Deploying VMware Site Recovery Manager 5.0 with VMware vSphere 5.0 on Hitachi Virtual Storage Platform

Implementation Guide

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Feedback

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Deploying VMware Site Recovery Manager 5.0 with VMware vSphere 5.0 on Hitachi Virtual Storage Platform

Implementation Guide

Virtualizing a data center with VMware vSphere provides several benefits to IT infrastructures:

- Reduce capital expenses through server consolidation
- Reduce operating expenses through automation to allow a data center to run more efficiently
- Protect critical applications running on a central infrastructure with features such as VMware High Availability, which reduces planned and unplanned downtime

Expanding data centers across multiple locations provides an opportunity to increase these layers of protection beyond a single data center.

VMware vCenter Site Recovery Manager is a business continuity and disaster recovery solution that integrates VMware vSphere infrastructures with data replication on storage systems to protect large sites and business critical applications. It does the following:

- Provides centralized management of disaster recovery plans
- Enables non-disruptive testing
- Automates site recovery and migration processes

Using an automated and tested recovery plan, a production data center can do a disaster recovery failover in an organized and proven manner.

Remote data replication is a key function in building out stable and reliable disaster recovery environments. Replicating data to a remote secondary site represents the most effective insurance policy against a catastrophic failure. Although you can perform data replication at the server level, you can perform data replication more effectively within the storage infrastructure.
Hitachi Virtual Storage Platform is an integral piece in building out a robust business continuity and disaster recovery solution. VMware vCenter Site Recovery Manager integrates tightly with Hitachi Virtual Storage Platform using the Hitachi Storage Replication Adapter. The advanced functions found in Virtual Storage Platform fulfills the requirements of a virtual infrastructure and provide reliable protection by managing data replication across data centers.

This paper’s intended use is by IT administrators charged with the storage, deployment, or administration of VMware vSphere infrastructures on Hitachi Virtual Storage Platform and Hitachi Compute Blade 2000. It assumes familiarity with storage area network (SAN)-based storage systems, VMware vSphere, Hitachi data replication technologies, and common IT storage practices.
Tested Solution Components

This white paper describes how to implement a disaster recovery solution for a VMware virtualized infrastructure using Hitachi hardware and software. Specifically, this solution uses the following:

- The platform for virtualized data centers in local and remote locations:
  - Hitachi Virtual Storage Platform
  - Hitachi Compute Blade 2000
    - Two server blades installed with ESXi 5.0 configured in a high availability cluster
    - Virtual machines running on ESXi 5.0 for management and disaster recovery administration.
    - Virtual machines running on ESXi 5.0 protected by storage replication and VMware Site Recovery Manager.

- The software for storage replication using one of the following:
  - Hitachi TrueCopy® Remote Replication bundle
  - Hitachi Universal Replicator

Figure 1 illustrates the environment.
This describes the hardware and software components required to deploy the solution described in this white paper.

Hardware Components

Table 1 describes the hardware needed to deploy this solution.

Table 1. Solution Hardware

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Quantity</th>
<th>Configuration</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hitachi Virtual Storage Platform</td>
<td>2</td>
<td>• 8 × 8 Gb/sec Fibre Channel ports used&lt;br&gt;• 8 × 600 GB, 10K RPM, SAS disks</td>
<td>Primary and remote storage</td>
</tr>
<tr>
<td>Hitachi Compute Blade 2000 chassis</td>
<td>2</td>
<td>• 8-blade chassis&lt;br&gt;• 2 Fibre Channel switch modules&lt;br&gt;• 8 × 1 Gb/sec network ports&lt;br&gt;• 2 × management modules&lt;br&gt;• 8 × cooling fan modules&lt;br&gt;• 4 × power supply modules</td>
<td>Blade chassis</td>
</tr>
<tr>
<td>Hitachi Compute Blade 2000 X57A1 server blades</td>
<td>2</td>
<td>• 2 × 8 core processor with 64 GB of memory&lt;br&gt;• 2 × management modules&lt;br&gt;• 8 × cooling fan modules&lt;br&gt;• 4 × power supply modules</td>
<td>Protected site virtual infrastructure running VMware ESXi 5.0</td>
</tr>
<tr>
<td>Hitachi Compute Blade 2000 X57A1 server blades</td>
<td>2</td>
<td>• 2 × 8 core processor with 64 GB of memory&lt;br&gt;• 2 × management modules&lt;br&gt;• 8 × cooling fan modules&lt;br&gt;• 4 × power supply modules</td>
<td>Recovery site virtual infrastructure running VMware ESXi 5.0</td>
</tr>
</tbody>
</table>

