C H A P T E R 7

Configuring the Switch Alarms

Note For complete syntax and usage information for the commands used in this chapter, see the switch command reference for this release.

Note For information about the alarm input and output ports, see the *Cisco CGS 2520 Hardware Installation Guide*.

Understanding CGS 2520 Switch Alarms

The switch software monitors switch conditions on a per port or a switch basis. If the conditions present on the switch or a port do not match the set parameters, the switch software triggers an alarm or a system message. By default, the switch software sends the system messages to a system message logging facility, or a *syslog* facility. You can also configure the switch to send Simple Network Management Protocol (SNMP) traps to an SNMP server. You can configure the switch to trigger an external alarm device by using the alarm relay. For more information on how to configure the alarms, see the "Configuring CGS 2520 Switch Alarms" section on page 7-6.

Global Status Monitoring Alarms

The CGS 2520 switch processes alarms related to temperature and power supply conditions, referred to as global or facility alarms.

Table 7-1   *CGS 2520 Global Status Monitoring Alarms*

Alarm	Description
Power supply alarm	The switch monitors dual power supply levels. If there are two power supplies installed in the switch, an alarm triggers if a power supply fails. The alarm is automatically cleared when both power supplies are working. You can configure the power supply alarm to be connected to the hardware relays. For more information, see the "Configuring the Power Supply Alarms" section on page 7-6.
Temperature alarms	The switch contains two temperature sensors that monitor the environmental conditions inside the switch. • The primary alarm is enabled automatically to trigger both at a low temperature, –4°F (–20°C) and a high temperature, 203°F (95°C). It cannot be disabled. By default, the primary temperature alarm is associated with the major relay. • The secondary alarm triggers when the system temperature is higher or lower than the configured high and low temperature thresholds. The secondary alarm is disabled by default. For more information, see the "Configuring the Switch Temperature Alarms" section on page 7-7.

FCS Error Hysteresis Threshold

The Ethernet standard calls for a maximum bit-error rate of 10^{-8}. On the CGS 2520 switch, the bit error-rate range is from 10^{-6} to 10^{-11}. The bit error-rate input to the switch is a positive exponent. If you want to configure the bit error-rate of 10^{-9}, enter the value 9 for the exponent. By default, the FCS bit error-rate is 10^{-8}.

You can set the FCS error hysteresis threshold to prevent the toggle of the alarm when the actual bit-error rate fluctuates near the configured rate. The hysteresis threshold is defined as the ratio between the alarm clear threshold to the alarm set threshold, expressed as a percentage value.

For example, if the FCS bit error-rate alarm value is configured to 10^{-8}, that value is the alarm set threshold. To set the alarm clear threshold at $5*10^{-10}$, the hysteresis, value *h*, is determined as follows:

h = alarm clear threshold / alarm set threshold

$h = 5*10^{-10} / 10^{-8} = 5*10^{-2} = 0.05 = 5$ percent

The FCS hysteresis threshold is applied to all ports on the switch. The allowable range is from 1 to 10 percent. The default value is 10 percent. See the "Configuring the FCS Bit Error Rate Alarm" section on page 7-10 for more information.

Port Status Monitoring Alarms

The switch can also monitor the status of the Ethernet ports and generate alarm messages based on the alarms listed in Table 7-2. To save user time and effort, it supports changeable alarm configurations by using alarm profiles. You can create a number of profiles and assign one of these profiles to each Ethernet port.

Alarm profiles provide a mechanism for you to enable or disable alarm conditions for a port and associate the alarm conditions with one or both alarm relays. You can also use alarm profiles to set alarm conditions to send alarm traps to an SNMP server and system messages to a syslog server. The alarm profile *defaultPort* is applied to all interfaces in the factory configuration (by default).

> **Note** You can associate multiple alarms to one relay or one alarm to both relays.

Table 7-2 lists the port status monitoring alarms and their descriptions and functions. Each fault condition is assigned a severity level based on the Cisco IOS System Error Message Severity Level.

