Cisco APIC Faults, Events, and System Messages Management Guide

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Americas Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
http://www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 527-0883

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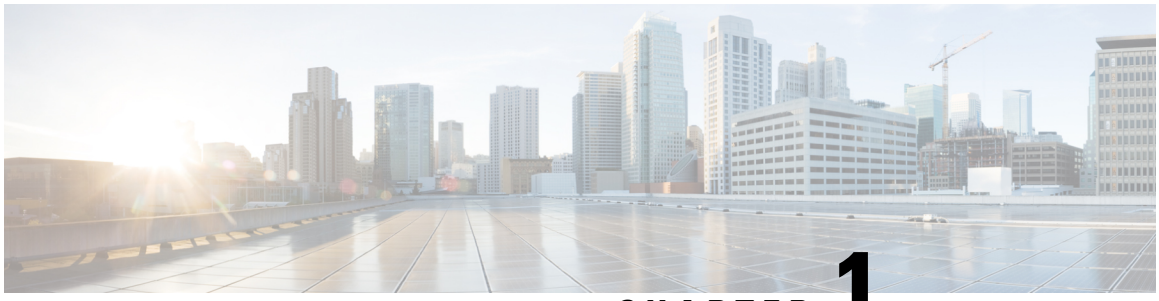


CHAPTER 1

New and Changed Information

This chapter contains the following sections:

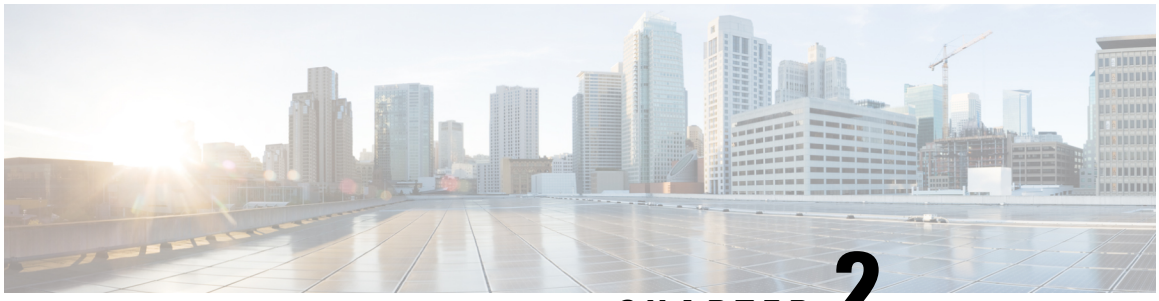
New and Changed Information

The following table provides an overview of the significant changes to this guide up to this current release. The table does not provide an exhaustive list of all changes made to the guide or of the new features up to this release.

Table 1: New Features and Changed Behavior in Cisco APIC

Cisco APIC Release Version	Feature	Description	Where Documented
Release 4.2(1)	Change Severity or Ignoring Event from Events table	You can change the severity or squelch an event directly from the Events table instead of from the monitoring policy.	This content is available in Changing the Severity or Squelching an Event, on page 27
Release 4.0(1)	Ignore Fault option	The steps for squelching a fault are changed.	This content is available in Changing the Severity or Squelching a Fault, on page 18.

Cisco APIC Release Version	Feature	Description	Where Documented
Release 3.2(1)	Change Severity Policies	Adds the ability to override the default severity level of faults and events, including the ability to squelch a fault or event.	This content is available in Changing the Severity or Squelching a Fault, on page 18 and Changing the Severity or Squelching an Event, on page 27.



CHAPTER 2

Faults

About Faults

Note For detailed reference information about faults, events, errors, and system messages, see the *Cisco ACI System Messages Reference Guide* or the *Cisco APIC Management Information Model Reference*, which is a web-based application.

The Application Policy Infrastructure Controller (APIC) maintains a comprehensive, up-to-date run-time representation of the administrative and operational state of the ACI fabric system in a collection of managed objects (MOs). In this model, a fault is represented as a mutable, stateful, and persistent MO. When a specific condition occurs, such as a component failure or an alarm, the system creates a fault MO as a child object to the MO that is primarily associated with the fault. For a fault object class, the fault conditions are defined by the fault rules of the parent object class. An MO class can have multiple defined faults, each of which has a different fault code and a different fault rule. The fault code uniquely identifies a fault definition, and a fault rule uniquely identifies the fault conditions. For a given fault code, a parent MO instance can have only one fault MO.

In most cases, a fault MO is automatically created, escalated, de-escalated, and deleted by the system as specific conditions are detected. If the same condition is detected multiple times while the corresponding fault MO is active, the properties of the fault MO are updated, and no additional instances of the fault MO are created. A fault MO contains an “occur” property to record how many times a fault condition occurs. This property is useful for detecting fault flapping.

The creation of a fault MO can be triggered by internal processes such as finite state machine (FSM) transitions or detected component failures, or by conditions specified by various fault policies, some of which are user configurable. For example, you can set fault thresholds on statistical measurements such as health scores, data traffic, or temperatures.

A fault MO remains in the system after the fault condition is cleared until it is deleted from the system by one of the following circumstances:

- When the parent MO is deleted.
- When a cleared fault is acknowledged by the user.
- When a cleared fault has existed longer than the retention interval.

Fault Objects and Records

In the *Cisco APIC Management Information Model Reference*, the **fault** package contains the fault-related object classes.

Fault Objects

A fault object is represented by one of the following two classes:

- `fault:Inst`—When a fault occurs in an MO, a fault instance MO (`fault:Inst`) is created under the MO that experienced the fault condition.
- `fault:Delegate`—Many MOs are used internally by the system and are not presented conspicuously in the APIC GUI. In order to improve the visibility of a fault that might otherwise go unnoticed, for some faults a corresponding fault delegate MO (`fault:Delegate`) is created and attached to a logical MO that has higher visibility in the APIC. A fault delegate MO is an identical copy of the original fault MO (`fault:Inst`). The identity of the original MO that experienced the fault condition is stored in the `fault:Delegate:affected` property of the fault delegate MO.

  As an example, if the system attempts to deploy the configuration for an endpoint group to multiple nodes and encounters issues on one of the nodes, the system raises a fault (`fault:Inst` MO) on the node object affected by the issue and also raises a corresponding fault delegate on the object that represents the endpoint group. The fault delegate allows the user to see all the faults related to the endpoint group in a single place, regardless of where they were triggered.

Fault Records

A fault record records the history of a state transition for a fault instance object. For every fault state change, a fault record object (`fault:Record`) is created in the fault log. A fault record is an immutable object that cannot be modified either by the user or by the system. Record creation is triggered by fault instance MO creation or deletion or by modification of key properties (for example, severity, life cycle, or acknowledgment) of the fault instance object. All properties of the record are set at the time the record object is created.

A record object contains a complete snapshot of the fault instance object and is logically organized as a flat list under a single container. The record object contains properties from the corresponding instance object (`fault:Inst`) such as severity (original, highest, and previous), acknowledgment, occurrence, and life cycle as well as inherited properties that provide a snapshot of the fault instance and the nature and time of its change. The record is meant to be queried using time-based filters or property filters for severity, affected DN, or other criteria.

The object creation can also trigger the export of record details to an external destination by syslog. To analyze how a fault object is created and deleted, inspect the fault records.

Fault record objects are purged only when the maximum capacity of fault record objects is reached and space is needed for new fault records. Depending on the space availability, a fault record can be retained long after

the fault object itself has been deleted. The retention and purge behavior is specified in the fault record retention policy (`fault:ARetP`) object. For information about configuring the retention policy, see Log Retention Policies, on page 37.

Fault Severity

A fault raised by the system can transition through more than one severity during its life cycle. This table describes the possible fault severities in decreasing order of severity:

Severity	Description
critical	A service-affecting condition that requires immediate corrective action. For example, this severity could indicate that the managed object is out of service and its capability must be restored.
major	A service-affecting condition that requires urgent corrective action. For example, this severity could indicate a severe degradation in the capability of the managed object and that its full capability must be restored.
minor	A nonservice-affecting fault condition that requires corrective action to prevent a more serious fault from occurring. For example, this severity could indicate that the detected alarm condition is not currently degrading the capacity of the managed object.
warning	A potential or impending service-affecting fault that currently has no significant effects in the system. An action should be taken to further diagnose, if necessary, and correct the problem to prevent it from becoming a more serious service-affecting fault.
info	A basic notification or informational message that is possibly independently insignificant. (Used only for events)
cleared	A notification that the condition that caused the fault has been resolved, and the fault has been cleared.

Note There is no 'debug' severity level.

Fault Types

A fault raised by the system can be one of the types described in this table:

Type	Description
generic	The system has detected a generic issue.
equipment	The system has detected that a physical component is inoperable or has another functional issue.
configuration	The system is unable to successfully configure a component.
connectivity	The system has detected a connectivity issue, such as an unreachable adapter.
environmental	The system has detected a power issue, thermal issue, voltage issue, or a loss of CMOS settings.

Type	Description
management	The system has detected a serious management issue, such as one of the following: • Critical services could not be started. • Components in the instance include incompatible firmware versions.
network	The system has detected a network issue, such as a link down.
operational	The system has detected an operational issue, such as a log capacity limit or a failed component discovery.

