Configuring Switch Alarms

Information About 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.

Global Status Monitoring Alarms

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

Table 10 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 Configuring the Power Supply Alarms, page 51.
Temperature alarms	The switch contains one temperature sensor with a primary and secondary temperature setting. The sensor monitors the environmental conditions inside the switch. The primary and secondary temperature alarms can be set as follows: ■ 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 Configuring the Switch Temperature Alarms, page 52.
SD-Card	By default the alarm is disabled.

FCS Error Hysteresis Threshold

The Ethernet standard calls for a maximum bit-error rate of 10^{-8}. 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 Configuring the FCS Bit Error Rate Alarm, page 52 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 11 on page 50. 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 11 on page 50 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 11 Port Status Monitoring Alarms

Alarm List ID	Alarm	Description
1	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.
2	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.
3	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.
4	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 Configuring the FCS Bit Error Rate Alarm, page 52 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, port status and SD flash card 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 Configuring the Power Supply Alarms, page 51 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 Enabling SNMP Traps, page 54 for more information.

- Syslog Messages

  You can use alarm profiles to send system messages to a syslog server. See Configuring the Power Supply Alarms, page 51 for more information.

Default Switch Alarm Settings

Table 12 Default Switch Alarm Settings

	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.
	Output relay mode alarm	Normally deenergized. The alarm output has switched off or is in an off state.
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.

How to Configure Switch Alarms

Configuring the Power Supply Alarms

	Command	Purpose
1.	**configure terminal**	Enters global configuration mode.
2.	**power-supply dual**	Configures dual power supplies.
3.	**alarm facility power-supply disable**	Disables the power supply alarm.
4.	**alarm facility power-supply relay major**	Associates the power supply alarm to the relay.
5.	**alarm facility power-supply notifies**	Sends power supply alarm traps to an SNMP server.
6.	**alarm facility power-supply syslog**	Sends power supply alarm traps to a syslog server.
7.	**end**	Returns to privileged EXEC mode.

	Command	Purpose
8.	show env power	Displays the switch power status.
9.	show facility-alarm status	Displays all generated alarms for the switch.
10.	**show alarm settings**	Verifies the configuration.
11.	**copy running-config startup-config**	(Optional) Saves your entries in the configuration file.

Configuring the Switch Temperature Alarms

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

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 switch is called the major relay.

	Command	Purpose
1.	**configure terminal**	Enters global configuration mode.
2.	**alarm facility temperature** {**primary** | **secondary**} **relay major**	Associates the primary or secondary temperature alarm to the relay.
3.	**alarm facility temperature** {**primary** | **secondary**} **notifies**	Sends primary or secondary temperature alarm traps to an SNMP server.
4.	**alarm facility temperature** {**primary** | **secondary**} **syslog**	Sends primary or secondary temperature alarm traps to a syslog server. Uses the **no alarm facility temperature secondary** command to disable the secondary temperature alarm.
5.	**end**	Returns to privileged EXEC mode.
6.	**show alarm settings**	Verifies the configuration.
7.	**copy running-config startup-config**	(Optional) Saves your entries in the configuration file.

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.

	Command	Purpose
1.	**configure terminal**	Enters global configuration mode.
2.	**interface** *interface-id*	Enters the interface to be configured, and enters interface configuration mode.
3.	**fcs-threshold** ***value***	Sets 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}.
4.	**end**	Returns to privileged EXEC mode.
5.	**show fcs-threshold**	Verifies the setting.
6.	**copy running-config startup-config**	(Optional) Saves your entries in the configuration file.

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. The FCS hysteresis threshold is applied to all ports of a switch.

	Command	Purpose
1.	**configure terminal**	Enters global configuration mode.
2.	**alarm facility fcs-hysteresis** *percentage*	Sets the hysteresis percentage for the switch. For *percentage*, the range is 1 to 10. The default value is 10 percent.
3.	**end**	Returns to privileged EXEC mode.
4.	**show running config**	Verifies the configuration.
5.	**copy running-config startup-config**	(Optional) Saves your entries in the configuration file.

Configuring Alarm Profiles

Creating 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.

	Command	Purpose
1.	**configure terminal**	Enters global configuration mode.
2.	**alarm profile** ***name***	Creates the new profile or identifies an existing profile, and enters alarm profile configuration mode.
3.	**end**	Returns to privileged EXEC mode.
4.	**show alarm profile** ***name***	Verifies the configuration.
5.	**copy running-config startup-config**	(Optional) Saves your entries in the configuration file.

Modifying an Alarm Profile

You can modify an alarm profile from alarm profile configuration mode.

You can enter more than one alarm type separated by a space.

Command	Purpose
alarm {fcs-error | link-fault | not-forwarding | not-operating}	(Optional) Adds or modifies alarm parameters for a specific alarm.
notifies {fcs-error | link-fault | not-forwarding | not-operating}	(Optional) Configures the alarm to send an SNMP trap to an SNMP server.
relay-major {fcs-error | link-fault | not-forwarding | not-operating}	(Optional) Configures the alarm to send an alarm trap to the relay.
syslog {fcs-error | link-fault | not-forwarding | not-operating}	(Optional) Configures the alarm to send an alarm trap to a syslog server.

