CHAPTER 16

Configuring the Embedded Event Manager

This chapter describes how to configure the Embedded Event Manager (EEM) to detect and handle critical events on Cisco NX-OS devices.

This chapter includes the following sections:

Information About EEM

EEM monitors events that occur on your device and takes action to recover or troubleshoot these events, based on your configuration.

This section includes the following topics:

EEM Overview

EEM consists of three major components:

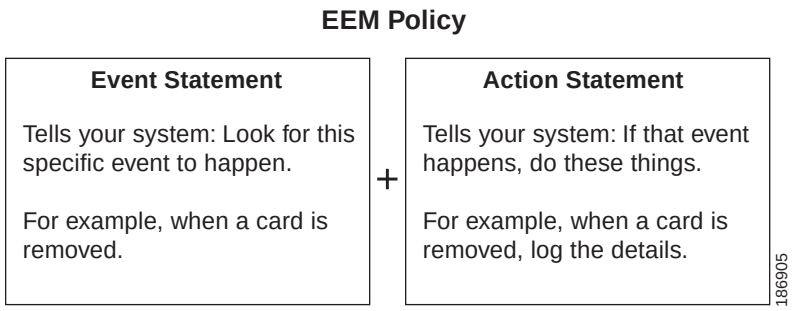
- Event statements—Events to monitor from another Cisco NX-OS component that may require some action, workaround, or notification.
- Action statements —An action that EEM can take, such as sending an e-mail, or disabling an interface, to recover from an event.
- Policies—An event paired with one or more actions to troubleshoot or recover from the event.

Policies

An EEM policy consists of an event statement and one or more action statements. The event statement defines the event to look for as well as the filtering characteristics for the event. The action statement defines the action EEM takes when the event occurs.

Figure 16-1 shows the two basic statements in an EEM policy.

Figure 16-1 EEM Policy Statements



You can configure EEM policies using the CLI or a VSH script.

EEM gives you a device-wide view of policy management. You configure EEM policies on the supervisor, and EEM pushes the policy to the correct module based on the event type. EEM takes any actions for a triggered event either locally on the module or on the supervisor (the default option).

EEM maintains event logs on the supervisor.

Cisco NX-OS has a number of preconfigured system policies. These system policies define many common events and actions for the device. System policy names begin with two underscore characters (__).

You can create user policies to suit your network. If you create a user policy, any actions in your policy occur after EEM triggers any system policy actions related to the same event as your policy. To configure a user policy, see the "Defining a User Policy Using the CLI" section on page 16-254.

You can also override some system policies. The overrides that you configure take the place of the system policy. You can override the event or the actions.

Use the **show event manager system-policy** command to view the preconfigured system policies and determine which policies that you can override.

To configure an overriding policy, see the "Overriding a Policy" section on page 16-261.

Note You should use the **show running-config eem** command to check the configuration of each policy. An override policy that consists of an event statement and no action statement triggers no action and no notification of failures.

Note Your override policy should always include an event statement. An override policy without an event statement overrides all possible events in the system policy.

