C H A P T E R **12**

Configuring the Scheduler

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

This chapter includes the following sections:

Information About the Scheduler

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

- Quality of Service 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.

This section includes the following topics:

Scheduler Overview

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—Job is completed once a day.

    Weekly—Job is completed once a week.

    Monthly—Job is completed once a month.

    Delta—Job begins at the specified start time and then at specified intervals (days:hours:minutes).

    –   One-time mode—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, then the output is truncated. For more information, see the "Defining the Scheduler Log File Size" procedure on page 12-183.

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, Release 5.x.*

Licensing Requirements for the Scheduler

Product	License Requirement
Cisco NX-OS	The scheduler requires no license. Any feature not included in a license package is bundled with the Cisco NX-OS system images and is provided at no extra charge to you. For a complete explanation of the Cisco NX-OS licensing scheme, see the *Cisco NX-OS Licensing 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 or vdc-admin user privileges to configure a scheduled job.

Guidelines and Limitations

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

Table 12-1 lists the scheduler default settings.

Table 12-1   Default Command Scheduler Parameters

Parameters	Default
Scheduler state	Disabled.
Log file size	16 KB.

Configuring the Scheduler

This section includes the following topics:

Enabling the Scheduler

You can enable the scheduler feature so that you can configure and schedule jobs.

BEFORE YOU BEGIN

Make sure that you are in the correct VDC. To change the VDC, use the **switchto vdc** command.

SUMMARY STEPS

1. **config t**

2. **feature scheduler**

3. **show scheduler config**

4. **copy running-config startup-config**

DETAILED STEPS

:

	Command or Action	Purpose

Step 1	`config t`
	
	Example:
	`switch# config t`
	`Enter configuration commands, one per line.`
	`End with CNTL/Z.`
	`switch(config)#`
		Places you in global configuration mode.

Step 2	`feature scheduler`
	
	Example:
	`switch(config)# feature scheduler`
		Enables the scheduler in the current VDC.

Step 3	`show scheduler config`
	
	Example:
	`switch(config)# show scheduler config`
	`config terminal`
	`  feature scheduler`
	`  scheduler logfile size 16`
	`end`
	
	`switch(config)#`
		(Optional) Displays the scheduler configuration.

Step 4	`copy running-config startup-config`
	
	Example:
	`switch(config)# copy running-config`
	`startup-config`
		(Optional) Saves the change persistently through reboots and restarts by copying 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.

BEFORE YOU BEGIN

Make sure that you are in the correct VDC. To change the VDC, use the **switchto vdc** command.

SUMMARY STEPS

1. **config t**

2. **scheduler logfile size** *value*

3. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose

Step 1	`config t`
	
	Example:
	`switch# config t`
	`Enter configuration commands, one per line.  End with CNTL/Z.`
	`switch(config)#`
		Places you in global configuration mode.

Step 2	`scheduler logfile size` *value* **Example:** `switch(config)# scheduler logfile size 1024`	Defines the scheduler log file size in kilobytes. The range is from 16 to 1024. The default is 16. **Note** If the size of the job output is greater than the size of the log file, then the output is truncated.

Step 3	`copy running-config startup-config`
	
	Example:
	`switch(config)# copy running-config startup-config`
		(Optional) Saves the change persistently through reboots and restarts by copying 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.

BEFORE YOU BEGIN

Make sure that you are in the correct VDC. To change the VDC, use the **switchto vdc** command.

SUMMARY STEPS

1. **config t**

2. **scheduler aaa-authentication password** [**0** | **7**] *password*

3. **scheduler aaa-authentication username** *name* **password** [**0** | **7**] *password*

4. **show running-config | include "scheduler aaa-authentication"**

5. **copy running-config startup-config**

DETAILED STEPS

:

	Command or Action	Purpose

Step 1	`config t`
	
	Example:
	`switch# config t`
	`Enter configuration commands, one per line.`
	`End with CNTL/Z.`
	`switch(config)#`
		Places you in global configuration mode.

Step 2	`scheduler aaa-authentication password [0 | 7] password`
	
	Example:
	`switch(config)# scheduler`
	`aaa-authentication password X12y34Z56a`
		Configures a clear text password for the user who is currently logged in.

Step 3	`scheduler aaa-authentication username name password [0 | 7] password`
	
	Example:
	`switch(config)# scheduler`
	`aaa-authentication username newuser`
	`password Z98y76X54b`
		Configures a clear text password for a remote user.