Attaching an Alarm Profile to a Specific Port

	Command	Purpose
1.	**configure terminal**	Enters global configuration mode.
2.	**interface** *port interface*	Enters interface configuration mode.
3.	**alarm-profile** ***name***	Attaches the specified profile to the interface.
4.	**end**	Returns to privileged EXEC mode.
5.	**show alarm profile**	Verifies the configuration.
6.	**copy running-config startup-config**	(Optional) Saves your entries in the configuration file.

Enabling SNMP Traps

	Command	Purpose
1.	**configure terminal**	Enters global configuration mode.
2.	**snmp-server enable traps alarms**	Enables the switch to send SNMP traps.
3.	**end**	Returns to privileged EXEC mode.
4.	**show alarm settings**	Verifies the configuration.
5.	**copy running-config startup-config**	(Optional) Saves your entries in the configuration file.

Monitoring and Maintaining Switch Alarms Status

Table 13 Commands for Displaying Global and Port Alarm Status

Command	Purpose
show alarm description ports	Displays an alarm number and its text description.
show alarm profile [*name*]	Displays all alarm profiles in the system or a specified profile.

Table 13 Commands for Displaying Global and Port Alarm Status (continued)

Command	Purpose
show alarm settings	Displays all global alarm settings on the switch.
show env {**alarm-contact** | **all** | **power** | **temperature**}	Displays the status of environmental facilities on the switch.
show facility-alarm status [**critical** | **info** | **major** | **minor**]	Displays generated alarms on the switch.

Configuration Examples for Switch Alarms

Configuring External Alarms: Example

This example configures alarm input 1 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 1 description door sensor
Switch(config)# alarm contact 1 severity major
Switch(config)# alarm contact 1 trigger closed
Switch(config)# end
Switch(config)# show env alarm-contact
Switch# show env alarm-contact

ALARM CONTACT 1
   Status:      not asserted
   Description: door sensor
   Severity:    major
   Trigger:     closed
ALARM CONTACT 2
   Status:      not asserted
   Description: external alarm contact 2
   Severity:    minor
   Trigger:     closed
```

Associating Temperature Alarms to a Relay: Examples

This example sets the secondary temperature alarm to the major relay, with a high temperature threshold value of 113°F (45°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 a Dual Power Supply: Examples

This example shows how to configure two power supplies:

```
Switch# configure terminal
```

```
Switch(config)# power-supply dual
```

These examples show how to display information when two power supplies are not present which results in a triggered alarm.

```
Switch# show facility-alarm status
Source Severity Description Relay Time
Switch MAJOR 5 Redundant Pwr missing or failed NONE Mar 01
1993 00:23:52

Switch# show env power
POWER SUPPLY A is DC OK
POWER SUPPLY B is DC FAULTY <--

Switch# show hard led
SWITCH: 1
SYSTEM: GREEN
ALARM : ALT_RED_BLACK <--
```

Displaying Alarm Settings: Example

```
Switch# show alarm settings
Alarm relay mode: De-energized
Power Supply
     Alarm      Enabled
     Relay
     Notifies  Disabled
     Syslog     Enabled
Temperature-Primary
     Alarm      Enabled
     Thresholds  MAX: 95C  MIN: -20C
     Relay      MAJ
     Notifies  Enabled
     Syslog     Enabled
Temperature-Secondary
     Alarm      Disabled
     Threshold
     Relay
     Notifies  Disabled
     Syslog     Disabled
License-File-Corrupt
     Alarm      Enabled
     Relay
     Notifies  Enabled
     Syslog     Enabled

Switch# show alarm settings
Alarm relay mode: De-energized
Power Supply
         Alarm                   Enabled
         Relay
         Notifies                Disabled
         Syslog                  Enabled
Temperature-Primary
         Alarm                   Enabled
         Thresholds              MAX: 95C               MIN:  -20C
         Relay                   MAJ
         Notifies                Enabled
         Syslog                  Enabled
Temperature-Secondary
         Alarm                   Disabled
         Threshold
         Relay
```

```
         Notifies                Disabled
         Syslog                  Disabled
SD-Card
         Alarm                   Disabled
         Relay
         Notifies                Disabled
         Syslog                  Enabled
Input-Alarm 1
         Alarm                   Enabled
         Relay
         Notifies                Disabled
         Syslog                  Enabled
Input-Alarm 2
         Alarm                   Enabled
         Relay
         Notifies                Disabled
         Syslog                  Enabled
```

Additional References

The following sections provide references related to switch administration:

Related Documents

Related Topic	Document Title
Alarm input and output ports.	*Hardware Installation Guide Hardware Technical Guide*

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
–	To locate and download MIBs using Cisco IOS XR software, use the Cisco MIB Locator found at the following URL and choose a platform under the Cisco Access Products menu: http://cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml

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
The Cisco Technical Support website contains thousands of pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.	http://www.cisco.com/techsupport