

# Veritas™ Cluster Server Agent for IBM XIV Mirror Installation and Configuration Guide

Windows Server 2003, Windows Server  
2008

5.0

# Veritas Cluster Server Agent for IBM XIV Mirror Installation and Configuration Guide

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# Introducing the Veritas agent for IBM XIV Mirror

This chapter includes the following topics:

- [About the agent for IBM XIV Mirror](#)
- [What's new in this release](#)
- [Supported software for the IBM XIV Mirror agent](#)
- [Supported hardware for IBM XIV Mirror](#)
- [Typical IBM XIV Mirror setup in a VCS cluster](#)
- [IBM XIV Mirror agent functions](#)

## About the agent for IBM XIV Mirror

The Veritas Cluster Server (VCS) agent for IBM XIV Mirror manages the roles of the IBM XIV Mirror devices that have been configured for synchronous and asynchronous replication.

## What's new in this release

- The agent for IBM XIV Mirror now manages the replication of a consistency group in addition to the existing support for managing volume mirror pairs.

## Supported software for the IBM XIV Mirror agent

For information on the software versions that the agent for IBM XIV Mirror supports, see the Symantec Operations Readiness Tools (SORT) site:  
<https://sort.symantec.com/agents>.

## Supported hardware for IBM XIV Mirror

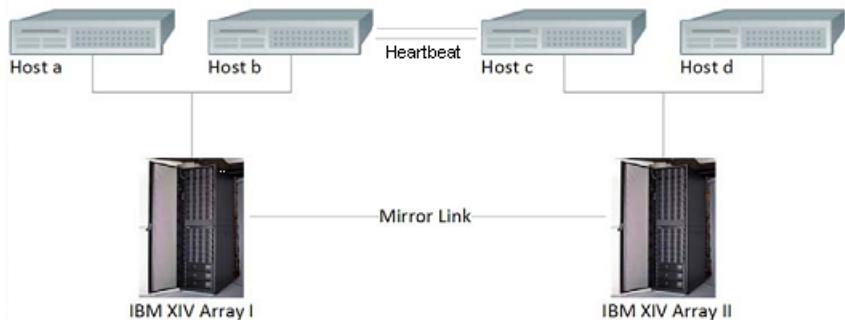
IBM XIV array version: 10.2.2.a and later

IBM XIV Remote Mirror replications must be planned and established between XIV volumes or consistency groups.

## Typical IBM XIV Mirror setup in a VCS cluster

A typical IBM XIV Mirror setup in a VCS cluster includes at least two hosts per IBM XIV array, a heartbeat connection between hosts of different arrays, and a mirror link between the arrays.

**Figure 1-1**      Typical IBM XIV Mirror setup in a VCS cluster



This configuration maintains the following links:

- Host a and host b are attached via fibre channel or iSCSI to XIV Array I.
- Host c and host d are attached via fibre channel or iSCSI to XIV Array II.
- Volumes or a consistency group from Array I are mirrored against volumes or a consistency group from Array II.
- Network heartbeating between the two datacenters to determine their health; this network heartbeating could be LLT or TCP/IP. See “[About cluster heartbeats](#)” on page 21.

- In a replicated data cluster environment, all hosts are part of the same cluster. You must connect them with the dual and dedicated networks that support LLT.
- In a global cluster environment, you must attach all hosts in a cluster to the same XIV array.

## IBM XIV Mirror agent functions

The agent performs the following functions:

online	If the state of all local devices is read-write enabled, the agent creates a lock file on the local host to indicate that the resource is online.  In other cases, when the consistency group or all local volumes or are Slave, the online function takes various actions depending on the replication link state and replication active state. See “ <a href="#">About the agent’s online function</a> ” on page 11.
offline	Removes the lock file from the local host.
monitor	Verifies that the lock file exists.  If the lock file exists, the monitor function reports the status of the resource as online.  If the lock file does not exist, the monitor function reports the status of the resource as offline.
clean	Removes the lock file from the local host.
open	Removes the lock file from the host where the function is called. This action prevents a potential concurrency violation if the service group fails over to another node. Note that the agent does not remove the lock file if the agent was started after a <code>hastop -force</code> command.
info	Modifies or adds the resource information of the XIVMirror resource for showing consolidated information about local volumes or the consistency group. This includes information about the role, synchronization type, link state, mirror state, and sync state.

## About the agent’s online function

The online function attempts to make the specified XIV devices read-writable.

When the consistency group or all the local volumes are Master, the agent creates the lock file and exits.

