than the size of the log file, then the output is truncated. |
| **Step 3** | (Optional) switch(config)# **copy running-config startup-config** | Copies the running configuration to the startup configuration. |

# Configuring Remote User Authentication

You can configure the scheduler to use remote authentication for users who want to configure and schedule jobs.

**Note** Remote users must authenticate with their clear text password before creating and configuring jobs.

**Note** Remote user passwords are always shown in encrypted form in the output of the **show running-config** command. The encrypted option (**7**) in the command supports the ASCII device configuration.

### Procedure

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | switch# **configure terminal** | Enters global configuration mode. |
| **Step 2** | switch(config)# **scheduler aaa-authentication password** [**0** \| **7**] *password* | Configures a cleartext password for the user who is currently logged in. |

| | Command or Action | Purpose |
|---|---|---|
| **Step 3** | switch(config)# **scheduler aaa-authentication username** *name* **password** [**0** \| **7**] *password* | Configures a cleartext password for a remote user. |
| **Step 4** | (Optional) switch(config)# **show running-config** \| **include "scheduler aaa-authentication"** | Displays the scheduler password information. |
| **Step 5** | (Optional) switch(config)# **copy running-config startup-config** | Copies the running configuration to the startup configuration. |

# Defining a Job

You can define a job including the job name and the command sequence.

**Caution** Once a job is defined, you cannot modify or remove a command. To change the job, you must delete it and create a new one.

### Procedure

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | switch# **configure terminal** | Enters global configuration mode. |
| **Step 2** | switch(config)# **scheduler job name** *string* | Creates a job and enters job configuration mode.<br>This example creates a scheduler job named backup-cfg. |
| **Step 3** | switch(config-job)# *command1* ;[*command2* ;*command3* ;...] | Defines the sequence of commands for the specified job. You must separate commands with a space and a semicolon (for example, " ;").<br>This example creates a scheduler job that saves the running configuration to a file in bootflash and then copies the file from bootflash to a TFTP server. The filename is created using the current time stamp and switch name. |
| **Step 4** | (Optional) switch(config-job)# **show scheduler job** [**name** *name*] | Displays the job information. |
| **Step 5** | (Optional) switch(config)# **copy running-config startup-config** | Copies the running configuration to the startup configuration. |

# Deleting a Job

You can delete a job from the scheduler.

**Procedure**

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | switch# **configure terminal** | Enters global configuration mode. |
| **Step 2** | switch(config)# **no scheduler job name** *string* | Deletes the specified job and all commands defined within it. |
| **Step 3** | (Optional) switch(config-job)# **show scheduler job** [**name** *name*] | Displays the job information. |
| **Step 4** | (Optional) switch(config)# **copy running-config startup-config** | Copies the running configuration to the startup configuration. |

# Defining a Timetable

You can define a timetable in the scheduler to be used with one or more jobs.

If you do not specify the time for the **time** commands, the scheduler assumes the current time. For example, if the current time is March 24, 2013, 22:00 hours, jobs are started as follows:

- For the **time start 23:00 repeat 4:00:00** command, the scheduler assumes a start time of March 24, 2013, 23:00 hours.
- For the **time daily 55** command, the scheduler assumes a start time every day at 22:55 hours.
- For the **time weekly 23:00** command, the scheduler assumes a start time every Friday at 23:00 hours.
- For the **time monthly 23:00** command, the scheduler assumes a start time on the 24th of every month at 23:00 hours.

**Note** The scheduler will not begin the next occurrence of a job before the last one completes. For example, you have scheduled a job to be completed at one-minute intervals beginning at 22:00; but the job requires two minutes to complete. The scheduler starts the first job at 22:00, completes it at 22:02, and then observes a one-minute interval before starting the next job at 22:03.

**Procedure**

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | switch# **configure terminal** | Enters global configuration mode. |
| **Step 2** | switch(config)# **scheduler schedule name** *string* | Creates a new schedule and places you in schedule configuration mode for that schedule. |
| **Step 3** | switch(config-schedule)# **job name** *string* | Associates a job with this schedule. You can add multiple jobs to a schedule. |
| **Step 4** | switch(config-schedule)# **time daily** *time* | Indicates the job starts every day at a designated time specified as HH:MM. |

| | Command or Action | Purpose |
|---|---|---|
| **Step 5** | switch(config-schedule)# **time weekly** [[*dow*:]*HH*:]*MM* | Indicates that the job starts on a specified day of the week.<br>Day of the week (dow) specified as one of the following:<br>• An integer such as 1 = Sunday, 2 = Monday, and so on.<br>• An abbreviation such as Sun = Sunday.<br>The maximum length for the entire argument is 10. |
| **Step 6** | switch(config-schedule)# **time monthly** [[*dm*:]*HH*:]*MM* | Indicates the job starts on a specified day each month (dm). If you specify either 29, 30, or 31, the job is started on the last day of each month. |
| **Step 7** | switch(config-schedule)# **time start** {**now repeat** *repeat-interval* \| *delta-time* [**repeat** *repeat-interval*]} | Indicates the job starts periodically.<br>The start-time format is [[[[yyyy:]mmm:]dd:]HH]:MM.<br>• *delta-time*—Specifies the amount of time to wait after the schedule is configured before starting a job.<br>• **now**—Specifies that the job starts now.<br>• **repeat** *repeat-interval*—Specifies the frequency at which the job is repeated.<br>In this example, the job starts immediately and repeats every 48 hours. |
| **Step 8** | (Optional) switch(config)# **show scheduler config** | Displays the scheduler configuration. |
| **Step 9** | (Optional) switch(config)# **copy running-config startup-config** | Copies the running configuration to the startup configuration. |

