



## CHAPTER 3

# Configuring Catalyst 2955 Switch Alarms

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This section describes how to configure the different alarms for the Catalyst 2955 switch.



### Note

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The alarms described in this chapter are not available on the Catalyst 2950 switch.

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

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This chapter consists of these sections:

- [Understanding Catalyst 2955 Switch Alarms, page 3-1](#)
- [Configuring Catalyst 2955 Switch Alarms, page 3-4](#)
- [Displaying Catalyst 2955 Switch Alarms Status, page 3-11](#)

## Understanding Catalyst 2955 Switch Alarms

The Catalyst 2955 switch software monitors switch conditions on a per port or a switch basis. If the conditions present on the switch or port do not match the parameters set by the user, 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 two independent alarm relays (major or minor). For more information on how to configure the alarms, see the “[Configuring Catalyst 2955 Switch Alarms](#)” section on page 3-4.

This section includes information about these topics:

- [Global Status Monitoring Alarms, page 3-2](#)
- [FCS Error Hysteresis Threshold, page 3-2](#)
- [Port Status Monitoring Alarms, page 3-3](#)
- [Triggering Alarm Options, page 3-3](#)

## Global Status Monitoring Alarms

The Catalyst 2955 switch contains facilities for processing alarms related to temperature and power supply conditions. These are referred to as global or facility alarms. [Table 3-1](#) lists the three global alarms and their descriptions and functions.

**Table 3-1** Catalyst 2955 Global Status Monitoring Alarms

Alarm	Description
Power Supply Alarm	The switch monitors dual DC power supply levels. If the system is configured to operate in a dual power mode, an alarm triggers if a power supply fails or is missing. The alarm is automatically cleared when both power supplies are present or working. You can configure the power supply alarm to be connected to the hardware relays. For more information, see the <a href="#">“Configuring the Power Supply Alarm”</a> section on page 3-5.
Temperature Alarms	<p>The switch contains a temperature sensor that monitors the environmental conditions inside the switch. The switch contains two alarms that are associated with temperature.</p> <ul style="list-style-type: none"> <li>The primary alarm is enabled automatically to trigger both at a low temperature (-20°C) and a high temperature (95°C) for the safe operation of the switch. It cannot be changed or disabled. By default, the primary temperature alarm is associated with the major relay.</li> <li>You can use the secondary temperature alarm to trigger an alarm when the system temperature is greater than the configured temperature threshold. The lower threshold is configurable within the range of 40°C to the maximum threshold, 95°C. The secondary alarm is disabled by default.</li> </ul> <p>For more information, see the <a href="#">“Configuring the Switch Temperature Alarms”</a> section on page 3-6.</p>

## FCS Error Hysteresis Threshold

The Ethernet standard calls for a maximum bit error rate of  $10^{-8}$ . In the Catalyst 2955 switch, the bit error rate configurable 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  $10^{-9}$ , then you 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 bit error 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  $5 \times 10^{-10}$ , the hysteresis, value  $h$ , is determined as follows:

$$h = \text{alarm clear threshold} / \text{alarm set threshold}$$

$$h = 5 \times 10^{-10} / 10^{-8} = 5 \times 10^{-2} = 0.05 = 5 \text{ percent}$$

The FCS hysteresis threshold is applied to all ports on the Catalyst 2955 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 3-7 for more information.

## Port Status Monitoring Alarms

The Catalyst 2955 switch can also monitor the status of the Ethernet ports and generate alarm messages based on the alarms listed in [Table 3-2](#). To save user time and effort, the switch supports changing 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 3-2](#) 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 3-2** Catalyst 2955 Port Status Monitoring Alarms

Alarm	Description
Link Fault alarm	The Catalyst 2955 switch generates a link fault alarm when there are problems with a port physical layer that 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 <i>error condition</i> , 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 <i>warning</i> , level 4.
Port is not Operating alarm	The switch generates a port is not operating alarm when it finds that a port is in a failed state during the startup self-test. When triggered, the port is not operating alarm is only cleared when the switch is restarted and the port is found to be operational. The severity for this alarm is <i>error condition</i> , 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 FCS Bit Error Rate. You can set the FCS bit error rate by using the interface configuration CLI for each of the ports. See the <a href="#">“Configuring the FCS Bit Error Rate Alarm” section on page 3-7</a> for more information. The severity for this alarm is <i>error condition</i> , level 3.

## Triggering Alarm Options

The switch supports three methods for triggering alarms:

- Configurable Relays

The switch is equipped with two independent alarm relays that can be triggered by alarms for global and port status conditions. The relays can be configured 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 either alarm relay or both relays. Each fault condition is assigned a severity level based on the Cisco IOS System Error Message Severity Level.

See the [“Configuring Catalyst 2955 Switch Alarms” section on page 3-4](#) for more information on configuring the relays.

- 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 modified in the Catalyst 2955 switch software to allow the user to 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 3-11 for more information.

- Syslog Messages

You can use alarm profiles to send system messages to a syslog server. See the “[Configuring Catalyst 2955 Switch Alarms](#)” section on page 3-4 for more information.