Step 4	`show running-config | include "scheduler aaa-authentication"`
	
	Example:
	`switch(config)# show running-config |`
	`include "scheduler aaa-authentication"`
		(Optional) Displays the scheduler password information.

Step 5	`copy running-config startup-config`
	
	Example:
	`switch(config)# copy running-config`
	`startup-config`
		(Optional) Saves the change persistently through reboots and restarts by copying 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.

BEFORE YOU BEGIN

Make sure that you are in the correct VDC. To change the VDC, use the **switchto vdc** command.

SUMMARY STEPS

1. **config t**

2. **scheduler job name** *string*

3. *command1* ;[*command2* ;*command3* ;...]

4. **show scheduler job** [**name** *name*]

5. **copy running-config startup-config**

DETAILED STEPS

	Command	Purpose

Step 1	`config t`
	
	Example:
	`switch# config t`
	`Enter configuration commands, one per line.`
	`End with CNTL/Z.`
	`switch(config)#`
		Places you in global configuration mode.

Step 2	`scheduler job name string`
	
	Example:
	`switch(config)# scheduler job name`
	`backup-cfg`
	`switch(config-job)`
		Creates a job and enters job configuration mode.
		
		This example creates a scheduler job named backup-cfg.

Step 3	`command1 ;[command2 ;command3 ;...]`
	
	Example:
	`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)#`
		Defines the sequence of commands for the specified job. You must separate commands with a space and a semicolon (for example, " ;").
		
		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 file name is created using the current time stamp and switch name.

Step 4	`show scheduler job [name name]`
	
	Example:
	`switch(config-job)# show scheduler job`
		(Optional) Displays the job information.

Step 5	`copy running-config startup-config`
	
	Example:
	`switch(config-job)# copy running-config`
	`startup-config`
		(Optional) Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

Deleting a Job

You can delete a job from the scheduler.

BEFORE YOU BEGIN

Make sure that you are in the correct VDC. To change the VDC, use the **switchto vdc** command.

SUMMARY STEPS

1. **config t**

2. **no scheduler job name** *string*

3. **show scheduler job** [**name** *name*]

4. **copy running-config startup-config**

DETAILED STEPS

	Command	Purpose

Step 1	`config t`
	
	Example:
	`switch# config t`
	`Enter configuration commands, one per line.`
	`End with CNTL/Z.`
	`switch(config)#`
		Places you in global configuration mode.

Step 2	`no scheduler job name` *string*
	
	Example:
	`switch(config)# no scheduler job name`
	`configsave`
	`switch(config-job)`
		Deletes the specified job and all commands defined within it.

Step 3	`show scheduler job` [`name` *name*]
	
	Example:
	`switch(config-job)# show scheduler job name`
	`configsave`
		(Optional) Displays the job information.

Step 4	`copy running-config startup-config`
	
	Example:
	`switch(config)# copy running-config`
	`startup-config`
		(Optional) Saves the change persistently through reboots and restarts by copying 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, 2008, 22:00 hours, then 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, 2008, 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.

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BEFORE YOU BEGIN

Make sure that you are in the correct VDC. To change the VDC, use the **switchto vdc** command.

SUMMARY STEPS

1. **config t**
2. **scheduler schedule name** *string*
3. **job name** *string*
4. **time daily** *time*

   time weekly [[**dow:**] *HH:*]*MM*

   time monthly [[**dm:**] *HH:*] *MM*

   time start {**now repeat** *repeat-interval* | *delta-time* [**repeat** *repeat-interval*]}
5. **show scheduler schedule** [*name*]
6. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	`config t` **Example:** switch# config t Enter configuration commands, one per line. End with CNTL/Z. switch(config)#	Places you in global configuration mode.
Step 2	`scheduler schedule name string` **Example:** switch(config)# scheduler schedule name weekendbackupqos switch(config-schedule)#	Creates a new schedule and places you in schedule configuration mode for that schedule.
Step 3	`job name string` **Example:** switch(config-schedule)# job name offpeakZoning	Associates a job with this schedule. You can add multiple jobs to a schedule.
Step 4	`time daily time` **Example:** switch(config-schedule)# time daily 23:00	Indicates the job starts every day at a designated time specified as HH:MM.
	`time weekly [[dow:]HH:]MM` **Example:** switch(config-schedule)# time weekly Sun:23:00	Indicates that the job starts on a specified day of the week. • Day of the week (dow) specified as one of the following: – An integer such as 1 = Sunday, 2 = Monday, and so on. – An abbreviation such as Sun = Sunday. The maximum length for the entire argument is 10.

