



Configuring Graceful Insertion and Removal

Graceful Insertion and Removal (GIR) provides an alternative method to minimize network service impact caused by device maintenance. GIR leverages redundant paths in the network to smoothly remove a device under maintenance, out of service, and insert it back to service when the maintenance is complete. This module describes the how to configure GIR.

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Restrictions for Graceful Insertion and Removal

GIR is supported for layer two interface shutdown and ISIS routing protocol. This is configured either by creating customized templates or without a template.

Information About Graceful Insertion and Removal

Overview

Graceful Insertion and Removal (GIR) isolates a switch from the network in order to perform debugging or an upgrade. When switch maintenance is complete, the switch will return to normal mode on either reaching the configured maintenance timeout, or by enabling the **stop maintenance** command.

A switch can be put into maintenance mode using default template or a custom template. The default template contains all the ISIS instances, along with **shut down l2**. In the custom template, you can configure the required ISIS instances and **shutdown l2** option. On entering maintenance mode, all participating protocols are isolated, and L2 ports are shut down. When normal mode is restored, all the protocols and L2 ports are brought back up.

Creating a maintenance mode template before you put the switch in maintenance mode is optional. The objective of maintenance mode for a device is to minimize traffic disruption at the time of removal from the network, as well as during the time of insertion. There are mainly three stages:

- Graceful removal of the node from network.
- Performing maintenance on the device.
- Graceful insertion into the network.

Snapshots are taken automatically while entering and exiting the maintenance mode. You can use the **snapshot create** *snapshot-name snapshot-description* command to capture and store snapshots for pre-selected features. Snapshots are useful to compare the state of a switch before it went into maintenance mode and after it came back to normal mode. The snapshot process consists of three parts:

- Creating a snapshot of the states of a few preselected features on the switch and storing them on the persistent storage media.
- Listing the snapshots taken at various time intervals and managing them.
- Comparing snapshots and showing the summary and details of each feature.

The maximum number of snapshots that may be stored on the switch is 10. You can use the command **snapshot delete** *snapshot-name* to delete a specific snapshot from the device.

Layer 2 Interface Shutdown

Layer 2 interfaces, such as ports on a switch, are shut down when the system is transitioning into maintenance mode. Layer 2 interfaces are shut down by using the **shutdown l2** (maintenance template configuration mode) command in the custom template.

Custom Template

The network administrator can create a template that will be applied when the system goes into maintenance mode. This allows the administrator to isolate specific protocols. All instances that need to be isolated must be explicitly specified.

The admin can create multiple templates with different configurations. However, only a single template will be applied to the maintenance mode CLI. Once applied, the template cannot be updated. If the template needs to be updated, then you must remove it, make the changes, and then re-apply.

How to Configure Graceful Insertion and Removal

Creating maintenance template

Procedure

	Command or Action	Purpose
Step 1	enable Example: <pre>> enable</pre>	Enables privileged EXEC mode. Enter your password if prompted.
Step 2	configure terminal Example: <pre># config t</pre>	Enters the global configuration mode.
Step 3	maintenance-template <i>template_name</i> Example: <pre>(config)# maintenance-template girl</pre>	Creates a template with the specified name. For example, see Examples: Creating customer profile.
Step 4	router <i>routing_protocol instance_id</i> shutdown 12 Example: <pre>(config-maintenance-templ)# router isis 1 (config-maintenance-templ)# shutdown 12</pre>	Creates instances that should be isolated under this template. <ul style="list-style-type: none"> • router: Configures routing protocols and associated instance id. • shutdown 12: Shuts down layer 2 interfaces.

Configuring System Mode Maintenance

Procedure

	Command or Action	Purpose
Step 1	enable Example: <pre>Device> enable</pre>	Enables privileged EXEC mode. Enter your password if prompted.
Step 2	configure terminal Example: <pre>Device# configure terminal</pre>	Enters the global configuration mode.
Step 3	system mode maintenance Example:	Enters system mode maintenance configuration mode.

