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.

About EEM

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

EEM consists of three major components:

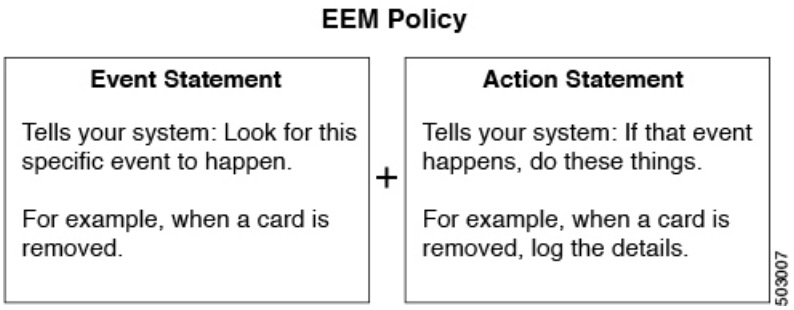
- Event statements—Events to monitor from another Cisco NX-OS component that may require some action, workaround, or notification.
- Action statements—An action that EEM can take, such as executing CLI commands, sending an email through the use of Smart Call Home feature, and disabling an interface to recover from an event.
- Policies—An event that is 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.

This figure shows the two basic statements in an EEM policy.

Figure 1: EEM Policy Statements



You can configure EEM policies using the command-line interface (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 that are related to the same event as your policy.

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.

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.

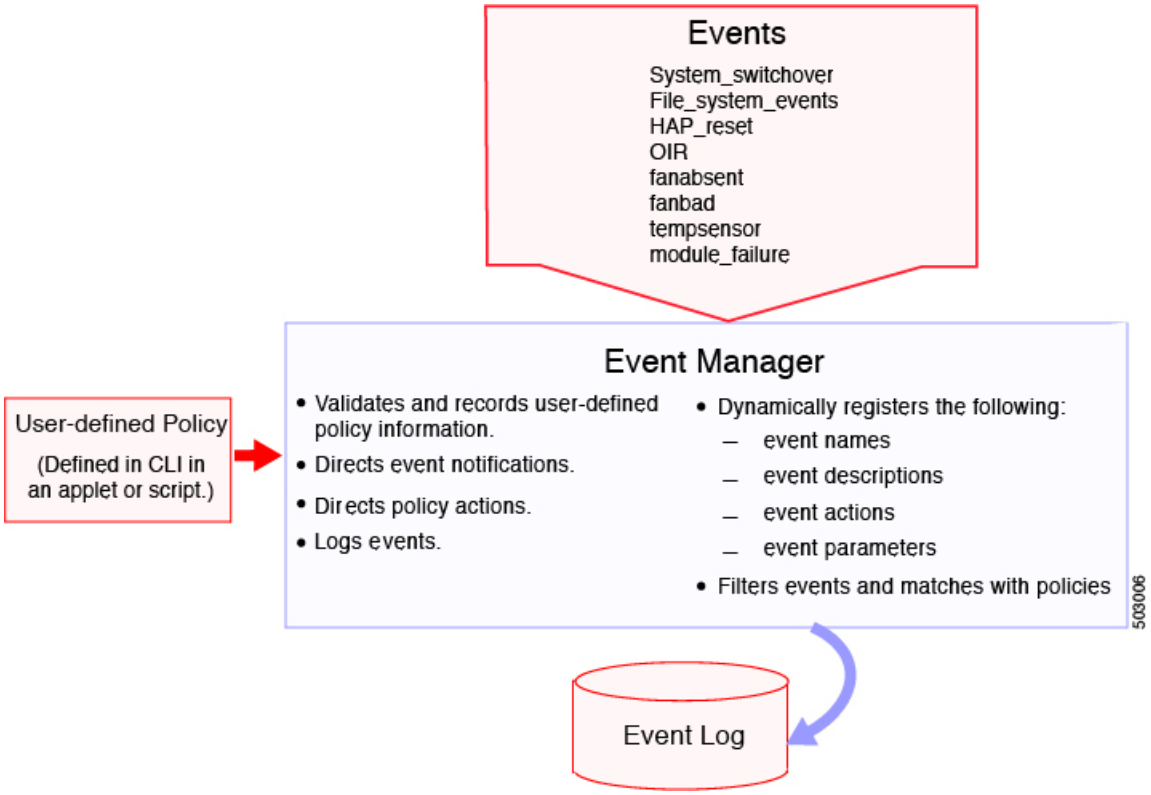
Event Statements

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.

This figure shows events that are handled by EEM.

Figure 2: EEM Overview



Event statements specify the event that triggers a policy to run. You can configure multiple event triggers.

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 EEM can only process a complete action cli list of up to 1024 characters in total. If more actions are required, you must define them as a new redundant applet with same trigger.

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.

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 email server.

