



# Sun Cluster Geographic Edition Reference Manual

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# Preface

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The *Sun Cluster Geographic Edition System Reference Manual* provides reference information for commands, functions, and other public interfaces in Sun™ Cluster Geographic Edition software. This book is intended for experienced system administrators with extensive knowledge of Sun software and hardware. This book is not to be used as a planning or presales guide. The information in this book assumes knowledge of the Solaris™ Operating System and expertise with the volume manager software that is used with Sun Cluster software.

Both novice users and those familiar with the Solaris Operating System can use online man pages to obtain information about their SPARC® based system and its features.

A man page is intended to answer concisely the question “What does this command do?” The man pages in general comprise a reference manual. They are not intended to be a tutorial.

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## Overview

The following contains a brief description of each man page section and the information it references:

- Section 1 describes, in alphabetical order, commands available with the operating system.
- Section 1M describes, in alphabetical order, commands that are used chiefly for system maintenance and administration purposes.
- Section 2 describes all of the system calls. Most of these calls have one or more error returns. An error condition is indicated by an otherwise impossible returned value.
- Section 3 describes functions found in various libraries, other than those functions that directly call UNIX® system primitives, which are described in Section 2.

- Section 4 outlines the formats of various files. The C structure declarations for the file formats are given where applicable.
- Section 5 contains miscellaneous documentation such as character-set tables.
- Section 6 contains available games and demos.
- Section 7 describes various special files that refer to specific hardware peripherals and device drivers. STREAMS software drivers, modules, and the STREAMS-generic set of system calls are also described.
- Section 9 provides reference information that is needed to write device drivers in the kernel environment. This section describes two device driver interface specifications: the Device Driver Interface (DDI) and the Driver/Kernel Interface (DKI).
- Section 9E describes the DDI/DKI, DDI-only, and DKI-only entry-point routines a developer can include in a device driver.
- Section 9F describes the kernel functions available for use by device drivers.
- Section 9S describes the data structures that drivers use to share information between the driver and the kernel.

The following is a generic format for man pages. The man pages of each manual section generally follow this order, but include only needed headings. For example, if no bugs can be reported, no BUGS section is included. See the `intro` pages for more information and detail about each section, and `man(1)` for general information about man pages.

NAME	This section gives the names of the commands or functions that are documented, followed by a brief description of what they do.				
SYNOPSIS	<p>This section shows the syntax of commands or functions. If a command or file does not exist in the standard path, its full path name is shown. Options and arguments are alphabetized, with single-letter arguments first, and options with arguments next, unless a different argument order is required.</p> <p>The following special characters are used in this section:</p> <table> <tr> <td>[ ]</td><td>Brackets. The option or argument that is enclosed in these brackets is optional. If the brackets are omitted, the argument must be specified.</td></tr> <tr> <td>. . .</td><td>Ellipses. Several values can be provided for the previous argument, or the previous argument can be specified multiple times, for example, "filename . . .".</td></tr> </table>	[ ]	Brackets. The option or argument that is enclosed in these brackets is optional. If the brackets are omitted, the argument must be specified.	. . .	Ellipses. Several values can be provided for the previous argument, or the previous argument can be specified multiple times, for example, "filename . . .".
[ ]	Brackets. The option or argument that is enclosed in these brackets is optional. If the brackets are omitted, the argument must be specified.				
. . .	Ellipses. Several values can be provided for the previous argument, or the previous argument can be specified multiple times, for example, "filename . . .".				

		Separator. Only one of the arguments separated by this character can be specified at a time.
	{ }	Braces. The options and/or arguments enclosed within braces are interdependent. All characters within braces must be treated as a unit.
PROTOCOL		This section occurs only in subsection 3R and indicates the protocol description file.
DESCRIPTION		This section defines the functionality and behavior of the service. Thus it describes concisely what the command does. DESCRIPTION does not discuss OPTIONS or cite EXAMPLES. Interactive commands, subcommands, requests, macros, and functions are described under USAGE.
IOCTL		This section appears on pages in Section 7 only. Only the device class that supplies appropriate parameters to the <code>ioctl(2)</code> system call is called <code>ioctl</code> and generates its own heading. <code>ioctl</code> calls for a specific device are listed alphabetically (on the man page for that specific device). <code>ioctl</code> calls are used for a particular class of devices. All these calls have an <code>io</code> ending, such as <code>mtio(7I)</code> .
OPTIONS		This section lists the command options with a concise summary of what each option does. The options are listed literally and in the order in which they appear in the SYNOPSIS section. Possible arguments to options are discussed under the option, and where appropriate, default values are supplied.
OPERANDS		This section lists the command operands and describes how they affect the actions of the command.
OUTPUT		This section describes the output—standard output, standard error, or output files—generated by the command.
RETURN VALUES		If the man page documents functions that return values, this section lists these values and describes the conditions under which they are returned. If a function can return only constant values, such as 0 or -1, these values are listed in tagged paragraphs.

	<p>Otherwise, a single paragraph describes the return values of each function. Functions that are declared void do not return values, so they are not discussed in RETURN VALUES.</p>
ERRORS	<p>On failure, most functions place an error code in the global variable <code>errno</code> that indicates why they failed. This section lists alphabetically all error codes a function can generate and describes the conditions that cause each error. When more than one condition can cause the same error, each condition is described in a separate paragraph under the error code.</p>
USAGE	<p>This section lists special rules, features, and commands that require in-depth explanations. The subsections that are listed here are used to explain built-in functionality:</p> <ul style="list-style-type: none"> <li>Commands</li> <li>Modifiers</li> <li>Variables</li> <li>Expressions</li> <li>Input Grammar</li> </ul>
EXAMPLES	<p>This section provides examples of usage or of how to use a command or function. Wherever possible, a complete example, which includes command-line entry and machine response, is shown. Whenever an example is given, the prompt is shown as <code>example%</code>, or if the user must be superuser, <code>example#</code>. Examples are followed by explanations, variable substitution rules, or returned values. Most examples illustrate concepts from the SYNOPSIS, DESCRIPTION, OPTIONS, and USAGE sections.</p>
ENVIRONMENT VARIABLES	<p>This section lists any environment variables that the command or function affects, followed by a brief description of the effect.</p>
EXIT STATUS	<p>This section lists the values the command returns to the calling program or shell and the conditions that cause these values to be returned. Usually, zero is returned for successful completion, and values other than zero are returned for various error conditions.</p>



FILES	This section lists all file names that are referred to by the man page, files of interest, and files created or required by commands. Each file name is followed by a descriptive summary or explanation.
ATTRIBUTES	This section lists characteristics of commands, utilities, and device drivers by defining the attribute type and its corresponding value. See <code>attributes(5)</code> for more information.
SEE ALSO	This section lists references to other man pages, Sun documentation, and third-party publications.
DIAGNOSTICS	This section lists diagnostic messages with a brief explanation of the condition that caused the error.
WARNINGS	This section lists warnings about special conditions that could seriously affect your working conditions. WARNINGS is not a list of diagnostics.
NOTES	This section lists additional information that does not belong elsewhere on the page. NOTES covers points of special interest to the user. Critical information is never covered here.
BUGS	This section describes known bugs and, wherever possible, suggests workarounds.