Fault Properties

The system provides detailed information about each fault raised. This table describes the fault properties:

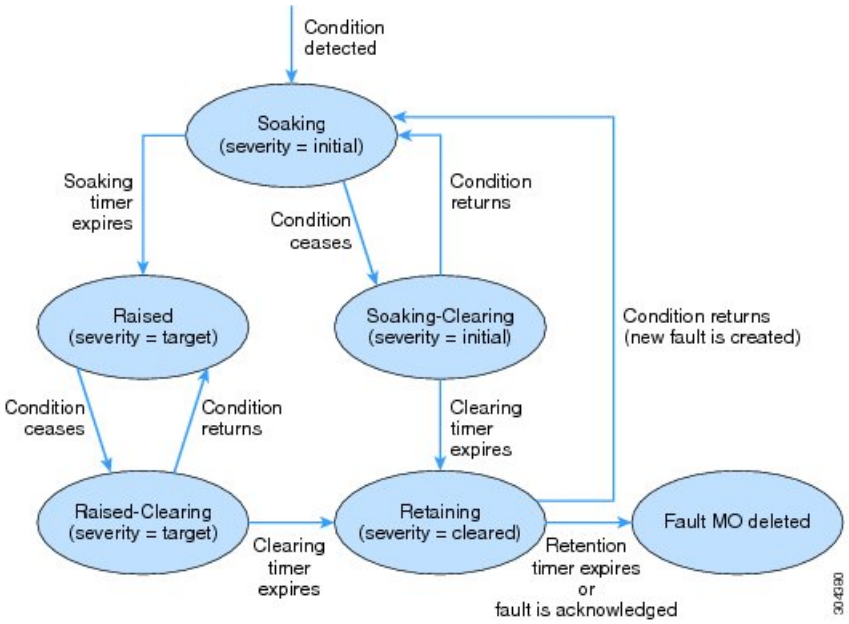
Property	Description
code	The fault code (for example, F1017).
rule id	The identifier of the rule that generated the fault instance.
id	The unique identifier assigned to the fault.
cause	The probable cause category (for example, equipment-inoperable).
type	The type of fault (for example: connectivity or environmental).
severity	The current severity level of the fault.
created	The day and time when the fault occurred.
lastTransition	The day and time on which the severity or life cycle state for the fault last changed.
descr	The description of the fault.
lc	The life cycle state of the fault (for example, soaking).
occur	The number of times the event that raised the fault occurred.
origSeverity	The severity assigned to the fault on the first time that it occurred.
prevSeverity	If the severity has changed, this is the previous severity.
highestSeverity	The highest severity encountered for this issue.

Fault Life Cycle

APIC fault MOs are stateful, and a fault raised by the APIC transitions through more than one state during its life cycle. In addition, the severity of a fault might change due to its persistence over time, so a change in the state may also cause a change in severity. Each change of state causes the creation of a fault record and, if external reporting is configured, can generate a syslog or other external report.

Only one instance of a given fault MO can exist on each parent MO. If the same fault occurs again while the fault MO is active, the APIC increments the number of occurrences.

The fault life cycle is shown in the following state diagram:



The characteristics of each state are as follows:

- Soaking—A fault MO is created when a fault condition is detected. The initial state is Soaking, and the initial severity is specified by the fault policy for the fault class. Because some faults are important only if they persist over a period of time, a soaking interval begins, as specified by the fault policy. During the soaking interval, the system observes whether the fault condition persists or whether it is alleviated and reoccurs one or more times. When the soaking interval expires, the next state depends on whether the fault condition remains.
- Soaking-Clearing— If the fault condition is alleviated during the soaking interval, the fault MO enters the Soaking-Clearing state, retaining its initial severity. A clearing interval begins. If the fault condition returns during the clearing interval, the fault MO returns to the Soaking state. If the fault condition does not return during the clearing interval, the fault MO enters the Retaining state.
- Raised—If the fault condition persists when the soaking interval expires, the fault MO enters the Raised state. Because a persistent fault might be more serious than a transient fault, the fault is assigned a new severity, the target severity. The target severity is specified by the fault policy for the fault class. The fault remains in the Raised state at the target severity until the fault condition is alleviated.
- Raised-Clearing—When the fault condition of a Raised Fault is alleviated, the fault MO enters the Raised-Clearing state. The severity remains at the target severity, and a clearing interval begins. If the fault condition returns during the clearing interval, the fault MO returns to the Raised state.
- Retaining—When the fault condition is absent for the duration of the clearing interval in either the Raised-Clearing or Soaking-Clearing state, the fault MO enters the Retaining state with the severity level cleared. A retention interval begins, during which the fault MO is retained for the length of time that is specified in the fault policy. This interval ensures that the fault reaches the attention of an administrator even if the condition that caused the fault has been alleviated, and that the fault is not deleted prematurely. If the fault condition reoccurs during the retention interval, a new fault MO is created in the Soaking state. If the fault condition has not returned before the retention interval expires, or if the fault is acknowledged by the user, the fault MO is deleted.

The soaking, clearing, and retention intervals are specified in the fault life cycle profile (`fault:LcP`) object.

Note A fault lifecycle change might not take effect on a switch if the inter-process messaging system is overloaded. For example, overloading can occur when the syslog severity level is set to "debug" or when pushing an extremely large configuration much beyond the scale limit of the switch.

Configuring the Fault Life Cycle Intervals

The fault lifecycle has three user-configurable parameters.

Procedure

Step 1 Navigate to **Fabric > Fabric Policies > Policies > Monitoring > Common Policy > Fault Lifecycle Policy**.

Step 2 In the work pane, you can configure the following parameters:

- **Clearing Interval**—The range is 0 to 3600 seconds. The default is 120 seconds.
- **Retention Interval**—The range is 0 to 31536000 seconds. The default is 3600 seconds.
- **Soaking Interval**—The range is 0 to 3600 seconds. The default is 120 seconds.

Step 3 To see the nodes and policies that will be affected by changes to this policy, click **Show Usage**.

Step 4 Click **Submit**.

Viewing Faults

The APIC GUI displays fault data in multiple views and locations, presenting the information in aggregate for assessing system health, and in detail for troubleshooting specific problems.

Fault Tables

In ACI, a fault instance (either `fault:Inst` or `fault:Delegate`) is created under a specific MO that experiences the fault condition. Each component in the APIC UI, such as a tenant static path binding or a fabric node interface, represents an MO. For each of these MOs, the GUI provides a **Faults** tab that lists all active fault objects that have occurred on the MO itself or on its child MOs at any level.

In the table displayed by the **Faults** tab, you can view the properties and details of a specific active fault by double-clicking the fault row. To view the records (`fault:Record` objects) of previous faults of a component, click the **History > Faults** tab under the component.

Fault Group View and List View

With the large number of fabric nodes that a single APIC can manage, many faults may be generated for display. To simplify the viewing of so many faults, some components in the APIC UI provide two fault display modes:

- **Group View**—Displays one row for each fault code, along with the number of instances reported with that fault code. By double-clicking the row for a specific fault code in the group view, you can switch to a list view of that fault code, where all instances of the fault code are displayed.
- **List View**—Displays one row for each fault instance.

When a component supports the group view, its default mode is group view. You can toggle between the modes by clicking the List View or Group View icon in the top right corner of the **Faults** tab toolbar.

The following GUI locations are examples of components supporting the group view:

- **System > Faults**— Displays all faults for every node (APIC, leaf, or spine) in the ACI fabric.
- **Fabric > Inventory > Pod *number* > Faults**— Displays all faults for MOs under this pod.
- **Fabric > Inventory > Pod *number* > *node* > Faults**— Displays all faults for MOs under this node.

Fault Counts in Dashboards

In addition to the faults tables, the APIC GUI provides a **Dashboard** tab for some components, such as a tenant or a pod. The dashboard provides a summary view of the health score and fault counts for the MOs under the component. Separate panels are provided for **Fault Counts By Domain**, such as infra or tenant, and for **Fault Counts By Type**, such as configuration or environmental. Each panel provides the option to hide all acknowledged faults and to hide all delegated faults.

In each panel, the dashboard displays the aggregated fault count for each severity level. By double-clicking a fault row in the dashboard panel, you can switch to the **Faults** tab in the same work pane, with appropriate display filtering applied in the list view mode.

The following GUI locations are examples of component dashboards:

- **System > Dashboard**— Displays fault counts for the entire ACI Fabric.
- **Tenant > *name* > Dashboard**— Displays fault counts for all MOs under this tenant.
- **Fabric > Inventory > Pod *number* > Dashboard**— Displays fault counts for all MOs under this pod.
- **Fabric > Inventory > Pod *number* > *node* > Dashboard**— Displays fault counts for all MOs under this node.

Viewing Faults Using the GUI

Logged faults are presented in several places in the GUI, filtered to show only those faults that are relevant to the current GUI context, such as a tenant or pod menu. Wherever a **Faults** tab appears in the GUI work pane, you can view the relevant entries from the fault log.

This procedure shows how to view tenant faults as an example.

Procedure

Step 1 Navigate to **Tenant > *name* > *name***.

Step 2 In the work pane, click the **Faults** tab.

The faults table is displayed.

- If the UI component supports the group view, the table shows the faults codes that have occurred and the number of instances (fault count) for each fault code. To view the instances of a particular fault code, double-click the row of the fault code in the table.
- If the UI component does not support the group view, the table shows all fault instances.

Step 3 To view the fault properties of a particular fault instance, double-click the row of the instance in the table.

The **Fault Properties** window opens. In this window you can view general properties of the fault, troubleshooting information such as the explanation and recommended action, and the fault history.

Step 4 To view the fault records, follow these steps:

a) Navigate again to the top-level object (in this example, **Tenant** > ***name*** > ***name***).
b) In the work pane, click the **History** tab.
c) Under the **History** tab, click the **Faults** tab.
d) Double-click the row of a fault in the table to display its fault record.

Viewing Faults Using the NX-OS Style CLI

To display a summary of faults for a specific entity, enter the **show faults** command with the appropriate qualifiers. Some common forms of the **show faults** command are the following:

- **show faults**
- **show faults controller**
- **show faults leaf**
- **show faults leaf interface**
- **show faults spine**
- **show faults tenant**

To display a fault record for a specific entity, add the **history** keyword to the **show faults** command with the appropriate qualifiers, such as **show faults history leaf 101**.

For details of these and other CLI commands, see the *Cisco APIC NX-OS Style CLI Command Reference*.

Note Beginning with Cisco APIC Release 1.2, the Cisco APIC Object Model CLI is deprecated and the default CLI is the NX-OS style CLI.