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

This example shows a sample action statement to force a module 1 shutdown, with a reset reason of "EEM action."

```
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 the following example.

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

You can reuse this environment variable in any policy.

EEM Event Correlation

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.

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

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

Prerequisites for EEM

EEM has the following prerequisites:

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

Guidelines and Limitations for EEM

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.
- 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.
- Only single action is supported when option **collect** is used in event applet action statement.
- The following guidelines apply to Event Log Auto-Collection and Backup:
  - By default, enabled log collection on a switch provides between 15 minutes to several hours of event logs depending on size, scale and component activity.
  - To be able to collect relevant logs that span a longer period, only enable event log retention for the specific services/features you need. See "Enabling Extended Log File Retention For a Single Service". You can also export the internal event logs. See "External Log File Storage".
  - When troubleshooting, it is good practice to manually collect a snapshot of internal event logs in real time. See "Generating a Local Copy of Recent Log Files".
- When you configure an EEM policy action to collect **show tech** commands, make sure to allocate enough time for the **show tech** commands to complete before the same action is called again.

- Note the following about override policies:
  - An override policy that consists of an event statement without an 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 regular expressions must conform to the Portable Operating System Interface for uniX (POSIX) extended standard.
  - All keywords must be expanded.
  - Only the * symbol can be used for argument replacement.
- Note the following about EEM event correlation:
  - EEM event correlation is supported only on the supervisor module.
  - 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, and syslog.
  - EEM event correlation does not override the system default policies.
- 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.
- Default action execution is not supported for policies that are configured with tagged events.
- You can invoke EEM from Python. For more information about Python, see the Cisco Nexus 9000 Series NX-OS Programmability Guide.

Default Settings for EEM

This table lists the default settings for 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.

Defining an Environment Variable

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

Procedure

	Command or Action	Purpose

Step 1	**configure terminal**
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters 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	(Optional) **show event manager environment** {*variable-name* | **all**} **Example:** `switch(config)# show event manager environment all`	Displays information about the configured environment variables.
Step 4	(Optional) **copy running-config startup-config** **Example:** `switch(config)# copy running-config startup-config`	Copies the running configuration to the startup configuration.

Defining a User Policy Using the CLI

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

Procedure

	Command or Action	Purpose

Step 1	**configure terminal**
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters 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	(Optional) **description** *policy-description* **Example:**	Configures a descriptive string for the policy. The string can be any alphanumeric string up

	Command or Action	Purpose
	`switch(config-applet)# description "Monitors interface shutdown."`	to 80 characters. Enclose the string in quotation marks.
Step 4	**event** *event-statement* **Example:** `switch(config-applet)# event cli match "conf t ; interface * ; shutdown"`	Configures the event statement for the policy. Repeat this step for multiple event statements. See Configuring Event Statements, on page 8.
Step 5	(Optional) **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`	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 Ethernet 3/1`	Configures an action statement for the policy. Repeat this step for multiple action statements. See Configuring Action Statements, on page 13.
Step 7	(Optional) **show event manager policy-state** *name* [**module** *module-id*] **Example:** `switch(config-applet)# show event manager policy-state monitorShutdown`	Displays information about the status of the configured policy.
Step 8	(Optional) **copy running-config startup-config** **Example:** `switch(config)# copy running-config startup-config`	Copies the running configuration to the startup configuration.

Configuring Event Statements

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

Command	Purpose
event application [**tag** *tag*] **sub-system** *sub-system-id* **type** *event-type* **Example:** `switch(config-applet)# event application sub-system 798 type 1`	Triggers an event when an event specification matches the subsystem ID and application event type. The range for the *sub-system-id* and for the *event-type* is from 1 to 4294967295. The **tag** *tag* keyword-argument pair identifies this specific event when multiple events are included in the policy. **Note** To use this command, you must first enable the **feature evmed** command to enable generic event detectors.
event cli [**tag** *tag*] **match** *expression* [**count** *repeats* | **time** *seconds*] **Example:** `switch(config-applet)# event cli match "conf t ; interface * ; 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.

Command	Purpose
event fib {**adjacency extra** | **resource tcam usage** | **route** {**extra** | **inconsistent** | **missing**}} **Example:** `switch(config-applet)# event fib adjacency extra`	Triggers an event for one of the following: • **adjacency extra**—If there is an extra route in the unicast FIB. • **resource tcam usage**—Each time the TCAM utilization percentage becomes a multiple of 5, in either direction. • **route** {**extra** | **inconsistent** | **missing**}—If a route is added, changed, or deleted in the unicast FIB.
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 Configuring Memory Thresholds, on page 17.
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. 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 none **Example:** `switch(config-applet)# event none`	Manually runs the policy event without any events specified. **Note** To use this command, you must first enable the **feature evmed** command to enable generic event detectors.

Command	Purpose
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.
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.

Command	Purpose
event syslog [**occurs** *count*] {**pattern** *string* | **period** *time* | **priority** *level* | **tag** *tag*} **Example:** `switch(config-applet)# event syslog period 500`	Triggers an event if the specified syslog threshold is exceeded. The range for the count is from 1 to 65000, and the range for the time is from 1 to 4294967295. The priority range is from 0 to 7. The **tag** *tag* keyword-argument pair identifies this specific event when multiple events are included in the policy.
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.

Command	Purpose
event timer {**absolute time** *time* **name** *name* | **countdown time** *time* **name** *name* | **cron cronentry** *string* | **tag** *tag* | **watchdog time** *time* **name** *name*} **Example:** `switch(config-applet)# event timer absolute time 100 name abtimer`	Triggers an event if the specified time is reached. The range for the time is from 1 to 4294967295. • **absolute time**—Triggers an event when the specified absolute time of day occurs. • **countdown time**—Triggers an event when when the specified time counts down to zero. The timer does not reset. • **cron cronentry**—Triggers an event when the CRON string specification matches the current time. • **watchdog time**—Triggers an event when the specified time counts down to zero. The timer automatically resets to the initial value and continues to count down. The **tag** *tag* keyword-argument pair identifies this specific event when multiple events are included in the policy. **Note** To use this command, you must first enable the **feature evmed** command to enable generic event detectors.
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-number* 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 Ethernet 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.

Command	Purpose
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.
action *number*[.*number2*] **publish-event** **Example:** `switch(config-applet)# action 1.0 publish-event`	Forces the publication of an application-specific 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*] **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.

Command	Purpose
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

Ensure that you are logged in with administrator privileges.

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

Procedure

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.

Procedure

	Command or Action	Purpose

Step 1	**configure terminal**
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters 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	(Optional) **copy running-config startup-config** **Example:** `switch(config)# copy running-config startup-config`	Copies the running configuration to the startup configuration.

Overriding a Policy

You can override a system policy.

Procedure

	Command or Action	Purpose

Step 1	**configure terminal**
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters global configuration mode.

Step 2	(Optional) **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`
		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 Embedded Event Manager System Events and Configuration Examples.

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.

	Command or Action	Purpose
Step 4	(Optional) **description** *policy-description* **Example:** `description "Overrides link flap policy."`	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	Required: **[no] event** *event-statement* **Example:** `switch(config-applet)# event policy-default count 2 time 1000`	Configures the event statement for the policy. The **no** form of this command removes the configuration.
Step 6	Required: **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. Repeat this step for multiple action statements.
Step 7	(Optional) **show event manager policy-state** *name* **Example:** `switch(config-applet)# show event manager policy-state ethport`	Displays information about the configured policy.
Step 8	(Optional) **copy running-config startup-config** **Example:** `switch(config)# copy running-config startup-config`	Copies the running configuration to the startup configuration.

Configuring Memory Thresholds

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

Before you begin

Ensure that you are logged in with administrator privileges.

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `switch# configure terminal switch(config)#`	Enters global configuration mode.

	Command or Action	Purpose
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: • 2013 May 7 17:06:30 switch %$ %PLATFORM-2-MEMORY_ALERT: Memory Status Alert : MINOR • 2013 May 7 17:06:30 switch %$ %PLATFORM-2-MEMORY_ALERT: Memory Status Alert : SEVERE • 2013 May 7 17:06:30 switch %$ %PLATFORM-2-MEMORY_ALERT: Memory Status Alert : CRITICAL • 2013 May 7 17:06:35 switch %$ %PLATFORM-2-MEMORY_ALERT: Memory Status Alert : MINOR ALERT RECOVERED • 2013 May 7 17:06:35 switch %$ %PLATFORM-2-MEMORY_ALERT: Memory Status Alert : SEVERE ALERT RECOVERED • 2013 May 7 17:06:35 switch %$ %PLATFORM-2-MEMORY_ALERT: Memory Status Alert : CRITICAL ALERT RECOVERED
Step 3	(Optional) **system memory-thresholds threshold critical no-process-kill** **Example:** `switch(config)# system memory-thresholds threshold critical no-process-kill`	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.
Step 4	(Optional) **show running-config | include "system memory"** **Example:** `switch(config-applet)# show running-config | include "system memory"`	Displays information about the system memory configuration.

	Command or Action	Purpose
Step 5	(Optional) **copy running-config startup-config** **Example:** `switch(config)# copy running-config startup-config`	Copies the running configuration to the startup configuration.

Configuring Syslog as EEM Publisher

You can monitor syslog messages from the switch.

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

Before you begin

EEM should be available for registration by syslog.

The syslog daemon must be configured and executed.

Procedure

	Command or Action	Purpose

Step 1	**configure terminal**
	Example:
	`switch# configure terminal`
	`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.

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.

	Command or Action	Purpose
		• 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	(Optional) **copy running-config startup-config** **Example:** `switch(config)# copy running-config startup-config`	Copies the running configuration to the startup configuration.

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-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.
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
```