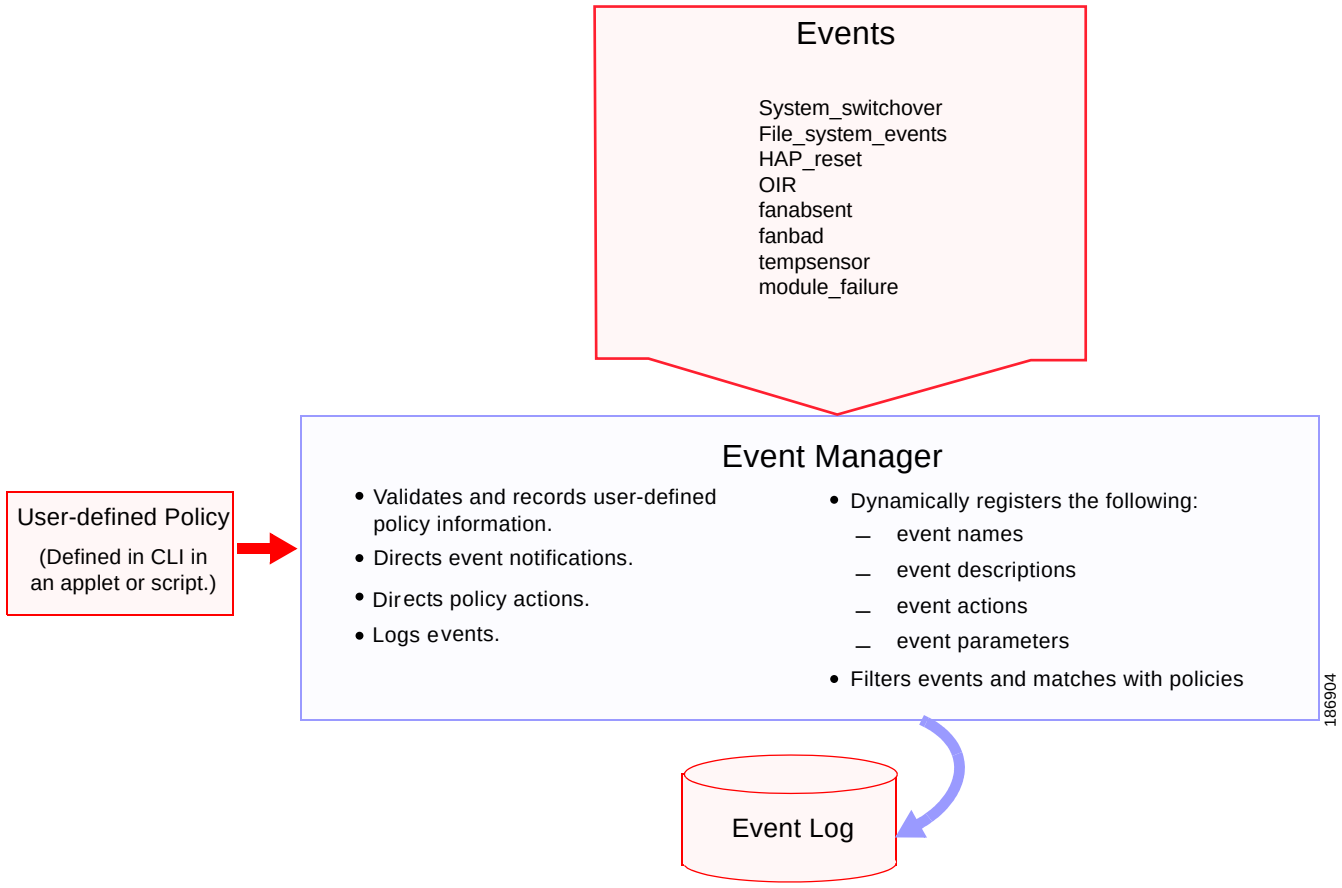
Event Statements

An event is any device activity for which some action, such as a workaround or a notification, should be taken. In many cases, these events are related to faults in the device such as when an interface or a fan malfunctions.

EEM defines event filters so only critical events or multiple occurrences of an event within a specified time period trigger an associated action.

Figure 16-2 shows events that are handled by EEM.

Figure 16-2 EEM Overview



Event statements specify the event that triggers a policy to run. In Cisco NX-OS Releases prior to 5.2, you can configure only one event statement per policy. However, beginning in Cisco NX-OS Release 5.2, you can configure multiple event triggers. For more information on configuring multiple events, see the "EEM Event Correlation" section on page 16-251.

EEM schedules and runs policies on the basis of event statements. EEM examines the event and action commands and runs them as defined.

Note If you want to allow the triggered event to process any default actions, you must configure the EEM policy to allow the event default action statement.

Action Statements

Action statements describe the action triggered by a policy. Each policy can have multiple action statements. If no action is associated with a policy, EEM still observes events but takes no actions.

EEM supports the following actions in action statements:

- Execute any CLI commands.
- Update a counter.
- Log an exception.
- Force the shutdown of any module.
- Reload the device.
- Shut down specified modules because the power is over budget.
- Generate a syslog message.
- Generate a Call Home event.
- Generate an SNMP notification.
- Use the default action for the system policy.

Note If you want to allow the triggered event to process any default actions, you must configure the EEM policy to allow the default action. For example, if you match a CLI command in a match statement, you must add the event-default action statement to the EEM policy or EEM will not allow the CLI command to execute.

Note Verify that your action statements within your user policy or overriding policy do not negate each other or adversely affect the associated system policy.

VSH Script Policies

You can also write policies in a VSH script, using a text editor. These policies have an event statement and action statement(s) just as other policies, and these policies can either augment or override system policies. After you write your VSH script policy, copy it to the device and activate it. To configure a policy in a VSH script, see the "Defining a Policy using a VSH Script" section on page 16-260.

Environment Variables

You can define environment variables for EEM that are available for all policies. Environment variables are useful for configuring common values that you can use in multiple policies. For example, you can create an environment variable for the IP address of an external e-mail server.

You can use an environment variable in action statements by using the parameter substitution format.

Example 16-1 shows a sample action statement to force a module 1 shutdown, with a reset reason of "EEM action."

Example 16-1 Action Statement

```
switch (config-eem-policy)# action 1.0 forceshut module 1 reset-reason "EEM action."
```

If you define an environment variable for the shutdown reason, called default-reason, you can replace that reset reason with the environment variable, as shown in Example 16-2.

Example 16-2 Action Statement with Environment Variable

```
switch (config-eem-policy)# action 1.0 foreshut module 1 reset-reason $default-reason
```

You can reuse this environment variable in any policy. For more information on environment variables, see the "Defining an Environment Variable" section on page 16-253.