Viewing Faults Using the API

You can view faults using the API query methods to search for fault MOs, which can be of class `fault:Inst` or `fault:Delegate`. You can search for all instances or you can refine your search using query filters as described in the *Cisco APIC REST API Configuration Guide*.

This example shows how to query a physical interface for the faults associated to it:

```
GET
http://192.0.20.123/api/node/mo/topology/pod-1/node-1017/sys/phys-[eth1/11]/phys.xml?rsp-subtree-include=faults

RESPONSE:
<ethpmPhysIf
.
. [PROPERTIES TRUNCATED FOR READABILITY]
.
>
  <faultInst
     ack="no"
     cause="port-failure"
     changeSet="operStQual (New: sfp-missing)"
     childAction=""
     code="F0546"
     created="2014-07-24T02:54:23.533+00:00"
     descr="Port is down, reason:sfp-missing, used by:discovery"
     domain="access"
     highestSeverity="warning"
     lastTransition="2014-07-24T02:56:33.054+00:00"
     lc="raised"
     occur="1"
     origSeverity="warning"
     prevSeverity="warning"
     rn="fault-F0546"
     rule="ethpm-if-port-down-no-infra"
     severity="warning"
     status=""
     subject="port-down"
     type="communications"/>
</ethpmPhysIf>
```

This example shows how to request all the fault records associated to a multicast tree object:

```
GET
http://192.0.20.123/api/node/mo/topology/pod-1/node-1017/sys/isis/inst-default/dom-overlay-1/fmtree-2.xml
 ?rsp-subtree-include=fault-records
```

For detailed information about configuring the APIC REST API, see the *Cisco APIC REST API Configuration Guide*.

External Reporting of Faults

The APIC can report faults and events asynchronously to external systems through the following mechanisms:

- Syslog
- Cisco Call Home
- API subscriptions
- SNMP

Note ACI fault objects and records are not reported through SNMP. SNMP messages report error conditions and events that are listed in supported MIBs.

- The APIC controller supports SNMP for APIC-related conditions listed in supported MIBs.
- SNMP messages for ACI leaf and spine switches are sent by the switches themselves, but APIC can configure SNMP trap destinations for SNMP traps sent by ACI switches.
- For a list of SNMP MIBs and traps supported by ACI, see the Cisco ACI MIB Support List.

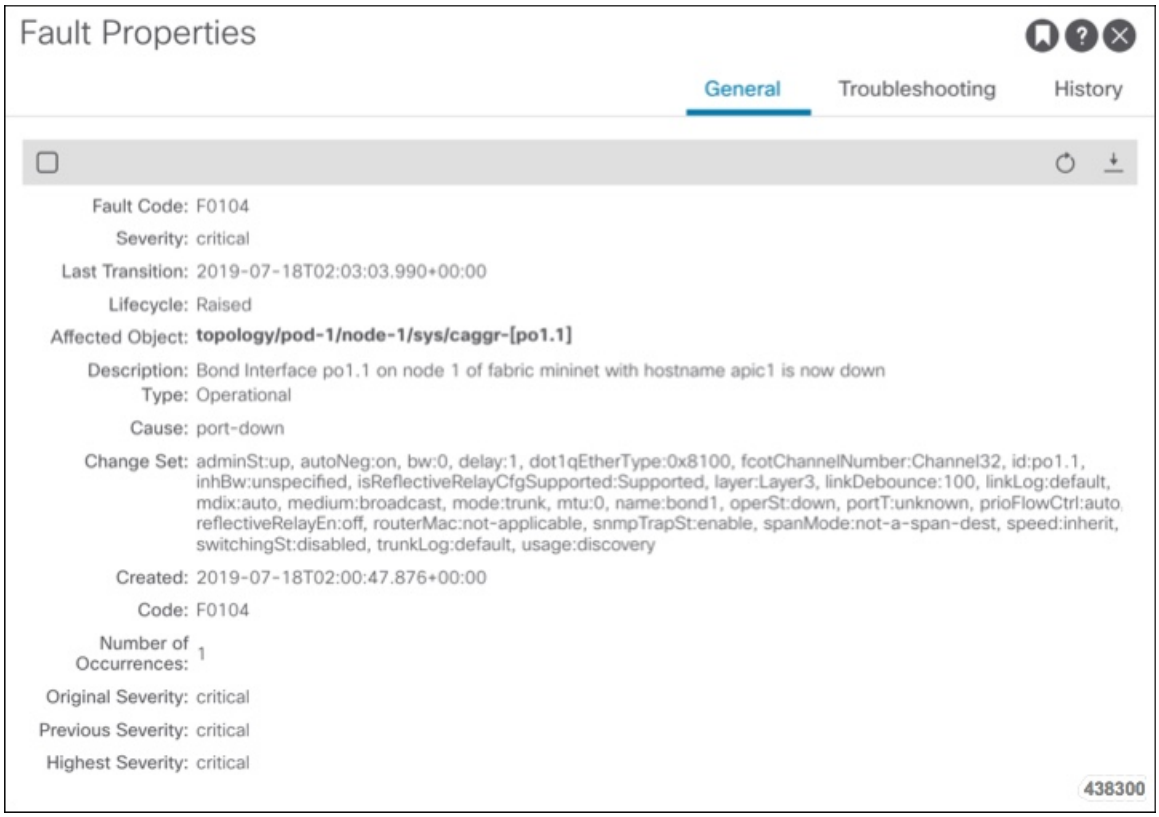
For information on configuring external reporting, see the following documents:

- *Cisco APIC Troubleshooting Guide*
- *Cisco APIC REST API Configuration Guide*

Researching a Fault

When a fault object is created, it contains information about the particular fault instance, such as the creation time, lifecycle state, number of occurrences, and the specific object to which it is attached. The instance object also contains a limited set of properties common to all instances of the fault class, such as the fault code and a brief cause of the problem. While this information is useful, you can find more information, such as an expanded explanation and recommended action, by accessing the reference documentation for the fault class. In the APIC GUI, you can double-click a fault in any fault table.

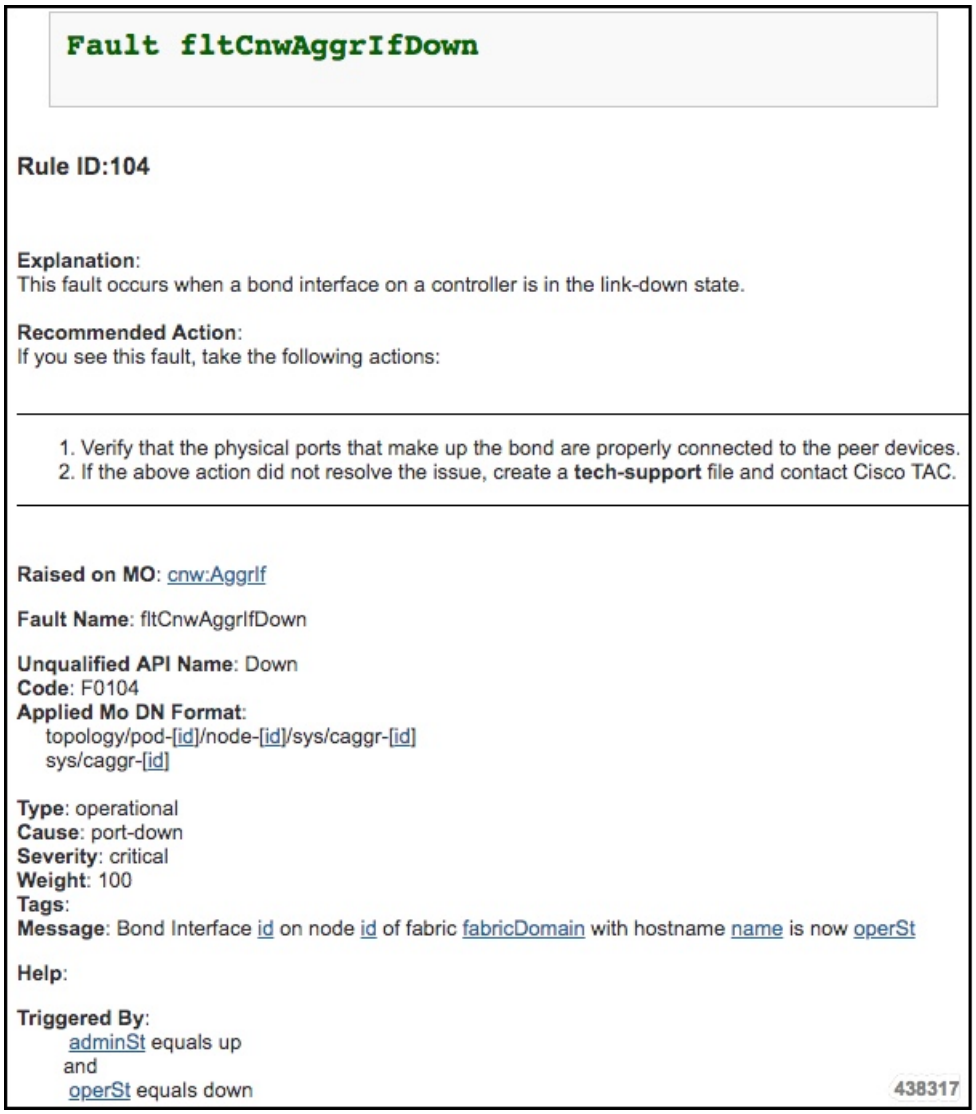
As described in Viewing Faults, on page 8, there are several methods for inspecting the current faults. For this Cisco APIC Release 4.1(1) example, you can double-click a fault table row in the GUI for the **Fault Code** number F0104. The **Fault Properties** window below opens, displaying the instance properties of this fault class:



The **Fault Properties** window contains three tabs, providing the following information:

- **General**— Provides time, severity, and state information for this fault instance. The Description string may provide specific object instances related to the fault instance.
- **Troubleshooting**— Provides a general description of the fault cause, and gives a recommended action to address the fault.
- **History**— Provides the fault record for a particular fault instance of a fault delegate MO.