Upon reaching a maximum failure threshold, the AsicMemory, FpgaRegTest, and L2ACLRedirect system policies force a reload of the switch. This example shows how to override the default action for one of these policies and issue a syslog instead:

```
event manager applet gold override __fpgareg
action 1 syslog priority emergencies msg FpgaRegTest_override
```

This example shows how to override a default policy but still enact the default action:

```
event manager applet gold_fpga_ovrd override __fpgareg
  action 1 policy-default
  action 2 syslog priority emergencies msg FpgaRegTest_override
```

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

Event Log Auto-Collection and Backup

Automatically collected event logs are stored locally on switch memory. Event log file storage is a temporary buffer that stores files for a fixed amount of time. Once the time period has elapsed, a roll-over of the buffer makes room for the next files. The roll-over uses a first-in-first-out method.

Beginning with Cisco NX-OS Release 9.3(3), EEM uses the following methods of collection and backup:

- Extended Log File Retention
- Trigger-Based Event Log Auto-Collection

Extended Log File Retention

Beginning with Cisco NX-OS release 9.3(3), all Cisco Nexus platform switches, with at least 8Gb of system memory, support the extended retention of event logging files. Storing the log files locally on the switch or remotely through an external container, reduces the loss of event logs due to rollover.

Enabling Extended Log File Retention For All Services

Extended Log File Retention is enabled by default for all services running on a switch. If the switch doesn't have the log file retention feature enabled (**no bloggerd log-dump** is configured), use the following procedure to enable it.

Procedure

	Command or Action	Purpose

Step 1	**configure terminal**
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters global configuration mode.

Step 2	**bloggerd log-dump all**
	Example:
	`switch(config)# bloggerd log-dump all`
	`switch(config)#`
		Enables the log file retention feature for all services.

Example

```
switch# configure terminal
switch(config)# bloggerd log-dump all
Sending Enable Request to Bloggerd
```

```
Bloggerd Log Dump Successfully enabled
switch(config)#
```

Disabling Extended Log File Retention For All Services

Extended Log File Retention is enabled by default for all services running on the switch.

If the switch has the log file retention feature enabled for all services, and you want to disable it, use the following procedure.

Procedure

	Command or Action	Purpose

Step 1	**configure terminal**
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters global configuration mode.

Step 2	**no bloggerd log-dump all**
	Example:
	`switch(config)# no bloggerd log-dump all`
	`switch(config)#`
		Disables the log file retention feature for all services on the switch.

Example

```
switch# configure terminal
switch(config)# no bloggerd log-dump all
Sending Disable Request to Bloggerd
Bloggerd Log Dump Successfully disabled
switch(config)#
```

Enabling Extended Log File Retention For a Single Service

Use this procedure to enable Log File Retention for a single service.

Procedure

	Command or Action	Purpose
Step 1	**show system internal sysmgr service name** *service-type* **Example:** `switch# show system internal sysmgr service name aclmgr`	Displays information about the ACL Manager including the service SAP number.

Step 2	**configure terminal**
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters global configuration mode.

	Command or Action	Purpose
Step 3	**bloggerd log-dump sap** *number* **Example:** `switch(config)# bloggerd log-dump sap 351`	Enables the log file retention feature for the ACL Manager service.
Step 4	**show system internal bloggerd info log-dump-info** **Example:** `switch(config)# show system internal bloggerd info log-dump-info`	Displays information about the log file retention feature on the switch.