## Configuring Catalyst 2955 Switch Alarms

This section describes how to configure the Catalyst 2955 switch alarms:

- [Default Catalyst 2955 Switch Alarm Configuration](#), page 3-4
- [Configuring the Power Supply Alarm](#), page 3-5
- [Configuring the Switch Temperature Alarms](#), page 3-6
- [Configuring the FCS Bit Error Rate Alarm](#), page 3-7
- [Configuring Alarm Profiles](#), page 3-9
- [Enabling SNMP Traps](#), page 3-11

## Default Catalyst 2955 Switch Alarm Configuration

Table 3-3 shows the default Catalyst 2955 switch alarms configuration.

**Table 3-3** Default Catalyst 2955 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 95 <sup>0</sup> C maximum to -20 <sup>0</sup> 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 is not Operating Alarm	Enabled on all interfaces.
	FCS Bit Error Rate Alarm	Disabled on all interfaces.

## Configuring the Power Supply Alarm

This section describes how to configure the power supply alarm on your switch. It contains this configuration information:

- [Setting the Power Mode, page 3-5](#)
- [Setting the Power Supply Alarm Options, page 3-5](#)

### Setting the Power Mode

The Catalyst 2955 switch has two DC power inputs. By default, the system operates in the single power mode. You can use the **power-supply dual** global configuration command to set the dual mode operation. In dual-power mode, a second power supply gives power to the switch if the primary power supply fails.

Beginning in privileged EXEC mode, follow these steps to set the switch to dual power mode operation:

	Command	Purpose
Step 1	<b>configure terminal</b>	Enter global configuration mode.
Step 2	<b>power-supply dual</b>	Set the system to dual mode operation.
Step 3	<b>end</b>	Return to privileged EXEC mode.
Step 4	<b>show alarm settings</b>	Verify the configuration.
Step 5	<b>copy running-config startup-config</b>	(Optional) Save your entries in the configuration file.

Use the **no power-supply dual** command to disable this alarm by setting the switch back to single power mode operation.

### Setting the Power Supply Alarm Options

Use the **alarm facility power-supply** global configuration command to associate the power supply alarm to a 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	<b>configure terminal</b>	Enter global configuration mode.
Step 2	<b>alarm facility power-supply relay</b> {major   minor}	Associate the power supply alarm to the major or minor relay.
Step 3	<b>alarm facility power-supply notifies</b>	Configure sending power supply alarm traps to an SNMP server.
Step 4	<b>alarm facility power-supply syslog</b>	Configure sending power supply alarm traps to a syslog server.
Step 5	<b>end</b>	Return to privileged EXEC mode.
Step 6	<b>show alarm settings</b>	Verify the configuration.
Step 7	<b>copy running-config startup-config</b>	(Optional) Save your entries in the configuration file.

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 3-11.

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

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

## Configuring the Switch Temperature Alarms

The temperature thresholds for the primary temperature alarm cannot be changed, but you can change the association of the primary temperature alarm from the major relay to the minor relay. You can also set a lower maximum temperature threshold for the secondary temperature alarm and associate the alarm with either the major or minor relay.

This section describes how to configure the temperature alarms on your switch. It contains this configuration information:

- [Setting a Secondary Temperature Threshold for the Switch, page 3-6](#)
- [Associating the Temperature Alarms to a Relay, page 3-7](#)

### Setting a Secondary Temperature Threshold for the Switch

In global configuration mode, you can use the **alarm facility temperature secondary** command to set a lower temperature threshold for the secondary temperature monitoring alarm. You can also use the **alarm facility temperature secondary** command to associate the secondary temperature alarm to either the major or minor alarm relay.

Beginning in privileged EXEC mode, follow these steps to set a lower temperature threshold:

	Command	Purpose
Step 1	<b>configure terminal</b>	Enter global configuration mode.
Step 2	<b>alarm facility temperature secondary threshold</b>	Set the secondary temperature threshold value. Enter values from 40 to 95 to set threshold from 40°C to 95°C.
Step 3	<b>end</b>	Return to privileged EXEC mode.
Step 4	<b>show alarm settings</b>	Verify the configuration.
Step 5	<b>copy running-config startup-config</b>	(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 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 major relay. You can use the **alarm facility temperature** command to associate the primary temperature alarm to the minor relay, to an SNMP trap, to a syslog message, or to associate the secondary temperature alarm to the major or minor relay, an SNMP trap, or a syslog message.