Click the help icon in the **Fault Properties** window to display the class properties of the fault:



Fault fltCnwAggrIfDown

Rule ID:104

Explanation:
This fault occurs when a bond interface on a controller is in the link-down state.

Recommended Action:
If you see this fault, take the following actions:

1. Verify that the physical ports that make up the bond are properly connected to the peer devices.
2. If the above action did not resolve the issue, create a **tech-support** file and contact Cisco TAC.

Raised on MO: cnw:AggrIf

Fault Name: fltCnwAggrIfDown

Unqualified API Name: Down
Code: F0104
Applied Mo DN Format:
topology/pod-[id]/node-[id]/sys/caggr-[id]
sys/caggr-[id]

Type: operational
Cause: port-down
Severity: critical
Weight: 100
Tags:
Message: Bond Interface id on node id of fabric fabricDomain with hostname name is now operSt

Help:

Triggered By:
adminSt equals up
and
operSt equals down

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In earlier APIC releases, the class information might not be accessible in the same way. In that case, you can also find the fault class properties in the following sources:

- Cisco APIC System Faults and Messages Reference— An interactive Web-based lookup tool. Enter an APIC fault or event code to learn the cause, recommended action, affected object, severity, and other properties of the system message.
- Cisco APIC Management Information Model Reference— A comprehensive Web-based reference listing all APIC object classes and properties, event types, fault types, and syslog messages. In the **Navigation** frame of this reference:
  - Select the **Classes** tab to view the properties of the affected object class for a fault or event.
  - Select the **Faults** tab to view the faults by affected object or by the fault name.
  - Select the **Syslog Messages** tab and the **Syslog Faults** link to view a list of faults by fault code.

This document is also embedded in the APIC GUI and can be accessed by clicking the "Help and Tools" icon in the main menu bar, then selecting **Documentation > API Documentation**.

- Cisco ACI System Messages Reference Guide— A reference document listing the system messages sent by APIC and by the ACI switches, and describing the format of the messages. For a fault class, this document lists only the severity, explanation, and recommended action.

Handling Expected Faults

During the operation of the ACI fabric, some faults may be generated due to conditions that are benign at the time. For example, a fault with fault code F0532 can be raised against a port which is currently down but associated with an endpoint group (EPG). This condition is expected and can be ignored if the port is currently unused but planned for use in the future. In a situation such as this, where you are fully aware of a fault-generating condition and wish to ignore it, you have the ability to suppress the fault notification completely (squelch) or to temporarily ignore it (acknowledge).

- **Squelch**— To permanently suppress all faults with a specific fault code, you can squelch the fault. Any fault with the squelched fault code will then be discarded and will not appear in any dashboard or log. If you later wish to unsquelch the fault code, you must do so manually, but any faults that were squelched during the squelched period will not appear.

  You can squelch a fault either from a fault table or in a monitoring policy. Squelched faults have no effect on the health score.

- **Acknowledge**— To temporarily ignore a particular fault for a specific object (by its distinguished name or DN), you can acknowledge the fault. Acknowledging a fault has two purposes:
  - To mark the fault as a known acknowledged fault so that users can safely ignore the notifications.
  - To delete the fault before it is deleted automatically by the retention policy. If a fault is in retain life cycle, it will be deleted immediately when it's acknowledged. Otherwise, it will be deleted once the retention time has passed. If the fault condition resolves but then reappears, you must reacknowledge the fault.

  By default, acknowledging a fault does not change its contribution to the health score, but you can choose to ignore the acknowledged fault in the health score evaluation. You can also choose to hide acknowledged faults from the GUI.

The following table shows some of the advantages and disadvantages of each method:

	Acknowledge	Squelch
Granularity of control	+ Full control, any specific fault can be acknowledged. - Each fault must be acknowledged individually.	+ All faults with the same fault code are squelched with one setting. - If some faults with the fault code should not be ignored, squelching should not be used.

	Acknowledge	Squelch
Consistency	+ Because the acknowledge status is reset when a fault clears, no user intervention is required to remove the acknowledgement after a temporary fault condition is resolved. - If the expected fault reappears intermittently, it must be acknowledged every time it appears.	+ An intermittent fault needs only to be squelched once. - If the fault will need to be unsquelched later, it is up to the user to remember to change the setting.
Visibility	+ You have the option to hide an acknowledged fault. - To hide an acknowledged fault from monitoring, you must add a filter.	+ A squelched fault does not appear in monitoring, with no need for a filter. - There is no method to notify the user about a fault condition for a squelched fault on any MO. - Because there is no indication that a fault has been squelched, it is up to the user to remember the setting if the fault should be unsquelched later.
Health Score Impact	You have the option to allow or prevent an acknowledged fault from affecting the health score.	A squelched fault does not affect the health score.

Acknowledging Faults

Acknowledging a fault that is in the 'retaining' lifecycle state deletes the fault immediately instead of waiting for the retention interval to expire (the retention interval is one hour by default). You can acknowledge a fault that is in another lifecycle state in order to mark the fault as an expected fault or as a fault to be ignored.

Procedure

Step 1 Navigate to the area of the GUI (such as Tenant, Fabric, or Access) that is affected by the fault.

You can acknowledge a fault in any **Faults** tab in the GUI. The locations are described in Viewing Faults Using the GUI, on page 9.

Step 2 In the work pane, click the **Faults** tab.

Step 3 In the **Faults** table, locate the desired fault code and double-click the entry to display the fault instances.

Step 4 Check the **Acked** checkbox next to the fault instance to acknowledge and delete the fault.

Tip You can acknowledge or unacknowledge all instances in a faults instances table with the **Acknowledge All** and **Un-Acknowledge All** checkboxes in the toolbar of the table.

Ignoring Acknowledged Faults

Ignoring an acknowledged fault prevents the fault from being included in the computation of the health score of the ACI fabric.

Procedure

Step 1 Navigate to **Fabric > Fabric Policies > Policies > Monitoring > Common Policy > Health Score Evaluation Policies > Health Score Evaluation Policy**.

Step 2 In the work pane, check **Ignore Acknowledged Faults**.

Hiding Acknowledged and Delegated Faults

From any APIC GUI dashboard or faults tab, you can choose to hide acknowledged or delegated faults.

Tip When a fault condition results in the creation of both a fault and a delegated fault, both will appear in the fault count summary. To see a more accurate fault count, you can hide delegated faults.

Procedure

Step 1 Navigate to any dashboard or fault table.

- Navigate to the **Fault Counts By Domain** or **Fault Counts By Type** panel in any controller, tenant, pod, or switch dashboard, such as **System > Dashboard** or **Tenant > *name* > *name* > Dashboard**.
- Navigate to any controller, tenant, pod, or switch fault table, such as **System > Faults** or **Tenant > *name* > *name* > Faults**. In the fault table, click the tools icon in the table toolbar to display the tool options:

Step 2 To hide acknowledged faults, check the checkbox for **Hide Acknowledged Faults**.

Step 3 To hide delegated faults, check the checkbox for **Hide Delegated Faults**.

Changing the Severity or Squelching a Fault

Every APIC fault has a default severity. In some circumstances, a fault might be considered more or less severe than the default level. In some cases, you might want to ignore a particular fault and squelch (suppress) it from appearing in fault reports or status dashboards. APIC provides two locations from which you can change the severity of a fault type:

- Directly from the **Faults** tab under a component in the APIC GUI
- In a monitoring policy

Note The option to directly change the severity or squelch a fault from a component **Faults** tab was introduced in Cisco APIC Release 3.2(1).

Changing Fault Severity or Squelching a Fault from the Faults Tab

In the **Faults** tab of an APIC GUI component, you can change the severity of a displayed fault or you can suppress (squelch) it altogether.

Tip For squelching a fault, we recommend using this procedure instead of the procedure described in Changing Fault Severity or Squelching a Fault in the Monitoring Policy, on page 19. This simple procedure eliminates the need to look up the fault code or the relevant monitoring category (Tenant, Fabric, or Access). We do recommend, however, that you remember which monitoring policy (by default, Tenant common, Fabric, or Access Monitoring default) is modified by the operation in case you want to unsquelch the fault type at a later time. The affected monitoring policy is displayed when you select the **Ignore Fault** action.

Procedure

Step 1 Navigate to the **Faults** tab that currently displays an instance of the fault.

Step 2 Choose one of the following actions:

- To change the severity of these faults, right-click the row of the desired fault code, select **Change Severity**, select the desired severity level, and click **Change Severity**.
- To prevent these faults from appearing in fault reports (squelching the fault), right-click the row of the desired fault code, select **Ignore Fault**, then click **Ignore Fault**.

With either of these actions, a dialog box appears in which you can confirm the selected action. In both cases, the dialog box displays the path to the **Affected Monitoring Policy**, which will be automatically modified as a result of the action. To undo the action later, you can navigate to this policy and manually modify it as described in Changing Fault Severity or Squelching a Fault in the Monitoring Policy, on page 19.

This change will be applied for all faults with this fault code that occur as a result of the displayed **Affected Monitoring Policy**.

What to do next

When you squelch a fault code, a squelch policy is automatically created and added to a monitoring policy. If you want the faults to be raised and visible again, you must locate and delete that squelch policy. Depending on the `monPolDn` property of the parent MO, the auto-created fault squelch policy can be stored in the **Fault Severity Assignment Policies** under one of the following:

- **Tenants > common > Policies > Monitoring > default**
- **Fabric > Access Policies > Policies > Monitoring > default**
- **Fabric > Fabric Policies > Policies > Monitoring > default**

If you have created and applied a non-default monitoring policy (not one of the four default policies mentioned above) to the parent MO that has the fault condition, you must access that non-default monitoring policy when you want to undo the squelch policy.

When you have located the squelch policy, follow the procedure in Changing Fault Severity or Squelching a Fault in the Monitoring Policy, on page 19 to delete the entry for the fault code or change the severity to a setting other than **squelched**.