When the consistency group or all the local volumes are Slave, the mirror link state and the replication active state determine the action the agent takes:

- If the mirror link state is connected, the replication state is active, the agent takes actions according to the mode of replication.
  - If the mode of replication is synchronous and mirror sync state is Consistent, the agent executes the switch role operation sequentially for all the volumes or the consistency group.
  - If the mode of replication is asynchronous and the mirror sync state is RPO OK, the agent takes the following steps:
    - Waits until the OnlineTimeout value is about to expire and checks if the consistency group or any of the volumes have sync jobs.
    - If the consistency group or any of the volumes have sync jobs, the agent logs an error message and does not initialize the switch role operation for all the mirrors. This ensures that the XIV volumes or consistency group do not end in mixed replication roles due to potential failure of the switch role command because a mirror has a sync job.
    - If there is no consistency group or volume with sync jobs, the agent executes the switch role operation sequentially for all the volumes or the consistency group.
- If, for any of the volumes, this operation fails with errors MIRROR\_HAS\_SYNC\_JOB or MIRROR\_RETRY\_OPERATION, the agent retries the switch role operation for those volumes after some time, before the OnlineTimeout value is about to expire.
- If the mirror link state is not connected, and the AutoTakeover attribute is 0, the agent does not take any action.
- If the mirror link state is not connected, and the AutoTakeover attribute is 1, the agent executes the change role command.
- If the mirror replication state is inactive, and the SplitTakeover attribute is 0, the agent does not take any action.
- If the mirror replication state is inactive, and the SplitTakeover attribute is 1, the agent executes the change role command. After successful execution of the switch role or change role command, the agent creates the lock file.

If the local volumes have different roles, replication states, replication modes (mix of synchronous and asynchronous replication), and link states, the agent logs an error and does not take any action.

# Installing and removing the agent for IBM XIV Mirror

This chapter includes the following topics:

- [Before you install the agent for IBM XIV Mirror](#)
- [Installing the agent for IBM XIV Mirror](#)
- [Removing the agent for IBM XIV Mirror](#)

## Before you install the agent for IBM XIV Mirror

Set up your cluster. For information about installing and configuring VCS, see the *Veritas Cluster Server Installation Guide*.

Set up replication and the required hardware infrastructure.

Install the IBM XCLI on each of the cluster nodes on which you will install the IBM XIV agent.

## Installing the agent for IBM XIV Mirror

You must install the IBM XIV Mirror agent on each node in the cluster. In global cluster environments, install the agent on each node in each cluster.

**To install the VCS agent for IBM XIV Mirror from the Agent Pack release**

- 1 Log on to any node in the cluster.  
Ensure that the logged on user has the domain administrative privileges.
- 2 Download the Agent Pack from the Symantec Operations Readiness Tools (SORT) site: <https://sort.symantec.com/agents>.  
You can download the complete Agent Pack tar file or the individual agent tar file.
- 3 Uncompress the file to a temporary location.
- 4 If you downloaded the complete Agent Pack tar file, navigate to the directory containing the package for the platform running in your environment.

Windows 2003 x86	cd1\windows\w2k3x86\vcs\replication\xivmirror_agent\ agent_version\pkgs
Windows 2003 (IA64)	cd1\windows\w2k3IA64\vcs\replication\xivmirror_agent\ agent_version\pkgs
Windows 2003 (x64)	cd1\windows\w2k3x64\vcs\replication\xivmirror_agent\ agent_version\pkgs
Windows 2008 IA64	cd1\windows\w2k8IA64\vcs\replication\xivmirror_agent\ agent_version\pkgs
Windows 2008 x64	cd1\windows\w2k8x64\vcs\replication\xivmirror_agent\ agent_version\pkgs

- 5 Double-click **vrtsvcsvxiv.msi**.

Follow the instructions that the install program provides, to complete the installation of the agent.

## Removing the agent for IBM XIV Mirror

This section describes steps for uninstalling the agent. Do not attempt to remove the agent if service groups accessing the shared storage are online.

**To remove the agent**

- 1 Open the Windows Control Panel and click **Add or Remove Programs**.
- 2 Click **vrtsvcsvxiv.msi** and click **Remove**.

- 3 Follow the instructions that the install program provides, to complete the uninstallation of the agent.
- 4 Click **Finish**.

## **Removing the agent for IBM XIV Mirror**

# Configuring the agent for IBM XIV Mirror

This chapter includes the following topics:

- [Configuration concepts for the IBM XIV Mirror agent](#)
- [Before you configure the agent for IBM XIV Mirror](#)
- [Configuring the agent for IBM XIV Mirror](#)

## Configuration concepts for the IBM XIV Mirror agent

Review the resource type definition and the attribute definitions for the agent.