Hitachi Virtual Storage Platform

Hitachi Virtual Storage Platform is the first 3D scaling storage platform designed for all data types. Its storage architecture flexibly adapts for performance, capacity, and multi-vendor storage. Combined with the unique Hitachi Command Suite management platform, it transforms the data center.

- **Scale Up**—Meet increasing demands by dynamically adding processors, connectivity, and capacity in a single unit. Provide the highest performance for both open and mainframe environments.

- **Scale Out**—Meet multiple demands by dynamically combining multiple units into a single logical system with shared resources. Support increased demand in virtualized server environments. Ensure safe multi-tenancy and quality of service through partitioning of cache and ports.

- **Scale Deep**—Extend storage value by virtualizing new and existing external storage systems dynamically. Extend the advanced functions of Hitachi Virtual Storage Platform to multivendor storage. Offload less demanding data to external tiers to save costs and to optimize the availability of tier one resources.
For more information, see [Hitachi Virtual Storage Platform](#) on the Hitachi Data Systems website.

**Hitachi Compute Blade 2000**

Hitachi Compute Blade 2000 is an enterprise-class blade server platform. It features the following:

- A balanced system architecture that eliminates bottlenecks in performance and throughput
- Configuration flexibility
- Eco-friendly power-saving capabilities
- Fast server failure recovery using a N+1 cold standby design that allows replacing failed servers within minutes

For more information, see [Hitachi Compute Blade Family](#) on the Hitachi Data Systems website.

**Software Components**

Table 2 lists the software needed to deploy this solution.

**Table 2. Solution Software**

<table>
<thead>
<tr>
<th>Software</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hitachi Storage Navigator</td>
<td>Microcode dependent</td>
</tr>
<tr>
<td>Hitachi Storage Replication Adapter</td>
<td>02.01.01</td>
</tr>
<tr>
<td>Hitachi Command Control Interface</td>
<td>01-25-03/11</td>
</tr>
<tr>
<td><strong>Note:</strong> Ver. 01-24/03/13 or later is required</td>
<td></td>
</tr>
<tr>
<td>Hitachi TrueCopy Remote Replication bundle</td>
<td>Licensed feature available with Hitachi Virtual Storage Platform</td>
</tr>
<tr>
<td>Hitachi Universal Replicator</td>
<td>Licensed feature available with Hitachi Virtual Storage Platform</td>
</tr>
<tr>
<td>Hitachi ShadowImage® Heterogeneous Replication</td>
<td>Licensed feature available with Hitachi Virtual Storage Platform</td>
</tr>
<tr>
<td>VMware vCenter</td>
<td>5.0.0 build 455964</td>
</tr>
<tr>
<td>VMware vSphere ESXi</td>
<td>5.0.0 build 469512</td>
</tr>
<tr>
<td>VMware Site Recovery Manager</td>
<td>5.0 build 474459</td>
</tr>
</tbody>
</table>

**Hitachi TrueCopy Heterogeneous Remote Replication Bundle**

For synchronous replication up to 190 miles (300 km) with WAN optimized controllers, Hitachi TrueCopy Heterogeneous Remote Replication bundle provides a no-data-loss, rapid restart solution. Real-time copies are the same as the originals. This reduces recovery time to minutes.

Synchronous replication provides very fast recovery time (low RTO) and good data currency (low RPO) between Hitachi Data Systems storage systems.
For more information, see TrueCopy Synchronous Remote Replication Software on the Hitachi Data Systems website.