Example

```
switch# show system internal sysmgr service name aclmgr
Service "aclmgr" ("aclmgr", 80):
UUID = 0x182, PID = 653, SAP = 351
State: SRV_STATE_HANDSHAKED (entered at time Mon Nov  4 11:10:41 2019).
Restart count: 1
Time of last restart: Mon Nov  4 11:10:39 2019.
The service never crashed since the last reboot.
Tag = N/A
Plugin ID: 0
switch(config)# configure terminal
switch(config)# bloggerd log-dump sap 351
Sending Enable Request to Bloggerd
Bloggerd Log Dump Successfully enabled
switch(config)# show system internal bloggerd info log-dump-info
------------------------------------------------------------
Log Dump config is READY
Log Dump is DISABLED for ALL application services in the switch
Exceptions to the above rule (if any) are as follows:
------------------------------------------------------------
Module     | VDC        | SAP                       | Enabled?
------------------------------------------------------------
1          | 1          | 351 (MTS_SAP_ACLMGR     ) | Enabled
------------------------------------------------------------
------------------------------------------------------------
Log Dump Throttle Switch-Wide Config:
-------------------------------------
Log Dump Throttle                                    : ENABLED
Minimum buffer rollover count (before throttling)    : 5
Maximum allowed rollover count per minute            : 1
------------------------------------------------------------

switch(config)#
```

Displaying Extended Log Files

Use this task to display the event log files currently stored on the switch.

Procedure

	Command or Action	Purpose
Step 1	**dir debug:log-dump/** **Example:** `switch# dir debug:log-dump/`	Displays the event log files currently stored on the switch.

Example

```
switch# dir debug:log-dump/

3676160 Dec 05 02:43:01 2019 20191205023755_evtlog_archive.tar
3553280 Dec 05 06:05:06 2019 20191205060005_evtlog_archive.tar

Usage for debug://sup-local
913408 bytes used
4329472 bytes free
5242880 bytes total
```

Disabling Extended Log File Retention For a Single Service

Extended Log File Retention is enabled by default for all services on the switch from release 9.3(5). If the switch has the log file retention feature enabled for a single service or all services, and you want to disable a specific service or services, use the following procedure.

Procedure

	Command or Action	Purpose
Step 1	**show system internal sysmgr service name** *service-type* **Example:** `switch# show system internal sysmgr service name aclmgr`	Displays information about the ACL Manager including the service SAP number.

Step 2	**configure terminal**
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters global configuration mode.

Step 3	**no bloggerd log-dump sap** *number* **Example:** `switch(config)# no bloggerd log-dump sap 351`	Disables the log file retention feature for the ACL Manager service.
Step 4	**show system internal bloggerd info log-dump-info** **Example:**	Displays information about the log file retention feature on the switch.

	Command or Action	Purpose
	`switch(config)# show system internal bloggerd info log-dump-info`	

Example

The following example shows how to disable extended log file retention for a service named "aclmgr":

```
switch# show system internal sysmgr service name aclmgr
Service "aclmgr" ("aclmgr", 80):
        UUID = 0x182, PID = 653, SAP = 351
        State: SRV_STATE_HANDSHAKED (entered at time Mon Nov  4 11:10:41 2019).
        Restart count: 1
        Time of last restart: Mon Nov  4 11:10:39 2019.
        The service never crashed since the last reboot.
        Tag = N/A
        Plugin ID: 0
switch(config)# configure terminal
switch(config)# no bloggerd log-dump sap 351
Sending Disable Request to Bloggerd
Bloggerd Log Dump Successfully disabled
switch(config)# show system internal bloggerd info log-dump-info
------------------------------------------------------------
Log Dump config is READY
Log Dump is DISABLED for ALL application services in the switch
Exceptions to the above rule (if any) are as follows:
------------------------------------------------------------
Module     | VDC        | SAP                       | Enabled?
------------------------------------------------------------
1          | 1          | 351 (MTS_SAP_ACLMGR     ) | Disabled
------------------------------------------------------------
------------------------------------------------------------
Log Dump Throttle Switch-Wide Config:
-------------------------------------
Log Dump Throttle                                    : ENABLED
Minimum buffer rollover count (before throttling)    : 5
Maximum allowed rollover count per minute            : 1
------------------------------------------------------------

switch(config)#
```

Trigger-Based Event Log Auto-Collection

Trigger-based log collection capabilities:

- Automatically collect relevant data when issues occur.
- No impact on control plane
- Customizable configuration:
  - Defaults populated by Cisco
  - Selectively override what-to-collect by network administrator or by Cisco TAC.
  - Automatically update new triggers on image upgrades.

- Store logs locally on the switch or remotely on an external server.
- Supports severity 0, 1, and 2 syslogs
- Custom syslogs for ad-hoc events (auto-collection commands attached to the syslogs)

Enabling Trigger-Based Log File Auto-Collection

To enable trigger-based automatic creation of log files, you must create an override policy for the __syslog_trigger_default system policy with a custom YAML file and define the specific logs for which information will be collected.

For more information on creating a custom YAML file to enable log file auto-collection, see Configuring the Auto-Collection YAML File, on page 27.

Auto-Collection YAML File

The Auto-Collection YAML file that is specified in the **action** command in the EEM function, defines actions for different system or feature components. This file is located in the switch directory: /bootflash/scripts. In addition to the default YAML file, you can create component-specific YAML files and place them in the same directory. The naming convention for component-specific YAML files is **component-name.yaml**. If a component-specific file is present in the same directory, it takes precedence over the file that is specified in the **action** command. For example, if the action file, **bootflash/scripts/platform.yaml** is in the **/bootflash/scripts** directory with the default action file, **bootflash/scripts/test.yaml**, then the instructions defined in **platform.yaml** file take precedence over the instructions for the platform component present in the default **test.yaml** file.

Examples of components are, ARP, BGP, IS-IS, and so on. If you are not familiar with all the component names, contact Cisco Customer Support for assistance in defining the YAML file for component-specific actions (and for the default **test.yaml** file as well).

Example:

```
event manager applet test_1 override __syslog_trigger_default
  action 1.0 collect test.yaml $_syslog_msg
```

Configuring the Auto-Collection YAML File

The contents of a YAML file determines the data collected during trigger-based auto-collection. There must be only one YAML file on the switch but it can contain auto-collection meta-data for any number of switch components and messages.