### Resource type definition for the IBM XIV Mirror agent

The resource type definition for the XIV Mirror agent is as follows:

```
type XIVMirror (
    static keylist SupportedActions = { }
    static int OpenTimeout = 180
    static int RestartLimit = 1
    static str ArgList[] = {XCliPath, UserLocal, PasswordLocal,
        UserRemote, PasswordRemote, LocalXIVIPs, RemoteXIVIPs,
        LocalVolNames, AutoTakeover, SplitTakeover, IsConsistencyGroup,
        GroupName }
    str XCliPath
    str UserLocal
    str PasswordLocal
    str UserRemote
    str PasswordRemote
```

```
    str LocalXIVIPs[]
    str RemoteXIVIPs[]
    str LocalVolNames[]
    int AutoTakeover = 1
    int SplitTakeover = 0
    int IsConsistencyGroup = 1
    str GroupName
    temp str VCSResLock
)
```

## Attribute definitions for the XIV Mirror agent

The attributes for the XIV Mirror agent are as follows:

XCliPath	Specifies the XIV command line interface name with its full path.
LocalXIVIPs	List of local XIV IP addresses to connect.
RemoteXIVIPs	List of remote XIV IP addresses to connect.
LocalVolNames	List of local XIV volume names that the agent manages.
AutoTakeover	Indicates whether the agent should enable read/write access to the local devices in the replication relationship when the replication link is broken. If it is set to 0, the agent does not enable read/write access when the replication link is broken.
UserLocal	Specifies the user for the local XIV array.
PasswordLocal	Specifies the password for the local XIV array.
UserRemote	Specifies the user for the remote XIV array.
PasswordRemote	Specifies the password for the remote XIV array.
SplitTakeover	Indicates whether the agent should enable read/write access to the local devices in the replication relationship when the replication is in an inactive state. If it is set to 0, the agent does not enable read/write access when the replication is in an inactive state.

IsConsistencyGroup    Specifies if the agent must manage a consistency group or a list of mirror pairs.

When the value of this attribute is set to 0, it means that the agent must manage mirror pairs. When the value of this attribute is set to 1, it means that the agent must manage a consistency group.

**Note:** If you configure both, the LocalVolNames attribute and the GroupName attribute, the agent refers to the value of the IsConsistencyGroup attribute to determine if the agent must manage mirror pairs or a consistency group.

Default Value: 1

GroupName    The name of the consistency group that the agent must manage.  
A resource can manage only one consistency group.

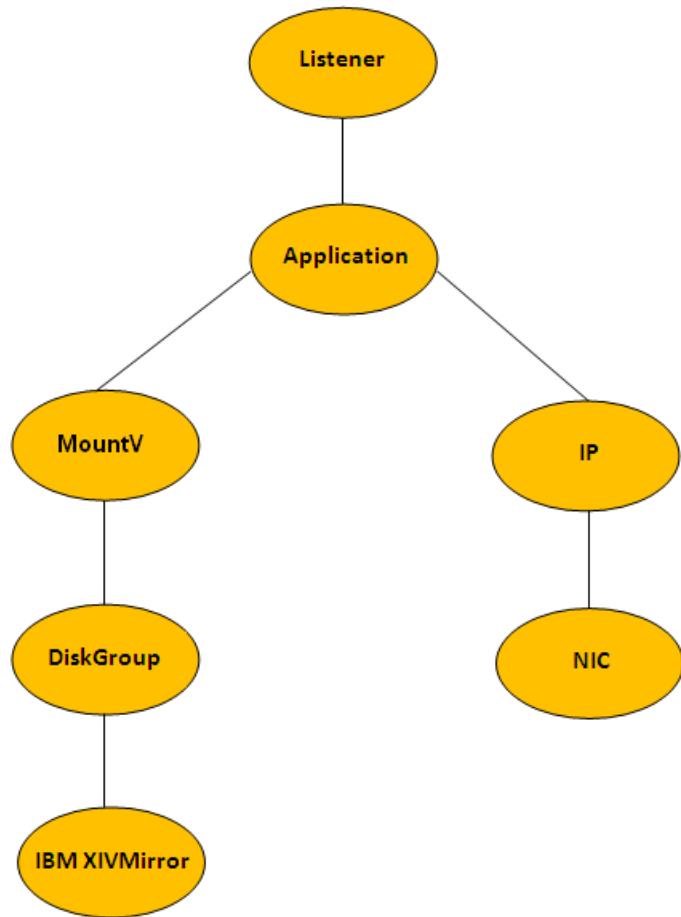
Consider the following points:

- If you plan to use the environment variables—XIV\_XCLIUSER and XIV\_XCLIPASSWORD, these variables must be set before HAD or VCS starts.
- If you are using XCLI version 3.1.1.x or later, Symantec recommends using the `xcli --protect` command to encrypt the credentials of the local and remote arrays.
- The UserLocal and PasswordLocal attributes are optional when any one of the following conditions are met:
  - The environment variables—XIV\_XCLIUSER and XIV\_XCLIPASSWORD—on the host, point to the username and password of the local XIV array.
  - The local array credentials are encrypted by using the `xcli --protect` command.
- The UserRemote and PasswordRemote attributes are optional when any one of the following conditions are met:
  - The environment variables—XIV\_XCLIUSER and XIV\_XCLIPASSWORD—point to the username and password of the remote XIV array.
  - The remote array credentials are encrypted by using the `xcli --protect` command.

