Configuring the Scheduler

This chapter contains the following sections:

- Information About the Scheduler, on page 1
- Guidelines and Limitations for the Scheduler, on page 2
- Default Settings for the Scheduler, on page 2
- Configuring the Scheduler, on page 3
- Verifying the Scheduler Configuration, on page 10
- Configuration Examples for the Scheduler, on page 11
- Standards for the Scheduler, on page 12

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.

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. Because user credentials from a remote authentication are not retained long enough to support a scheduled job, you must 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.

Scheduler Log Files

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

Guidelines and Limitations for the Scheduler

- The scheduler can fail if it encounters one of the following while performing a job:
  - If a feature license is expired when a job for that feature is scheduled.
  - If a feature is disabled at the time when a job for that feature is scheduled.
- Verify that you have configured the time. The scheduler does not apply a default timetable. If you create a schedule, 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**, **reload**, and other similar commands) are specified because the job is started and conducted noninteractively. When a reload job is scheduled for a given time and executed, the switch goes into a boot loop. Hence it should not be used in scheduler configuration.

Default Settings for the Scheduler

Table 1: Default Command Scheduler Parameters

Parameters	Default
Scheduler state	Disabled
Log file size	16 KB

Configuring the Scheduler

Enabling the Scheduler

SUMMARY STEPS

1. switch# **configure terminal**
2. switch(config) # **feature scheduler**
3. (Optional) switch(config) # **show scheduler config**
4. (Optional) switch(config)# **copy running-config startup-config**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	switch# **configure terminal**	Enters global configuration mode.
Step 2	switch(config) # **feature scheduler**	Enables the scheduler.
Step 3	(Optional) switch(config) # **show scheduler config**	Displays the scheduler configuration.
Step 4	(Optional) switch(config)# **copy running-config startup-config**	Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

Example

This example shows how to enable the scheduler:

```
switch# configure terminal
switch(config)# feature scheduler
switch(config)# show scheduler config
config terminal
   feature scheduler
   scheduler logfile size 16
end
switch(config)#
```

Defining the Scheduler Log File Size

SUMMARY STEPS

1. switch# **configure terminal**
2. switch(config) # **scheduler logfile size** *value*
3. (Optional) switch(config)# **copy running-config startup-config**

DETAILED STEPS

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 log file size is 16. **Note** If the size of the job output is greater than the size of the log file, the output is truncated.
Step 3	(Optional) switch(config)# **copy running-config startup-config**	Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

Example

This example shows how to define the scheduler log file size:

```
switch# configure terminal
switch(config)# scheduler logfile size 1024
switch(config)#
```

Configuring Remote User Authentication

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

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.

SUMMARY STEPS

1. switch# **configure terminal**
2. switch(config) # **scheduler aaa-authentication password** [**0** | **7**] *password*
3. switch(config) # **scheduler aaa-authentication username** *name* **password** [**0** | **7**] *password*
4. (Optional) switch(config) # **show running-config** | **include "scheduler aaa-authentication"**
5. (Optional) switch(config)# **copy running-config startup-config**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	switch# **configure terminal**	Enters global configuration mode.

	Command or Action	Purpose
Step 2	switch(config) # **scheduler aaa-authentication password** [**0** | **7**] *password*	Configures a password for the user who is currently logged in. To configure a clear text password, enter **0**. To configure an encrypted password, enter **7**.
Step 3	switch(config) # **scheduler aaa-authentication username** *name* **password** [**0** | **7**] *password*	Configures a clear text 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**	Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

Example

This example shows how to configure a clear text password for a remote user called NewUser:

```
switch# configure terminal
switch(config) # scheduler aaa-authentication
username NewUser password z98y76x54b
switch(config) # copy running-config startup-config
switch(config) #
```

Defining a Job

After you define a job, you cannot modify or remove commands. To change the job, you must delete it and create a new one.

SUMMARY STEPS

1. switch# **configure terminal**
2. switch(config) # **scheduler job name** *name*
3. switch(config-job) # *command1* **;** [*command2* **;***command3* **;** ...
4. (Optional) switch(config-job) # **show scheduler job** [*name*]
5. (Optional) switch(config-job) # **copy running-config startup-config**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	switch# **configure terminal**	Enters global configuration mode.
Step 2	switch(config) # **scheduler job name** *name*	Creates a job with the specified name and enters the job configuration mode.

	Command or Action	Purpose
		The *name* is restricted to 31 characters.
Step 3	switch(config-job) # *command1* **;** [*command2* **;***command3* **;** ...	Defines the sequence of commands for the specified job. Separate commands with spaces and semicolons (;). Creates the filename using the current timestamp and switch name.
Step 4	(Optional) switch(config-job) # **show scheduler job** [*name*]	Displays the job information. The *name* is restricted to 31 characters.
Step 5	(Optional) switch(config-job) # **copy running-config startup-config**	Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

Example

This example shows how to:

- Create a scheduler job named "backup-cfg"
- Save the running configuration to a file in the bootflash
- Copy the file from the bootflash to a TFTP server
- Save the change to the startup configuration

```
switch# configure terminal
switch(config) # scheduler job name backup-cfg
switch(config-job) # copy running-config
tftp://1.2.3.4/$(SWITCHNAME)-cfg.$(TIMESTAMP) vrf management
switch(config-job) # copy running-config startup-config
```

Deleting a Job

SUMMARY STEPS

1. switch# **configure terminal**
2. switch(config) # **no scheduler job name** *name*
3. (Optional) switch(config-job) # **show scheduler job** [*name*]
4. (Optional) switch(config-job) # **copy running-config startup-config**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	switch# **configure terminal**	Enters global configuration mode.