Locate the YAML file in the following directory on the switch:

```
/bootflash/scripts
```

Invoke the YAML file for trigger-based collection by using the following example. The example shows the minimum required configuration for trigger-based collection to work with a user-defined YAML file.

```
switch# show running-config eem
!Command: show running-config eem
!Running configuration last done at: Mon Sep 30 19:34:54 2019
!Time: Mon Sep 30 22:24:55 2019
version 9.3(3) Bios:version 07.59
event manager applet test_1 override __syslog_trigger_default
  action 1.0 collect test.yaml $_syslog_msg
```

In the preceding example, "`test_1`" is the name of the applet and "`test.yaml`" is the name of the user-configured YAML file present in the /bootflash/scripts directory.

Example YAML File

The following is an example of a basic YAML file supporting the trigger-based event log auto-collection feature. The definitions for the keys/values in the file are in the table that follows.

Note Make sure that the YAML file has proper indentation. As a best practice, run it through any "online YAML validator" before using it on a switch.

```
bash-4.3$ cat /bootflash/scripts/test.yaml
version: 1
components:
   securityd:
        default:
            tech-sup: port
            commands: show module
   platform:
        default:
            tech-sup: port
            commands: show module
```

Key: Value	Description
version: 1	Set to 1. Any other number creates an incompatibility for the auto collect script.
components:	Keyword specifying that what follows are switch components.
securityd:	Name of the syslog component (`securityd` is a facility name in syslog).
default:	Identifies all messages belonging to the component.
tech-sup: port	Collect tech support of the port module for the `securityd` syslog component.
commands: show module	Collect show module command output for the `securityd` syslog component.
platform:	Name of the syslog component (`platform` is a facility name in syslog).
tech-sup: port	Collect tech support of the port module for the `platform` syslog component.
commands: show module	Collect show module command output for the `platform` syslog component.

Use the following example to associate auto-collect metadata only for a specific log. For example, SECURITYD-2-FEATURE_ENABLE_DISABLE

```
securityd:
                feature_enable_disable:
                        tech-sup: security
                        commands: show module
```

Key: Value	Description
securityd:	Name of the syslog component (`securityd` is a facility name in syslog).
feature_enable_disable:	Message ID of the syslog message.

Key: Value	Description
tech-sup: security	Collect tech support of the security module for the `securityd` syslog component.
commands: show module	Collect show module command output for the security syslog component.

Example syslog output for the above YAML entry:

```
2019 Dec 4 12:41:01 n9k-c93108tc-fx %SECURITYD-2-FEATURE_ENABLE_DISABLE: User
has enabled the feature bash-shell
```

Use the following example to specify multiple values.

```
version: 1
components:
   securityd:
        default:
            commands: show module;show version;show module
            tech-sup: port;lldp
```

Note Use semicolons to separate multiple show commands and tech support key values (see the preceding example).

Beginning with Release 10.1(1), `test.yaml` can be replaced with a folder inside which more than one YAML files can be present. All the YAML files in the folder must follow the `ComponentName.yaml` naming convention.

In the following example, `test.yaml` is replaced with `test_folder`:

```
test.yaml:
event manager applet logging2 override __syslog_trigger_default
   action 1.0 collect test.yaml rate-limt 30 $_syslog_msg

test_folder:
event manager applet logging2 override __syslog_trigger_default
   action 1.0 collect test_folder rate-limt 30 $_syslog_msg
```

The following example shows the path and component(s) for `test_folder`:

```
ls /bootflash/scripts/test_folder
bgp.yaml ppm.yaml
```

Limiting the Amount of Auto-Collections Per Component

For auto-collection, the limit of the number of bundles per component event is set to three (3) by default. If more than the default events occur for a component, then the events are dropped with the status message **`EVENTLOGLIMITREACHED`**. The auto-collection of the component event restarts when the event log has rolled over.

Example:

```
switch# show system internal event-logs auto-collect history
DateTime             Snapshot ID  Syslog                   Status/Secs/Logsize(Bytes)
2020-Jun-27 07:20:03  1140276903   ACLMGR-0-TEST_SYSLOG     EVENTLOGLIMITREACHED
2020-Jun-27 07:15:14  1026359228   ACLMGR-0-TEST_SYSLOG     RATELIMITED
2020-Jun-27 07:15:09  384952880    ACLMGR-0-TEST_SYSLOG     RATELIMITED
2020-Jun-27 07:13:55  1679333688   ACLMGR-0-TEST_SYSLOG     PROCESSED:2:9332278
2020-Jun-27 07:13:52  1679333688   ACLMGR-0-TEST_SYSLOG     PROCESSING
2020-Jun-27 07:12:55  502545693    ACLMGR-0-TEST_SYSLOG     RATELIMITED
```

```
2020-Jun-27 07:12:25  1718497217   ACLMGR-0-TEST_SYSLOG     RATELIMITED
2020-Jun-27 07:08:25  1432687513   ACLMGR-0-TEST_SYSLOG     PROCESSED:2:10453823
2020-Jun-27 07:08:22  1432687513   ACLMGR-0-TEST_SYSLOG     PROCESSING
2020-Jun-27 07:06:16  90042807     ACLMGR-0-TEST_SYSLOG     RATELIMITED
2020-Jun-27 07:03:26  1737578642   ACLMGR-0-TEST_SYSLOG     RATELIMITED
2020-Jun-27 07:02:56  40101277     ACLMGR-0-TEST_SYSLOG     PROCESSED:3:10542045
2020-Jun-27 07:02:52  40101277     ACLMGR-0-TEST_SYSLOG     PROCESSING
```

Auto-Collection Log Files

About Auto-Collection Log Files

The configuration in a YAML file determines the contents of an auto-collected log file. You can't configure the amount of memory used for collected log files. You can configure the frequency of when the stored files get purged.