## Sample configuration for the IBM XIV Mirror agent

[Figure 3-1](#) shows the dependency graph for a VCS service group with a resource of type XIVMirror.

**Figure 3-1** Sample configuration for the XIV Mirror agent



You can configure a resource of type XIVMirror in the main.cf file.

A sample main.cf file when the agent is configured to manage volume mirror pairs is as follows:

```
XIVMirror sync_xiv-res (
    XCliPath = "C:\Program Files\XIV\GUI10\xcli.exe"
    UserLocal = LocalUser
    PasswordLocal = LocalPassword
    UserRemote = RemoteUser
    PasswordRemote = RemotePassword
    LocalXIVIPs = { "XXX.XXX.XXX.XXX" }
    RemoteXIVIPs = { "YYY.YYY.YYY.YYY" }
```

```
LocalVolNames = { Volume_1,  Volume_2 }
IsConsistencyGroup = 0
)
```

A sample main.cf file when the agent is configured to manage a consistency group is as follows:

```
XIVMirror sync_xiv_res (
    XCliPath = "C:\\Program Files (x86)\\XIV\\GUI10\\xcli.exe"
    UserLocal = LocalUser
    PasswordLocal = LocalPassword
    UserRemote = RemoteUser
    PasswordRemote = RemotePassword
    LocalXIVIPs = { "XXX.XXX.XXX.XXX" }
    RemoteXIVIPs = { "YYY.YYY.YYY.YYY" }
    GroupName = VCS_CG_Async
    IsConsistencyGroup = 1
)
```

## Before you configure the agent for IBM XIV Mirror

Before you configure the agent, review the following information:

- Verify that you have installed the agent on all systems in the cluster.
- Verify that IBM XCLI is installed on each cluster node on which you have installed the agent.
- Verify the hardware setup for the agent.
- Make sure that the cluster has an effective heartbeat mechanism in place.  
See “[About cluster heartbeats](#)” on page 21.

## About cluster heartbeats

In a replicated data cluster, ensure robust heartbeating by using dual, dedicated networks over which the Low Latency Transport (LLT) runs. Additionally, you can configure a low-priority heartbeat across public networks.

In a global cluster, VCS sends ICMP pings over the public network between the two sites for network heartbeating. To minimize the risk of split-brain, VCS sends ICMP pings to highly available IP addresses. VCS global clusters also notify the administrators when the sites cannot communicate.

To minimize the chances of split-brain, use the steward process.

# Configuring the agent for IBM XIV Mirror

After configuration, the application service group must follow the dependency diagram.

## Configuring the agent manually in a replicated data cluster

Configuring the agent manually in a replicated data cluster involves the following tasks:

### To configure the agent in a replicated data cluster

- 1 Start Cluster Manager and log on to the cluster.
- 2 In each service group that uses replicated data, add a resource of type XIVMirror at the bottom of the service group.
- 3 Configure the attributes of the XIVMirror resource. Note that some attributes must be localized to reflect values for the hosts that are attached to different arrays.
- 4 Set the SystemZones attribute for the service group to reflect which hosts are attached to the same array.

## Configuring the agent manually in a global cluster

Configuring the agent manually in a global cluster involves the following tasks:

### To configure the agent in a global cluster

- 1 Start Cluster Manager and log on to the cluster.

- 2 Add a resource of type XIVMirror at the bottom of the service group.

- 3 Configure the attributes of the XIVMirror resource.

- 4 If the service group is not configured as a global service group, configure the service group using the Global Group Configuration Wizard.

See the *Veritas Cluster Server Administrator's Guide* for more information.

- 5 Repeat step 2 through step 4 for each service group in each cluster that uses replicated data.

- 6 The configuration must be identical on all cluster nodes, both primary and disaster recovery.

# Managing and testing clustering support for IBM XIV Mirror

This chapter includes the following topics:

- How VCS recovers from various disasters in an HA/DR setup with IBM XIV Mirror
- Testing the global service group migration
- Testing disaster recovery after host failure
- Testing disaster recovery after site failure
- Performing failback after a node failure or an application failure
- Performing failback after a site failure

## How VCS recovers from various disasters in an HA/DR setup with IBM XIV Mirror

This section covers the failure scenarios and how VCS responds to the failures for the following DR cluster configurations:

Global clusters When a site-wide global service group or system fault occurs, VCS failover behavior depends on the value of the ClusterFailOverPolicy attribute for the faulted global service group. The VCS agent for IBM XIV Mirror ensures safe and exclusive access to the configured IBM XIV Mirror devices.