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## geoadm(1M)

<b>NAME</b>	geoadm – enable or disable the Sun Cluster Geographic Edition infrastructure on the local cluster
<b>SYNOPSIS</b>	<p>Checking whether the Sun Cluster Geographic Edition infrastructure is enabled on the local cluster.</p> <pre><b>geoadm show</b></pre> <p>Enabling the Sun Cluster Geographic Edition infrastructure on the local cluster.</p> <pre><b>geoadm start</b></pre> <p>Displaying the runtime status of the Sun Cluster Geographic Edition entities on the local cluster.</p> <pre><b>geoadm status</b></pre> <p>Disabling the Sun Cluster Geographic Edition infrastructure on the local cluster.</p> <pre><b>geoadm stop</b> [--cleanup] [--force]</pre> <pre><b>geoadm stop</b> [-c] [-f]</pre> <p>Displaying version information.</p> <pre><b>geoadm --version</b></pre> <pre><b>geoadm -V</b></pre> <p>Displaying help information.</p> <pre><b>geoadm --help</b></pre> <pre><b>geoadm -?</b></pre>
<b>DESCRIPTION</b>	<p>The <code>geoadm</code> command enables or disables the Sun Cluster Geographic Edition infrastructure on the local cluster. This command can also be used to check whether the Sun Cluster Geographic Edition software is enabled on the cluster.</p> <p>After installation, the Sun Cluster Geographic Edition product must be enabled by using the command <code>geoadm start</code>. This command enables the cluster to participate in partnerships and to host protection groups. The <code>geoadm start</code> command configures the highly available infrastructure that unlocks the Sun Cluster Geographic Edition module on the cluster.</p> <p>The <code>geoadm stop</code> command stops the highly available infrastructure that leaves the Sun Cluster Geographic Edition module locked on the cluster. Use the <code>geoadm stop</code> command before removing product packages.</p> <p><b>Note</b> – The <code>geoadm stop</code> command can successfully disable the Sun Cluster Geographic Edition module on a cluster only under one condition All local states of the protection groups in which the cluster is involved must be <code>Offline</code> or <code>Unknown</code>.</p> <p>Running the <code>geoadm start</code> or the <code>geoadm stop</code> command on one node of the cluster affects the entire cluster.</p>

To use the `geoadm` command to enable or disable the Sun Cluster Geographic Edition infrastructure, you must be assigned the proper role-based access control (RBAC) rights profile.

If you have root access, you have permissions to perform any operation. If you do not have root access, the following RBAC rights apply:

- **Basic Solaris User.** You can read information about Sun Cluster Geographic Edition entities by using commands such as `geoadm list`, `geohb list`, and `geops list`.
- **Geo Management.** You can perform all the read operations that someone with Basic Solaris User access can perform. You can also perform administrative and configuration tasks such as `geohb add`, `geopg switchover`, `geoadm start`, and `geoadm stop`.

For more information, see the `rbac(5)` man page and “Sun Cluster Geographic Edition Software and RBAC” in *Sun Cluster Geographic Edition System Administration Guide*.

## SUBCOMMANDS

Subcommands specify the actions the command that performs. Only one subcommand is allowed on the command line.

The following subcommands are supported:

<code>show</code>	Displays whether the Sun Cluster Geographic Edition software is enabled on the cluster.
<code>start</code>	Configures and enables the Sun Cluster Geographic Edition infrastructure on the cluster.
<code>status</code>	<p>Displays the runtime status of the Sun Cluster Geographic Edition entities on the local cluster.</p> <p>The Sun Cluster Geographic Edition software must be installed on the local cluster before you can use the <code>status</code> subcommand. You can use the <code>status</code> subcommand whether or not the cluster has been enabled for partnership.</p> <p>The <code>status</code> subcommand displays the following information:</p> <ul style="list-style-type: none"> <li>■ Whether the local cluster is enabled for partnership.</li> <li>■ Whether the local cluster is involved in a partnership. If the cluster is involved in a partnership, the <code>status</code> subcommand lists all partnership members.</li> <li>■ Heartbeat status.</li> <li>■ Protection group status.</li> <li>■ Status of ongoing transactions.</li> </ul> <p>See the EXTENDED DESCRIPTION section for details about the possible values for each status.</p>
<code>stop</code>	Disables the Sun Cluster Geographic Edition infrastructure and configuration on the cluster.

