



## Configuring Backhaul Manager

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This chapter describes how to configure the Backhaul Manager to monitor backhails in order to maximize backhaul uptime, and to take corrective behavior when a backhaul is down on the Cisco 1000 Series Connected Grid Routers (hereafter referred to as the Cisco CG-OS router).

This chapter includes the following sections:

- [Information About Backhaul Manager, page 5-1](#)
- [Prerequisites, page 5-2](#)
- [Guidelines and Limitations, page 5-2](#)
- [Default Settings, page 5-2](#)
- [Configuring Backhaul Manager, page 5-2](#)
- [syslog Events, page 5-6](#)
- [Verifying the Configuration, page 5-7](#)
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### Information About Backhaul Manager

When configured on the Cisco CG-OS router, the Backhaul Manager actively monitors the backhaul between the Cisco CG-OS router and the head-end router.

When a catastrophe affects the backhaul, the Backhaul Manager automatically initiates its configured policies to attempt to recover the backhaul. The first action taken is a reset of interfaces (such as cellular, WiMax, Ethernet) and tunnels on the backhaul. When a reset of the interfaces or tunnels does not restore the backhaul, then a reload of the Cisco CG-OS router occurs.

The following Backhaul Manager policies can be configured on all Cisco CG-OS router interfaces and tunnels.

- **Admin-state**—Ensures that the Cisco CG-OS router checks the admin-state of all interfaces and tunnels specified by the policy to determine if an administrator has mistakenly configured a shutdown of the interface. When the Cisco CG-OS software detects the shutdown down state, it generates an emergency level syslog event to alert the administrator of the interface or tunnel shutdown state. Using the CLI, the administrator can then enter the **no shutdown** command at the Interface command mode to resolve the issue.

- Backhaul flap—Defines thresholds for the number of allowed backhaul-down events (count) that can occur within a defined period (duration) on a backhaul before the Cisco CG-OS software generates a syslog event (see [syslog Events, page 5-6](#)).



**Note** To define actions to address the backhaul flap beyond reporting a syslog event, add those actions (such as backhaul rest or backhaul reload) to the script (see [Defining Backhaul Manager Applets, Track Objects and Scheduler Script, page 5-5](#)).

- Backhaul reset—Defines the period of time that a backhaul must be down before the Cisco CG-OS software resets specific interfaces or tunnels within the backhaul.
- Backhaul reload—When the backhaul does not recover after a backhaul reset and the backhaul remains down after the defined outage threshold expires, then the Cisco CG-OS router reloads. Additionally, this policy ensures that the threshold timer resets when a backhaul recovers before the threshold expires so that no reload of the Cisco CG-OS router occurs.

For detailed configuration steps and examples for the Backhaul Manager policies, see [Configuring Backhaul Manager, page 5-2](#).

## Prerequisites

The Backhaul Manager must be configured in the default VDC of the Cisco CG-OS router. No other VDCs are supported on the Cisco CG-OS router.

When you want to collect syslog events locally on the Cisco CG-OS router, you must enable syslog (see [Chapter 2, “Configuring System Message Logging”](#)).

Enable the Scheduler on the Cisco CG-OS router (see [Defining Backhaul Manager Applets, Track Objects and Scheduler Script, page 5-5](#)).

## Guidelines and Limitations

None.

## Default Settings

No preset values. The configuration examples indicate the recommended values.

## Configuring Backhaul Manager

This section includes the following topics:

- [Defining Event Manager Environments, page 5-3](#)
- [Defining Backhaul Manager Applets, Track Objects and Scheduler Script, page 5-5](#)

## Defining Event Manager Environments

Defines environment and threshold policies that the Backhaul Manager can execute to monitor or reset interfaces or tunnels (connections) within the backhaul or to reload the Cisco CG-OS router.

### BEFORE YOU BEGIN

Review the “[Information About Backhaul Manager](#)” section on page 5-1 and “[Prerequisites](#)” section on page 5-2.