# Clearing the Scheduler Log File

You can clear the scheduler log file.

### Procedure

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | switch# **configure terminal** | Enters global configuration mode. |
| **Step 2** | switch(config)# **clear scheduler logfile** | Clears the scheduler log file. |

# Verifying the Scheduler Configuration

To display the scheduler configuration information, perform one of the following tasks:

| Command | Purpose |
|---|---|
| **show scheduler config** | Displays the scheduler configuration. |
| **show scheduler job** [**name** *string*] | Displays the jobs configured. |
| **show scheduler logfile** | Displays the contents of the scheduler log file. |
| **show scheduler schedule** [**name** *string*] | Displays the schedules configured. |

# Configuration Examples for the Scheduler

## Creating a Scheduler Job

This example shows how to create a scheduler job that saves the running configuration to a file in bootflash and then copies the file from bootflash to a TFTP server (the filename is created using the current time stamp and switch name):

```
switch# configure terminal
switch(config)# scheduler job name backup-cfg
switch(config-job)# cli var name timestamp $(TIMESTAMP) ;copy running-config
bootflash:/$(SWITCHNAME)-cfg.$(timestamp) ;copy bootflash:/$(SWITCHNAME)-cfg.$(timestamp)
tftp://1.2.3.4/ vrf management
switch(config-job)# end
switch(config)#
```

## Scheduling a Scheduler Job

This example shows how to schedule a scheduler job called backup-cfg to run daily at 1 a.m.:

```
switch# configure terminal
switch(config)# scheduler schedule name daily
switch(config-if)# job name backup-cfg
switch(config-if)# time daily 1:00
switch(config-if)# end
switch(config)#
```

## Displaying the Job Schedule

This example shows how to display the job schedule:

```
switch# show scheduler schedule
Schedule Name : daily
---------------------------
User Name : admin
Schedule Type : Run every day at 1 Hrs 00 Mins
Last Execution Time : Fri Jan 2 1:00:00 2013
```

```
Last Completion Time: Fri Jan 2 1:00:01 2013
Execution count : 2
-----------------------------------------------
Job Name Last Execution Status
-----------------------------------------------
back-cfg Success (0)
switch#
```

# Displaying the Results of Running Scheduler Jobs

This example shows how to display the results of scheduler jobs that have been executed by the scheduler:

```
switch# show scheduler logfile
Job Name : back-cfg Job Status: Failed (1)
Schedule Name : daily User Name : admin
Completion time: Fri Jan 1 1:00:01 2013
-------------------------------- Job Output ---------------------------------
`cli var name timestamp 2013-01-01-01.00.00`
`copy running-config bootflash:/$(HOSTNAME)-cfg.$(timestamp)`
`copy bootflash:/switch-cfg.2013-01-01-01.00.00 tftp://1.2.3.4/ vrf management `
copy: cannot access file '/bootflash/switch-cfg.2013-01-01-01.00.00'
==============================================================================
Job Name : back-cfg Job Status: Success (0)
Schedule Name : daily User Name : admin
Completion time: Fri Jan 2 1:00:01 2013
-------------------------------- Job Output ---------------------------------
`cli var name timestamp 2013-01-02-01.00.00`
`copy running-config bootflash:/switch-cfg.2013-01-02-01.00.00`
`copy bootflash:/switch-cfg.2013--01-02-01.00.00 tftp://1.2.3.4/ vrf management `
Connection to Server Established.
[ ] 0.50KBTrying to connect to tftp server......
[###### ] 24.50KB
TFTP put operation was successful
==============================================================================
switch#
```

# Related Documents

| Related Topic | Document Title |
|---|---|
| Scheduler CLI commands | *Cisco Nexus 7000 Series NX-OS System Management Command Reference* |
| VDCs | *Cisco Nexus 7000 Series NX-OS Virtual Device Context Configuration Guide* |

# Feature History for the Scheduler

Your software release might not support all the features in this document. For the latest caveats and feature information, see the Bug Search Tool at https://tools.cisco.com/bugsearch/ and the release notes for your software release.

*Table 1: Feature History for the Scheduler*

| Feature Name | Releases | Feature Information |
|---|---|---|
| Scheduler | 4.0(1) | This feature was introduced. |