Hitachi Universal Replicator

Hitachi Universal Replicator for the Hitachi Virtual Storage Platform is an advanced technology for asynchronously replicating data hosted on Virtual Storage Platform models.

Asynchronous replication maintains a remote copy of data without having a performance impact on the primary data. In asynchronous replication, the system considers an I/O update operation complete when confirming the update at the primary site.

The Hitachi Virtual Storage Platform manages the process of replicating the changes to the secondary site.

Hitachi Universal Replicator software uses disk-based journaling and an optimized replication engine to reduce resource consumption and costs while increasing performance and operational resilience. The strengths of Hitachi Universal Replicator are two key technical innovations: performance optimized, disk based journaling and a pull-style replication engine.

The following are the key characteristics of Universal Replicator:

- **Replication across any distance without significant negative effect on host performance**—Hitachi Universal Replicator has been successfully used in replication configurations that span thousands of miles.

- **No acknowledgement dependencies from secondary site**—Hitachi Universal Replicator replicates to a remote site without the performance impact of waiting to acknowledge each individual record. Instead, Hitachi Universal Replicator manages the remote relationship at a controller level. During a disruption of communication to the remote unit or while exceeding the capability of the replication circuit, Hitachi Universal Replicator retains replicated write data in local journals, then updates the write data when the condition is corrected.

There is a potential for some data lag between remote and primary sites, particularly at longer distances. Manage the recovery point objective with the configuration of the data communication lines. When I/O activity at the primary site exceeds the capacity of the communication channel, the data is staged and moved to the secondary site in the same order as it was written at the primary site.

Hitachi ShadowImage Heterogeneous Replication

Hitachi ShadowImage Heterogeneous Replication is a storage-based hardware solution that creates RAID-protected duplicate volumes within Hitachi Virtual Storage Platform. ShadowImage Heterogeneous Replication primary volumes (P-VOL) contain the original data. Up to nine secondary volumes (S-VOL) can be created as copies.
On Hitachi Virtual Storage Platform, use ShadowImage Heterogeneous Replication to implement clones, a full copy of the primary data. Each clone is available for use by secondary applications. The unique value of working with a clone is that any operation on a clone has no effect on the primary data.

Detailed information on using Shadow Image Heterogeneous Replication is in *Hitachi Command Control Interface User and Reference Guide (MK-90RD7010)*.

**VMware vSphere 5.0**

VMware vSphere 5.0 is a virtualization platform that provides a data center infrastructure. It features Distributed Resource Scheduler (DRS), high availability, and fault tolerance.

Use of the round robin multipathing policy in vSphere 5.0 distributes the load across multiple host bus adapters (HBAs) and multiple storage ports. Use of DRS with Hitachi Dynamic Provisioning automatically distributes loads on the ESX host and across the back end of the storage system.

VMware vSphere 5.0 has the following components:

- **ESXi 5.0**—This is a hypervisor that loads directly on a physical server. It partitions one physical machine into many virtual machines that share hardware resources.

- **vCenter Server**—This allows management of the vSphere environment through a single user interface. With vCenter, there are features available such as vMotion, Storage vMotion, Distributed Resource Scheduler, high availability, and fault tolerance.

For more information, see the [VMware vSphere](https://www.vmware.com) website.

**VMware vCenter Site Recovery Manager 5.0**

VMware vCenter Site Recovery Manager 5.0 is a disaster recovery solution that helps to reduce planned and unplanned downtime of a vSphere infrastructure. It enables automated site recovery and migration processes. This can leverage the built-in vSphere Replication for hypervisor-based replication to cover a wide range of required recovery time and data currency.

This reference architecture focuses on using Site Recovery Manager with storage-based replication technologies such as Hitachi TrueCopy Heterogeneous Remote Replication bundle and Hitachi Universal Replicator. This use provides centralized management of recovery plans. Tight integration between storage arrays, VMware vCenter, VMware vCenter Site Recovery Manager, and the Hitachi Storage Replication Adapter ensure a coordinated recovery for large, business critical environments.