Table 7-2   CGS 2520 Port Status Monitoring Alarms

Alarm	Description
Link Fault alarm	The switch generates a link fault alarm when problems with a port physical layer cause unreliable data transmission. A typical link fault condition is loss of signal or clock. The link fault alarm is cleared automatically when the link fault condition is cleared. The severity for this alarm is *error condition*, level 3.
Port not Forwarding alarm	The switch generates a port not-forwarding alarm when a port is not forwarding packets. This alarm is cleared automatically when the port begins to forward packets. The severity for this alarm is *warning*, level 4.
Port not Operating alarm	The switch generates a port not-operating alarm when a port fails during the startup self-test. When triggered, the port not-operating alarm is only cleared when the switch is restarted and the port is operational. The severity for this alarm is *error condition*, level 3.
FCS Bit Error Rate alarm	The switch generates an FCS bit error-rate alarm when the actual FCS bit error-rate is close to the configured rate. You can set the FCS bit error-rate by using the interface configuration CLI for each of the ports. See the "Configuring the FCS Bit Error Rate Alarm" section on page 7-10 for more information. The severity for this alarm is *error condition*, level 3.

Triggering Alarm Options

The switch supports these methods for triggering alarms:

- Configurable Relay

  The switch is equipped with one independent alarm relay that can be triggered by alarms for global and port status conditions. You can configure the relay to send a fault signal to an external alarm device, such as a bell, light, or other signaling device. You can associate any alarm condition with the alarm relay. Each fault condition is assigned a severity level based on the Cisco IOS System Error Message Severity Level.

  See the "Configuring CGS 2520 Switch Alarms" section on page 7-6 for more information on configuring the relay.

- SNMP Traps

    SNMP is an application-layer protocol that provides a message format for communication between managers and agents. The SNMP system consists of an SNMP manager, an SNMP agent, and a management information base (MIB).

    The **snmp-server enable traps** command can be changed so that the user can send alarm traps to an SNMP server. You can use alarm profiles to set environmental or port status alarm conditions to send SNMP alarm traps. See the "Enabling SNMP Traps" section on page 7-13 for more information.
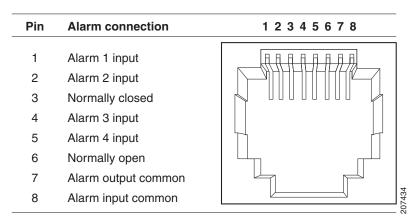
- Syslog Messages

    You can use alarm profiles to send system messages to a syslog server. See the "Configuring CGS 2520 Switch Alarms" section on page 7-6 for more information.

Configuring External Alarms

You can connect up to four alarm inputs from external devices in your environment, such as a door, a temperature gauge, or a fire alarm, to the alarm input port on the switch front panel.

Figure 7-1   Alarm Port Pinouts

Pin	Alarm connection
1	Alarm 1 input
2	Alarm 2 input
3	Normally closed
4	Alarm 3 input
5	Alarm 4 input
6	Normally open
7	Alarm output common
8	Alarm input common

For each alarm input, you can configure an open or closed circuit to trigger an alarm and configure the severity of the alarm. A triggered alarm generates an system message. If you enter a descriptive name for the alarm, that name is included in the system message. A triggered alarm also turns on the LED display (the LED is normally off, meaning no alarm). See the *Cisco CGS 2520 Hardware Installation Guide* for information about the LEDs.

The alarm trigger setting is **open** or **closed.** If not set, the alarm is triggered when the circuit closes.

- Open means that the normal condition has current flowing through the contact (normally closed contact). The alarm is generated when the current stops flowing.

- Closed means that no current flows through the contact (normally open contact). The alarm is generated when current does flow.

You can set the alarm severity to **minor**, **major**, or **critical**. The severity is included in the alarm message and also sets the LED color when the alarm is triggered. The LED is amber for a minor alarm, red for a major alarm, and blinking red for a critical alarm. If not set, the default alarm severity is **minor**.

Beginning in privileged EXEC mode, follow these steps to configure alarm contacts.