Changing Fault Severity or Squelching a Fault in the Monitoring Policy

You can change the severity of a fault or suppress (squelch) it altogether by creating a fault severity assignment policy.

Before you begin

Determine the affected object class of the fault. Every fault code is associated with a managed object (MO) class on which the fault can be raised. To create a Fault Severity Assignment Policy for a specific fault, you must provide the affected object class of the fault. For a given fault code, refer to Researching a Fault, on page 12 to find the affected object class. In the fault properties reference descriptions, the affected object class of the fault is typically shown as the "Raised on MO" attribute or the "Mo Class" attribute.

For example, the affected object class of the fault code F0321 is `infra:WiNode`.

Procedure

Step 1 Navigate to the monitoring policy that is affected by the fault.

Common locations of monitoring policies are:

- **Tenants > common > Policies > Monitoring > default**
- **Fabric > Access Policies > Policies > Monitoring > default**
- **Fabric > Fabric Policies > Policies > Monitoring > default**

Step 2 Expand the monitoring policy and select **Fault Severity Assignment Policies**.

Step 3 In the **Work** pane toolbar, click the **Actions** icon to open a drop-down list. Choose **Modify Fault Severity Assignment Policies**.

Step 4 In the **Modify Fault Severity Assignment Policies** dialog box, open the **Monitoring Object** drop-down list and find the object class associated with your fault code. If the desired object class does not appear, perform the following steps to add your object class to the drop-down list:

a) Click the Edit (pencil) icon next to the **Monitoring Object** box to open the **Add/Delete Monitoring Object** dialog box.

b) Use your platform's Find function to search for the desired object class.

For example, use CTRL-F in Windows or ⌘-F in MacOS.

Note In the displayed list, a period and not a colon separates the package name and class name. Also, the list provides a descriptive name of the class. For example, the object class `infra:WiNode` appears in this list as `Cluster Element (infra.WiNode)`.

c) Check the **Select** checkbox next to the desired object class.

Classes that already appear in the **Monitoring Object** list already have checkmarks. In this step, you can add a single class or multiple classes to the list.

d) Click **Submit** to add your selection to the **Monitoring Object** drop-down list.

Step 5 From the **Monitoring Object** drop-down list, choose your desired object class.

Step 6 With your desired object class displayed in the **Monitoring Object** box, click **+** in the **Monitoring Object** toolbar to create a new fault severity assignment policy for the displayed object class.

A form row appears in the table.

Step 7 Select the desired fault code in the **Code** drop-down list.

Some object classes are associated with more than one fault code.

Step 8 Select the current severity level in the **Initial Severity** drop-down list.

Step 9 Select the desired severity level in the **Target Severity** drop-down list.

To prevent the fault from appearing in fault reports, select **squelched**. To restore a fault that was previously squelched, select a different severity level.

Step 10 (Optional) To make a notation about the change, you can add a comment in the **Description** text box.

Step 11 Click **Update** to create the policy. Close the **Modify Fault Severity Assignment Policies** dialog box.

Monitoring a Specific Object Class or Fault Code

To monitor faults remotely, create a monitoring source policy to send fault log messages to a Callhome, Smart Callhome, SNMP, Syslog, or TACACS remote monitoring server. In the monitoring source policy, you can narrow the scope of the fault reporting in three levels:

- By default, a monitoring source policy sends fault log messages for all faults to the remote monitoring server.
- You can configure the monitoring source policy to report only the faults (fault codes) belonging to a specific managed object (MO) class.

- You can configure the monitoring source policy to report only a specific fault code.

To monitor a single fault code, you must configure a fault severity assignment policy in addition to the monitoring source policy. Follow the procedure described in Changing Fault Severity or Squelching a Fault in the Monitoring Policy, on page 19 to configure a fault severity assignment policy that specifies the fault code to be monitored. For this purpose, the policy doesn't change the fault severity or squelch the fault. The policy merely provides a means to associate the fault code with a monitoring source policy. In the fault severity assignment policy, choose 'inherit' as the initial severity and target severity to preserve the default severity of the fault. This policy is only necessary for monitoring a single fault code. It is not necessary for monitoring all faults of an object class, or for monitoring all faults entirely.

To create the monitoring source policy, follow the procedure described in Creating a Monitoring Source Policy for a Specific Object Class or Fault Code, on page 21. Choose a reporting method, such as syslog, and configure the monitoring source policy for that method. Configure the monitoring object and scope for your desired level of monitoring:

- To monitor an object class, select the object class as the monitoring object and set the scope to 'all.'
- To monitor a specific fault code, select the associated object class as the monitoring object, set the scope to 'specific fault,' and select the fault code.

To monitor multiple specific fault codes, you must configure a separate monitoring source policy for each fault code. In addition, each fault code must be represented by a separate fault severity assignment policy.

Creating a Monitoring Source Policy for a Specific Object Class or Fault Code

This example procedure describes how to create a syslog monitoring source policy for reporting instances of a single fault code or all faults raised on a single object class.

Note Other available monitoring source types in addition to syslog include Callhome, Smart Callhome, SNMP, and TACACS. This example procedure describes only the configuration of a syslog monitoring source. Refer to other Cisco APIC documentation for configuring other monitoring source types.

Before you begin

- Create a Fault Severity Assignment Policy for the specific fault to be reported by this monitoring source policy. When monitoring all faults of an object class, this step is not necessary.
- Choose a monitoring source type, such as Callhome, Smart Callhome, SNMP, Syslog, or TACACS.
- Create a compatible destination group for receiving the monitoring messages.
- Verify that no other monitoring sources of the same type are configured under any **Monitoring Policy** folder, such as for any tenants or fabric. For example, if you configure a syslog source for a specific fault code while another syslog source is configured for 'ALL' object classes or for all faults of an object class, you might receive messages for other fault codes.

Procedure

Step 1 Navigate to **Fabric** > **Fabric Policies** > **Policies** > **Monitoring** > **default** > **Callhome/Smart Callhome/SNMP/Syslog/TACACS**.

Step 2 From the **Source Type** controls, click the desired type.

For this example, we use **Syslog** as the **Source Type**.

Step 3 From the **Monitoring Object** drop-down list, choose the object class that you want to monitor or that is associated with your fault code.

For a specific fault, choose the object class you used in Changing Fault Severity or Squelching a Fault in the Monitoring Policy, on page 19.

Step 4 Choose one of the following actions:

- To monitor an object class, select 'all' from the **Scope** controls.
- To monitor a specific fault, select 'specific fault' from the **Scope** controls, and choose your fault code in the **Fault** drop-down list.

Some object classes are associated with more than one fault code.

Step 5 At the far right edge of the grey bar immediately above the policy table, click **+** to create a monitoring source for the displayed **Monitoring Object**.

Step 6 In the **Create Syslog Source** dialog box, perform the following steps to configure the monitoring source:

Note For source types other than syslog, the configuration steps might be different.

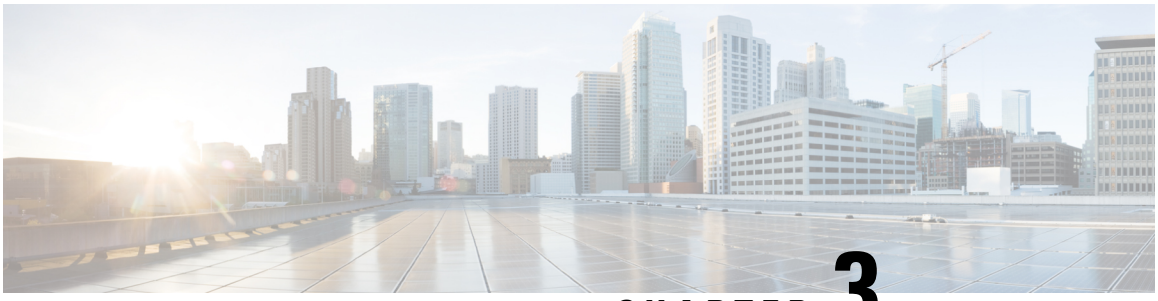
a) Type a **Name** for the source.
b) For **Min Severity**, choose the default severity level of the object class you are monitoring.

You can find the default severity level in the same source from which you found the associated object class.

c) For **Include**, check **Faults**.
d) For **Dest Group**, choose the destination group that will receive the monitoring messages.
e) Click **Submit**.

Step 7 To monitor additional object classes or fault codes, you must repeat these steps to create an additional syslog monitoring source policy for each object class or fault code.

If the additional fault code is associated with the same monitoring object class, you need only repeat from Step 4. If the additional fault code is associated with a different monitoring object class, repeat from Step 3. In addition, each fault code must be represented by a separate fault severity assignment policy.



CHAPTER 3

Events and Audit Logs

About Events

Note For detailed reference information about faults, events, errors, and system messages, see the *Cisco ACI System Messages Reference Guide* or the *Cisco APIC Management Information Model Reference*, which is a web-based application.

The Application Policy Infrastructure Controller (APIC) maintains a comprehensive, up-to-date run-time representation of the administrative and operational state of the Cisco Application Centric Infrastructure (ACI) fabric system in a collection of managed objects (MOs). Any configuration or state change in any MO is considered an event. Most events are part of the normal workflow and there is no need to record their occurrence or to bring them to the attention of the user unless they meet one of the following criteria:

- The event is defined in the model as requiring notification.
- The event follows a user action that is required to be auditable.

Event Objects and Logs

In the *Cisco APIC Management Information Model Reference*, the **event** package contains general event-related object classes, although some event types are found in other packages.

A loggable event is represented by an event record object, which is an immutable, stateless, and persistent MO created by the system to record the occurrence of a specific set of conditions at a given point in time. Although an event record MO is usually triggered by conditions in another MO, it is not contained by that MO but is contained in an event log.

Each new event record MO is added to one of three separate event logs, depending on the cause of the event:

- Audit log—Holds objects that are records of user-initiated events such as logins and logouts (`aaa:SessionLR`) or configuration changes (`aaa:ModLR`) that are required to be auditable.