For more information, see [VMware vCenter Site Recovery Manager](https://www.vmware.com) on the VMware website.
Solution Implementation

Follow these steps to deploy this solution:

1. Configure the Storage Area Network
2. Configure the Storage Replication Link
3. Configure Storage
4. Configure vSphere environment
5. Configure Command Control Interface (CCI) for Replication
6. Implement Storage Replication for Site Recovery Manager
7. Implement Storage Replication for Site Recovery Manager

Configure the Storage Area Network

Each server blade at the local and remote site uses dual-port Fibre Channel mezzanine cards. They connect internally to the internal Fibre Channel switch modules located in the Hitachi Compute Blade 2000 chassis.

Four inter-switch links from the internal Fibre Channel switch modules connect to two Brocade 5300 switches, one link per switch per blade for redundancy. In turn, the Brocade 5300 switches connect to four target ports on the Hitachi Virtual Storage Platform.

The Hitachi Virtual Storage Platform supports active-active multipath connectivity. Ensure at least two unique paths exist from the ESXi host to the storage system to maximize availability. The multipathing policy was set to round robin in ESXi 5.0.

Table 3 shows the multipath configuration for the protected site.

<table>
<thead>
<tr>
<th>Host</th>
<th>Host HBA Number</th>
<th>Director Zone Name</th>
<th>Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protected Site - ESXi 1</td>
<td>HBA 2 Port 1</td>
<td>ESX1_HBA2_1_VSP1_5B_6B</td>
<td>5B, 6B</td>
</tr>
<tr>
<td>Protected Site - ESXi 1</td>
<td>HBA 2 Port 2</td>
<td>ESX1_HBA2_2_VSP1_5D_6D</td>
<td>5D, 6D</td>
</tr>
<tr>
<td>Protected Site - ESXi 2</td>
<td>HBA 2 Port 1</td>
<td>ESX2_HBA2_1_VSP1_5B_6B</td>
<td>5B, 6B</td>
</tr>
<tr>
<td>Protected Site - ESXi 2</td>
<td>HBA 2 Port 2</td>
<td>ESX2_HBA2_2_VSP1_5D_6D</td>
<td>5D, 6D</td>
</tr>
</tbody>
</table>
Table 4 shows the multipath configuration for the recovery site.

Table 4. Recovery Site Multipath Configuration

<table>
<thead>
<tr>
<th>Host</th>
<th>Host HBA Number</th>
<th>Director Zone Name</th>
<th>Storage Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recovery Site - ESXi 3</td>
<td>HBA 2 Port 1</td>
<td>ESX3_HBA2_1_VSP2_5B_6B</td>
<td>5B</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6B</td>
</tr>
<tr>
<td>Recovery Site - ESXi 3</td>
<td>HBA 2 Port 2</td>
<td>ESX3_HBA2_2_VSP2_5D_6D</td>
<td>5D</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6D</td>
</tr>
<tr>
<td>Recovery Site - ESXi 4</td>
<td>HBA 2 Port 1</td>
<td>ESX4_HBA2_1_VSP2_5B_6B</td>
<td>5B</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6B</td>
</tr>
<tr>
<td>Recovery Site - ESXi 4</td>
<td>HBA 2 Port 2</td>
<td>ESX4_HBA2_2_VSP2_5D_6D</td>
<td>5D</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6D</td>
</tr>
</tbody>
</table>

In addition, replication requires dedicated Fibre Channel connections between storage systems at the local and the remote site. For this solution, each Hitachi Virtual Storage Platform uses a total of two initiator ports and two RCU target ports.

Table 5 shows the storage replication paths and zoning between storage systems on each site.