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	<p><b>Caution</b> – All protection groups on the cluster must be in the <code>Offline</code> state to successfully use the <code>stop</code> subcommand.</p> <p>The <code>stop</code> subcommand removes the cluster state and Sun Cluster Geographic Edition infrastructure resource groups on the cluster, but the <code>stop</code> subcommand does not remove data replication resource groups.</p> <p>The Sun Cluster Geographic Edition infrastructure is enabled and configured again the first time you use the <code>start</code> subcommand after using the <code>stop</code> subcommand.</p>				
<b>OPTIONS</b>	<p>The following options are supported:</p> <p><code>-c   --cleanup</code> Specifies that the cluster should clean up the overall Sun Cluster Geographic Edition configuration. Cleaning up the configuration enables a cluster to restart with an empty configuration.</p> <p><b>Caution</b> – The <code>--cleanup</code> option removes the configuration for the Sun Cluster Geographic Edition entities such as partnerships, protection groups, and heartbeats from the cluster. If you enable the cluster again by using the <code>geoadm start</code> command, you must define new user-entity configuration information.</p> <p>If you do not use the <code>--cleanup</code> option, the configuration tables of the entities that you have defined remain on the cluster.</p> <p><code>-f   --force</code> Indicates that you want to bypass the command confirmation questions while the Sun Cluster Geographic Edition infrastructure is being disabled.</p> <p><code>-v   --version</code> Displays version information. This option stops interpretation of subsequent arguments.</p> <p><code>-?   --help</code> Displays help information. This option stops interpretation of subsequent arguments.</p> <p>The question mark might be interpreted as a special character by some shells. Use quotes (<code>"?"</code>) or an escape character to avoid pattern-matching.</p>				
<b>EXTENDED DESCRIPTION</b>	<p>The following sections list the status descriptions.</p>				
<b>Partnership Status</b>	<p>Partnership status displays status for the local cluster only. The partnership status can be one of the following:</p> <table><tr><td>OK</td><td>The partner clusters are connected.</td></tr><tr><td>Error</td><td>The partner clusters are disconnected.</td></tr></table>	OK	The partner clusters are connected.	Error	The partner clusters are disconnected.
OK	The partner clusters are connected.				
Error	The partner clusters are disconnected.				
<b>Synchronization Status</b>	<p>Synchronization status displays status for all the clusters in a partnership. The partnership synchronization status can be one of the following:</p>				

	OK	The configuration is synchronized between partner clusters.
	Error	The configuration on the partner clusters is different. You must synchronize the partnership again.
	Mismatch	The partner clusters have been configured individually. Therefore, you must delete the configuration on one cluster and copy the configuration of the partner cluster.
	Unknown	Information is not accessible because the partners are disconnected.
<b>Heartbeat Status</b>	Heartbeat status displays status for a single cluster only. The heartbeat status can be one of the following:	
	OK	Heartbeat monitoring is running, and the partner cluster is responding within timeout and retry periods.
	Error	Heartbeat monitoring is running, but the partner cluster is not responding and retries have timed out.
	Offline	Heartbeat monitoring is not running.
<b>Heartbeat Plug-in Status</b>	Heartbeat plug-in status displays status for a single cluster only. The heartbeat plug-in status can be one of the following:	
	OK	The partner cluster is responding.
	Inactive	The plug-in is not in use. It is a standby plug-in that is used for retrying if other plug-ins do not respond.
	No-Response	The partner cluster is not responding.
<b>Protection Group Status</b>	Protection group status displays the overall status for all the clusters in the protection group. The overall protection group status can be one of the following:	
	OK	The protection group is online, application resource groups are online, and data replication is running.
	Offline	The protection group is inactive.
	Degraded	The protection group and the application resource groups are online, but data replication is either not running or is in partial error state.
	Error	The protection group is online, but at least one component of the partnership, such as configuration, data replication, or resource groups, is in an error state.
	Unknown	The protection group is online, but the status for at least one component of the partnership, such as configuration, data replication, or resource groups, is unknown.

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**Configuration Status**

Protection group configuration status displays the status for a single cluster only. The protection group configuration status can be one of the following;

OK	The protection group configuration has been validated without errors on the cluster.
Error	The validation of the protection group configuration resulted in error. You must validate the protection group again.
Unknown	Information is not accessible because the partner clusters are disconnected.

**Data Replication Status**

Data replication status displays the status of data replication that has been configured for the protection group on a single cluster. The protection group data replication status can be one of the following;

OK	Data replication is configured, online, and running without errors.
Degraded	Data replication is either off or in a partial error state.
Error	Data replication is not operating because of an error.
None	Data replication has not been configured.
Unknown	Information is not accessible because the partners are disconnected.

**Resource Groups Status**

Resource group status displays the status of resource groups that have been configured for the protection group on a single cluster. The protection group resource group status can be one of the following;

OK	All resource groups are online on the primary cluster, and all resource groups are offline or unmanaged on the secondary cluster.
Error	Not all resource groups are online on the primary cluster, or not all resource groups are offline or unmanaged on the secondary cluster.
Unknown	Information is not accessible because the partners are disconnected.

**EXIT STATUS**

The following exit values are returned:

0	The command completed successfully.
nonzero	An error has occurred.

**ATTRIBUTES**

See `attributes(5)` for descriptions of the following attributes.

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Architecture	SPARC
Availability	SUNWscgctl



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ATTRIBUTE TYPE	ATTRIBUTE VALUE
Interface Stability	Evolving

**SEE ALSO** rbac(5), geohb(1M), geopg(1M), geops(1M)

geohb(1M)

NAME	geohb – configure and manage the heartbeat mechanism
SYNOPSIS	<p>Associating a new plug-in to a heartbeat.</p> <pre><b>geohb add-plugin</b> <i>heartbeat-name plugin-name</i> [--property <i>property-setting</i> [–property...]</pre> <pre><b>geohb add-plugin</b> <i>heartbeat-name plugin-name</i> -p <i>property-setting</i> [-p...]</pre> <p>Creating a heartbeat mechanism.</p> <pre><b>geohb create</b> <i>heartbeat-name</i> --remote-cluster <i>cluster-list</i> [–property <i>property-setting</i>] [–property...]</pre> <pre><b>geohb create</b> <i>heartbeat-name</i> -r <i>cluster-list</i> [-p <i>property-setting</i>] [-p...]</pre> <p>Deleting a heartbeat.</p> <pre><b>geohb delete</b> <i>heartbeat-name</i></pre> <p>Printing heartbeat configuration.</p> <pre><b>geohb list</b> <i>heartbeat-name</i> ...</pre> <p>Changing the configuration on a heartbeat or heartbeat plug-in.</p> <pre><b>geohb modify-plugin</b> <i>heartbeat-name plugin-name</i> --property <i>property-setting</i> [–property...]</pre> <pre><b>geohb modify-plugin</b> <i>heartbeat-name plugin-name</i> -p <i>property-setting</i> [-p...]</pre> <p>Removing a heartbeat plug-in.</p> <pre><b>geohb remove-plugin</b> <i>heartbeat-name plugin-name</i></pre> <p>Changing the properties of a heartbeat.</p> <pre><b>geohb set-prop</b> <i>heartbeat-name</i> --property <i>property-setting</i> [–property...]</pre> <pre><b>geohb set-prop</b> <i>heartbeat-name</i> [-p <i>property-setting</i>] [-p...]</pre> <p>Printing version information.</p> <pre><b>geohb</b> --version</pre> <pre><b>geohb</b> -V</pre> <p>Displaying help information.</p> <pre><b>geohb</b> --help</pre> <pre><b>geohb</b> -?</pre>
DESCRIPTION	<p>The geohb command enables you to configure and manage the heartbeat mechanism.</p> <p>A heartbeat is a monitor between two clusters: a requester cluster and a responder cluster. Creating a partnership establishes two heartbeats, one in each direction. For example, a partnership between a primary cluster, <i>cluster-paris</i>, and a secondary</p>

cluster, cluster-newyork, contains two heartbeats. One heartbeat has cluster cluster-paris as the requester and cluster cluster-newyork as the responder. The other heartbeat has cluster cluster-newyork as the requester and cluster cluster-newyork as the responder.