See “[Failure scenarios in global clusters](#)” on page 24.

Replicated data clusters When service group or system faults occur, VCS failover behavior depends on the value of the AutoFailOver attribute for the faulted service group. The VCS agent for IBM XIV Mirror ensures safe and exclusive access to the configured IBM XIV Mirror devices.

See “[Failure scenarios in replicated data clusters](#)” on page 27.

See the *Veritas Cluster Server Administrator's Guide* for more information on the DR configurations and the global service group attributes.

## Failure scenarios in global clusters

[Table 4-1](#) lists the failure scenarios in a global cluster configuration and describes the behavior of VCS and the agent in response to the failure.

See the *Veritas Cluster Server Administrator's Guide* for more information on the DR configurations and the global service group attributes.

**Table 4-1** Failure scenarios in a global cluster configuration with VCS agent for IBM XIV Mirror

Failure	Description and VCS response
Application failure	<p>Application cannot start successfully on any hosts at the primary site.</p> <p>VCS response at the secondary site:</p> <ul style="list-style-type: none"> <li>■ Causes global service group at the primary site to fault and displays an alert to indicate the fault.</li> <li>■ Does the following based on the ClusterFailOverPolicy global service group attribute: <ul style="list-style-type: none"> <li>■ Auto or Connected—VCS automatically brings the faulted global group online at the secondary site.</li> <li>■ Manual—No action. You must bring the global group online at the secondary site.</li> </ul> </li> </ul> <p>Agent response:</p> <ul style="list-style-type: none"> <li>■ Write enables the devices at the secondary site.</li> <li>■ The agent does the following: <ul style="list-style-type: none"> <li>■ If replication is suspended and the value of the SplitTakeover attribute is set to 0, the agent takes no action.</li> <li>■ If the write mode is asynchronous, sync state is RPO_OK, and SplitTakeover is set to 1, the agent issues failover.</li> <li>■ Promotes the volumes at the remote site to Master.</li> </ul> </li> </ul> <p>See “<a href="#">Performing failback after a node failure or an application failure</a>” on page 34.</p>
Host failure	<p>All hosts at the primary site fail.</p> <p>VCS response at the secondary site:</p> <ul style="list-style-type: none"> <li>■ Displays an alert to indicate the primary cluster fault.</li> <li>■ Does the following based on the ClusterFailOverPolicy global service group attribute: <ul style="list-style-type: none"> <li>■ Auto—VCS automatically brings the faulted global group online at the secondary site.</li> <li>■ Manual or Connected—No action. You must bring the global group online at the secondary site.</li> </ul> </li> </ul> <p>Agent response:</p> <ul style="list-style-type: none"> <li>■ Write enables the devices at the secondary site.</li> <li>■ The agent does the following: <ul style="list-style-type: none"> <li>■ In case the replication is suspended and the value of the SplitTakeover attribute is set to 0, no action is taken by agent.</li> <li>■ In case the write mode is asynchronous, sync state is RPO_OK and SplitTakeover is set to 1, the agent will issue failover.</li> <li>■ Promotes the volumes at the remote site to Master.</li> </ul> </li> </ul> <p>See “<a href="#">Performing failback after a node failure or an application failure</a>” on page 34.</p>

**Table 4-1** Failure scenarios in a global cluster configuration with VCS agent for IBM XIV Mirror (*continued*)

Failure	Description and VCS response
Site failure	<p>All hosts and the storage at the primary site fail.</p> <p>VCS response at the secondary site:</p> <ul style="list-style-type: none"> <li>■ Displays an alert to indicate the cluster fault.</li> <li>■ Does the following based on the ClusterFailOverPolicy global service group attribute:           <ul style="list-style-type: none"> <li>■ Auto—VCS automatically brings the faulted global group online at the secondary site.</li> <li>■ Manual or Connected—No action. You must bring the global group online at the secondary site.</li> </ul> </li> </ul> <p>Agent response: The agent does the following based on the value of the AutoTakeover attribute of the XIVMirror resource:</p> <ul style="list-style-type: none"> <li>■ 1—The agent issues the <code>failover</code> command to promote the volumes at the remote site to Master.</li> <li>■ 0—No action is taken by the agent. The XIVMirror resource is faulted.</li> </ul> <p>See “<a href="#">Performing failback after a site failure</a>” on page 35.</p>
Replication link failure	<p>Replication link between the arrays at the two sites fails.</p> <p>VCS response: No action.</p> <p>Agent response: The agent does the following based on the value of the AutoTakeover attribute of the XIVMirror resource:</p> <ul style="list-style-type: none"> <li>■ 1—The agent issues the <code>failover</code> command to promote the volumes at the remote site to Master.</li> <li>■ 0—No action is taken by the agent. The XIVMirror resource is faulted.</li> </ul>