Table 5. Recovery Site Multipath Configuration

<table>
<thead>
<tr>
<th>Storage System</th>
<th>Storage Port</th>
<th>Director Zone Name</th>
<th>Storage System</th>
<th>Storage Port</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Protected Site—VSP1</td>
<td>1B—Initiator</td>
<td>VSP1_1B_VSP2_1D</td>
<td>Recovery Site—VSP2</td>
<td>1D—RCU Target</td>
<td></td>
</tr>
<tr>
<td>Protected Site—VSP1</td>
<td>2B—Initiator</td>
<td>VSP1_2B_VSP2_2D</td>
<td>Recovery Site—VSP2</td>
<td>2D—RCU Target</td>
<td></td>
</tr>
<tr>
<td>Recovery Site—VSP2</td>
<td>1B—Initiator</td>
<td>VSP2_1B_VSP1_1D</td>
<td>Protected Site—VSP1</td>
<td>1D—RCU Target</td>
<td></td>
</tr>
<tr>
<td>Recovery Site—VSP2</td>
<td>2B—Initiator</td>
<td>VSP2_2B_VSP1_2D</td>
<td>Protected Site—VSP1</td>
<td>2D—RCU Target</td>
<td></td>
</tr>
</tbody>
</table>
Figure 2 shows the storage network configuration of the virtual infrastructure at each site.

Configure the Storage Replication Link

Site Recovery Manager supports two types of replication technologies available with Hitachi Virtual Storage Platform. Choose the storage replication technology based on the recovery point object (RPO) requirement, as shown in Table 6.

Table 6. RPO Requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Replication Type</th>
<th>Storage Replication Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low RPO</td>
<td>Synchronous remote replication</td>
<td>Hitachi TrueCopy Heterogeneous Remote Replication Bundle</td>
</tr>
<tr>
<td>Flexible RPO</td>
<td>Asynchronous remote replication</td>
<td>Hitachi Universal Replicator</td>
</tr>
</tbody>
</table>
The following describes how to configure the storage replication link between the local and remote storage systems for the respective replication technologies.

- Hitachi TrueCopy Heterogeneous Remote Replication Bundle
- Hitachi Universal Replicator
- Creating Journal Groups for Hitachi Universal Replicator

**Hitachi TrueCopy Remote Replication Bundle**

This procedure assumes that zoning storage replication paths within your Fibre Channel fabric is complete. To create storage replication links for Hitachi TrueCopy on Virtual Storage Platform using Hitachi Storage Navigator software, follow these steps:

1. From the **Actions** menu, point to **Remote Copy**, then point to **TrueCopy**, and then click **RCU Operation**.

2. Modify settings on the storage ports.
   
   (1) Click the **Pen** button in the top right area of the pane to enter **Modify** mode.

   (2) Click the **Port** option.

   (3) Right-click the storage ports to change the port attribute to **Initiator** or **RCU Target**, as appropriate.

   This solution uses ports 1B/2B for Initiator and 1D/2D for RCU Target.

   (4) Click the **MCU&RCU** option.

   (5) Click **CU Free** from the navigation tree.

   TrueCopy software selects the first available control unit to be the RCU.

   (6) Right-click the blank space on the right pane.

   A shortcut menu opens.

3. Add the RCU (Fibre) connections.

   (1) Click **RCU Operation** and then click **Add RCU (Fibre)** from the shortcut menu.

   The **Add RCU (Fibre)** dialog box opens.

   (2) Provide the following information in the **Add RCU (Fibre)** dialog box:

   i. Type the serial number for the remote storage system in **S/N**.

   ii. Click the LDKC of the remote storage system from the **LDKC** list.

   iii. Click **6 (VSP)** from the **Controller ID** list.
iv. Select the Default check box for the Path Group ID.

v. Click the local storage system port and its corresponding pair port in the MCU-RCU Path area.

This solution uses the following MCU - RCU port configuration:
1B - 1D, 2B - 2D

(3) Set options.

i. Click Option.

ii. Type values in Minimum Paths, RIO MiH Time (sec.) and Round Trip Time (ms).

iii. Click Set.

4. Accept the changes and complete the changes.

   (1) Click Apply.

A confirmation dialog box opens.

   (2) Click OK to confirm applying the changes.

   Another confirmation dialog box opens.

   (3) Click OK.

Repeat these steps on the remote storage system to add an RCU (Fibre) connection for reverse replication. This is necessary for VMware Site Recovery Manager to perform failback operations.