The Sun Cluster Geographic Edition software provides a default heartbeat mechanism that is based on the TCP/UDP plug-in as the primary source and the ping plug-in as backup. The geohb command enables you to configure and maintain heartbeats. You can perform the following tasks:

- Configuring a heartbeat between clusters that participate in a partnership. Configuring a heartbeat includes the configuration of associated plug-ins.
- Creating or deleting a heartbeat setting.
- Adding, modifying, and removing plug-ins that are associated with a heartbeat setting.
- Retrieving the current configuration of a heartbeat and its associated plug-ins.

Use the geohb command on a cluster that has been enabled for partnership.

To use the geohb command to configure and manage the heartbeat mechanism, you must be assigned the proper role-based access control (RBAC) rights profile.

If you have root access, you have permissions to perform any operation. If you do not have root access, the following RBAC rights apply:

- **Basic Solaris User.** You can read information about Sun Cluster Geographic Edition entities by using commands such as geoadm list, geohb list, and geops list.
- **Geo Management.** You can perform all the read operations that someone with Basic Solaris User access can perform. You can also perform administrative and configuration tasks such as geohb add, geopg switchover, geoadm start, and geoadm stop.

For more information, see the rbac(5) man page and “Sun Cluster Geographic Edition Software and RBAC” in *Sun Cluster Geographic Edition System Administration Guide*.

To create a heartbeat that is named paris-to-newyork, use the following:

```
# geohb create paris-to-newyork -r cluster-newyork
```

To create a heartbeat plug-in that is named command1, use the following:

```
# geohb add paris-to-newyork -g command1 -p Query_cmd=/usr/bin/hb/
```

## SUBCOMMANDS

Subcommands specify the actions that are performed by the command. Only one subcommand is allowed on the command line.

The following subcommands are supported:

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add-plugin	Associates a heartbeat with a plug-in. If you specify a custom plug-in, you must also specify the path to your custom plug-in command by using the <code>Query_cmd</code> property.
create	Creates a heartbeat. You can monitor heartbeat status by using the <code>geoadm(1M)</code> command. You must configure the remote cluster to make the heartbeat operational.
delete	Deletes a heartbeat.
list	Displays existing configuration information.
modify-plugin	Modifies heartbeat plug-in properties.
remove-plugin	Removes a heartbeat plug-in.
set-prop	Modifies heartbeat properties.

**OPTIONS** The following options are supported:

*heartbeat-name*

Specifies an identifier for the heartbeat setting on the local cluster. If you are trying to create a new heartbeat, and the specified identifier already exists, the `geohb create` command fails.

`-p property-setting | --property property-setting`

Specifies the properties of a heartbeat or heartbeat plug-in.

A heartbeat property is assigned a value by using a *name=statement* pair. Multiple properties might be set at one time by using multiple statements.

The value for these properties are assigned at creation and tunable at runtime.

See the EXTENDED DESCRIPTION section for currently defined properties.

*plugin-name*

Specifies the name of the heartbeat plug-in.

`-r cluster-list | --remote-cluster cluster-list`

Specifies the name of a remote cluster with which the local cluster should establish heartbeat monitoring.

`-V | --version`

Displays version information. This option stops interpretation of subsequent arguments.

`-? | --help`

Displays help information. This option stops interpretation of subsequent arguments.

The question mark might be interpreted as a special character by some shells. Use quotes (`- " ? "`) or an escape character to avoid pattern-matching.

**EXTENDED DESCRIPTION**

The following sections list the heartbeat and heartbeat plug-in properties.

**Heartbeat Properties**

You can specify the following heartbeat property:

`Query_interval`

Specifies the delay in seconds between heartbeat status requests. The plug-in will enter emergency mode if three `Query_interval` periods pass without response. The plug-in times out and goes into error mode if a further `Query_interval` period passes with no response.

Optional property.

Type: Integer.

Tuning recommendations: The value of this property is assigned at creation and tunable at runtime.

Default value: 120 seconds.

**Heartbeat Plug-in Properties**

Heartbeat plug-in properties determine how a heartbeat functions.

`Plugin_properties`

Specifies a property string that is specific to the plug-in.

Optional property.

Type: String.

Tuning recommendations: The value of this property is assigned at creation and tunable at runtime.

Default value: None except for heartbeats that use the default heartbeat plug-ins, `tcp_udp_plugin` and `ping-plugin`.

For the `tcp_udp_plugin` plug-in, the format of this string is predefined as

*remote\_IP\_address*/UDP/8765 [/ipsec], *remote\_IP\_address*/TCP/8765 [/

The *remote\_IP\_address* argument specifies the IP address of the partner cluster. The optional /ipsec string indicates that the plug-in uses IPsec.

For the `ping-plugin`, the format of this string is predefined as *remote\_IP\_address*, where *remote\_IP\_address* specifies the IP address of the partner cluster.

`Query_cmd`

Specifies the path to the command for a heartbeat status request.

Required property if the plug-in does not specify a predefined plug-in.

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		<p>Type: String.</p> <p>Tuning recommendations: The value of this property is assigned at creation and tunable at runtime.</p> <p>Default value: None.</p>
	Requester_agent	<p>Specifies the absolute path to requester agent.</p> <p>Optional property.</p> <p>Type: String.</p> <p>Tuning recommendations: The value of this property for the default plug-in should not be tuned except for testing purposes.</p> <p>Default value: None.</p>
	Responder_agent	<p>Specifies the absolute path to the responder agent.</p> <p>Optional property.</p> <p>Type: String.</p> <p>Tuning recommendations: The value of this property for the default plug-in should not be tuned except for testing purposes.</p> <p>Default value: None.</p>
	Type	<p>Specifies the type of plug-in. Set to either Primary or Backup.</p> <p>Required property.</p> <p>Type: Enum.</p> <p>Tuning recommendations: The value of this property is assigned at creation and tunable at runtime.</p> <p>Default value: None, except for heartbeats with default heartbeat name ping_plugin. In this case, the default value is Backup.</p>
EXIT STATUS	The following exit values are returned:	
	0	The command executed successfully, indicating that the remote cluster is alive.
	nonzero	An error has occurred, meaning that the remote cluster did not respond to the heartbeat check.