	Command	Purpose
Step 1	**configure terminal**	Enter global configuration mode.
Step 2	**alarm contact** *contact-number* **description** *string*	(Optional) Configure a description for the alarm contact number. • The *contact-number* is from 1 to 4. • The description string is up to 80 alphanumeric characters in length and is included in any generated system messages.
Step 3	**alarm contact** {*contact-number* / **all**} {**severity** {**critical** / **major** / **minor**} / **trigger** {**closed** / **open**}}	Configure the trigger and severity for an alarm contact number or for all contact numbers. • Enter a contact number (1 to 4) or specify that you are configuring **all** alarms. See Figure 7-1 for the alarm contact pinouts. • For **severity**, enter **critical**, **major**, or **minor**. If you do not configure a severity, the default is **minor**. • For **trigger**, enter **open** or **closed**. If you do not configure a trigger, the alarm is triggered when the circuit is **closed**.
Step 4	**end**	Return to privileged EXEC mode.
Step 5	**show env alarm-contact**	Show the configured alarm contacts.
Step 6	**copy running-config startup-config**	(Optional) Save your entries in the configuration file.

To delete the alarm description, enter the **no alarm contact** *contact-number* **description** privileged EXEC command. To set the alarm severity to **minor** (the default), enter the **no alarm contact** {*contact-number* / **all**} **severity**. To set the alarm contact trigger to **closed** (the default), enter the **no alarm contact** {*contact-number* / **all**} **trigger.**

To see the alarm configuration and status, enter the **show env alarm-contact** privileged EXEC command.

For more detailed information about the alarm commands, see the command reference for this release.

Note The switch supports the CISCO-ENTITY-ALARM-MIB for these alarms.

This example configures alarm input 2 named *door sensor* to assert a major alarm when the door circuit is closed and then displays the status and configuration for all alarms:

```
Switch(config)# alarm contact 2 description door sensor
Switch(config)# alarm contact 2 severity major
Switch(config)# alarm contact 2 trigger closed
Switch(config)# end
Switch(config)# show env alarm-contact
Switch# show env alarm-contact
ALARM CONTACT 1
    Status:      not asserted
    Description: test_1
    Severity:    critical
    Trigger:     open
ALARM CONTACT 2
    Status:      not asserted
    Description: door sensor
    Severity:    major
    Trigger:     closed
```

```
ALARM CONTACT 3
    Status:     not asserted
    Description: flood sensor
    Severity:   critical
    Trigger:    closed
ALARM CONTACT 4
    Status:     not asserted
    Description:
    Severity:   critical
    Trigger:    closed
```

Configuring CGS 2520 Switch Alarms

Default CGS 2520 Switch Alarm Configuration

Table 7-3   Default CGS 2520 Switch Alarm Configuration

	Alarm	Default Setting
Global	Power supply alarm	Enabled in switch single power mode. No alarm. In dual-power supply mode, the default alarm notification is a system message to the console.
	Primary temperature alarm	Enabled for switch temperature range of 203°F (95°C) maximum to –4°F (–20°C) minimum. The primary switch temperature alarm is associated with the major relay.
	Secondary temperature alarm	Disabled.
Port	Link fault alarm	Disabled on all interfaces.
	Port not forwarding alarm	Disabled on all interfaces.
	Port not operating alarm	Enabled on all interfaces.
	FCS bit error rate alarm	Disabled on all interfaces.

Configuring the Power Supply Alarms

The presence of power supplies is dynamically detected. Use the **show env power** command in privileged EXEC or user EXEC mode to display power information for the switch.

Use the **alarm facility power-supply** global configuration command to associate the power supply alarm to the relay. You can also configure all alarms and traps associated with the power supply alarm to be sent to syslog and the SNMP server.

Beginning in privileged EXEC mode, follow these steps to associate the power supply alarm to a relay:

	Command	Purpose
Step 1	**configure terminal**	Enter global configuration mode.
Step 2	**alarm facility power-supply relay major**	Associate the power supply alarm to the relay.
Step 3	**alarm facility power-supply notifies**	Send power supply alarm traps to an SNMP server.
Step 4	**alarm facility power-supply syslog**	Send power supply alarm traps to a syslog server.
Step 5	**end**	Return to privileged EXEC mode.
Step 6	**show alarm settings**	Verify the configuration.
Step 7	**copy running-config startup-config**	(Optional) Save your entries in the configuration file.

To disable the default power supply alarm, use the **alarm facility power-supply disable** global configuration command.

To disable sending the alarm to a relay, to syslog, or to an SNMP server, use the **no alarm facility power-supply relay**, **no alarm facility power-supply notifies**, or **no alarm facility power-supply syslog** global configuration commands.