EEM Event Correlation

Beginning with Cisco NX-OS Release 5.2, you can trigger an EEM policy based on a combination of events. First, you use the **tag** keyword to create and differentiate multiple events in the EEM policy. Then using a set of boolean operators (**and**, **or**, **andnot**), along with the count and time, you can define a combination of these events to trigger a custom action.

Note For information on configuring EEM event correlation, see the "Defining a User Policy Using the CLI" section on page 16-254.

High Availability

Cisco NX-OS supports stateless restarts for EEM. After a reboot or supervisor switchover, Cisco NX-OS applies the running configuration.

Virtualization Support

You configure EEM in the virtual device context (VDC) that you are logged into. By default, Cisco NX-OS places you in the default VDC. You must be in this VDC to configure policies for module-based events.

Not all actions or events are visible in all VDCs. You must have network-admin or vdc-admin privileges to configure policies.

See the *Cisco Nexus 7000 Series NX-OS Virtual Device Context Configuration Guide, Release 5.x*, for more information on VDCs.

Licensing Requirements for EEM

Product	License Requirement
Cisco NX-OS	EEM requires no license. Any feature not included in a license package is bundled with the Cisco NX-OS system images and is provided at no extra charge to you. For a complete explanation of the Cisco NX-OS licensing scheme, see the *Cisco NX-OS Licensing Guide*.

Prerequisites for EEM

EEM has the following prerequisites:

- You must have network-admin or vdc-admin user privileges to configure EEM.

Guidelines and Limitations

EEM has the following configuration guidelines and limitations:

- The maximum number of configurable EEM policies is 500.
- Action statements within your user policy or overriding policy should not negate each other or adversely affect the associated system policy.
- If you want to allow a triggered event to process any default actions, you must configure the EEM policy to allow the default action. For example, if you match a CLI command in a match statement, you must add the event-default action statement to the EEM policy or EEM will not allow the CLI command to execute.
- An override policy that consists of an event statement and no action statement triggers no action and no notification of failures.
- An override policy without an event statement overrides all possible events in the system policy.
- The following rules apply to regular command expressions: all keywords must be expanded, and only the * symbol can be used for argument replacement.
- EEM event correlation is supported only on the supervisor module, not on individual line cards.
- EEM event correlation is not supported across different modules within a single policy.
- EEM event correlation supports up to four event statements in a single policy. The event types can be the same or different, but only these event types are supported: cli, counter, module, module-failure, oir, snmp, syslog, and track.
- When more than one event statement is included in an EEM policy, each event statement must have a **tag** keyword with a unique *tag* argument.
- EEM event correlation does not override the system default policies.
- Default action execution is not supported for policies that are configured with tagged events.

Default Settings

Table 16-1 lists the default settings for EEM parameters.

Table 16-1 Default EEM Parameters

Parameters	Default
System policies	Active

Configuring EEM

You can create policies that contain actions to take based on system policies. To display information about the system policies, use the **show event manager system-policy** command. For more information about system policies, see the "Embedded Event Manager System Events and Configuration Examples" appendix.

This section includes the following topics:

Defining an Environment Variable

You can define a variable to serve as a parameter in an EEM policy.

BEFORE YOU BEGIN

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

SUMMARY STEPS

1. **config t**
2. **event manager environment** *variable-name variable-value*
3. (Optional) **show event manager environment** {*variable-name* | **all**}
4. (Optional) **copy running-config startup-config**

DETAILED STEPS

	Command	Purpose

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

Step 2	**event manager environment** *variable-name variable-value* **Example:** `switch(config)# event manager environment emailto "admin@anyplace.com"`	Creates an environment variable for EEM. The *variable-name* can be any case-sensitive alphanumeric string up to 29 characters. The *variable-value* can be any quoted alphanumeric string up to 39 characters,
Step 3	**show event manager environment** {*variable-name* | **all**} **Example:** `switch(config)# show event manager environment all`	(Optional) Displays information about the configured environment variables.
Step 4	**copy running-config startup-config** **Example:** `switch(config)# copy running-config startup-config`	(Optional) Saves this configuration change.

Defining a User Policy Using the CLI

You can define a user policy using the CLI to the device.

This section includes the following topics:

BEFORE YOU BEGIN

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

SUMMARY STEPS

1. **config t**
2. **event manager applet** *applet-name*
3. (Optional) **description** *policy-description*
4. **event** *event-statement*
   (Repeat Step 4 for multiple event statements.)
5. (Optional) **tag** *tag* {**and** | **andnot** | **or**} *tag* [**and** | **andnot** | **or** {*tag*}] {**happens** *occurs* **in** *seconds*}
6. **action** *number*[**.***number2*] *action-statement*
   (Repeat Step 6 for multiple action statements.)