- Health score log—Holds records of changes in the health score (`health:Record`) of the system or components.
- Event log—Holds records of other system-generated events (`event:Record`) such as link state transitions.

Each log collects and retains event records. An event MO remains in the log until it is purged when the log reaches capacity and space is needed for new event records. The retention and purge behavior for each log is specified in a record retention policy (`event:ARetP`) object associated with each log.

The creation of an event record object can also trigger the export of record details to an external destination by syslog, SNMP trap, or other methods.

Event Properties

The system provides detailed information about each event object. This table describes the event properties:

Property	Description
code	The event code.
id	The unique identifier assigned to the event.
affected	The MO associated with the event.
cause	The probable cause category (for example, transition).
trigger	The generating activity for the event (for example, user, operation, or session).
severity	The severity level of the event. Events are of severity level 'info.'
created	The day and time when the event occurred.
descr	The description of the event.

Event Life Cycle

APIC event MOs are stateless. An event MO created by the APIC is never modified or cleared. An event MO is deleted by the rotation of the event log as newer events are added and log space is needed.

Event Descriptions

The *Cisco APIC Management Information Model Reference*, a Web-based application, contains a list of events with descriptions and attributes. In the **Navigation** frame of the application, select the **Events** tab to view the event list.

This example shows an event description from the *Cisco APIC Management Information Model Reference*:

```
Event ifc:policymgr:user|creation||aaa:User|User $name$ created

Rule ID:7475

Raised on MO: aaa:User
Name: user_creation__aaa_User_User__name__created
Code: E4201779
Cause: transition
```

```
Severity: info
Trigger: USER
Message: User name created

Triggered By:
```

Viewing Events

Viewing Events Using the GUI

Logged events are presented in many places in the GUI, filtered to show only those events relevant to the current GUI context. Wherever a **History** tab appears in the GUI **Work** pane, you can view the relevant log entries from the event log, health log, or audit log. This procedure shows how to view Authentication, Authorization, and Accounting (AAA) events as an example.

Procedure

Step 1 In the menu bar, click **Admin**.
Step 2 In the submenu bar, click **AAA**.
Step 3 In the **Navigation** pane, choose **AAA Authentication**.
Step 4 In the **Work** pane, click the **History** tab.
Step 5 Under the **History** tab, click the **Events** subtab to view the event log.
Step 6 Under the **History** tab, click the **Audit Log** subtab to view the audit log.
Step 7 Double-click a log entry to view additional details about the event.

Viewing Events Using the API

In the *Cisco APIC Management Information Model Reference*, the **event** package contains the event-related object classes except for audit log classes, which are contained in the **aaa** package.

You can view events using the API query methods to search for specific system event MOs (`event:Record`) or audit log event MOs (`aaa:ModLR`). Every event MO contains a property (`affected`) that shows the DN of the affected MO.

This example shows how to view a Tenant object and the associated audit logs. The query asks for the audit logs for tenant 't6' and the response shows the log entry for creation of the tenant.

```
GET http://192.0.20.123/api/node/mo/uni/tn-t6.xml?rsp-subtree-include=audit-logs

RESPONSE:
<fvTenant
.
. [PROPERTIES TRUNCATED FOR READABILITY]
.
>
   <aaaModLR
     affected="uni/tn-t6"
```

```
    cause="transition"
    changeSet="name:t6"
    childAction=""
    code="E4206326"
    created="2014-07-24T03:01:54.440+00:00"
    descr="Tenant t6 created"
    id="4294968636"
    ind="creation"
    modTs="never"
    rn="mod-4294968636"
    severity="info"
    status=""
    trig="config"
    txId="576460752303423731"
    user="admin"/>
</fvTenant>
```

This example shows how to request all event logs associated to a tunnel interface object:

```
GET http://192.0.20.123/api/node/mo/topology/pod-1/node-1019/sys/tunnel-[tunnel7].xml
?rsp-subtree-include=event-logs
```

For detailed information about configuring the APIC REST API, see the *Cisco APIC REST API Configuration Guide*.

External Reporting of Events

The APIC can report events asynchronously to external systems through the following mechanisms:

- Syslog

Note Beginning with Cisco ACI 3.1(1) release, an enhancement is introduced to add the time accuracy by including the sub-second information in the timestamp field of the Syslog messages.

For example, the **Creation Time** now includes the milliseconds information, for example, (.817) in the Syslog output.

```
Here is an example:

Severity        : info
Affected Object : topology/pod-1/node-101/sys/hsrp/inst-default
Code            : E4210476
ID              : 4294970360
Cause           : admin-state-change
Description     : HSRP instance is administratively Enabled
Creation Time   : 2017-09-13T10:17:11.817-07:00
```

- Cisco Call Home
- API subscriptions
- SNMP
    - Beginning with Cisco APIC Release 1.2(1), the APIC controller supports SNMP for APIC-related events.

- SNMP messages for ACI leaf and spine switches are sent by the switches themselves, but APIC can configure SNMP trap destinations for SNMP traps sent by ACI switches.
- For a list of SNMP MIBs and traps supported by ACI, see the *Cisco ACI MIB Support List*.

For information on configuring external reporting, see the following documents:

- *Cisco APIC Troubleshooting Guide*
- *Cisco APIC REST API Configuration Guide*

Changing the Severity or Squelching an Event

Every APIC event has a default severity. In some circumstances, an event might be considered more or less severe than the default level. In some cases, you might want to ignore a particular event and squelch (suppress) it from appearing in event reports or status dashboards. APIC provides two locations from which you can change the severity of an event type:

- In a monitoring policy (beginning with Cisco APIC Release 3.2(1))
- Directly from the **Events** tab under a component in the APIC GUI (beginning with Cisco APIC Release 4.2(1))

Note When you change the severity or choose to ignore an event type, the change applies only to newly created events. Existing event records are not affected.

Changing Event Severity or Squelching an Event from the Events Tab

In the **Events** tab of an APIC GUI component, you can change the severity of a displayed event or you can suppress (squelch) it altogether.

Note The option to directly change the severity or squelch an event from a component **Events** tab was introduced in Cisco APIC Release 4.2(1).

Tip For squelching an event, we recommend using this procedure instead of the procedure described in Changing Event Severity or Squelching an Event in the Monitoring Policy, on page 28. This simple procedure eliminates the need to look up the event code or the relevant monitoring policy. We do recommend, however, that you remember which monitoring policy (by default, Tenant common, Fabric, or Access Monitoring default) is modified by the operation in case you want to unsquelch the event type at a later time. The affected monitoring policy is displayed when you select the **Ignore Event** action.

Procedure

Step 1 Navigate to the **Events** tab that currently displays an instance of the event.

Step 2 Choose one of the following actions:

- To change the severity of these events, right-click the row of the desired event code, select **Change Severity**, select the desired severity level, and click **Change Severity**.
- To prevent these events from appearing in event reports (squelching the event), right-click the row of the desired event code, select **Ignore Event**, then click **Ignore Event**.

With either of these actions, a dialog box appears in which you can confirm the selected action. In both cases, the dialog box displays the path to the **Affected Monitoring Policy**, which will be automatically modified as a result of the action. To undo the action later, you can navigate to this policy and manually modify it as described in Changing Event Severity or Squelching an Event in the Monitoring Policy, on page 28.

This change will be applied for all future events with this event code that occur as a result of the displayed **Affected Monitoring Policy**.

What to do next

When you squelch an event code, a squelch policy is automatically created and added to a monitoring policy. If you want the future event instances to appear again, you must locate and delete that squelch policy. Depending on the `monPolDn` property of the parent MO, the auto-created event squelch policy can be stored in the **Event Severity Assignment Policies** under one of the following:

- **Tenants > common > Policies > Monitoring > default**
- **Fabric > Access Policies > Policies > Monitoring > default**
- **Fabric > Fabric Policies > Policies > Monitoring > default**
- **Fabric > Fabric Policies > Policies > Monitoring > Common Policy**

If you have created and applied a non-default monitoring policy (not one of the four default policies mentioned above) to the parent MO that has the event code, you must access that non-default monitoring policy when you want to undo the squelch policy.

When you have located the squelch policy, follow the procedure in Changing Event Severity or Squelching an Event in the Monitoring Policy, on page 28 to delete the entry for the event code or change the severity to a setting other than **squelched**.

Changing Event Severity or Squelching an Event in the Monitoring Policy

You can change the severity of an event type or suppress (squelch) it altogether by modifying the **Event Severity Assignment Policies** in the monitoring policy.

Note The option to directly change the severity or squelch an event from a monitoring policy was introduced in Cisco APIC Release 3.2(1).

Procedure

Step 1 Navigate to the monitoring policy that is affected by the event.

Step 2 Expand the monitoring policy and select **Event Severity Assignment Policies**.

Step 3 From the **Monitoring Object** drop-down list, select the object that contains the event to be changed.

If the desired object does not appear in the list, follow these steps:

a) Click the pencil icon next to the list.
b) Check the box for the desired object.
c) Click **Submit** to add the object to the **Monitoring Object** list.

Step 4 In the task bar at the top of the policy table, click the + sign.

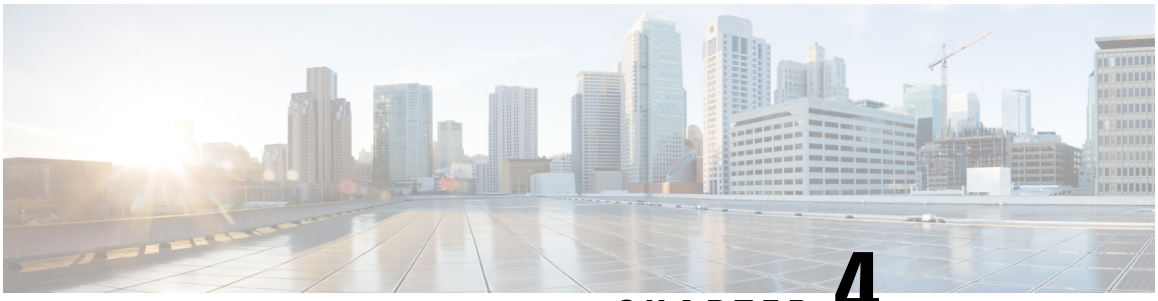
A form row appears in the table.