Autocollected log files get saved in the following directory:

```
switch# dir bootflash:eem_snapshots
   44205843    Sep 25 11:08:04 2019
1480625546_SECURITYD_2_FEATURE_ENABLE_DISABLE_eem_snapshot.tar.gz
  Usage for bootflash://sup-local
 6940545024 bytes used
44829761536 bytes free
51770306560 bytes total
```

Accessing the Log Files

Locate the logs by using the command keyword "`debug`":

```
switch# dir debug:///
...
       26    Oct 22 10:46:31 2019  log-dump
       24    Oct 22 10:46:31 2019  log-snapshot-auto
       26    Oct 22 10:46:31 2019  log-snapshot-user
```

The following table describes the log locations and the log types stored.

Location	Description
log-dump	This folder stores Event logs on log rollover.
log-snapshot-auto	This folder contains the auto-collected logs for syslog events 0, 1, 2.
log-snapshot-user	This folder stores the collected logs when you run the `bloggerd log-snapshot <>` command.

Use the following example to view the log files generated on log rollover:

```
switch# dir debug:log-dump/
debug:log-dump/20191022104656_evtlog_archive.tar
debug:log-dump/20191022111241_evtlog_archive.tar
debug:log-dump/20191022111841_evtlog_archive.tar
debug:log-dump/20191022112431_evtlog_archive.tar
debug:log-dump/20191022113042_evtlog_archive.tar
debug:log-dump/20191022113603_evtlog_archive.tar
```

Parsing the Log tar Files

Use the following example to parse the logs in the tar files:

```
switch# show system internal event-logs parse debug:log-dump/20191022104656_evtlog_archive.tar
--------LOGS:/tmp/BLOGGERD0.991453012199/tmp/1-191022104658-191022110741-device_test-M27-V1-I1:0-P884.gz--------
2019 Oct 22 11:07:41.597864 E_DEBUG Oct 22 11:07:41 2019(diag_test_start):Data Space
Limits(bytes): Soft: -1  Ha rd: -1
2019 Oct 22 11:07:41.597857 E_DEBUG Oct 22 11:07:41 2019(diag_test_start):Stack Space
Limits(bytes): Soft: 500000  Hard: 500000
2019 Oct 22 11:07:41.597850 E_DEBUG Oct 22 11:07:41 2019(diag_test_start):AS: 1005952076
-1
2019 Oct 22 11:07:41.597406 E_DEBUG Oct 22 11:07:41 2019(device_test_process_events):Sdwrap
 msg unknown
2019 Oct 22 11:07:41.597398 E_DEBUG Oct 22 11:07:41 2019(diag_test_start):Going back to
select
2019 Oct 22 11:07:41.597395 E_DEBUG Oct 22 11:07:41 2019(nvram_test):TestNvram examine 27
blocks
2019 Oct 22 11:07:41.597371 E_DEBUG Oct 22 11:07:41 2019(diag_test_start):Parent: Thread
created test index:4 thread_id:-707265728
2019 Oct 22 11:07:41.597333 E_DEBUG Oct 22 11:07:41 2019(diag_test_start):Node inserted
2019 Oct 22 11:07:41.597328 E_DEBUG Oct 22 11:07:41 2019(diag_test_start):The test index
in diag is 4
2019 Oct 22 11:07:41.597322 E_DEBUG Oct 22 11:07:41 2019(diag_test_start):result severity
level
2019 Oct 22 11:07:41.597316 E_DEBUG Oct 22 11:07:41 2019(diag_test_start):callhome alert
level
```

The following table describes the additional keywords available for parsing the specific tar file:

Keyword	Description
component	Decode logs belonging to the component identified by process name.
from-datetime	Decode logs from a specific date and time in yy[mm[dd[HH[MM[SS]]]]] format.
instance	List of SDWRAP buffer instances to be decoded (comma separated).
module	Decode logs from modules such as SUP and LC (using module IDs).
to-datetime	Decode logs up to a specific date and time in yy[mm[dd[HH[MM[SS]]]]] format.

Copying Logs to a Different Location

Use the following example to copy logs to a different location such as a remote server:

```
switch# copy debug:log-dump/20191022104656_evtlog_archive.tar
scp://<ip-adress>/nobackup/<user> vrf management  use-kstack
Enter username: user@<ip-address>'s password:
20191022104656_evtlog_archive.tar                                          100%  130KB
130.0KB/s   00:00
Copy complete, now saving to disk (please wait)...
Copy complete.
```

Purging Auto-Collection Log Files

There are two types of generated trigger-based auto-collection logs: EventHistory and EventBundle.

Purge Logic for EventHistory Logs

For event history, purging occurs in the /var/sysmgr/srv_logs/xport folder. 250MB of partitioned RAM is mounted at /var/sysmgr/srv_logs directory.

If the /var/sysmgr/srv_logs memory usage is under 65% of the 250MB allocated, no files get purged. When the memory utilization reaches the 65% limit level, the oldest files get purged until there's enough memory available to continue saving new logs.

Purge Logic for EventBundle Logs

For event bundles, the purge logic occurs in the /bootflash/eem_snapshots folder. For storing the auto-collected snapshots, the EEM auto-collect script allocates 5% of the bootflash storage. The logs get purged once the 5% bootflash capacity is used.

When a new auto-collected log is available but there's no space to save it in bootflash (already at 5% capacity), the system checks the following:

1. If there are existing auto-collected files that are more than 12 hours old, the system deletes the files and the new logs get copied.
2. If the existing auto collected files are less than 12 hours old, the system discards the newly collected logs without saving them.

You can modify the 12-hour default purge time by using the following commands. The time specified in the command is in minutes.

```
switch(config)# event manager applet test override __syslog_trigger_default
switch(config-applet)# action 1.0 collect test.yaml purge-time 300 $_syslog_msg
```

event manager command: *test* is an example name for the policy. **__syslog_trigger_default** is the name of the system policy that you want to override. This name must begin with a double underscore (__).

action command: **1.0** is an example number for the order in which the action is executed. **collect** indicates that data is collected using the YAML file. *test.yaml* is an example name of the YAML file. **$_syslog_msg** is the name of the component.

Note At any given time, there can be only one trigger-based auto-collection event in progress. If another new log event is attempting to be stored when auto-collection is already occurring, the new log event is discarded.