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**ATTRIBUTES** See attributes(5) for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Architecture	SPARC
Availability	SUNWscgctl
Interface Stability	Evolving

**SEE ALSO** rbac(5), geops(1M)

## geopg(1M)

<b>NAME</b>	geopg – create or manage protection groups
<b>SYNOPSIS</b>	<p>Adding a data-replication disk device group.</p> <pre><b>geopg add-device-group</b> <i>protection-group-name device-group-name</i> [<i>--property property-setting</i>] [<i>--property...</i>]</pre> <pre><b>geopg add-device-group</b> <i>protection-group-name device-group-name</i> <i>-p property-setting</i> [<i>-p...</i>]</pre> <p>Adding a resource group to a protection group.</p> <pre><b>geopg add-resource-group</b> <i>protection-group-name resource-group</i> <b>geopg add-resource-group</b> <i>protection-group-name resource-group</i></pre> <p>Creating a protection group.</p> <pre><b>geopg create</b> <i>protection-group-name --partnership partnership-name</i> <i>--role local-role</i> [<i>--datarep-type data-replication-type</i>] [<i>--property property-setting</i>] [<i>--property...</i>]</pre> <pre><b>geopg create</b> <i>protection-group-name -s partnership-name -o local-role</i> [<i>-d data-replication-type</i>] [<i>-p property-setting</i>] [<i>-p...</i>]</pre> <p>Deleting a protection group.</p> <pre><b>geopg delete</b> <i>protection-group-name</i></pre> <p>Creating a local configuration for a protection group that has already been created on the partner cluster.</p> <pre><b>geopg get</b> [<i>protection-group-name</i>] <i>--partnershippartnership-name</i> <b>geopg get</b> [<i>protection-group-name</i>] <i>-spartnership-name</i></pre> <p>Printing the protection group configuration.</p> <pre><b>geopg list</b> [<i>protection-group-name</i>] [<i>...</i>]</pre> <p>Changing the configuration of a data-replication disk device group.</p> <pre><b>geopg modify-device-group</b> <i>protection-group-name</i> <i>--device-group device-group-name --property property-setting</i> [<i>--property...</i>]</pre> <pre><b>geopg modify-device-group</b> <i>protection-group-name -i device-group-name</i> <i>-p property-setting</i> [<i>-p...</i>]</pre> <p>Removing a data-replication disk device group.</p> <pre><b>geopg remove-device-group</b> <i>--device-group device-group-name</i> <b>geopg remove-device-group</b> <i>-i device-group-name</i></pre> <p>Removing resource groups from a protection group.</p> <pre><b>geopg remove-resource-group</b> <i>--rg-name resource-group</i></pre>



```
geopg remove-resource-group -r resource-group
```

Changing the configuration of a protection group.

```
geopg set-prop protection-group-name --property property-setting
  [--property...]
```

```
geopg set-prop protection-group-name -p property-setting [-p...]
```

Activating a protection group.

```
geopg start protection-group-name --scope <local | global>
  [--nodatarep]
```

```
geopg start protection-group-name -e <local | global> [-n]
```

Deactivating a protection group.

```
geopg stop protection-group-name --scope [ [local] | [global]]
  [--only-datarep]
```

```
geopg stop protection-group-name -e [ [local] | [global]] [-D]
```

Switching over the role of a protection group.

```
geopg switchover --primary new-primary-cluster-name {protection-group-name}
  [--force]
```

```
geopg switchover -m new-primary-cluster-name {protection-group-name} [-f]
```

Forcing a cluster to assume the primary role.

```
geopg takeover [--force] protection-group-name
```

```
geopg takeover [-f] protection-group-name
```

Resynchronizing a protection group.

```
geopg update protection-group-name
```

Validating a protection group.

```
geopg validate protection-group-name
```

Printing version information.

```
geopg --version
```

```
geopg -V
```

Printing help information.

```
geopg --help
```

```
geopg -?
```

**DESCRIPTION** The geopg command enables you to configure and maintain protection groups. You can perform the following tasks:

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- Configuring a protection group between clusters that participate in a partnership. This task includes the configuration of associated data replication parameters.
- Adding or removing resource groups and data-replication disk device groups.
- Adding, modifying, and removing data replication parameters that are associated with a protection group setting.
- Retrieving the current configuration of a specific protection group or all defined protection groups.
- Activating a protection group.
- Deactivating a protection group.
- Switching over the role of a protection group.
- Taking over the primary role of a protection group.

Before you can create a protection group, the clusters that will be hosting the protection group must already be in a partnership.

To use the `geopg` command to create, modify, or delete a protection group, or a data-replication disk device group, you must be assigned the proper role-based access control (RBAC) rights profile.

If you have root access, you have permissions to perform any operation. If you do not have root access, the following RBAC rights apply:

- **Basic Solaris User.** You can read information about Sun Cluster Geographic Edition entities by using commands such as `geoadm list`, `geohb list`, and `geops list`.
- **Geo Management.** You can perform all the read operations that someone with Basic Solaris User access can perform. You can also perform administrative and configuration tasks such as `geohb add`, `geopg switchover`, `geoadm start`, and `geoadm stop`.

For more information, see the `rbac(5)` man page and “Sun Cluster Geographic Edition Software and RBAC” in *Sun Cluster Geographic Edition System Administration Guide*.

## SUBCOMMANDS

Subcommands specify the actions that are performed by the command. Only one subcommand is allowed on the command line.

The following subcommands are supported:

`add-device-group` Enables a data-replication disk device group to be part of a protection group.

If the data-replication disk device group you are adding is online, then the protection group must also be online before you add the data-replication disk device group. The `geopg add-device-group` command fails when a protection group is offline and the data-replication disk device group that is being added is online.