7. (Optional) **show event manager policy-state** *name* [**module** *module-id*]
8. (Optional) **copy running-config startup-config**

DETAILED STEPS

	Command	Purpose
Step 1	**config t** **Example:** switch# config t Enter configuration commands, one per line. End with CNTL/Z. switch(config)#	Places you in global configuration mode.
Step 2	**event manager applet** *applet-name* **Example:** switch(config)# event manager applet monitorShutdown switch(config-applet)#	Registers the applet with EEM and enters applet configuration mode. The *applet-name* can be any case-sensitive alphanumeric string up to 29 characters.
Step 3	**description** *policy-description* **Example:** switch(config-applet)# description "Monitors interface shutdown."	(Optional) Configures a descriptive string for the policy. The string can be any alphanumeric string up to 80 characters. Enclose the string in quotation marks.
Step 4	**event** *event-statement* **Example:** switch(config-applet)# event cli match "shutdown"	Configures the event statement for the policy. See the "Configuring Event Statements" section on page 16-256. Repeat Step 4 for multiple event statements.
Step 5	**tag** *tag* {**and** | **andnot** | **or**} *tag* [**and** | **andnot** | **or** {*tag*}] {**happens** *occurs* **in** *seconds*} **Example:** switch(config-applet)# tag one or two happens 1 in 10000	(Optional) Correlates multiple events in the policy. The range for the *occurs* argument is from 1 to 4294967295. The range for the *seconds* argument is from 0 to 4294967295 seconds.
Step 6	**action** *number*[.*number2*] *action-statement* **Example:** switch(config-applet)# action 1.0 cli show interface e 3/1	Configures an action statement for the policy. See the "Configuring Action Statements" section on page 16-259. Repeat Step 6 for multiple action statements.
Step 7	**show event manager policy-state** *name* [**module** *module-id*] **Example:** switch(config-applet)# show event manager policy-state monitorShutdown	(Optional) Displays information about the status of the configured policy.
Step 8	**copy running-config startup-config** **Example:** switch(config)# copy running-config startup-config	(Optional) Saves this configuration change.

Configuring Event Statements

Use one of the following commands in EEM configuration mode to configure an event statement:

Command	Purpose
event cli [**tag** *tag*] **match** *expression* [**count** repeats | **time** *seconds*] **Example:** switch(config-applet)# event cli match "shutdown"	Triggers an event if you enter a command that matches the regular expression. The **tag** *tag* keyword-argument pair identifies this specific event when multiple events are included in the policy. The *repeats* range is from 1 to 65000. The time range, in seconds, is from 0 to 4294967295, where 0 indicates no time limit.
event counter [**tag** *tag*] **name** *counter* **entry-val** *entry* **entry-op** {**eq** | **ge** | **gt** | **le** | **lt** |**ne**} [**exit-val** *exit* **exit-op** {**eq** | **ge** | **gt** | **le** | **lt** |**ne**}] **Example:** switch(config-applet)# event counter name mycounter entry-val 20 gt	Triggers an event if the counter crosses the entry threshold based on the entry operation. The event resets immediately. Optionally, you can configure the event to reset after the counter passes the exit threshold. The **tag** *tag* keyword-argument pair identifies this specific event when multiple events are included in the policy. The *counter* name can be any case-sensitive, alphanumeric string up to 28 characters. The *entry* and *exit* value ranges are from 0 to 2147483647.
event fanabsent [**fan** *number*] **time** *seconds* **Example:** switch(config-applet)# event fanabsent time 300	Triggers an event if a fan is removed from the device for more than the configured time, in seconds. The *number* range is module dependent. The *seconds* range is from 10 to 64000.
event fanbad [**fan** *number*] **time** *seconds* **Example:** switch(config-applet)# event fanbad time 3000	Triggers an event if a fan fails for more than the configured time, in seconds. The *number* range is module dependent. The *seconds* range is from 10 to 64000.
event gold module {*slot* | **all**} **test** *test-name* [**severity** {**major** | **minor** | **moderate**}] **testing-type** {**bootup** | **monitoring** | **ondemand** | **scheduled**} **consecutive-failure** *count* **Example:** switch(config-applet)# event gold module 2 test ASICRegisterCheck testing-type ondemand consecutive-failure 2	Triggers an event if the named online diagnostic test experiences the configured failure severity for the configured number of consecutive failures. The *slot* range is from 1 to 10. The *test-name* is the name of a configured online diagnostic test. The *count* range is from 1 to 1000.
event memory {**critical** | **minor** | **severe**} **Example:** switch(config-applet)# event memory critical	Triggers an event if a memory threshold is crossed. See also the "Configuring Memory Thresholds" section on page 16-263.