By default, there's only one trigger-based bundle collected every five minutes (300 sec). This rate limiting is also configurable by the following commands. The time specified in the command is in seconds.

```
switch(config)# event manager applet test override __syslog_trigger_default
switch(config-applet)# action 1.0 collect test.yaml rate-limit 600 $_syslog_msg
```

event manager command: *test* is an example name for the policy. **__syslog_trigger_default** is an example name of the system policy to override. This name must begin with a double underscore (__).

action command: **1.0** is an example number for the order in which the action is executed. **collect** indicates that data is collected using the YAML file. *test.yaml* is an example name of the YAML file. **$_syslog_msg** is the name of the component.

Beginning with Release 10.1(1), the rate of collection can also be regulated using a maximum number of triggers option, ensuring that only those many number of triggers are honored. After the **max-triggers** value is reached, no more bundles will be collected on the syslog occurrence.

```
event manager applet test_1 override __syslog_trigger_default
  action 1.0 collect test.yaml rate-limt 30 max-triggers 5 $_syslog_msg
```

Note If you delete auto collected bundles manually from `debug:log-snapshot-auto/`, then it will restart the collection based on the configured number of **max-triggers** when the next event occurs.

Auto-Collection Statistics and History

The following example shows trigger-based collection statistics:

```
switch# show system internal event-logs auto-collect statistics
--------------------EEM Auto Collection Statistics--------------------
Syslog Parse Successful :88 Syslog Parse Failure :0
Syslog Ratelimited :0 Rate Limit Check Failed :0
Syslog Dropped(Last Action In Prog) :53 Storage Limit Reached :0
User Yaml Action File Unavailable :0 User Yaml Parse Successful :35
User Yaml Parse Error :0 Sys Yaml Action File Unavailable :11
Sys Yaml Parse Successful :3 Sys Yaml Parse Error :0
Yaml Action Not Defined :0 Syslog Processing Initiated :24
Log Collection Failed :0 Tar Creation Error :0
Signal Interrupt :0 Script Exception :0
Syslog Processed Successfully :24 Logfiles Purged :0
```

The following example shows trigger-based collection history (the processed syslogs, process time, size of the data collected) obtained using a CLI command:

```
switch# show system internal event-logs auto-collect history
DateTime Snapshot ID Syslog Status/Secs/Logsize(Bytes)
2019-Dec-04 05:30:32 1310232084 VPC-0-TEST_SYSLOG PROCESSED:9:22312929
2019-Dec-04 05:30:22 1310232084 VPC-0-TEST_SYSLOG PROCESSING
2019-Dec-04 04:30:13 1618762270 ACLMGR-0-TEST_SYSLOG PROCESSED:173:33194665
2019-Dec-04 04:28:47 897805674 SYSLOG-1-SYSTEM_MSG DROPPED-LASTACTIONINPROG
2019-Dec-04 04:28:47 947981421 SYSLOG-1-SYSTEM_MSG DROPPED-LASTACTIONINPROG
2019-Dec-04 04:27:19 1618762270 ACLMGR-0-TEST_SYSLOG PROCESSING
2019-Dec-04 02:17:16 1957148102 CARDCLIENT-2-FPGA_BOOT_GOLDEN NOYAMLFILEFOUND
```

Verifying Trigger-Based Log Collection

Verify that the trigger-based log collection feature is enabled by entering the **show event manager system-policy | i trigger** command as in this example:

```
switch# show event manager system-policy | i trigger n 2
           Name : __syslog_trigger_default
    Description : Default policy for trigger based logging
    Overridable : Yes
     Event type : 0x2101
```

Checking Trigger-Based Log File Generation

You can check to see if the trigger-based auto-collection feature has generated any event log files. Enter one of the commands in the following examples:

```
switch# dir bootflash:eem_snapshots
9162547 Nov 12 22:33:15 2019 1006309316_SECURITYD_2_FEATURE_ENABLE_DISABLE_eem_snapshot.tar.gz

Usage for bootflash://sup-local
8911929344 bytes used
3555950592 bytes free
12467879936 bytes total
```

```
switch# dir debug:log-snapshot-auto/
63435992 Dec 03 06:28:52 2019
```

```
20191203062841_1394408030_PLATFORM_2_MOD_PWRDN_eem_snapshot.tar.gz

Usage for debug://sup-local
544768 bytes used
4698112 bytes free
5242880 bytes total
```

Local Log File Storage

Local log file storage capabilities:

- Amount of local data storage time depends on the scale, and type, of deployment. For both modular and nonmodular switches, the storage time is from 15 minutes to several hours of data. To be able to collect relevant logs that span a longer period:
  - Only enable event log retention for the specific services/features you need. See Enabling Extended Log File Retention For a Single Service , on page 23.
  - Export the internal event logs off the switch. See External Log File Storage, on page 36.
- Compressed logs are stored in RAM.
- 250MB memory is reserved for log file storage.
- Log files are optimized in tar format (one file for every five minutes or 10MB, whichever occurs first).
- Allow snap-shot collection.

Generating a Local Copy of Recent Log Files

Extended Log File Retention is enabled by default for all services running on a switch. Log files are stored locally on flash memory. Use the following procedure to generate a file of up to ten of the most recent event log files.

Procedure

	Command or Action	Purpose
Step 1	**bloggerd log-snapshot** [*file-name*] [**bootflash:** *file-path* | **logflash:** *file-path* | **usb1:**] [**size** *file-size*] [**time** *minutes*] **Example:** `switch# bloggerd log-snapshot snapshot1`	Creates a snapshot bundle file of the last ten event logs stored on the switch. Default storage for this operation is **logflash**. *file-name*: The filename of the generated snapshot log file bundle. Use a maximum of 64 characters for *file-name*. **Note** This variable is optional. If it is not configured, the system applies a timestamp and "_snapshot_bundle.tar" as the filename. Example: `20200605161704_snapshot_bundle.tar`

	Command or Action	Purpose
		bootflash: *file-path*: The file path where the snapshot log file bundle is being stored on the bootflash. Choose one of the following initial paths: • bootflash:/// • bootflash://module-1/ • bootflash://sup-1/ • bootflash://sup-active/ • bootflash://sup-local/ **logflash:** *file-path*: The file path where the snapshot log file bundle is being stored on the logflash. Choose one of the following initial paths: • logflash:/// • logflash://module-1/ • logflash://sup-1/ • logflash://sup-active/ • logflash://sup-local/ **usb1:**: The file path where the snapshot log file bundle is being stored on the USB device. **size** *file-size*: The snapshot log file bundle based on size in megabytes (MB). Range is from 5MB through 250MB. **time** *minutes*: The snapshot log file bundle based on the last x amount of time (minutes). Range is from 1 minute through 30 minutes.