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

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



### 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 3-11.

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

This example sets the secondary temperature alarm to the minor relay, with a lower high temperature threshold value of 45°C. All alarm and traps associated with this alarm will be sent to a syslog server and an SNMP server.

```
Switch(config) # alarm facility temperature secondary 45
Switch(config) # alarm facility temperature secondary relay minor
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 will be 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

This section describes how to configure the FCS bit error rate alarm on your switch:

- [Setting the FCS Error Threshold, page 3-8](#)
- [Setting the FCS Error Hysteresis Threshold, page 3-8](#)

## Setting the FCS Error Threshold

The switch generates an FCS bit error rate alarm when the actual FCS bit error rate is close to the configured FCS bit error 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	<b>configure terminal</b>	Enter global configuration mode.
Step 2	<b>interface</b> <i>interface-id</i>	Enter the interface to be configured, and enter interface configuration mode.
Step 3	<b>fcs-threshold</b> <i>value</i>	Set the FCS error rate.  For <i>value</i> , 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	<b>end</b>	Return to privileged EXEC mode.
Step 5	<b>show fcs-threshold</b>	Verify the setting.
Step 6	<b>copy running-config startup-config</b>	(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 fastethernet0/1
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 bit error 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 a Catalyst 2955 switch.

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

	Command	Purpose
Step 1	<b>configure terminal</b>	Enter global configuration mode.
Step 2	<b>alarm facility fcs-hysteresis</b> <i>percentage</i>	Set the hysteresis percentage for the switch.  For <i>percentage</i> , the range is 1 to 10. The default value is 10 percent.
Step 3	<b>end</b>	Return to privileged EXEC mode.
Step 4	<b>show running config</b>	Verify the configuration.
Step 5	<b>copy running-config startup-config</b>	(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

This section describes how to configure alarm profiles on your switch. It contains this configuration information:

- [Creating or Modifying an Alarm Profile, page 3-9](#)
- [Attaching an Alarm Profile to a Specific Port, page 3-10](#)

### 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 is not Operating alarm.

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

	Command	Purpose
Step 1	<b>configure terminal</b>	Enter global configuration mode.
Step 2	<b>alarm profile <i>name</i></b>	Create the new profile or identify an existing profile, and then enter alarm profile configuration mode.
Step 3	<b>alarm <i>alarm-id</i></b>	Add or modify alarm parameters for a specific alarm (see <a href="#">Table 3-4</a> ). The values are 1 to 4. You can enter more than one alarm ID separated by a space.
Step 4	<b>notifies <i>alarm-id</i></b>	(Optional) Configure the alarm to send an SNMP trap to an SNMP server.
Step 5	<b>relay-major <i>alarm-id</i></b> <b>relay-minor <i>alarm-id</i></b>	(Optional) Configure the alarm to send an alarm trap to the major relay. (Optional) Configure the alarm to send an alarm trap to the minor relay.
Step 6	<b>syslog <i>alarm-id</i></b>	(Optional) Configure the alarm to send an alarm trap to a syslog server.
Step 7	<b>end</b>	Return to privileged EXEC mode.
Step 8	<b>show alarm profile <i>name</i></b>	Verify the configuration.
Step 9	<b>copy running-config startup-config</b>	(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 fastEthernetPort with link-down (*alarmList* ID 3) and an FCS error rate of 30 percent (*alarmList* ID 4) alarms enabled. The link-down alarm is connected to the minor relay, and the FCS error rate alarm is connected to the major relay. These alarms also send notifications to an SNMP server and send system messages to a syslog server.

```
Switch(config)# alarm profile fastE
Switch(config-alarm- prof)# alarm 3 4
Switch(config-alarm- prof)# relay major 4
Switch(config-alarm- prof)# relay minor 3
Switch(config-alarm- prof)# notifies 3 4
Switch(config-alarm- prof)# syslog 3 4
```

**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 3-11.

Table 3-4 lists the *alarmList* IDs and their corresponding alarm definitions. For a description of these alarms, see the “Port Status Monitoring Alarms” section on page 3-3.

**Table 3-4 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	<b>configure terminal</b>	Enter global configuration mode.
Step 2	<b>interface port interface</b>	Enter the number of the switch port to be configured, and the switch enters interface configuration mode.
Step 3	<b>alarm-profile name</b>	Attach the specified profile to the interface.
Step 4	<b>end</b>	Return to privileged EXEC mode.
Step 5	<b>show alarm profile</b>	Verify the configuration.
Step 6	<b>copy running-config startup-config</b>	(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 0/2
Switch(config-if)# alarm profile fastE
```

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

```
Switch(config)# interface FastEthernet 0/2
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	<b>configure terminal</b>	Enter global configuration mode.
Step 2	<b>snmp-server enable traps alarms</b>	Enable the switch to send SNMP traps.
Step 3	<b>end</b>	Return to privileged EXEC mode.
Step 4	<b>show alarm settings</b>	Verify the configuration.
Step 5	<b>copy running-config startup-config</b>	(Optional) Save your entries in the configuration file.

## Displaying Catalyst 2955 Switch Alarms Status

To display the global and port alarm status, use one or more of the privileged EXEC commands in [Table 3-5](#):

**Table 3-5** Commands for Displaying Global and Port Alarm Status

Command	Purpose
<b>show alarm description port</b>	Displays an alarm number and its text description.
<b>show alarm profile [name]</b>	Displays all alarm profiles in the system or a specified profile.
<b>show alarm settings</b>	Displays all global alarm settings in the switch.
<b>show env {all   power   temperature}</b>	Displays the status of environmental facilities on the Catalyst 2955 switch.
<b>show alarm status [critical   info   major   minor]</b>	Displays generated alarms in the switch.