Hitachi Universal Replicator

This procedure assumes that zoning storage replication paths within your Fibre Channel fabric is complete. To create storage replication links for Hitachi Universal Replicator on Virtual Storage Platform using Hitachi Storage Navigator software, follow these steps:

1. From the Actions menu, point to Remote Copy, then point to Universal Replicator, and then click DKC Operation.

2. Modify settings on the storage ports.

   (1) Click the Pen button in the top right area of the pane to enter Modify mode.

   (2) Click the Port option.

   (3) Right-click the storage ports to change the port attribute to Initiator or RCU Target, as appropriate.

      This solution uses ports 1B/2B for Initiator and 1D/2D for RCU Target.

   (4) Click the DKC option.

      The LDKC navigation tree displays in the left pane.
(5) Click LDKC#00 on the navigation tree.

(6) Right-click the blank space on the left pane.

A menu displays.

3. Add the DKC connections.

(1) Click DKC Operation and then click Add DKC from the list.

The Add DKC dialog box opens.

(2) Provide the following information in the Add DKC dialog box:

   i. Type the serial number for the remote storage system in S/N.
   
   ii. Click the LDKC of the remote storage system from the LDKC list.
   
   iii. Click 6 (VSP) from the Controller ID list.
   
   iv. Click the local storage system ports and its corresponding pair-port in the M-R path area.

(3) Set options.

   i. Click Option.
   
   ii. Type values in Minimum Paths and RIO MIH Times (sec).
   
   iii. Click Set.

4. Accept the changes and complete the changes.

(1) Click Apply.

   A confirmation dialog box opens.

(2) Click OK to confirm applying the changes.

   Another confirmation dialog box opens.

(3) Click OK.

Repeat these steps on the remote storage system to add a DKC connection for reverse replication. This is necessary for VMware Site Recovery Manager to perform failback operations.
Creating Journal Groups for Hitachi Universal Replicator

To create Hitachi Universal Replicator journal groups using Hitachi Storage Navigator, follow these steps on the local storage system:

1. From the Actions menu, point to Remote Copy, then point to Universal Replicator, and then click Journal Operation.

2. Modify settings for the journals.
   (1) Click the Pen button in the top right area of the pane to enter Modify mode.
   (2) In the Journals tree, click to expand Free.
   (3) Select (highlight) a free journal group from Free.
      Details of the selected free journal group display in the right area.
   (4) Right-click the highlighted group in the right area, and then click Edit JNL VOLs from the shortcut menu.
      The Edit JNL Volumes dialog box opens.
   (5) Populate the journal volumes.
      i. Click the CU option.
      ii. From the menu on the right, click a CU.
         The Free Volumes pane populates.
   (6) Populate the journal volumes.
      i. Select one or more volumes in the Free Volumes area.
         The Add button becomes available.
      ii. Click Add.
         The JNL Volumes area populates.

3. Save the changes.
   (1) Click Set and then click Apply.
      A confirmation dialog box opens.
   (2) Click Yes.
      A final confirmation opens.
   (3) Click OK.

Repeat these steps on the remote storage system to add a journal group.
Configure Storage

This is how to configure your storage for this solution using Hitachi Dynamic Provisioning on Hitachi Virtual Storage Platform. The storage configuration for this solution includes the following:

- Over provisioning
- Wide striping
- On-line expansion of dynamic provisioning pools

This solution uses a dynamic provisioning pool comprised of a single RAID group with eight 600 GB 10k RPM SAS drives in a RAID-6 (6D+2P) configuration for each storage system. To increase performance and capacity needs of your virtual environment, add more RAID groups to the dynamic provisioning pool.

Using a RAID-6 configuration lowers the risk of data loss or pool failure, which is a primary concern for virtual machines protected by VMware Site Recovery Manager.