	<p><b>Note</b> – If a protection group has already been started at the time that you add a data-replication disk device group that is offline, the data-replication disk device group remains offline. To start the offline data-replication disk device group, use the command <code>geopg switchover -m</code>.</p>
add-resource-group	<p>Enables an application resource group to be part of a protection group.</p> <p>If the resource group you are adding is online, then the protection group must also be online before you add the resource group. The <code>geopg add</code> command fails when a protection group is offline and the resource group that is being added is online.</p> <p><b>Note</b> – If a protection group has already been started at the time that you add a resource group that is offline, the resource group remains offline. To start the offline resource group, use the command <code>geopg switchover -m</code>.</p>
create	<p>Creates a protection group or creates a data-replication disk device group.</p> <p>When you create a protection group, the management module updates the local configuration and notifies remote clusters of configuration changes.</p>
delete	<p>Deletes a protection group.</p>
get	<p>Creates the local configuration for a protection group that has already been created on a partner cluster.</p> <p>The configuration of an existing protection group gets propagated to the partner cluster that hosts the protection group if the partner clusters are connected. If you create a protection group while partner clusters are disconnected or before the partner has joined the partnership, you must use the <code>geopg get</code> command to propagate the configuration.</p>
list	<p>Displays the following information about the protection group:</p> <ul style="list-style-type: none"> <li>■ Defined protection groups</li> <li>■ Resource groups that are wrapped into protection groups</li> <li>■ Operation status information</li> </ul>
modify-device-group	<p>Modifies the properties of a data-replication disk device group.</p>
remove-device-group	<p>Removes data-replication disk device groups from a protection group.</p> <p>Removing a data-replication device group does not stop data replication or change the data-replication status for that data-replication device group.</p>

remove-resource	<p>Removes resource groups from a protection group.</p> <p>Removing an application resource group does not change the application resource group to the <code>Offline</code> state.</p>
set-prop	Modifies the properties of a protection group.
start	<p>Activates a protection group. After the subcommand is activated, the role of the protection group on a cluster is the role you assigned to the cluster when you configured the protection group.</p> <p>You can activate a protection group on the following levels:</p> <ul style="list-style-type: none"> <li>■ On all clusters where the protection group has been configured.</li> <li>■ Only on the primary cluster of the protection group. The secondary cluster remains inactive.</li> <li>■ Only on the secondary cluster of the protection group, after the primary cluster has been activated.</li> </ul> <p>Activation of a protection group enables the following events to occur:</p> <ul style="list-style-type: none"> <li>■ The protection group configuration can be validated.</li> <li>■ Clusters can determine whether an operation has been completed.</li> <li>■ Data replication can be started.</li> <li>■ Protected applications can be started.</li> <li>■ If the partner can be reached, the partner cluster can be notified of the protection group activation.</li> </ul>
stop	<p>Deactivates a protection group. You can deactivate a protection group on the following levels:</p> <ul style="list-style-type: none"> <li>■ On all clusters where the protection group has been configured.</li> <li>■ On the primary cluster of the protection group only. The secondary cluster remains active.</li> <li>■ On the secondary cluster of the protection group only, after the primary cluster has been deactivated.</li> </ul>
switchover	Switches the assigned role of a cluster in the protection group.
takeover	<p>Forces a cluster to become the <code>PRIMARY</code> cluster without considering the partner cluster state.</p> <p>After successful completion of the <code>geopg takeover</code> command, reactivating the protection group on the secondary cluster might require data recovery and actions to synchronize data.</p> <p><b>Note</b> – When possible, use the <code>geopg switchover</code> command instead of the <code>geopg takeover</code> command to coordinate between partner clusters to avoid loss of replicated data.</p>

	Use the <code>geopg takeover</code> command only in situations that require a new primary urgently. The situation must justify a loss of data and repairing and the time required to reactivate the protection group on the secondary cluster.
update	Resynchronizes the configuration information of the local protection group with the partner's configuration information.
validate	Validates a protection group on the local cluster by performing a sanity check of the dynamic values.
<b>OPTIONS</b>	<p>The following options are supported:</p> <p><code>-D   --only-datarep</code> Specifies that only the data replication should be deactivated, leaving the protection group active. If you do not use this option, the entire protection group is deactivated. To stop a protection group that has already had its data replication subsystem stopped, you must run the <code>geopg stop</code> command again and omit this option.</p> <p><code>-d data-replication-type   --datarep-type data-replication-type</code> Specifies the data replication mechanism for data replication between the clusters of the protection group.</p> <p>The <i>data-rep-type</i> must be one of the following strings:</p> <p><code>truecopy</code> Specifies that the data replication mechanism is Hitachi TrueCopy. This product works with Command and Control Interface RAID-Manager/Solaris Version 01-10-03/02, which requires Sun StorEdge™ 9970/9980 Array or Hitachi Lightning 9900 Series storage hardware.</p> <p><code>avs</code> Specifies that the data replication mechanism is Sun Availability Suite Remote Mirror Release 3.2, with patches.</p> <p><code>-e &lt;local global&gt;   --scope &lt;local global&gt;</code> Specifies whether the command operates only on the local cluster (<i>local</i>) or on both clusters where the protection group has been configured (<i>global</i>).</p> <p><code>-f   --force</code> Forces the command to perform the operation without asking the user for confirmation.</p> <p><code>-i device-group-name   --device-group device-group-name</code> Specifies the name of the disk device group that is to be created.</p> <p><code>-m new-primary-cluster   --primary new-primary-cluster</code> Specifies the name of the cluster that is to be the primary cluster for the protection group.</p> <p><code>-n   --nodatarep</code> Specifies that data replicaiton should not be used for this protection group. If this option is omitted, data replication starts at the same time as the protection group.</p>

## geopg(1M)

- o *local-role* | --role *local-role*  
Specifies the role of the local cluster as either PRIMARY or SECONDARY when used with the create subcommand. You can change the role of a cluster by using the geopg switchover command.
- p *property-setting* | --property *property-setting*  
Sets the properties of a protection group.  
  
A protection group property is assigned a value by using a *name=statement* pair statement. You can set multiple properties one time by using multiple statements.  
  
See the EXTENDED DESCRIPTION section for defined properties.
- protection-group-name*  
Specifies the name of the protection group. The create subcommand fails if the protection group that is specified with this option already exists. The modify subcommand fails if the specified protection group is not valid.
- r *resource-group* | --rg-name *resource-group*  
Specifies a comma-separated list of resource groups to add to the protection group when used with the add subcommand. The specified resource groups must already be defined.  
  