**Table 4-1** Failure scenarios in a global cluster configuration with VCS agent for IBM XIV Mirror (*continued*)

Failure	Description and VCS response
Network failure	<p>The network connectivity and the replication link between the sites fail.</p> <p>VCS response at the secondary site:</p> <ul style="list-style-type: none"> <li>■ VCS at each site concludes that the remote cluster has faulted.</li> <li>■ Does the following based on the ClusterFailOverPolicy global service group attribute: <ul style="list-style-type: none"> <li>■ Manual or Connected—No action. You must confirm the cause of the network failure from the cluster administrator at the remote site and fix the issue.</li> <li>■ Auto—VCS brings the global group online at the secondary site which may lead to a site-wide split brain. This causes data divergence between the devices on the primary and the secondary arrays.</li> </ul> </li> </ul> <p>When the network (wac and replication) connectivity restores, you must manually resync the data.</p> <p><b>Note:</b> Symantec recommends that the value of the ClusterFailOverPolicy attribute is set to Manual for all global groups to prevent unintended failovers due to transient network failures.</p>
Storage failure	<p>The array at the primary site fails.</p> <p>VCS response at the secondary site:</p> <ul style="list-style-type: none"> <li>■ Causes the global service group at the primary site to fault and displays an alert to indicate the fault.</li> <li>■ Does the following based on the ClusterFailOverPolicy global service group attribute: <ul style="list-style-type: none"> <li>■ Auto or Connected—VCS automatically brings the faulted global service group online at the secondary site.</li> <li>■ Manual—No action. You must bring the global group online at the secondary site.</li> </ul> </li> </ul>

## Failure scenarios in replicated data clusters

[Table 4-2](#) lists the failure scenarios in a replicated data cluster configuration, and describes the behavior of VCS and the agent in response to the failure.

**Table 4-2**

Failure scenarios in a replicated data cluster configuration with VCS agent for IBM XIV Mirror

Failure	Description and VCS response
Application failure	<p>Application cannot start successfully on any hosts at the primary site.</p> <p>VCS response:</p> <ul style="list-style-type: none"> <li>■ Causes the service group at the primary site to fault.</li> <li>■ Does the following based on the AutoFailOver attribute for the faulted global service group:           <ul style="list-style-type: none"> <li>■ 1—VCS automatically brings the faulted global service group online at the secondary site.</li> <li>■ 2—You must bring the global service group online at the secondary site.</li> </ul> </li> </ul> <p>Agent response:</p> <ul style="list-style-type: none"> <li>■ Write enables the devices at the secondary site.</li> <li>■ The agent does the following:           <ul style="list-style-type: none"> <li>■ In case the replication is suspended and the value of the SplitTakeover attribute is set to 0, no action is taken by agent.</li> <li>■ In case the write mode is asynchronous, sync state is RPO_OK and SplitTakeover is set to 1, the agent will issue failover.</li> <li>■ Promotes the volumes at the remote site to Master.</li> </ul> </li> </ul> <p>See “<a href="#">Performing failback after a node failure or an application failure</a>” on page 34.</p>
Host failure	<p>All hosts at the primary site fail.</p> <p>VCS response:</p> <ul style="list-style-type: none"> <li>■ Causes the service group at the primary site to fault.</li> <li>■ Does the following based on the AutoFailOver attribute for the faulted service group:           <ul style="list-style-type: none"> <li>■ 1—VCS automatically brings the faulted service group online at the secondary site.</li> <li>■ 2—You must bring the service group online at the secondary site.</li> </ul> </li> </ul> <p>Agent response:</p> <ul style="list-style-type: none"> <li>■ Write enables the devices at the secondary site.</li> <li>■ The agent does the following:           <ul style="list-style-type: none"> <li>■ In case the replication is suspended and the value of the SplitTakeover attribute is set to 0, no action is taken by agent.</li> <li>■ In case the write mode is asynchronous, sync state is RPO_OK and SplitTakeover is set to 1, the agent will issue failover.</li> <li>■ Promotes the volumes at the remote site to Master.</li> </ul> </li> </ul> <p>See “<a href="#">Performing failback after a node failure or an application failure</a>” on page 34.</p>

**Table 4-2** Failure scenarios in a replicated data cluster configuration with VCS agent for IBM XIV Mirror (*continued*)