✎

Note   Before you can use the **notifies** command to send alarm traps to an SNMP server, you must first set up the SNMP server by using the **snmp-server enable traps alarms** global configuration command. See the "Enabling SNMP Traps" section on page 7-13.

This example sets the power-supply monitoring alarm to the major relay.

```
Switch(config) # alarm facility power-supply relay major
```

Configuring the Switch Temperature Alarms

You can change the temperature thresholds for both the primary and secondary temperature alarms. You can also associate either the primary or secondary temperature alarm to the relay.

- Setting the Primary Temperature Threshold for the Switch, page 7-7
- Setting a Secondary Temperature Threshold for the Switch, page 7-8
- Associating the Temperature Alarms to a Relay, page 7-9

Setting the Primary Temperature Threshold for the Switch

You can use the **alarm facility temperature primary** global configuration command to set low and high temperature thresholds for the primary temperature monitoring alarm.

Beginning in privileged EXEC mode, follow these steps to set the high temperature threshold:

	Command	Purpose
Step 1	**configure terminal**	Enter global configuration mode.
Step 2	**alarm facility temperature primary high** *threshold*	Set the primary high temperature threshold value. Set the threshold from –238°F (–150°C) to 572°F (300°C).
Step 3	**alarm facility temperature primary low** *threshold*	Set the primary low temperature threshold value. Set the threshold from –328°F (–200°C) to 482°F (250°C).
Step 4	**end**	Return to privileged EXEC mode.
Step 5	**show alarm settings**	Verify the configuration.
Step 6	**copy running-config startup-config**	(Optional) Save your entries in the configuration file.

Use the **no alarm facility temperature primary high** *threshold* global configuration command to delete the temperature monitoring alarm configuration and return to the default setting.

This example shows how to delete the primary temperature monitoring alarm configuration and return to the default setting.

```
Switch(config) # no alarm facility temperature primary high 45
```

Setting a Secondary Temperature Threshold for the Switch

You can use the **alarm facility temperature secondary** global configuration command to set the low and high temperature thresholds for the secondary temperature monitoring alarm.

Beginning in privileged EXEC mode, follow these steps to set the low temperature threshold:

	Command	Purpose
Step 1	**configure terminal**	Enter global configuration mode.
Step 2	**alarm facility temperature secondary high** *threshold*	Set the secondary high temperature threshold value. Set the threshold from –238°F (–150°C) to 572°F (300°C).
Step 3	**alarm facility temperature secondary low** *threshold*	Set the secondary low temperature threshold value. Set the threshold from –328°F (–200°C) to 482°F (250°C).
Step 4	**end**	Return to privileged EXEC mode.
Step 5	**show alarm settings**	Verify the configuration.
Step 6	**copy running-config startup-config**	(Optional) Save your entries in the configuration file.

Use the **no alarm facility temperature secondary** *threshold* global configuration command to disable the secondary temperature threshold alarm.

This example disables the secondary temperature threshold alarm.

```
Switch(config) # no alarm facility temperature secondary 45
```

Associating the Temperature Alarms to a Relay

By default, the primary temperature alarm is associated to the relay. You can use the **alarm facility temperature** global configuration command to associate the primary temperature alarm to an SNMP trap, or a syslog message, or to associate the secondary temperature alarm to the relay, an SNMP trap, or a syslog message.

> **Note** The single relay on the Cisco CGS 2520 switch is called the major relay.

Beginning in privileged EXEC mode, follow these steps to associate the primary or secondary temperature alarm to the relay:

	Command	Purpose
Step 1	**configure terminal**	Enter global configuration mode.
Step 2	**alarm facility temperature {primary	secondary} relay major**	Associate the primary or secondary temperature alarm to the relay.
Step 3	**alarm facility temperature {primary	secondary} notifies**	Send primary or secondary temperature alarm traps to an SNMP server.
Step 4	**alarm facility temperature {primary	secondary} syslog**	Send primary or secondary temperature alarm traps to a syslog server.
Step 5	**end**	Return to privileged EXEC mode.
Step 6	**show alarm settings**	Verify the configuration.
Step 7	**copy running-config startup-config**	(Optional) Save your entries in the configuration file.

> **Note** Before you use the **notifies** command to send alarm traps to an SNMP server, you must first set up the SNMP server by using the **snmp-server enable traps alarms** global configuration command. See the "Enabling SNMP Traps" section on page 7-13.