Figure 3 shows the configuration for the dynamic provisioning pool on each storage system.
This solution provisions three LDEVs to the VMware infrastructure at both sites for:

- Management (VMFS datastore)
- Hitachi TrueCopy or Hitachi Universal Replicator replicated datastore (VMFS datastore)
- Command device (raw device mapping LUN)
The creation and presentation of the LDEVs in Figure 3 on the storage system involves the following steps:

1. Create Host Groups
2. Create LDEVs in a RAID Group
3. Create Dynamic Provisioning Pools
4. Create LDEVs within a Dynamic Provisioning Pool
5. Create a Command Device

The following describe in detail how to configure your storage for this solution.

**Create Host Groups**

This procedure creates the host group mappings to the ESXi host HBA’s World Wide Names (WWN). Host groups are then associated with LDEVs to ensure access is isolated to the specified hosts.

To create host groups using Hitachi Storage Navigator, follow these steps:

1. From the **Actions** menu, point to **Ports/Host Groups** and then click **Create Host Groups**.
   
   The **Create Host Groups** window displays.

2. Type a name in **Host Group Name**.

3. From the **Host Mode** list, click **21[VMware Extension]**.

4. In the **Available Hosts** area, select one or more hosts.

5. In the **Available Ports** area, select one or more ports.

6. In the **Host Mode Options** area, select the following **Mode No.** and click **Enable**.

   - 54 — Support Option for the EXTENDED COPY command
   - 63 — Support option for vStorage APIs based on T10 standards

   Following recommended practice, these **Host Mode Options** allow the LDEV to take advantage of **VMware VAAI** features.

7. Click **Add**.

   The **Selected Host Groups** area populates.

8. Click **Finish**.

   The **Create Host Groups** window opens.

9. Click **Apply**.
Create LDEVs in a RAID Group
This procedure creates the LDEVs that are the basis for the dynamic provisioning pool.

To create one or more LDEVs in a RAID group using Hitachi Storage Navigator, follow these steps:

1. From the Actions menu, point to Logical Device and then click Create LDEVs.
2. Set the choices for LDEV creation.
   (1) From the Provisioning Type list, click Basic.
   (2) From the Emulation Type list, click OPEN-V.
   (3) From the RAID Level list, click RAID-6 (6D+2P).
   These options allow you to filter the available RAID group volumes.
   (4) Click Select Free Spaces.
   (5) Select the Parity Group in the Available Free Space window and click OK.
   (6) Type a capacity amount in LDEV Capacity and click a unit of measure from the list.
   For functional testing purposes, this solution created a single LDEV using the maximum capacity available. Follow Hitachi Dynamic Provisioning recommended practices when implementing in your environment.
   (7) Type the number of LDEVs of that size to create in Number of LDEVs.
   (8) In the LDEV Name area, type a prefix in Prefix and type an initial number in Initial Number.
3. Click Add.
   The Selected LDEVs area populates.
4. Click Finish.
5. The confirmation window for creating LDEVs opens.
6. Click Apply.
Create Dynamic Provisioning Pools
This procedure assumes that zoning within your Fiber Channel fabric is complete.

To create dynamic provisioning pools using Hitachi Storage Navigator, follow these steps:

1. From the Actions menu, point to Pool and then click Create Pools.
2. From the Pool Type list, click Dynamic Provisioning.
3. Click Select Pool VOLS.
4. Select the LDEVs created from "Create LDEVs in a RAID Group" in the Available Pool Volumes area and click OK.
   The Create Pools window opens with Total Selected Pool Volume and Total Selected Capacity populated.
5. Type a prefix for the pool name in Prefix. As an option, type an initial number for the pool name in Initial Number.
6. Set the options.
   (1) Expand Options.
   (2) Type a pool ID in Pool ID.
   (3) Type a subscription limit in Subscription Limit.
       The subscription limit is the percentage of oversubscription for this pool that you allow in your environment.
   (4) Click a value from the User-Defined Threshold list and click Add.
       The user-defined threshold determines when to trigger a pool capacity alert.
       The Selected Pools area populates.
7. Click Finish.
   The Create Pools window displays.
8. Click Apply.
Create LDEVs within a Dynamic Provisioning Pool
This procedure assumes completion of dynamic pool creation in your environment.