Failure	Description and VCS response
Site failure	<p>All hosts and the storage at the primary site fail.</p> <p>VCS response:</p> <ul style="list-style-type: none"><li>■ Causes the service group at the primary site to fault.</li><li>■ Does the following based on the AutoFailOver attribute for the faulted service group:<ul style="list-style-type: none"><li>■ 1—VCS automatically brings the faulted service group online at the secondary site.</li><li>■ 2—You must bring the service group online at the secondary site.</li></ul></li></ul> <p>Agent response: The agent does the following based on the value of the AutoTakeover attribute of the XIVMirror resource:</p> <ul style="list-style-type: none"><li>■ 1—The agent issues the <code>failover</code> command to promote the volumes at the remote site to Master.</li><li>■ 0—No action is taken by the agent. The XIVMirror resource is faulted.</li></ul> <p>See “<a href="#">Performing failback after a site failure</a>” on page 35.</p>
Replication link failure	<p>Replication link between the arrays at the two sites fails.</p> <p>VCS response: No action.</p> <p>Agent response: The agent does the following based on the value of the AutoTakeover attribute of the XIVMirror resource:</p> <ul style="list-style-type: none"><li>■ 1—The agent issues the <code>failover</code> command to promote the volumes at the remote site to Master..</li><li>■ 0—No action is taken by the agent. The XIVMirror resource is faulted.</li></ul>

**Table 4-2**Failure scenarios in a replicated data cluster configuration with VCS agent for IBM XIV Mirror (*continued*)

Failure	Description and VCS response
Network failure	<p>The LLT and the replication links between the sites fail.</p> <p>VCS response:</p> <ul style="list-style-type: none"> <li>■ VCS at each site concludes that the nodes at the other site have faulted.</li> <li>■ Does the following based on the AutoFailOver attribute for the faulted service group:           <ul style="list-style-type: none"> <li>■ 2—No action. You must confirm the cause of the network failure from the cluster administrator at the remote site and fix the issue.</li> <li>■ 1—VCS brings the service group online at the secondary site which leads to a cluster-wide split brain. This causes data divergence between the devices on the arrays at the two sites.</li> </ul> </li> </ul> <p>When the network (LLT and replication) connectivity is restored, VCS takes all the service groups offline on one of the sites and restarts itself. This action eliminates concurrency violation where in the same group is online at both the sites.</p> <p><b>Note:</b> Symantec recommends that the value of the AutoFailOver attribute is set to 2 for all service groups to prevent unintended failovers due to transient network failures.</p> <p>Agent response: Similar to the site failure.</p>
Storage failure	<p>The array at the primary site fails.</p> <p>VCS response:</p> <ul style="list-style-type: none"> <li>■ Causes the service group at the primary site to fault and displays an alert to indicate the fault.</li> <li>■ Does the following based on the AutoFailOver attribute for the faulted service group:           <ul style="list-style-type: none"> <li>■ 1—VCS automatically brings the faulted service group online at the secondary site.</li> <li>■ 2—You must bring the service group online at the secondary site.</li> </ul> </li> </ul>

## Testing the global service group migration

After you configure the VCS agent for IBM XIV Mirror, verify that the global service group can migrate to hosts across the sites. Depending on your DR configuration, perform one of the following procedures.

### To test the global service group migration in global cluster setup

- 1 Fail over the global service group from the primary site to the secondary site.

Perform the following steps:

- Switch the global service group from the primary site to any node in the secondary site.

```
hagrp -switch global_group -any -clus cluster_name
```

VCS brings the global service group online on a node at the secondary site.

- Verify that the volumes at the secondary site are write-enabled, and the role of volumes is Master.

**2 Fail back the global service group from the secondary site to the primary site.**

Perform the following steps:

- Switch the global service group from the secondary site to the primary site.

```
hagrp -switch global_group -any -clus cluster_name
```

VCS brings the global service group online at the primary site.

- Verify that the volumes at the secondary site are write-enabled, and the role of volumes is Master.

**To test service group migration in replicated data cluster setup**

**1 Fail over the service group from the primary site to the secondary site.**

Perform the following steps:

- Switch the service group from the primary site to any node in the secondary site.

```
hagrp -switch service_group -to sys_name
```

VCS brings the service group online on a node at the secondary site.

- Verify that the volumes at the secondary site are write-enabled, and the role of volumes is Master.

**2 Fail back the service group from the secondary site to the primary site.**

Perform the following steps:

- Switch the service group from the secondary site to any node in the primary site.

```
hagrp -switch service_group -to sys_name
```

VCS brings the service group online on a node at the primary site.

- Verify that the volumes at the primary site are write-enabled, and the role of volumes is Master.

## Testing disaster recovery after host failure

Review the details on host failure and how VCS and the agent for IBM XIV Mirror behave in response to the failure.

See “[Failure scenarios in global clusters](#)” on page 24.

See “[Failure scenarios in replicated data clusters](#)” on page 27.

Depending on the DR configuration, perform one of the following procedures to test how VCS recovers after all hosts at the primary site fail.