Command or Action	Purpose
time monthly [[*dm*:]*HH*:]*MM* **Example:** switch(config-schedule)# time monthly 28:23:00	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.
time start {**now repeat** *repeat-interval* | *delta-time* [**repeat** *repeat-interval*]} **Example:** switch(config-schedule)# time start now repeat 48:00	Indicates the job starts periodically. The start-time format is [[[[yyyy:]mmm:]dd:]HH]:MM. • *delta-time* Specifies the amount of time to wait after the schedule is configured before starting a job. • **now** Specifies that the job starts now. • **repeat** *repeat-interval* Specifies the frequency at which the job is repeated In this example, the job starts immediately and repeats every 48 hours.
Step 5 **show scheduler config** **Example:** switch(config)# show scheduler config	(Optional) Displays the scheduler configuration.
Step 6 **copy running-config startup-config** **Example:** switch(config)# copy running-config startup-config	(Optional) Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

Clearing the Scheduler Log File

You can clear the scheduler log file.

BEFORE YOU BEGIN

Make sure that you are in the correct VDC. To change the VDC, use the **switchto vdc** command.

SUMMARY STEPS

1. **clear scheduler logfile**

DETAILED STEPS

Command or Action	Purpose
Step 1 **clear scheduler logfile** **Example:** switch(config)# clear scheduler logfile	Clears the scheduler log file.

Disabling the Scheduler

You can disable the scheduler feature.

BEFORE YOU BEGIN

The scheduler feature must be enabled before you can configure and schedule jobs.

Make sure that you are in the correct VDC. To change the VDC, use the **switchto vdc** command.

SUMMARY STEPS

1. **config t**
2. **no feature scheduler**
3. **show scheduler config**
4. **copy running-config startup-config**

DETAILED STEPS

:

	Command or Action	Purpose

Step 1	`config t`
	
	Example:
	`switch# config t`
	`Enter configuration commands, one per line.`
	`End with CNTL/Z.`
	`switch(config)#`
		Places you in global configuration mode.

Step 2	`no feature scheduler`
	
	Example:
	`switch(config)# no feature scheduler`
		Disables the scheduler in the current VDC.

Step 3	`show scheduler config`
	
	Example:
	`switch(config)# show scheduler config`
	`                    ^`
	`% Invalid command at '^' marker.`
	`switch(config)#`
		(Optional) Displays the scheduler configuration. In this example, the scheduler feature is disabled so the command is not recognized.

Step 4	`copy running-config startup-config`
	
	Example:
	`switch(config)# copy running-config`
	`startup-config`
		(Optional) Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

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 Scheduler

This section includes the following topics:

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# config t
  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# config t
  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 2009
Last Completion Time: Fri Jan 2 1:00:01 2009
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 2009
-------------------------------- Job Output ---------------------------------
`cli var name timestamp 2009-01-01-01.00.00`
`copy running-config bootflash:/$(HOSTNAME)-cfg.$(timestamp)`
`copy bootflash:/switch-cfg.2009-01-01-01.00.00 tftp://1.2.3.4/ vrf management `
copy: cannot access file '/bootflash/switch-cfg.2009-01-01-01.00.00'
================================================================================
Job Name      : back-cfg                   Job Status: Success (0)
Schedule Name : daily                      User Name : admin
Completion time: Fri Jan 2  1:00:01 2009
-------------------------------- Job Output ---------------------------------
`cli var name timestamp 2009-01-02-01.00.00`
`copy running-config bootflash:/switch-cfg.2009-01-02-01.00.00`
`copy bootflash:/switch-cfg.2009--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#
```

Additional References

For additional information related to the scheduler, see the following sections:

- Related Documents, page 12-193
- Standards, page 12-193

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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, Release 5.x*

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.	—

Feature History for the Scheduler

Table 12-2 lists the release history for this feature.

Table 12-2   Feature History for the Scheduler

Feature Name	Releases	Feature Information
Scheduler	5.2(1)	No change from Release 5.1.
Scheduler	5.1(1)	No change from Release 5.0.
Scheduler	5.0(2)	No change from Release 4.2.

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