	Command or Action	Purpose
	Device(config)# system mode maintenance	Different sub commands to create maintenance mode parameters are configured in this mode.
Step 4	timeout <i>timeout-value</i> template <i>template-name</i> failsafe <i>failsafe-timeout-value</i> on-reload reset-reason maintenance	<p>Configures maintenance mode parameters.</p> <ul style="list-style-type: none"> • timeout: Configures maintenance mode timeout period in minutes, after which the system automatically returns to normal mode. The default timeout value is never. • template: Configures maintenance mode using the specified template. • failsafe: Configures client-ack timeout value. <p>If the system is going into maintenance mode, it will continue to reach maintenance. If the system is exiting from maintenance mode, then it will reach normal mode.</p> <ul style="list-style-type: none"> • on-reload reset-reason maintenance: Configures the system such that when the system is reloaded it enters the maintenance mode. If it is not configured the system enters the normal mode when it is reloaded.

Starting and Stopping Maintenance Mode

Procedure

	Command or Action	Purpose
Step 1	enable Example: Device> enable	Enables privileged EXEC mode. Enter your password if prompted.
Step 2	start maintenance Example: Device# start maintenance	Puts the system into maintenance mode.
Step 3	stop maintenance Example: Device# stop maintenance	Puts the system back into normal mode.

Configuration Examples for Graceful Removal and Insertion

The following examples show the sequence followed to enable GIR during a maintenance window.

Example: Configuring maintenance template

Any protocol that is supported by GIR can be configured in the maintenance template. This example shows how to configure a maintenance template t1 with an ISIS routing protocol instance.

```
Device# config terminal
Device (config)# maintenance-template t1
Device (config-maintenance-templ)# router isis 1
```

This example shows how to configure a maintenance template t1 with shutdown 12.

```
Device# config terminal
Device (config)# maintenance-template t1
Device (config-maintenance-templ)# shutdown 12
```

Example: Configuring System Mode Maintenance

This example shows how to create a maintenance template and configure the maintenance mode parameters.

```
Device# configure terminal
Device(config)# system mode maintenance
Device(config-maintenance)# timeout 20
Device(config-maintenance)# failsafe 30
Device(config-maintenance)# on-reload reset-reason maintenance
Device(config-maintenance)# template t1
Device(config-maintenance)# exit
```

Example: Starting and Stopping the Maintenance Mode

This example shows how to put the system into maintenance mode.

```
Device# start maintenance
```

After the activity is completed, the system can be put out of maintenance mode.

This example shows how to put the system out of maintenance mode.

```
Device# stop maintenance
```

Example: Displaying System Mode Settings

This example shows how to display system mode settings using different options.

```
Device# show system mode
System Mode: Normal
```

```

Device# show system mode maintenance
  System Mode: Normal
  Current Maintenance Parameters:
  Maintenance Duration: 15(mins)
  Failsafe Timeout: 30(mins)
  Maintenance Template: t1
  Reload in Maintenance: False

Device# show system mode maintenance clients
  System Mode: Normal
  Maintenance Clients:
  CLASS-EGP
  CLASS-IGP
  router isis 1: Transition None
  CLASS-MCAST
  CLASS-L2

Device# show system mode maintenance template default
  System Mode: Normal
  default maintenance-template details:
  router isis 1
  router isis 2

Device# show system mode maintenance template t1
  System Mode: Normal
  Maintenance Template t1 details:
  router isis 1

```

Monitoring Graceful Insertion and Removal

Table 1: Privelege EXEC show commands

Command	Purpose
<code>show system mode [maintenance [clients template <i>template-name</i>]]</code>	Displays information about system mode.
<code>show system snapshots [dump <<i>snapshot-file-name</i>>]</code>	Displays all the snapshots present on the device. Using the keyword <code>dump</code> displays all snapshots in XML format.
<code>show system snapshots compare <i>snapshot-name1</i> <i>snapshot-name2</i></code>	Displays differences between snapshots taken before entering maintenance mode and after exiting from the maintenance mode.

Table 2: Global Troubleshooting Commands

Command	Purpose
<code>debug system mode maintenance</code>	Displays information for troubleshooting GIR feature.

Additional References for Graceful Insertion and Removal

Related Documents

Related Topic	Document Title
For complete syntax and usage information for the commands used in this chapter.	See the section of the

Feature History for Graceful Insertion and Removal

This table provides release and related information for features explained in this module.

These features are available on all releases subsequent to the one they were introduced in, unless noted otherwise.

Use Cisco Feature Navigator to find information about platform and software image support. To access Cisco Feature Navigator, go to <https://cfng.cisco.com>.