### DETAILED STEPS

	Command	Purpose
Step 1	<code>configure terminal</code>	Enters global configuration mode.
Step 2	<code>event manager environment bh_iflist</code> {“interface slot/port”  “tunnel number”} ...[“interface slot/port”  “tunnel number”]	<p>Creates an environment variable named <b>bh_iflist</b>, that defines all the interfaces (such as cellular, Ethernet, or WiMax) or tunnels that the Backhaul Manager monitors (and resets, if necessary) within the backhaul that connects the Cisco CG-OS router and the head-end router.</p> <p><b>Note:</b> Cisco recommends that you list all active interfaces and tunnels within the backhaul. Both the interface type and slot/port number must be enclosed in quotations as well as the tunnel and tunnel number.</p> <p><b>Note:</b> Do not provide a space between the interface type and slot/port (such as “<b>cellular3/1</b>”). Likewise, define the tunnel and its number with no space (such as “<b>tunnel1</b>”).</p> <p><b>Note:</b> Environment variables have a length limit of 39 characters. To ensure that you can define as many backhaul lists as necessary, the Cisco CG-OS software allows you to define multiple <b>bh_iflists</b> such as <b>bh_iflist1</b>, <b>bh_iflist2</b>, <b>bh_iflist3</b>, and so on. Later, the Cisco CG-OS software concatenates the lists.</p>
Step 3	<code>event manager environment</code> <code>bh_flap_thresh_cnt value</code>	<p>Creates an environment variable named <b>bh_flap_thresh_cnt</b> that monitors the backhaul flaps on the Cisco CG-OS router and generates a backhaul-down syslog event when the backhaul-down events exceed the defined count (<b>cnt value</b>) within a certain duration.</p> <p><i>value</i>—Enter any numeric value; however, it must be enclosed with quotation marks.</p> <p><b>Note:</b> The <code>event manager environment</code> <b>bh_flap_thresh_duration</b> command in <a href="#">Step 4</a> defines the duration.</p>

	Command	Purpose
Step 4	<b>event manager environment</b> <b>bh_flap_thresh_duration</b> “ <i>value</i> ”	Defines the maximum period of time (in mins) that a backhaul can remain down before the Cisco CG-OS software generates a backhaul-down syslog event.  <i>value</i> —Enter any numeric value; however, it must be enclosed with quotation marks.
Step 5	<b>event manager environment</b> <b>bh_down_reset_thresh</b> “ <i>value</i> ”	Creates an environment variable named <b>bh_down_reset_thresh</b> that defines the maximum allowed backhaul outage (in mins) before the Cisco CG-OS software resets defined interfaces and tunnels on the backhaul.  <i>value</i> —Enter any numeric value; however, it must be enclosed with quotation marks.  <b>Note:</b> The <b>event manager environment bh_iflist</b> command in <a href="#">Step 6</a> defines which interfaces and tunnels the Cisco CG-OS software resets.
Step 6	<b>event manager environment bh_iflist</b> { “ <i>interface slot/port</i> ”   “ <i>tunnel number</i> ” } ...[ “ <i>interface slot/port</i> ”   “ <i>tunnel number</i> ” ]	Creates an environment variable named <b>bh_iflist</b> that defines the interfaces and tunnels that the Cisco CG-OS software resets when the <b>bh_down_reset_thresh</b> value set in <a href="#">Step 5</a> is exceeded.
Step 7	<b>event manager environment</b> <b>bh_down_reload_thresh</b> “ <i>value</i> ”	Creates an environment variable named <b>bh_down_reload_thresh</b> that defines the maximum allowed backhaul outage (in mins) before the Cisco CG-OS software reloads the Cisco CG-OS router.  <i>value</i> —Enter any numeric value; however, it must be enclosed with quotation marks.
Step 8	<b>copy running-config startup-config</b>	(Optional) Saves this configuration change.