The protection group must be online before you add a resource group. The geopg add command fails when a protection group is offline and the resource group that is being added is online.  
  
**Note** – If a protection group has already been started at the time that you add a resource group, the resource group remains offline. You must start the resource group manually by using the geopg switchover command.
- s *partnership-name* | --partnership *partnership-name*  
Specifies the name of the partnership that includes the cluster on which this protection group can be activated.
- V | --version  
Displays version information. This option stops interpretation of subsequent arguments.
- ? | --help  
Displays help information. This option stops interpretation of subsequent arguments.  
  
The question mark might be interpreted as a special character by some shells. Use quotes (" ? ") or an escape character to avoid pattern-matching.

### EXTENDED DESCRIPTION

The following tables list the properties. The values of these properties are assigned at creation. The property values, such as true and false, are *not* case sensitive. Specific information about when you can tune the properties is provided in the property description.

#### General Protection Group Properties

Description	Describes the protection group when used in creating a protection group.
-------------	--

	Optional property.
	Type: string.
	Default value: none.
	Tuning recommendations: Assigned at creation and tunable at runtime.
RoleChange_ActionCmd	Specifies the absolute path to the executable command to run when the primary cluster of the protection group changes. This path should be valid on all partner clusters that host the protection group.
	Optional property.
	Type: string.
	Default value: none.
	Tuning recommendations: Assigned at creation and tunable at runtime.
RoleChange_ActionArgs	Specifies a string that follows system-defined arguments at the end of the command line when the role-change callback command runs.
	Optional property.
	Type: string.
	Default value: none.
	Tuning recommendations: Assigned at creation and tunable at runtime.
Timeout	Specifies the timeout period for the protection group in seconds.
	Used in creating a protection group only.
	Optional property.
	Type: Integer. A minimum value of at least 20 is required.
	Default value: 200 seconds.
	Tuning recommendations: Assigned at creation and tunable at runtime.

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**Sun Availability  
Suite Properties**

Data Replication Property: `Nodelist`

Lists the hostnames of the machines that can be primary for the replication mechanism. This list is comma delimited.

Optional property.

Type: string array.

Tuning recommendations: You can tune this property only when the protection group is offline.

Default value: empty.

Device Group Property: `Enable_volume_set`

Defines whether the volume sets that are defined in the file are enabled. Set to either `True` or `False` (case insensitive).

Optional property.

Type: Boolean.

Tuning recommendations: You cannot tune this property after it has been successfully validated during creation, replication, or synchronization.

Default value: `False`.

Device Group Property: `Local_logical_host`

Defines the local logical hostname that is used for the replication of the disk device group. Do not use an underscore (`_`) character in the logical hostname.

Required property.

Type: string.

Tuning recommendations: You cannot tune this property after it has been successfully validated during creation, replication, or synchronization.

Default value: none.

Device Group Property: `Remote_logical_host`

Defines the remote logical hostname that is used for the replication of the disk device group.

Required property.

Type: string.

Tuning recommendations: You cannot tune this property after it has been successfully validated during creation, replication, or synchronization.

Default value: none.

**Hitachi TrueCopy  
Data Replication  
Type Properties**

Data Replication Property: `Cluster_dgs`

Lists the disk device groups where the data is written. The list is comma delimited.



Optional property.

Type: string array.

Tuning recommendations: You can tune this property only when the protection group is offline.

Default value: empty.

Data Replication Property: `Nodelist`

Lists the hostnames of the machines that can be primary for the replication mechanism. This list is comma delimited.

Optional property.

Type: string array.

Tuning recommendations: You can tune this property at any time.

Default value: empty.

Device Group Property: `Fence_level`

Defines the fence level that is used by the disk device group. The fence level determines the level of consistency among the primary and secondary volumes for that disk device group. Possible values are `data`, `status`, `never`, and `async`.

You can set this property to any valid `Fence_level` when the current pair state is `SMPL`.

Required property.

Type: enum.

Tuning recommendations: You can tune this property only when the protection group is offline. For a Hitachi TrueCopy device group, if the pair has already been created, this property can be set only to the current `Fence_level` of the pair. If you want to change the `Fence_level` of an already existing pair, modify it by using the Hitachi TrueCopy CCI commands first, then tune the property to the new `Fence_level`.

Default value: none.

**EXIT STATUS** The following exit values are returned:

0	The command executed successfully.
nonzero	An error has occurred.

geopg(1M)

**ATTRIBUTES**

See `attributes(5)` for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Architecture	SPARC
Availability	SUNWscgctl
Interface Stability	Evolving

**SEE ALSO**

`rbac(5)`, `geops(1M)`

NAME	geops – create, configure, and manage partnerships between clusters
SYNOPSIS	<p>Creating a partnership between the local cluster and remote clusters.</p> <pre><b>geops create</b> --cluster <i>remote-partner-cluster-name</i> <i>partnership-name</i>   [--heartbeat-name <i>heartbeat-name</i>]   [--property <i>property-setting</i> [, ...]]</pre> <pre><b>geops create</b> -c <i>remote-partner-cluster-name</i> <i>partnership-name</i> [-h <i>heartbeat-name</i>]   [-p <i>property-setting</i> [, ...]]</pre> <p>Joining a partnership.</p> <pre><b>geops join-partnership</b> <i>remote-cluster-name</i> <i>partnership-name</i>   [--heartbeat-name <i>heartbeat-name</i>]</pre> <pre><b>geops join-partnership</b> <i>remote-cluster-name</i> <i>partnership-name</i>   [-h <i>heartbeat-name</i>]</pre> <p>Leaving a partnership.</p> <pre><b>geops leave-partnership</b> <i>partnership-name</i></pre> <p>Printing partnership configuration information.</p> <pre><b>geops list</b> <i>partnership-name</i></pre> <p>Modifying partnership properties.</p> <pre><b>geops set-prop</b> <i>partnership-name</i> --property <i>property-setting</i> [, ...] <b>geops set-prop</b> <i>partnership-name</i> -p <i>property-setting</i> [, ...]</pre> <p>Resynchronizing a partnership.</p> <pre><b>geops update</b> <i>partnership-name</i></pre> <p>Printing version information.</p> <pre><b>geops</b> --version <b>geops</b> -V</pre> <p>Displaying help information.</p> <pre><b>geops</b> --help <b>geops</b> -?</pre>
DESCRIPTION	<p>The geops command enables you to create, configure, and manage the partnerships that are defined between clusters. A partnership is a pair of clusters that define a cluster infrastructure on which an application might be protected against disaster.</p> <p>A partnership requires a running heartbeat between clusters. Partner clusters monitor each other with heartbeats.</p>

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The Sun Cluster Geographic Edition software notifies all remote partners of changes in the partnership configuration.