Step 5 Select the desired event code in the **Code** drop-down list.

Step 6 Select the desired severity level in the **Severity** drop-down list.

To prevent the event from appearing in event reports, select **squelched**.

Step 7 (Optional) To make a notation about the change, you can add a comment in the **Description** text box.



CHAPTER 4

System Messages

About System Messages

Note For detailed reference information about faults, events, errors, and system messages, see the *Cisco ACI System Messages Reference Guide* or the *Cisco APIC Management Information Model Reference*, which is a web-based application.

In addition to creating a log entry, a fault or event in APIC can trigger the sending of a system message. The system message typically contains a subset of information about the fault or event, and the message is sent by syslog, by an SNMP trap, or by a Cisco Call Home message.

Many system messages are specific to the action that a user is performing or the object that a user is configuring or administering. These messages can be the following:

- Informational messages, providing assistance and tips about the action being performed
- Warning messages, providing information about system errors related to an object, such as a user account or service profile, that the user is configuring or administering
- Finite state machine (FSM) status messages, providing information about the status of an FSM stage

A system message can contain one or more variables. The information that the APIC uses to replace these variables depends upon the context in which you see the message. Some messages can be generated by more than one type of condition.

Fault Syslogs

Fault-generated system messages are triggered by these mechanisms:

- A fault rule

- A threshold crossing
- A failure of a task or finite state machine (FSM) sequence

The fault-generated system messages are described in the *Cisco APIC Management Information Model Reference*, which is a web-based application. Under the **System Messages** navigation tab, select **Syslog Faults** or **Syslog FSM Transitions**.

Examples

This example shows a rule-based fault and the resulting system message generated by the fault:

```
Fault (rule-based): class=faultInst

mo (fault:Inst)

ack               no
cause             node-failed
changeSet         delayedHeartbeat (Old: no, New: yes), fabricSt (Old:
active, New: inactive)
childAction
code              F0110
created           2014-05-22T22:45:28.913+00:00
descr             Node 102 not reachable. unknown
dn                topology/pod-1/node-102/fault-F0110
domain            infra
highestSeverity   critical
lastTransition    2014-05-22T22:45:28.913+00:00
lc                soaking
occur             1
origSeverity      critical
prevSeverity      critical
rule              fabric-node-failed
severity          critical
status
subject           fabric-node
type              environmental
```

The following system message is generated by this fault:

```
syslog:
May 22 15:45:28 192.168.10.1 <1026> May 22 22:45:28 apic1
%LOG_LOCAL0-2-SYSTEM_MSG
[F0110][soaking][node-failed][critical][topology/pod-1/node-102/fault-F0110]
Node 102 not reachable. unknown
```

This example shows a threshold crossing fault and the resulting system message generated by the fault:

```
Fault (threshold crossing): class=faultInst

ack               no
cause             threshold-crossed
changeSet         normalizedLast:84
childAction
code              F41650
created           2014-05-22T21:17:33.849+00:00
descr             TCA: eqptTemp5min normalizedLast value 84 raised above threshold 80
dn                sys/ch/scslot-6/sc/sensor-1/fault-F41650
domain            infra
```

```
highestSeverity   critical
lastTransition    2014-05-22T22:50:55.012+00:00
lc                raised
occur             75
origSeverity      major
prevSeverity      cleared
rule              tca-eqpt-temp-normalized-last
severity          major
status
subject           counter
type              operational
```

The following system message is generated by this fault:

```
syslog:
May 22 15:49:54 192.168.10.102 <1027> May 22 22:49:54 spine1
%LOG_LOCAL0-3-SYSTEM_MSG
[F41650][raised][threshold-crossed][major][sys/ch/scslot-6/sc/sensor-1/fault-F41650]
TCA: eqptTemp5min normalizedLast value 84 raised above  threshold 80
```

Event Syslogs

Event-generated system messages are triggered by these mechanisms:

- An event rule
- An event in the NX-OS operating system of a leaf or spine switch

The event rule-generated system messages are described in the *Cisco APIC Management Information Model Reference*, which is a web-based application. Under the **System Messages** navigation tab, select **Syslog Events**.

The NX-OS operating system event messages are listed in the *Cisco ACI System Messages Reference Guide*.

Examples

This example shows a rule-based event record and the resulting system message generated by the event:

```
Event: class=eventRecord

mo:

affected     topology/pod-1/lnkcnt-1/lnk-101-1-1-to-1-1-3
cause        link-state-change
changeSet    linkState:ok, n1:101, n2:1, p1:1, p2:3, s1:1, s2:1
childAction
code         E4208219
created      2014-05-22T22:45:27.757+00:00
descr        Link State of Fabric Link is set to ok
dn           subj-[topology/pod-1/lnkcnt-1/lnk-101-1-1-to-1-1-3]/rec-4294968577
id           4294968577
ind          state-transition
modTs        never
severity     info
status
trig         oper
txId         1729382256910270971
```

```
user         internal
```

The following system message is generated by this event:

```
syslog:
May 22 15:45:27 192.168.10.1 <1030> May 22 22:45:27 apic1
%LOG_LOCAL0-6-SYSTEM_MSG
[E4208219][link-state-change][info][subj-[topology/pod-1/lnkcnt-1/lnk-101-1-1-to-1-1-3]/rec-4294968577]
Link State of Fabric Link is set to ok
```

This example shows an audit log event record and the resulting system message generated by the event:

```
Audit log: class=aaaModLR

mo

affected     uni/userext/user-nancy
cause        transition
changeSet    accountStatus:active, clearPwdHistory:no, email:nj@example.com,
             expiration:never, expires:no, firstName:Nancy, lastName:Johnson,
             name:nancy, pwdLifeTime:no-password-expire, unixUserId:15909
childAction
code         E4205213
created      2014-05-22T23:00:38.011+00:00
descr        User nancy created
dn           subj-[uni/userext/user-nancy]/mod-4294967339
id           4294967339
ind          creation
modTs        never
severity     info
status
trig         config
txId         9799832789158202025
user         admin
```

The following system message is generated by this event:

```
syslog:
May 22 16:00:40 192.168.10.1 <1030> May 22 23:00:40 apic1
%LOG_LOCAL0-6-SYSTEM_MSG
[E4205213][transition][info][subj-[uni/userext/user-nancy]/mod-4294967339]
User nancy created
```

System Message Structure

System messages have the following structure:

```
TIMESTAMP SOURCE %FACILITY-SEVERITY-MNEMONIC: Message-text
```

The fields in the message are as follows:

- TIMESTAMP

  The year, month, date, and time of day when the message was generated.

- SOURCE

The platform that sent the message, such as apic2 (for APIC messages) or nexus (for switch messages).

- FACILITY

  The facility code consists of two or more uppercase letters that indicate the facility to which the message refers. A facility can be a hardware device, a protocol, or a module of the system software.

- SEVERITY

  The syslog severity level is a single-digit code from 0 to 7 that reflects the severity of the condition. The lower the number, the more serious the situation. The syslog severity terminology differs from APIC severity terminology, which follows the ITU Perceived Severity values described in RFC5674.

  The following table lists the message severity levels along with the equivalent ITU values:

Severity Level	ITU Level	Description
0 – emergency		System is unusable
1 – alert	Critical	Immediate action required
2 – critical	Major	Critical condition
3 – error	Minor	Error condition
4 – warning	Warning	Warning condition
5 – notification	Indeterminate, Cleared	Normal but significant condition
6 – informational		Informational message only
7 – debugging		Message that appears during debugging only

- MNEMONIC

  The MNEMONIC code uniquely identifies the error message.

- Message-text

  Message-text is a text string that describes the condition. The text string sometimes contains detailed information about the event, including terminal port numbers, network addresses, or addresses that correspond to locations in the system memory address space. Because variable fields change from message to message, they are represented here by short strings enclosed in square brackets ([ ]). A decimal number, for example, is represented as [dec]. The following table lists the variable fields in messages:

Representation	Type of Information
[chars] or [char]	Character string
[dec]	Decimal
[hex]	Hexadecimal integer
[int]	Integer
[num]	Number

Examples

This example shows a typical system message:

```
2014 Jan 25 21:42:07 Nexus: ETHPORT-5-IF_DOWN_ADMIN_DOWN:
Interface Ethernet3/1 is down (Administratively down)
```

In this system message:

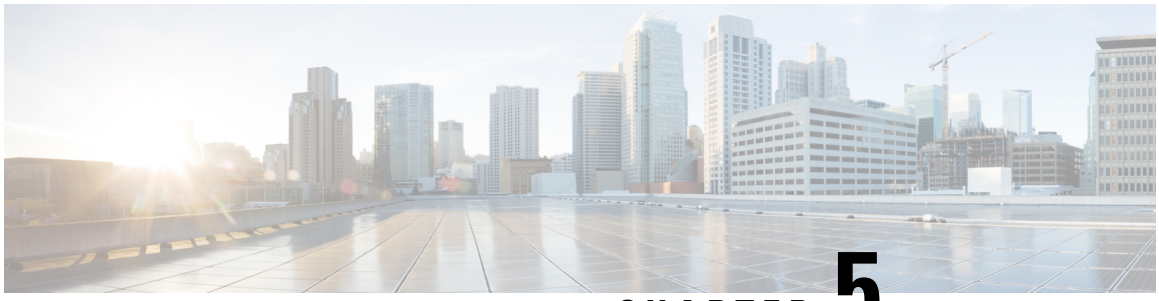
- Nexus indicates that the generating condition occurred in the NX-OS operating system of a switch.
- ETHPORT is the facility code.
- 5 is the severity level, indicating a notification message.
- IF_DOWN_ADMIN_DOWN is the mnemonic code.
- “Interface Ethernet3/1 is down (Administratively down)” is the message text.