**EXAMPLE**

This example shows how to configure the supported Backhaul Manager policies to monitor the backhaul between the Cisco CG-OS router and a head-end router.

```
router# configure terminal
router (config)# event manager environment bh_iflist "cellular3/1 wimax5/1"
router (config)# event manager environment bh_iflist1 "tunnel10 tunnel20"
router (config)# event manager environment bh_flap_thresh_cnt "10"
router (config)# event manager environment bh_flap_thresh_duration "120"
router (config)# event manager environment bh_down_reset_thresh "360"
router (config)# event manager environment bh_down_reload_thresh "720"
router (config)# copy running-config startup-config
```

## Defining Backhaul Manager Applets, Track Objects and Scheduler Script

The script reads and applies all the defined event manager environments each time it is invoked by either the scheduler or an event manager environment variable.

**BEFORE YOU BEGIN**

Define all the event manager environments listed in the [Defining Event Manager Environments](#) section.

**DETAILED STEPS**

At the Cisco CG-OS router command-line prompt, enter the following commands.

**Note**

For more details on the commands and their syntax, refer to the [Command Lookup Tool](#) on Cisco.com.

To define the router to monitor (in this case the loopback address of the head-end router), enter the following commands.

```
router(config)# track 1 ip route 20.0.0.1/32 reachability
router(config-track)# delay down 120
router(config-track)# delay up 120
router(config-track)# exit
router(config)# event manager environment bhmgr_track_obj_instance "1"
```

To define the objects to track and report backhaul up and down states, enter the following commands.

```
router(config)# event manager applet bhmgrbhdwn
router(config-applet)# event track 1 state down
router(config-applet)# action 1.0 syslog priority critical msg Backhaul is down
router(config-applet)# action 2.0 cli tclsh bootflash:bhmgr.tcl bhmgr_process_bh_down
router(config-applet)# action 3.0 cli command maximum-timeout
router(config-applet)# exit
router(config)# event manager applet bhmgrbhup
router(config-applet)# event track 1 state up
router(config-applet)# action 1.0 syslog priority errors msg Backhaul is up
router(config-applet)# action 2.0 cli tclsh bootflash:bhmgr.tcl bhmgr_process_bh_up
router(config-applet)# action 3.0 cli command maximum-timeout
router(config-applet)# exit
```



**Note** Object tracking ignores any intermediate state changes before the delay timer expires. The address specified in the **ip route** command is the loopback address of the head-end router and the *delay up* and *down* values are noted in seconds.

To define a job (a set of commands or tcl script) to be executed on a regular schedule enter the following commands.

```
router(config)# feature scheduler
router(config)# scheduler job name bhmgr_monitor
router(config-job)# tclsh bootflash:/bhmgr.tcl bhmgr_monitor
router(config-job)# exit
router(config)# scheduler schedule name bhmgr_monitor_schedule
router(config-job)# job name bhmgr_monitor
router(config-job)# time start now repeat 10
router(config-job)# exit
```

## syslog Events

System message logging allows you to configure the destination device of the system messages and to filter system messages by severity level. For more information on the syslog, see [Configuring System Message Logging](#).

Listed below is an example of the critical events reported to the syslog when a backhaul down condition occurs.

```
2012 Jan 6 17:07:31 cgr1000ca %$ VDC-1 %$ %EEM_ACTION-2-CRIT: bhmgr: Backhaul i/f tunnel1
is admin down. Pl *no shut* it immediately.

2012 Jan 6 17:20:07 cgr1000 %$ VDC-1 %$ %EEM_ACTION-2-CRIT: bhmgr: Backhaul is down

2012 Jan 6 17:21:44 cgr1000 %$ VDC-1 %$ %EEM_ACTION-2-CRIT: bhmgr: 3 mins to BH Reset

2012 Jan 6 17:21:44 cgr1000 %$ VDC-1 %$ %EEM_ACTION-2-CRIT: bhmgr: 8 mins to RELOAD

2012 Jan 6 17:23:46 cgr1000 %$ VDC-1 %$ %EEM_ACTION-2-CRIT: bhmgr: 1 mins to BH Reset

2012 Jan 6 17:23:46 cgr1000 %$ VDC-1 %$ %EEM_ACTION-2-CRIT: bhmgr: 6 mins to RELOAD

2012 Jan 6 17:25:48 cgr1000 %$ VDC-1 %$ %EEM_ACTION-2-CRIT: bhmgr: BH Reset policy hit

2012 Jan 6 17:25:59 cgr1000 %$ VDC-1 %$ %EEM_ACTION-2-CRIT: bhmgr: 4 mins to RELOAD

2012 Jan 6 17:28:01 cgr1000 %$ VDC-1 %$ %EEM_ACTION-2-CRIT: bhmgr: 2 mins to RELOAD

2012 Jan 6 17:30:03 cgr1000 %$ VDC-1 %$ %EEM_ACTION-2-CRIT: bhmgr: 0 mins to RELOAD

2012 Jan 6 17:32:05 cgr1000 %$ VDC-1 %$ %EEM_ACTION-0-EMERG: BH RELOAD policy hit.
Performing reload in 30 seconds
```