### To test disaster recovery for host failure in global cluster setup

- 1 Halt the hosts at the primary site.

The value of the ClusterFailOverPolicy attribute for the faulted global group determines the VCS failover behavior.

- Auto—VCS brings the faulted global service group online at the secondary site.
- Manual or Connected—You must bring the global service group online at the secondary site.

On a node in the secondary site, run the following command:

```
hagrp -online -force global_group -any
```

- 2 Verify that the global service group is online at the secondary site.

```
hagrp -state global_group
```

- 3 Verify that the volumes at the secondary site are write-enabled, and the role of volumes is Master.

### To test disaster recovery for host failure in replicated data cluster setup

- 1 Halt the hosts at the primary site.

The value of the AutoFailOver attribute for the faulted service group determines the VCS failover behavior.

- 1—VCS brings the faulted service group online at the secondary site.
- 2—You must bring the service group online at the secondary site.

On a node in the secondary site, run the following command:

```
hagrp -online service_group -to sys_name
```

- 2 Verify that the service group is online at the secondary site.

```
hagrp -state global_group
```

- 3 Verify that the volumes at the secondary site are write-enabled, and the role of volumes is Master.

## Testing disaster recovery after site failure

Review the details on site failure and how VCS and the agent for IBM XIV Mirror behave in response to the failure.

See “[Failure scenarios in global clusters](#)” on page 24.

See “[Failure scenarios in replicated data clusters](#)” on page 27.

Depending on the DR configuration, perform one of the following procedures to test the disaster recovery in the event of site failure.

### To test disaster recovery for site failure in global cluster setup

- 1 Halt all nodes and the arrays at the primary site.

If you cannot halt the array at the primary site, then disable the replication link between the two arrays.

The value of the ClusterFailOverPolicy attribute for the faulted global group determines the failover behavior of VCS.

- Auto—VCS brings the faulted global group online at the secondary site.
- Manual or Connected—You must bring the global group online at the secondary site.

On a node in the secondary site, run the following command:

```
hagrp -online -force global_group -any
```

- 2 Verify that the volumes at the secondary site are write-enabled, and the role of volumes is Master.

- 3 Verify that the global service group is online at the secondary site.

```
hagrp -state global_group
```

### To test disaster recovery for site failure in replicated data cluster setup

- 1 Halt all hosts and the arrays at the primary site.

If you cannot halt the array at the primary site, then disable the replication link between the two arrays.

The value of the AutoFailOver attribute for the faulted global service group determines the VCS failover behavior.

- 1—VCS brings the faulted global service group online at the secondary site.
- 2—You must bring the global service group online at the secondary site.  
On a node in the secondary site, run the following command:

```
hagrp -online service_group -sys sys_name
```

- 2 Verify that the volumes at the secondary site are write-enabled, and the role of volumes is Master.
- 3 Verify that the global service group is online at the secondary site.

```
hagrp -state global_group
```

## Performing fallback after a node failure or an application failure

Review the details on node failure and application failure and how VCS and the agent for IBM XIV Mirror behave in response to these failures.

See “[Failure scenarios in global clusters](#)” on page 24.

See “[Failure scenarios in replicated data clusters](#)” on page 27.

After the nodes at the primary site are restarted, you can perform a fallback of the global service group to the primary site. Depending on your DR configuration, perform one of the following procedures.

### To perform fallback after a node failure or an application failure in global cluster

- 1 Switch the global service group from the secondary site to any node in the primary site.

```
hagrp -switch global_group -any -clus cluster_name
```

VCS brings the global service group online at the primary site.

- 2 Verify that the volumes at the secondary site are write-enabled, and the role of volumes is Master.

**To perform fallback after a host failure or an application failure in replicated data cluster**

- 1 Switch the global service group from the secondary site to any node in the primary site.

```
hagrp -switch service_group -to sys_name
```

VCS brings the global service group online on a node at the primary site.

- 2 Verify that the volumes at the secondary site are write-enabled, and the role of volumes is Master.

## Performing fallback after a site failure

See “[Failure scenarios in global clusters](#)” on page 24.

See “[Failure scenarios in replicated data clusters](#)” on page 27.

**To perform fallback after a site failure in global cluster**

- 1 Take the global service group offline at the secondary site. On a node at the secondary site, run the following command:

```
hagrp -offline global_group -any
```

- 2 Bring the global service group online at the primary site. On a node in the primary site, run the following command:

```
hagrp -online global_group -any
```

**To perform fallback after a site failure in replicated data cluster**

- 1 Take the global service group offline at the secondary site. On a node in the secondary site, run the following command:

```
hagrp -offline service_group -sys sys_name
```

- 2 Bring the global service group online at the primary site. On a node in the primary site, run the following command:

```
hagrp -online service_group -sys sys_name
```

### **Performing failback after a site failure**

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