This example shows a typical system message:

```
May 22 15:49:54 192.168.10.102 <1027> May 22 22:49:54 spine1
%LOG_LOCAL0-3-SYSTEM_MSG
[F41650][raised][threshold-crossed][major][sys/ch/scslot-6/sc/sensor-1/fault-F41650]
TCA: eqptTemp5min normalizedLast value 84 raised above threshold 80
```

In this system message:

- spine1 indicates that the generating condition occurred in a spine switch.
- LOG_LOCAL0 is the facility code.
- 3 is the severity level, indicating an error condition.
- SYSTEM_MSG is the mnemonic code.
- “[F41650][raised][threshold-crossed][major][sys/ch/scslot-6/sc/sensor-1/fault-F41650] TCA: eqptTemp5min normalizedLast value 84 raised above threshold 80” is the message text.



CHAPTER 5

Logs and Retention Policies

Log Retention Policies

The log retention policy specifies the retention and purge behavior of logs. The policy specifies the maximum history record count and the number of records to purge with a purge interval. Records are periodically purged to contain log growth. When the purge timer triggers, a number of records equal to the **Purge Window Size** are deleted if the number of records in the log is greater than the **Maximum Size**.

You can configure the following settings:

- **Maximum Size**—The maximum number of records to be maintained in the log. The range is 1000 to 500000 records; the default is 100000 records.
- **Purge Window Size**— The maximum number of records to be deleted in a single swipe. Record deletion is performed periodically (every 30 seconds) in batches. The maximum size of a batch should be chosen to avoid spikes in I/O and CPU utilization. The range is 100 to 1000 records; the default is 250 records.

Configuring Log Retention Policies in the GUI

Procedure

Step 1 For releases prior to the 4.2(1) release, perform the following substeps:

a) In the menu bar, choose **Admin** > **Historical Record Policies**.

b) In the **Navigation** pane, choose **Controller Policies**.

In the **Work** pane, retention policy settings appear for the following logs:

- Audit log
- Events log
- Fault Records log
- Health Records log

c) For the desired log, enter or adjust the **Maximum Size**.

d) For the desired log, enter or adjust the **Purge Window Size**.
e) Click **Submit**.
f) To configure log retention policies for the switches, right-click **Switch Policies** in the **Navigation** pane and choose the action to create the desired retention policy.

Step 2 For the 4.2(1) release and later, perform the following substeps:

a) To configure log retention policies for the controllers, on the menu bar, choose **System** > **Controllers**.
b) In the **Navigation** pane, choose **Retention Policies**.
c) In the **Work** pane, for the desired log, enter or adjust the **Maximum Size** and **Purge Window Size**.
d) Click **Submit**.
e) To configure log retention policies for the switches, right-click **Switch Policies** in the **Navigation** pane and choose the action to create the desired retention policy.
f) To configure a retention policy for the switches, on the menu bar, choose **Fabric** > **Fabric Policies**.
g) In the **Navigation** pane, expand **Policies** > **Switch**.
h) Right click **Audit Log Retention Policies**, **Health Retention Policies**, **Event Retention Policies**, or **Fault Retention Policies** depending on the desired policy and choose to create a policy.

   Prior to the 5.2(1) release, these are labeled as **Switch Audit Log Retention Policies**, **Switch Health Retention Policies**, **Switch Event Retention Policies**, and **Switch Fault Retention Policies**.

i) Enter values as appropriate in the "create" dialog, then click **Submit**.

Configuring Log Retention Policies in the REST API

For detailed information about configuring the APIC REST API, see the *Cisco APIC REST API Configuration Guide*.

This example shows how to configure the maximum log size and purge window size for the audit log, the event log, the fault log, and the health log:

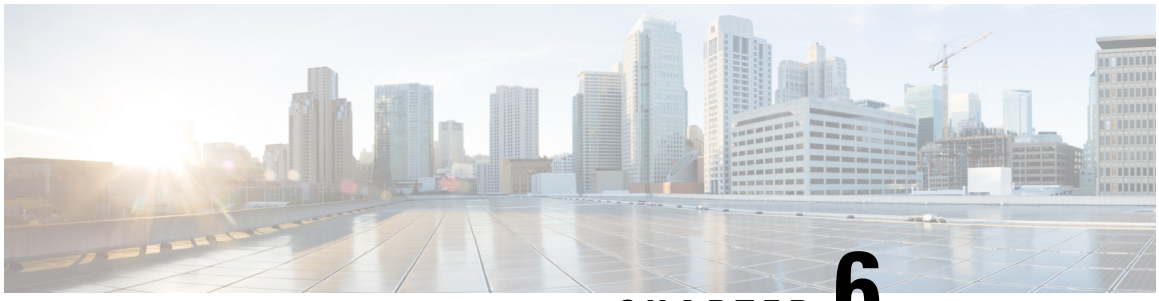
```
POST http://www.ExampleCorp.com/api/mo/uni/appliance.json

{
  "applianceInst": {
    "attributes": {
      "dn": "uni/appliance",
      "status": "modified"
    },
    "children": [{
      "aaaCtrlrRetP": {
        "attributes": {
          "dn": "uni/appliance/ifcaaaretp",
          "maxSize": "99999",
          "purgeWin": "250"
        },
        "children": []
      }
    },{
      "eventCtrlrRetP": {
        "attributes": {
          "dn": "uni/appliance/ifceretp",
          "maxSize": "99998",
          "purgeWin": "250"
        },
```

```
        "children": []
      }
    },{
      "faultCtrlrRetP": {
        "attributes": {
          "dn": "uni/appliance/ifcfretp",
          "maxSize": "99997",
          "purgeWin": "250"
        },
        "children": []
      }
    },{
      "healthCtrlrRetP": {
        "attributes": {
          "dn": "uni/appliance/ifchretp",
          "maxSize": "99996",
          "purgeWin": "250"
        },
        "children": []
      }
    }]
  }
}
```

The first section of the response is shown here, showing the fault log settings:

```
{
    "imdata": [{
        "applianceInst": {
            "attributes": {
                "childAction": "deleteNonPresent",
                "dn": "uni/appliance",
                "lcOwn": "local",
                "modTs": "2013-11-22T09:10:26.008+00:00",
                "monPolDn": "",
                "name": "",
                "replTs": "never",
                "status": "",
                "uid": "0"
            },
            "children": [{
                "faultCtrlrRetP": {
                    "attributes": {
                        "childAction": "deleteNonPresent",
                        "descr": "",
                        "lcOwn": "local",
                        "maxSize": "99997",
                        "modTs": "2013-11-23T08:54:54.601+00:00",
                        "monPolDn": "",
                        "name": "FaultCtrlrRetP",
                        "purgeWin": "250",
                        "replTs": "never",
                        "rn": "ifcfretp",
                        "status": "",
                        "uid": "0"
                    }
                }
            },
.
.
.
```



CHAPTER 6

Expected Output Errors

Expected Output Errors

Cisco Nexus hardware -EX, -FX1-3, and N93xxC can show output errors on internal interface counters and cause a fault (F119936) to be raised in ACI environments. As long as the output error counters under **show interface** remains unchanged, this is an expected behavior.

Also, note that the **show platform internal counters port** output error will increment. However, if checking the same port with **show interface**, the output error rate will not increment.

This section provides an example of the expected output errors.

```
module-1# show platform internal counters port 51
Stats for port 51
(note: forward drops includes sup redirected packets too)
IF          LPort                    Input                         Output
                                  Packets       Bytes          Packets     Bytes
eth-1/51    51  Total           669974   110547179       692398    194500094
                Unicast         112138    30292113       439809    161274739
                Multicast            0           0       251315     33075023
                Flood           261736    32880023         1274       150332
              Total Drops       296100                   261736
                Buffer               0                        0
                Error                0                   261736
                <...>
```

```
leaf-101# show interface ethernet 1/51
Ethernet1/51 is up
admin state is up, Dedicated Interface
  Hardware: 1000/10000/100000/40000 Ethernet, address: 0000.0000.0000 (bia a023.9f56.48f3)
  MTU 9366 bytes, BW 40000000 Kbit, DLY 1 usec
  reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, medium is broadcast
  Port mode is routed
  full-duplex, 40 Gb/s, media type is 40G
  FEC (forward-error-correction) : disable-fec
  Beacon is turned off
  Auto-Negotiation is turned on
  Input flow-control is off, output flow-control is off
  Auto-mdix is turned off
  Rate mode is dedicated
  Switchport monitor is off
  EtherType is 0x8100
```

Expected Output Errors

```
EEE (efficient-ethernet) : n/a
Last link flapped 1d14h
Last clearing of "show interface" counters never
1 interface resets
30 seconds input rate 4912 bits/sec, 3 packets/sec
30 seconds output rate 1944 bits/sec, 2 packets/sec
Load-Interval #2: 5 minute (300 seconds)
  input rate 3360 bps, 2 pps; output rate 10504 bps, 4 pps
L3 in Switched:
  ucast: 0 pkts, 0 bytes - mcast: 0 pkts, 0 bytes
L3 out Switched:
  ucast: 0 pkts, 0 bytes - mcast: 0 pkts, 0 bytes
RX
  352942 unicast packets  317417 multicast packets  0 broadcast packets
  670359 input packets  110608007 bytes
  8643 jumbo packets  0 storm suppression bytes
  0 runts  0 giants  0 CRC  0 no buffer
  0 input error  0 short frame  0 overrun   0 underrun  0 ignored
  0 watchdog  0 bad etype drop  0 bad proto drop  0 if down drop
  0 input with dribble  0 input discard
  0 Rx pause
TX
  417109 unicast packets  275682 multicast packets  0 broadcast packets
  692791 output packets  194559643 bytes
  7173 jumbo packets
  0 output error  0 collision  0 deferred  0 late collision
  0 lost carrier  0 no carrier  0 babble  0 output discard
  0 Tx pause
```

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