Use the **no alarm facility temperature secondary** to disable the secondary temperature alarm.

This example sets the secondary temperature alarm to the major relay, with a high temperature threshold value of $113^{o}F$ ($45^{o}C$). All alarms and traps associated with this alarm are sent to a syslog server and an SNMP server.

```
Switch(config) # alarm facility temperature secondary high 45
Switch(config) # alarm facility temperature secondary relay major
Switch(config) # alarm facility temperature secondary syslog
Switch(config) # alarm facility temperature secondary notifies
```

This example sets the first (primary) temperature alarm to the major relay. All alarms and traps associated with this alarm are sent to a syslog server.

```
Switch(config) # alarm facility temperature primary syslog
Switch(config) # alarm facility temperature primary relay major
```

Configuring the FCS Bit Error Rate Alarm

Setting the FCS Error Threshold

The switch generates an FCS bit error-rate alarm when the actual rate is close to the configured rate. Use the **fcs-threshold** interface configuration command to set the FCS error threshold.

Beginning in privileged EXEC mode, follow these steps to set the bit error-rate value for a port:

	Command	Purpose
Step 1	**configure terminal**	Enter global configuration mode.
Step 2	**interface** *interface-id*	Enter the interface to be configured, and enter interface configuration mode.
Step 3	**fcs-threshold** *value*	Set the FCS error rate.
		For *value*, the range is 6 to 11 to set a maximum bit error rate of 10^{-6} to 10^{-11}.
		By default, the FCS bit error rate is 10^{-8}.
Step 4	**end**	Return to privileged EXEC mode.
Step 5	**show fcs-threshold**	Verify the setting.
Step 6	**copy running-config startup-config**	(Optional) Save your entries in the configuration file.

Use the **no fcs-threshold** interface configuration command to return to the default FCS threshold value.

This example shows how to set the FCS bit error rate for a port to 10^{-10}.

```
Switch# configure terminal
Switch(config)# interface fastethernet1/1
Switch(config-if) # fcs-threshold 10
```

Setting the FCS Error Hysteresis Threshold

The hysteresis setting prevents the toggle of an alarm when the actual bit error-rate fluctuates near the configured rate. Use the **alarm facility fcs-hysteresis** global configuration command to set the FCS error hysteresis threshold.

Note The FCS hysteresis threshold is applied to all ports of an CGS 2520 switch.

Beginning in privileged EXEC mode, follow these steps to set the FCS error hysteresis threshold for a switch:

	Command	Purpose
Step 1	**configure terminal**	Enter global configuration mode.
Step 2	**alarm facility fcs-hysteresis** *percentage*	Set the hysteresis percentage for the switch.
		For *percentage*, the range is 1 to 10. The default value is 10 percent.

	Command	Purpose
Step 3	**end**	Return to privileged EXEC mode.
Step 4	**show running config**	Verify the configuration.
Step 5	**copy running-config startup-config**	(Optional) Save your entries in the configuration file.

Use the **no alarm facility fcs-hysteresis** command to set the FCS error hysteresis threshold to its default value.

Note   The **show running config** command displays any FCS error hysteresis that is not the default value.

This example shows how to set the FCS error hysteresis at 5 percent.

```
Switch(config)# alarm facility fcs-hysteresis 5
```

Configuring Alarm Profiles

- Creating or Modifying an Alarm Profile, page 7-11
- Attaching an Alarm Profile to a Specific Port, page 7-12

Creating or Modifying an Alarm Profile

You can use the **alarm profile** global configuration command to create an alarm profile or to modify an existing profile. When you create a new alarm profile, none of the alarms are enabled.

Note   The only alarm enabled in the *defaultPort* profile is the Port not operating alarm.