Use the `geops` command on a cluster that has been enabled for partnership.

To use the `geops` command to create, configure, and manage the partnerships, you must be assigned the proper role-based access control (RBAC) rights profile.

If you have root access, you have permissions to perform any operation. If you do not have root access, the following RBAC rights apply:

- **Basic Solaris User.** You can read information about Sun Cluster Geographic Edition entities by using commands such as `geoadm list`, `geohb list`, and `geops list`.
- **Geo Management.** You can perform all the read operations that someone with Basic Solaris User access can perform. You can also perform administrative and configuration tasks such as `geohb add`, `geopg switchover`, `geoadm start`, and `geoadm stop`.

For more information, see the `rbac(5)` man page and “Sun Cluster Geographic Edition Software and RBAC” in *Sun Cluster Geographic Edition System Administration Guide*.

## SUBCOMMANDS

Subcommands specify the actions that are performed by the command. Only one subcommand is allowed on the command line.

The following subcommands are supported:

<code>create</code>	Creates a partnership between the local cluster and a remote cluster.
<code>join-partnership</code>	Enables the local cluster to join an existing partnership.  Using the <code>geops join-partnership</code> command on a cluster that is already a member of a partnership causes the partnership configuration from the remote cluster to overwrite the partnership configuration of the local cluster.  If the remote partner cluster is down, modifications to the local cluster might not be propagated to the remote partner cluster.
<code>leave-partnership</code>	Removes the local cluster from a partnership. This subcommand deletes the partnership when the last participating cluster in the partnership leaves.
<code>list</code>	Displays partnership configuration information.
<code>set-prop</code>	Modifies the properties of a partnership. This subcommand updates the local cluster configuration and notifies remote partner clusters of the configuration change.
<code>update</code>	Updates partnership properties on a partner cluster while the cluster is disconnected from the partner cluster.

<b>OPTIONS</b>	<p>The following options are supported:</p> <p><b>-c <i>remote-cluster-name</i>   --cluster <i>remote-cluster-name</i></b>  Specifies the logical hostname of the cluster with which to form a partnership. The logical hostname is used by the Sun Cluster Geographic Edition software and maps to the name of the remote partner cluster. For example, a remote partner cluster name might resemble the following:</p> <pre>cluster-paris</pre> <p><b>-h <i>heartbeat-name</i>   --heartbeat-name <i>heartbeat-name</i></b>  Specifies an identifier for the heartbeat on a partner cluster that the local cluster can use to monitor partner availability. You must create the heartbeat by using the <code>geohb</code> command before you specify the heartbeat in the <code>geops</code> command.</p> <p>If this option is omitted, the Sun Cluster Geographic Edition software uses the default heartbeat mechanism between member clusters.</p> <p><b>-p <i>property-setting</i>   --property <i>property-setting</i></b>  Specifies the value of partnership properties. You can specify multiple properties at one time by using multiple statements.</p> <p>Using the <code>geops join-partnership</code> command on a cluster that is already a member of a partnership causes the partnership configuration from the partner cluster to overwrite the partnership configuration of the local cluster.</p> <p>See the EXTENDED DESCRIPTION section for a description of the properties.</p> <p><b><i>partnership-name</i></b>  Specifies the name of the partnership.</p> <p><b>-V   --version</b>  Displays version information. This option stops interpretation of subsequent arguments.</p> <p><b>-?   --help</b>  Displays help information and stops interpretation of subsequent arguments.</p> <p>The question mark might be interpreted as a special character by some shells. Use quotes (<code>-"?"</code>) or an escape character to avoid pattern-matching.</p>						
<b>EXTENDED DESCRIPTION</b>	<p>The following section lists the partnership properties. These properties are set at creation and tunable at runtime.</p> <table border="1"> <thead> <tr> <th data-bbox="284 1480 446 1543">Partnership Properties</th><th data-bbox="446 1480 1430 1543">Description</th></tr> </thead> <tbody> <tr> <td></td><td> Describes the partnership.   Optional property.   Type: String.   Default value: empty string. </td></tr> <tr> <td></td><td> <b>Notification_ActionCmd</b> Specifies the path to the script or command that is triggered when a heartbeat loss notification is issued. </td></tr> </tbody> </table>	Partnership Properties	Description		Describes the partnership.  Optional property.  Type: String.  Default value: empty string.		<b>Notification_ActionCmd</b> Specifies the path to the script or command that is triggered when a heartbeat loss notification is issued.
Partnership Properties	Description						
	Describes the partnership.  Optional property.  Type: String.  Default value: empty string.						
	<b>Notification_ActionCmd</b> Specifies the path to the script or command that is triggered when a heartbeat loss notification is issued.						

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Optional property.

Type: String.

Default value: Empty string.

**Notification\_EmailAddrss** Specifies the email address to send messages to when a heartbeat loss notification is issued. You can specify multiple email addresses by separating each email address with a comma.

Optional property.

Type: String array.

Default value: Empty string.

The **Notification\_EmailAddrss** and the **Notification\_ActionCmd** properties enable notification on heartbeat loss events. Heartbeat-loss events are detected locally on each cluster of the partnership, and the notification is triggered locally on the cluster where the event is detected. The email addresses and the notification action path should be valid on each cluster in the partnership.

The Sun Cluster Geographic Edition software enables you to specify a command to execute when a heartbeat-loss notification is issued. You can specify the path to the command by using the **Notification\_ActionCmd** property. The command is executed with root permissions, so the file must have root ownership and execution permissions. If both properties have been configured, an email is sent after the command that is specified in the **Notification\_ActionCmd** property is run.

**EXIT STATUS** The following exit values are returned:

0	The command executed successfully.
nonzero	An error has occurred.

**ATTRIBUTES** See **attributes(5)** for descriptions of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Architecture	SPARC
Availability	SUNWscgctl
Interface Stability	Evolving

**SEE ALSO** **rbac(5)**

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