Command	Purpose
event module [**tag** *tag*] **status** {**online** | **offline** | **any**} **module** {**all** | *module-num*} **Example:** `switch(config-applet)# event module status offline module all`	Triggers an event if the specified module enters the selected status. The **tag** *tag* keyword-argument pair identifies this specific event when multiple events are included in the policy.
event module-failure [**tag** *tag*] **type** *failure-type* ***module*** {*slot* | **all**} **count** *repeats* [**time** *seconds*] **Example:** `switch(config-applet)# event module-failure type lc-failed module 3 count 1`	Triggers an event if a module experiences the failure type configured. See the *Cisco Nexus 7000 Series NX-OS System Management Command Reference* for information on the failure types. The **tag** *tag* keyword-argument pair identifies this specific event when multiple events are included in the policy. The *repeats* range is from 0 to 4294967295. The *seconds* range is from 0 to 4294967295, where 0 indicates no time limit.
event oir [**tag** *tag*] {**fan** | **module** | **powersupply**} {**anyoir** | **insert** | **remove**} [*number*] **Example:** `switch(config-applet)# event oir fan remove 4`	Triggers an event if the configured device element (fan, module, or power supply) is inserted or removed from the device. The **tag** *tag* keyword-argument pair identifies this specific event when multiple events are included in the policy. You can optionally configure a specific fan, module, or power supply number. The *number* range is as follows: • Fan number—Module dependent. • Module number—Device dependent. • Power supply number—The range is from 1 to 3.
event policy-default count *repeats* [**time** *seconds*] **Example:** `switch(config-applet)# event policy-default count 3`	Uses the event configured in the system policy. Use this option for overriding policies. The *repeats* range is from 1 to 65000. The *seconds* range is from 0 to 4294967295, where 0 indicates no time limit.
event poweroverbudget **Example:** `switch(config-applet)# event poweroverbudget`	Triggers an event if the power budget exceeds the capacity of the configured power supplies.

Command	Purpose
event snmp [**tag** *tag*] **oid** *oid* **get-type** {**exact** | **next**} **entry-op** {**eq** | **ge** | **gt** | **le** | **lt** |**ne**} **entry-val** *entry* [**exit-comb** {**and** | **or**}] **exit-op** {**eq** | **ge** | **gt** | **le** | **lt** |**ne**} **exit-val** *exit* **exit-time** *time* **polling-interval** *interval* **Example:** `switch(config-applet)# event snmp oid 1.3.6.1.2.1.31.1.1.1.6 get-type next entry-op lt 300 entry-val 0 exit-op eq 400 exit-time 30 polling-interval 300`	Triggers an event if the SNMP OID crosses the entry threshold based on the entry operation. The event resets immediately, or optionally you can configure the event to reset after the counter passes the exit threshold. The OID is in dotted decimal notation. The **tag** *tag* keyword-argument pair identifies this specific event when multiple events are included in the policy. The *entry* and *exit* value ranges are from 0 to 18446744073709551615. The time, in seconds, is from 0 to 2147483647. The interval, in seconds, is from 1 to 2147483647.
event storm-control **Example:** `switch(config-applet)# event storm-control`	Triggers an event if traffic on a port exceeds the configured storm control threshold.
event sysmgr memory [**module** *module-num*] **major** *major-percent* **minor** *minor-percent* **clear** *clear-percent* **Example:** `switch(config-applet)# event sysmgr memory minor 80`	Triggers an event if the specified system manager memory threshold is exceeded. The range for the percentage is from 1 to 99.
event sysmgr switchover count *count* **time** *interval* **Example:** `switch(config-applet)# event sysmgr switchover count 10 time 1000`	Triggers an event if the specified switchover count is exceeded within the time interval specified. The switchover count is from 1 to 65000. The time interval is from 0 to 2147483647.
event temperature [**module** *slot*] [*sensor number*] **threshold** {**any** | **major** | **minor**} **Example:** `switch(config-applet)# event temperature module 2 threshold any`	Triggers an event if the temperature sensor exceeds the configured threshold. The sensor range is from 1 to 18.
event track [**tag** *tag*] *object-number* **state** {**any** | **down** | **up**} **Example:** `switch(config-applet)# event track 1 state down`	Triggers an event if the tracked object is in the configured state. The **tag** *tag* keyword-argument pair identifies this specific event when multiple events are included in the policy. The *object-numbe*r range is from 1 to 500.

Configuring Action Statements

Use the following commands in EEM configuration mode to configure action statements:

Command	Purpose
action *number*[.*number2*] **cli** *command1* [command2...] [**local**] **Example:** switch(config-applet)# action 1.0 cli "show interface e 3/1"	Runs the configured CLI commands. You can optionally run the commands on the module where the event occurred. The action label is in the format number1.number2. *number* can be any number up to 16 digits. The range for *number2* is from 0 to 9.
action *number*[.*number2*] **counter name** *counter* **value** *val* **op** {**dec** | **inc** | **nop** | **set**} **Example:** switch(config-applet)# action 2.0 counter name mycounter value 20 op inc	Modifies the counter by the configured value and operation. The action label is in the format number1.number2. *number* can be any number up to 16 digits. The range for *number2* is from 0 to 9. The counter name can be any case-sensitive, alphanumeric string up to 28 characters. The *val* can be an integer from 0 to 2147483647 or a substituted parameter.
action *number*[.*number2*] **event-default** **Example:** switch(config-applet)# action 1.0 event-default	Executes the default action for the associated event. The action label is in the format number1.number2. *number* can be any number up to 16 digits. The range for *number2* is from 0 to 9.
action *number*[.*number2*] **forceshut** [**module** *slot* | **xbar** xbar-*number*] **reset-reason** *seconds* **Example:** switch(config-applet)# action 1.0 forceshut module 2 reset-reason "flapping links"	Forces a module, crossbar, or the entire system to shut down. The action label is in the format number1.number2. *number* can be any number up to 16 digits. The range for *number2* is from 0 to 9. The reset reason is a quoted alphanumeric string up to 80 characters.
action *number*[.*number2*] **overbudgetshut** [**module** *slot* [**-** *slot*]] **Example:** switch(config-applet)# action 1.0 overbudgetshut module 3-5	Forces one or more modules or the entire system to shut down because of a power overbudget issue. *number* can be any number up to 16 digits. The range for *number2* is from 0 to 9.
action *number*[.*number2*] **policy-default** **Example:** switch(config-applet)# action 1.0 policy-default	Executes the default action for the policy that you are overriding. The action label is in the format number1.number2. *number* can be any number up to 16 digits. The range for *number2* is from 0 to 9.

Command	Purpose
action *number*[.*number2*] **reload** [**module** *slot* [- *slot*]] **Example:** switch(config-applet)# action 1.0 reload module 3-5	Forces one or more modules or the entire system to reload. *number* can be any number up to 16 digits. The range for *number2* is from 0 to 9.
action *number*[.*number2*] **snmp-trap** {[**intdata1** *data* [**intdata2** *data*] [strdata string]} **Example:** switch(config-applet)# action 1.0 snmp-trap strdata "temperature problem"	Sends an SNMP trap with the configured data. *number* can be any number up to 16 digits. The range for *number2* is from 0 to 9. The *data* arguments can by any number up to 80 digits. The *string* can be any alphanumeric string up to 80 characters.
action *number*[.*number2*] **syslog** [**priority** *prio-val*] **msg** *error-message* **Example:** switch(config-applet)# action 1.0 syslog priority notifications msg "cpu high"	Sends a customized syslog message at the configured priority. *number* can be any number up to 16 digits. The range for *number2* is from 0 to 9. The *error-message* can be any quoted alphanumeric string up to 80 characters.

Note If you want to allow the triggered event to process any default actions, you must configure the EEM policy to allow the default action. For example, if you match a CLI command in a match statement, you must add the event-default action statement to the EEM policy or EEM will not allow the CLI command to execute. You can use the **terminal event-manager bypass** command to allow all EEM policies with CLI matches to execute the CLI command.

Defining a Policy using a VSH Script

You can define a policy using a VSH script.

BEFORE YOU BEGIN

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

Ensure that you are logged in with administrator privileges.

Ensure that your script name is the same name as the script filename.

DETAILED STEPS

Step 1 In a text editor, list the commands that define the policy.

Step 2 Name the text file and save it.

Step 3 Copy the file to the following system directory:

bootflash://eem/user_script_policies

Registering and Activating a VSH Script Policy

You can register and activate a policy defined in a VSH script.

BEFORE YOU BEGIN

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

SUMMARY STEPS

1. **config t**
2. **event manager policy** *policy-script*
3. (Optional) **show event manager policy internal** *name*
4. (Optional) **copy running-config startup-config**

DETAILED STEPS

	Command	Purpose

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

Step 2	**event manager policy** *policy-script* **Example:** `switch(config)# event manager policy moduleScript`	Registers and activates an EEM script policy. The *policy-script* can be any case-sensitive alphanumeric string up to 29 characters.
Step 3	**show event manager policy internal** *name* **Example:** `switch(config)# show event manager policy internal moduleScript`	(Optional) Displays information about the configured policy.
Step 4	**copy running-config startup-config** **Example:** `switch(config)# copy running-config startup-config`	(Optional) Saves this configuration change.

Overriding a Policy

You can override a system policy.

BEFORE YOU BEGIN

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

SUMMARY STEPS

1. **config t**
2. (Optional) **show event manager policy-state** *system-policy*
3. **event manager applet** *applet-name* **override** *system-policy*
4. (Optional) **description** *policy-description*
5. **event** *event-statement*
6. **action** *number action-statement*
   (Repeat Step 6 for multiple action statements.)
7. (Optional) **show event manager policy-state** *name*
8. (Optional) **copy running-config startup-config**

DETAILED STEPS

	Command	Purpose

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

Step 2	**show event manager policy-state** *system-policy*
	
	Example:
	`switch(config-applet)# show event manager policy-state __ethpm_link_flap`
	`Policy __ethpm_link_flap`
	`Cfg count : 5`
	`Cfg time interval : 10.000000 (seconds)`
	`Hash default, Count 0`
		(Optional) Displays information about the system policy that you want to override, including thresholds. Use the **show event manager system-policy** command to find the system policy names. For information about system policies, see the "Embedded Event Manager System Events and Configuration Examples" appendix.