Example

```
switch# bloggerd log-snapshot snapshot1
Snapshot generated at logflash:evt_log_snapshot/snapshot1_snapshot_bundle.tar Please cleanup
 once done.
switch#
switch# dir logflash:evt_log_snapshot
159098880 Dec 05 06:40:24 2019 snapshot1_snapshot_bundle.tar
159354880 Dec 05 06:40:40 2019 snapshot2_snapshot_bundle.tar

Usage for logflash://sup-local
759865344 bytes used
5697142784 bytes free
6457008128 bytes total
```

Display the same files using the command in this example:

```
switch# dir debug:log-snapshot-user/
159098880 Dec 05 06:40:24 2019 snapshot1_snapshot_bundle.tar
159354880 Dec 05 06:40:40 2019 snapshot2_snapshot_bundle.tar

Usage for debug://sup-local
929792 bytes used
4313088 bytes free
5242880 bytes total
```

Note Note the filename at the end of the example. Each individual log file is also identified by the date and time it was generated.

Beginning with Release 10.1(1), the LC core file includes the `log-snapshot` bundle. The `log-snapshot` bundle filename is `tac_snapshot_bundle.tar.gz`. An example is shown below:

```
bash-4.2$ tar -tvf 1610003655_0x102_aclqos_log.17194.tar.gz
drwxrwxrwx root/root 0 2021-01-07 12:44 pss/
-rw-rw-rw- root/root 107 2021-01-07 12:44 pss/dev_shm_aclqos_runtime_info_lc.gz
-rw-rw-rw- root/root 107 2021-01-07 12:44 pss/dev_shm_aclqos_runtime_cfg_lc.gz
-rw-rw-rw- root/root 107 2021-01-07 12:44 pss/dev_shm_aclqos_debug.gz
-rw-rw-rw- root/root 129583 2021-01-07 12:44 pss/clqosdb_ver1_0_user.gz
-rw-rw-rw- root/root 20291 2021-01-07 12:44 pss/clqosdb_ver1_0_node.gz
-rw-rw-rw- root/root 444 2021-01-07 12:44 pss/clqosdb_ver1_0_ctrl.gz
drwxrwxrwx root/root 0 2021-01-07 12:44 proc/
-rw-rw-rw- root/root 15159 2021-01-07 12:44 0x102_aclqos_compress.17194.log.25162
-rw-rw-rw- root/root 9172392 2021-01-07 12:43 0x102_aclqos_core.17194.gz
-rw-rw-rw- root/root 43878 2021-01-07 12:44 0x102_aclqos_df_dmesg.17194.log.gz
-rw-rw-rw- root/root 93 2021-01-07 12:44 0x102_aclqos_log.17194
-rw-rw-rw- root/root 158 2021-01-07 12:44 0x102_aclqos_mcore.17194.log.gz
drwxrwxrwx root/root 0 2021-01-07 12:44 usd17194/
-rw-rw-rw- root/root 11374171 2021-01-07 12:44 tac_snapshot_bundle.tar.gz
```

External Log File Storage

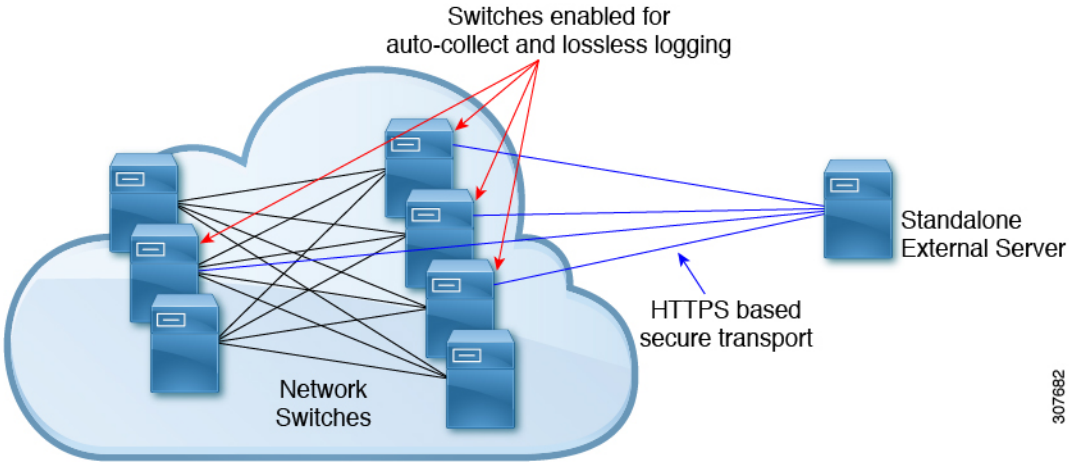
An external server solution provides the capability to store logs off-switch in a secure manner.

Note To create the external storage capability, contact Cisco Technical Assistance Center(TAC) to help deploy the external server solution.

Te following are external log file storage capabilities:

- Enabled on-demand
- HTTPS-based transport
- Storage requirements:
  - Nonmodular switches: 300MB
  - Modular switches: 12GB (per day, per switch)

- An external server generally stores logs for 10 switches. However, there's no firm limit to the number of switches supported by an external server.



The external server solution has the following characteristics:

- Controller-less environment
- Manual management of security certificates
- Three supported use-cases:
  - Continuous collection of logs from selected switches
  - TAC-assisted effort to deploy and upload logs to Cisco servers.
  - Limited on-premise processing

Note Contact Cisco TAC for information regarding the setup and collection of log files in an external server.