	Command or Action	Purpose
Step 2	switch(config) # **no scheduler job name** *name*	Deletes the specified job and all commands defined within it. The *name* is restricted to 31 characters.
Step 3	(Optional) switch(config-job) # **show scheduler job** [*name*]	Displays the job information.
Step 4	(Optional) switch(config-job) # **copy running-config startup-config**	Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

Example

This example shows how to delete a job called configsave:

```
switch# configure terminal
switch(config)# no scheduler job name configsave
switch(config-job)# copy running-config startup-config
switch(config-job)#
```

Defining a Timetable

You must configure a timetable. Otherwise, jobs will not be scheduled.

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,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.

SUMMARY STEPS

1. switch# **configure terminal**
2. switch(config) # **scheduler schedule name** *name*
3. switch(config-schedule) # **job name** *name*
4. switch(config-schedule) # **time daily** *time*

5. switch(config-schedule) # **time weekly** [[*day-of-week*:] *HH*:] *MM*
6. switch(config-schedule) # **time monthly** [[*day-of-month*:] *HH*:] *MM*
7. switch(config-schedule) # **time start** {**now repeat** *repeat-interval* | *delta-time* [**repeat** *repeat-interval*]}
8. (Optional) switch(config-schedule) # **show scheduler config**
9. (Optional) switch(config-schedule) # **copy running-config startup-config**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	switch# **configure terminal**	Enters global configuration mode.
Step 2	switch(config) # **scheduler schedule name** *name*	Creates a new scheduler and enters schedule configuration mode for that schedule. The *name* is restricted to 31 characters.
Step 3	switch(config-schedule) # **job name** *name*	Associates a job with this schedule. You can add multiple jobs to a schedule. The *name* is restricted to 31 characters.
Step 4	switch(config-schedule) # **time daily** *time*	Indicates the job starts every day at a designated time, specified as HH:MM.
Step 5	switch(config-schedule) # **time weekly** [[*day-of-week*:] *HH*:] *MM*	Indicates that the job starts on a specified day of the week. The day of the week is represented by an integer (for example, **1** for Sunday, **2** for Monday) or as an abbreviation (for example, **sun**, **mon**). The maximum length for the entire argument is 10 characters.
Step 6	switch(config-schedule) # **time monthly** [[*day-of-month*:] *HH*:] *MM*	Indicates that the job starts on a specified day each month. If you specify 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. 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 two minutes from now. • **repeat** *repeat-interval*— Specifies the frequency at which the job is repeated.

	Command or Action	Purpose
Step 8	(Optional) switch(config-schedule) # **show scheduler config**	Displays the scheduler information.
Step 9	(Optional) switch(config-schedule) # **copy running-config startup-config**	Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

Example

This example shows how to define a timetable where jobs start on the 28th of each month at 23:00 hours:

```
switch# configure terminal
switch(config)# scheduler schedule name weekendbackupqos
switch(config-scheduler)# job name offpeakzoning
switch(config-scheduler)# time monthly 28:23:00
switch(config-scheduler)# copy running-config startup-config
switch(config-scheduler)#
```

Clearing the Scheduler Log File

SUMMARY STEPS

1. switch# **configure terminal**
2. switch(config) # **clear scheduler logfile**

DETAILED STEPS

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.

Example

This example shows how to clear the scheduler log file:

```
switch# configure terminal
switch(config)# clear scheduler logfile
```

Disabling the Scheduler

SUMMARY STEPS

1. switch# **configure terminal**
2. switch(config) # **no feature scheduler**
3. (Optional) switch(config) # **show scheduler config**
4. (Optional) switch(config)# **copy running-config startup-config**

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	switch# **configure terminal**	Enters global configuration mode.
Step 2	switch(config) # **no feature scheduler**	Disables the scheduler.
Step 3	(Optional) switch(config) # **show scheduler config**	Displays the scheduler configuration.
Step 4	(Optional) switch(config)# **copy running-config startup-config**	Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

Example

This example shows how to disable the scheduler:

```
switch# configure terminal
switch(config) # no feature scheduler
switch(config) # copy running-config startup-config
switch(config) #
```

Verifying the Scheduler Configuration

Use one of the following commands to verify the configuration:

Table 2: Scheduler Show Commands

Command	Purpose
show scheduler config	Displays the scheduler configuration.
show scheduler job [**name** *name*]	Displays the jobs configured.
show scheduler logfile	Displays the contents of the scheduler log file.
show scheduler schedule [**name** *name*]	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 the bootflash. The job then copies the file from the bootflash to a TFTP server (creates the filename using the current timestamp and switch name):

```
switch# configure terminal
switch(config)# scheduler job name backup-cfg
switch(config-job)# copy running-config
tftp://1.2.3.4/$(SWITCHNAME)-cfg.$(TIMESTAMP) 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-schedule)# job name backup-cfg
switch(config-schedule)# time daily 1:00
switch(config-schedule)# 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(config)#
```

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#
```

Standards for the Scheduler

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