Step 3	**event manager applet** *applet-name* **override** *system-policy*
	
	Example:
	`switch(config)# event manager applet ethport override __ethpm_link_flap`
	`switch(config-applet)#`
		Overrides a system policy and enters applet configuration mode. The *applet-name* can be any case-sensitive alphanumeric string up to 29 characters. The *system-policy* must be one of the existing system policies.

Step 4	**description** *policy-description* **Example:** `switch(config-applet)# description "Overrides link flap policy."`	(Optional) Configures a descriptive string for the policy. The string can be any alphanumeric string up to 80 characters. Enclose the string in quotation marks.
Step 5	**event** *event-statement* **Example:** `switch(config-applet)# event policy-default count 2 time 1000`	Configures the event statement for the policy. See the "Configuring Event Statements" section on page 16-256.

	Command	Purpose
Step 6	**action** *number action-statement* **Example:** `switch(config-applet)# action 1.0 syslog priority warnings msg "Link is flapping."`	Configures an action statement for the policy. See the "Configuring Action Statements" section on page 16-259. Repeat Step 6 for multiple action statements.
Step 7	**show event manager policy-state** *name* **Example:** `switch(config-applet)# show event manager policy-state ethport`	(Optional) Displays information about the configured policy.
Step 8	**copy running-config startup-config** **Example:** `switch(config)# copy running-config startup-config`	(Optional) Saves this configuration change.

Configuring Memory Thresholds

You can set the memory thresholds used to trigger events and set whether the operating system should kill processes if it cannot allocate memory.

BEFORE YOU BEGIN

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

Ensure that you are logged in with administrator privileges.

SUMMARY STEPS

1. **config t**
2. **system memory-thresholds minor** *minor* **severe** *severe* **critical** *critical*
3. (Optional) **system memory-thresholds threshold critical no-process-kill**
4. (Optional) **show running-config | include "system memory"**
5. (Optional) **copy running-config startup-config**

DETAILED STEPS

	Command	Purpose
Step 1	**config t** **Example:** switch# config t Enter configuration commands, one per line. End with CNTL/Z. switch(config)#	Places you in global configuration mode.
Step 2	**system memory-thresholds minor** *minor* **severe** *severe* **critical** *critical* **Example:** switch(config)# system memory-thresholds minor 60 severe 70 critical 80	Configures the system memory thresholds that generate EEM memory events. The default values are as follows: • Minor—85 • Severe—90 • Critical—95 When these memory thresholds are exceeded, the system generates the following syslogs: • 2009 May 7 17:06:30 switch %$ VDC-1 %$ %PLATFORM-2-MEMORY_ALERT: Memory Status Alert : MINOR • 2009 May 7 17:06:30 switch %$ VDC-1 %$ %PLATFORM-2-MEMORY_ALERT: Memory Status Alert : SEVERE • 2009 May 7 17:06:30 switch %$ VDC-1 %$ %PLATFORM-2-MEMORY_ALERT: Memory Status Alert : CRITICAL • 2009 May 7 17:06:35 switch %$ VDC-1 %$ %PLATFORM-2-MEMORY_ALERT: Memory Status Alert : MINOR ALERT RECOVERED • 2009 May 7 17:06:35 switch %$ VDC-1 %$ %PLATFORM-2-MEMORY_ALERT: Memory Status Alert : SEVERE ALERT RECOVERED • 2009 May 7 17:06:35 switch %$ VDC-1 %$ %PLATFORM-2-MEMORY_ALERT: Memory Status Alert : CRITICAL ALERT RECOVERED
Step 3	**system memory-thresholds threshold critical no-process-kill** **Example:** switch(config)# system memory-thresholds threshold critical no-process-kill	(Optional) Configures the system to not kill processes when the memory cannot be allocated. The default value is to allow the system to kill processes, starting with the one that consumes the most memory.

	Command	Purpose
Step 4	**show running-config | include "system memory"** **Example:** switch(config-applet)# show running-config | include "system memory"	(Optional) Displays information about the system memory configuration.
Step 5	**copy running-config startup-config** **Example:** switch(config)# copy running-config startup-config	(Optional) Saves this configuration change.

Configuring Syslog as EEM Publisher

You can monitor syslog messages from the switch.

BEFORE YOU BEGIN

EEM should be available for registration by syslog.

The syslog daemon must be configured and executed.

RESTRICTIONS

The maximum number of searchable strings to monitor syslog messages is 10.

SUMMARY STEPS

1. **config t**
2. **event manager applet** *applet-name*
3. **event syslog** [**tag** *tag*] {**occurs** *number* | **period** *seconds* | **pattern** *msg-text* | **priority** *priority*}
4. (Optional) **copy running-config startup-config**

DETAILED STEPS

	Command	Purpose
Step 1	**config t** **Example:** switch# config t Enter configuration commands, one per line. End with CNTL/Z. switch(config)#	Enters global configuration mode.
Step 2	**event manager applet** applet-*name* **Example:** switch(config)# event manager applet abc switch(config-applet)#	Registers an applet with EEM and enters applet configuration mode.