Beginning in privileged EXEC mode, follow these steps to create an alarm profile:

	Command	Purpose
Step 1	**configure terminal**	Enter global configuration mode.
Step 2	**alarm profile** *name*	Create the new profile or identify an existing profile, and enter alarm profile configuration mode.
Step 3	**alarm** *alarm-id*	Add or modify alarm parameters for a specific alarm (see Table 7-4). The values are 1 to 4. You an enter more than one alarm ID separated by a space.
Step 4	**notifies** *alarm-id*	(Optional) Configure the alarm to send an SNMP trap to an SNMP server.
Step 5	**relay-major** *alarm-id*	(Optional) Configure the alarm to send an alarm trap to the relay.
Step 6	**syslog** *alarm-id*	(Optional) Configure the alarm to send an alarm trap to a syslog server.
Step 7	**end**	Return to privileged EXEC mode.
Step 8	**show alarm profile** *name*	Verify the configuration.
Step 9	**copy running-config startup-config**	(Optional) Save your entries in the configuration file.

To delete an alarm profile, use the **no alarm profile** *name* global configuration command.

This example creates or modifies the alarm profile *fastE* for the Fast Ethernet port with link-down (*alarmList* ID 3) alarm enabled. The link-down alarm is connected to the major relay. This alarm also send notifications to an SNMP server and sends system messages to a syslog server.

```
Switch(config)# alarm profile fastE
Switch(config-alarm-prof)# alarm 3
Switch(config-alarm-prof)# relay major 3
Switch(config-alarm-prof)# notifies 3
Switch(config-alarm-prof)# syslog 3
```

Note   Before you use the **notifies** command to send alarm traps to an SNMP server, you must first set up the SNMP server by using the **snmp-server enable traps alarms** global configuration command. See the "Enabling SNMP Traps" section on page 7-13.

Table 7-4 lists the *alarmList* IDs and their corresponding alarm definitions. For a description of these alarms, see the "Port Status Monitoring Alarms" section on page 7-2.

Table 7-4   AlarmList ID Number Alarm Descriptions

AlarmList ID	Alarm Description
1	Link fault
2	Port not forwarding
3	Port not operating
4	FCS error rate exceeds threshold

Attaching an Alarm Profile to a Specific Port

In interface configuration mode, you can use the **alarm-profile** command to attach an alarm profile to a specific port.

Beginning in privileged EXEC mode, follow these steps to attach an alarm profile to a port:

	Command	Purpose
Step 1	**configure terminal**	Enter global configuration mode.
Step 2	**interface** *port interface*	Enter the number of the switch port to be configured, and the switch enters interface configuration mode.
Step 3	**alarm-profile** *name*	Attach the specified profile to the interface.
Step 4	**end**	Return to privileged EXEC mode.
Step 5	**show alarm profile**	Verify the configuration.
Step 6	**copy running-config startup-config**	(Optional) Save your entries in the configuration file.

To detach an alarm profile from a specific port, use the **no alarm-profile** *name* interface configuration command.

This example attaches an alarm profile named *fastE* to a port.

```
Switch(config)# interface fastethernet 1/2
Switch(config-if)# alarm profile fastE
```

This example detaches an alarm profile named *fastE* from a port.

```
Switch(config)# interface fastethernet 1/2
Switch(config-if)# no alarm profile fastE
```

Enabling SNMP Traps

Use the **snmp-server enable traps alarms** global configuration command to enable the switch to send *alarm* traps.

> **Note**   Before using alarm profiles to set the switch to send SNMP alarm trap notifications to an SNMP server, you must first enable SNMP by using the **snmp-server enable traps alarms** global configuration command.

Beginning in privileged EXEC mode, follow these steps to enable the switch to send *alarm* traps:

	Command	Purpose
Step 1	**configure terminal**	Enter global configuration mode.
Step 2	**snmp-server enable traps alarms**	Enable the switch to send SNMP traps.
Step 3	**end**	Return to privileged EXEC mode.
Step 4	**show alarm settings**	Verify the configuration.
Step 5	**copy running-config startup-config**	(Optional) Save your entries in the configuration file.

Displaying CGS 2520 Switch Alarms Status

To display the global and port alarm status, use one or more of the privileged EXEC commands in Table 7-5:

Table 7-5   *Commands for Displaying Global and Port Alarm Status*

Command	Purpose
show alarm description port	Displays an alarm number and its text description.
show alarm profile [*name*]	Displays all alarm profiles in the system or a specified profile.
show alarm settings	Displays all global alarm settings on the switch.
show env {**all**	**power**	**temperature**}	Displays the status of environmental facilities on the switch.
show facility-alarm status [**critical**	**info**	**major**]	Displays generated alarms on the switch.