## Verifying the Configuration

To display event manager configuration information, enter the following commands.

Command	Purpose
<b>show event manager environment</b> [ <i>variable-name</i>   <b>all</b> ]	Displays information about the event manager environment variables.
<b>show logging logfile   grep -i bhmgr</b>	Displays all the logged syslog events for the Backhaul Manager.

### EXAMPLE

Information similar to the information below displays when you enter the **show event manager environment all** command.

```
router (config)# show event manager environment all
bh_down_reload_thresh : 720
bh_down_reset_thresh : 360
bh_flap_thresh_cnt : 10
bh_flap_thresh_duration : 120
bh_iflist : cellular3/1 wimax5/1
bh_iflist1 : tunnel10 tunnel20
bhmgr_track_obj_instance : 1
```

## Configuration Example

To configure the Backhaul Manager policies to monitor the backhaul between the Cisco CG-OS router and a head-end router, enter the following commands.

```
router# configure terminal
router (config)# event manager environment bh_iflist "cellular3/1 wimax5/1"
router (config)# event manager environment bh_iflist1 "tunnel10 tunnel20"
router (config)# event manager environment bh_flap_thresh_cnt "10"
router (config)# event manager environment bh_flap_thresh_duration "120"
router (config)# event manager environment bh_down_reset_thresh "360"
router (config)# event manager environment bh_down_reload_thresh "720"
router (config)# copy running-config startup-config
```

After defining the Backhaul Manager policies, enter the following commands to define the script.

```
router(config)# track 1 ip route 20.0.0.1/32 reachability
router(config-track)# delay down 120
router(config-track)# delay up 120
router(config-track)# exit
router(config)# event manager environment bhmgr_track_obj_instance "1"
router(config)# event manager applet bhmgrbhdwn
router(config-applet)# event track 1 state down
router(config-applet)# action 1.0 syslog priority critical msg Backhaul is down
router(config-applet)# action 2.0 cli tclsh bootflash:bhmgr.tcl bhmgr_process_bh_down
router(config-applet)# action 3.0 cli command maximum-timeout
router(config-applet)# exit
router(config)# event manager applet bhmgrbhup
router(config-applet)# event track 1 state up
router(config-applet)# action 1.0 syslog priority errors msg Backhaul is up
router(config-applet)# action 2.0 cli tclsh bootflash:bhmgr.tcl bhmgr_process_bh_up
router(config-applet)# action 3.0 cli command maximum-timeout
router(config-applet)# exit
router(config)# feature scheduler
router(config)# scheduler job name bhmgr_monitor
router(config-job)# tclsh bootflash:/bhmgr.tcl bhmgr_monitor
router(config-job)# exit
router(config)# scheduler schedule name bhmgr_monitor_schedule
router(config-job)# job name bhmgr_monitor
router(config-job)# time start now repeat 10
router(config-job)# exit
```

## Feature History

**Table 5-1** Feature History for Backhaul Manager

Feature Name	Release	Feature Information
Backhaul Manager	Cisco CG-OS Release CG1(1)	Initial support of the feature on the CGR 1000 Series Routers.