	Command	Purpose
Step 3	**event syslog** [**tag** *tag*] {**occurs** *number* | **period** *seconds* | **pattern** *msg-text* | **priority** *priority*} **Example:** `switch(config-applet)# event syslog occurs 10`	Monitors syslog messages and invokes the policy based on the search string in the policy. • The **tag** *tag* keyword-argument pair identifies this specific event when multiple events are included in the policy. • The **occurs** *number* keyword-argument pair specifies the number of occurrences. The range is from 1 to 65000. • The **period** *seconds* keyword-argument pair specifies the interval during which the event occurs. The range is from 1 to 4294967295. • The **pattern** *msg-text* keyword-argument pair specifies the matching regular expression. The pattern can contain character text, an environment variable, or a combination of the two. If the string contains embedded blanks, it is enclosed in quotation marks. • The **priority** *priority* keyword-argument pair specifies the priority of the syslog messages. If this keyword is not selected, all syslog messages are set at the informational priority level.
Step 4	**copy running-config startup-config** **Example:** `switch(config-applet)# copy running-config startup-config`	(Optional) Saves this configuration change.

Verifying the EEM Configuration

To display EEM configuration information, perform one of the following tasks:

Command	Purpose
show event manager environment [*variable-name* | **all**]	Displays information about the event manager environment variables.
show event manager event-types [*event* | **all** | **module** *slot*]	Displays information about the event manager event types.
show event manager history events [**detail**] [**maximum** *num-events*] [**severity** {**catastrophic** | **minor** | **moderate** | **severe**}]	Displays the history of events for all policies.
show event manager policy internal [*policy-name*] [**inactive**]	Displays information about the configured policies.
show event manager policy-state *policy-name*	Displays information about the policy state, including thresholds.
show event manager script system [*policy-name* | **all**]	Displays information about the script policies.

Command	Purpose
show event manager system-policy [**all**]	Displays information about the predefined system policies.
show running-config eem	Displays information about the running configuration for EEM.
show startup-config eem	Displays information about the startup configuration for EEM.

Configuration Examples for EEM

This example shows how to override the __lcm_module_failure system policy by changing the threshold for just module 3 hitless upgrade failures. This example also sends a syslog message. The settings in the system policy, __lcm_module_failure, apply in all other cases.

```
event manager applet example2 override __lcm_module_failure
    event module-failure type hitless-upgrade-failure module 3 count 2
    action 1 syslog priority errors msg module 3 "upgrade is not a hitless upgrade!"
    action 2 policy-default
```

This example shows how to override the __ethpm_link_flap system policy and shuts down the interface.

```
event manager applet ethport override __ethpm_link_flap
    event policy-default count 2 time 1000
    action 1 cli conf t
    action 2 cli int et1/1
    action 3 cli no shut
```

This example creates an EEM policy that allows the CLI command to execute but triggers an SNMP notification when a user enters configuration mode on the device:

```
event manager applet TEST
    event cli match "conf t"
    action 1.0 snmp-trap strdata "Configuration change"
    action 2.0 event-default
```

Note You must add the **event-default** action statement to the EEM policy, or EEM will not allow the CLI command to execute.

This example shows how to correlate multiple events in an EEM policy and execute the policy based on a combination of the event triggers. In this example, the EEM policy is triggered if one of the specified syslog patterns occurs within 120 seconds.

```
event manager applet eem-correlate
    event syslog tag one pattern "copy bootflash:.* running-config.*"
    event syslog tag two pattern "copy run start"
    event syslog tag three pattern "hello"
    tag one or two or three happens 1 in 120
    action 1.0 reload module 1
```

Note For additional EEM configuration examples, see Appendix 1, "Embedded Event Manager System Events and Configuration Examples."

Additional References

For additional information related to implementing EEM, see the following sections:

- Related Documents, page 16-268
- Standards, page 16-268

Related Documents

Related Topic	Document Title
EEM commands	*Cisco Nexus 7000 Series NX-OS System Management Command Reference*
VDCs	*Cisco Nexus 7000 Series NX-OS Virtual Device Context Configuration Guide, Release 5.x*

Standards

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

Feature History for EEM

Table 16-2 lists the release history for this feature.

Table 16-2 Feature History for EEM

Feature Name	Releases	Feature Information
EEM event correlation	5.2(1)	Added support for multiple event triggers in a single EEM policy.
Syslog as EEM publisher	5.1(1)	Added support to monitor syslog messages from the switch.
EEM	5.0(2)	No change from Release 4.2.
EEM	4.2(1)	No change from Release 4.1.
Memory thresholds configuration	4.1(3)	Added a configuration section for memory thresholds. See the "Configuring Memory Thresholds" section on page 16-263.