Create LDEVs within the pool for storing virtual machines. Map these virtual volumes to host groups containing the ESXi hosts (see "Create Host Groups").

To create and map the LDEVs used within a dynamic provisioning pool using Hitachi Storage Navigator, follow these steps:

1. From the **Actions** menu, point to **Logical Device** and then click **Create LDEVs**.
   
The **Create LDEVs** window opens.

2. From the **Provisioning Type** list, click **Dynamic Provisioning**.

3. From the **Emulation Type** list, click **OPEN-V**.

4. From the **RAID Level** list, click **RAID-6 (6D+2P)**.
   
   These options allow you to filter the available RAID group volumes.

5. Select the pool options.
   
   (1) Click **Select Pool**.
   
   The **Select Pool** window opens.

   (2) Select the pool created from "Create Dynamic Provisioning Pools" in the **Available Pools** area and click **OK**.

   (3) Type the capacity in **LDEV Capacity** and click a unit of measure from the list.

   This solution uses 500 GB LDEVs for the VMFS datastores.

   (4) Type the number of LDEVs of the size in **LDEV Capacity** to create in **Number of LDEVs**.

   (5) In the **LDEV Name** area, type a prefix in **Prefix** and type an initial number in **Initial Number**.

6. Add the LDEVS.
   
   (1) Click **Add**.

   The **Selected LDEVs** pane populates.

   (2) Click **Next**.

   (3) Click **Finish**.

   The confirmation window for creating LDEVs opens.

   (4) Click **Apply**.
Create a Command Device
Create command devices at the local and remote sites. Verify that all the command devices are accessible by the ESXi hosts through multiple I/O paths.

To create a command device using Hitachi Storage Navigator, follow these steps:

1. Create an LDEV in the Hitachi Dynamic Provisioning pool as described in “Create LDEVs within a Dynamic Provisioning Pool” section and map to the created host groups.

2. Convert an LDEV to a command device in Storage Navigator by following these steps:
   (1) Select the LDEV from the **Explorer > Logical Devices** area.
   (2) From the **Actions** menu, point to **Logical Device** and then click **Edit Command Devices**.
   (3) In the **Edit Command Devices** window, click the **Enable** option.
   (4) Click **Finish**.
   (5) Click **Apply**.

Configure vSphere environment
This solution uses two ESXi hosts placed in a VMware high availability cluster per virtual infrastructure site. This adds an additional layer of protection and redundancy for disaster recovery situations. As described in “Configure Storage,” the ESXi hosts at both sites contain the following three LDEVs presented from their respective storage systems:

- **Management virtual machines (VMFS datastore)**
  - **Database**—Microsoft Windows 2008 R2 virtual machine running Microsoft SQL Server 2008. This serves database instances for VMware vCenter Server 5.0 and VMware Site Recovery Manager 5.0.
  - **VMware vCenter**—Microsoft Windows 2008 R2 virtual machine running VMware vCenter Server 5.0 for overall management of the virtualized infrastructure.
  - **VMware Site Recovery Manager**—Microsoft Windows 2008 R2 virtual machine running VMware Site Recovery Manager, Hitachi Storage Replication Adapter, and command control interface from Hitachi. This handles replication communication between the virtual and storage infrastructure as well as site-to-site communications between Site Recovery Manager instances to facilitate an integrated disaster recovery process.

Install VMware Site Recovery Manager 5.0 prior to installing Hitachi Storage Replication Adapter. This action permits Site Recovery Manager to register the installed adapter properly.
- Hitachi TrueCopy or Hitachi Universal Replicator replicated datastore (VMFS datastore)
- Virtual machines protected by synchronous replication
- Command device (raw device mapping LUN)
- Present to the VMware Site Recovery Manager virtual machine as a physical Raw Device Mapping (RDM) disk. You cannot map command devices as virtual RDMs.

Figure 4 shows the architecture of the VMware vSphere environment.

**Primary/Recovery Site**

![Diagram of Primary/Recovery Site]

Figure 4
Configure Command Control Interface (CCI) for Replication

Hitachi TrueCopy and Hitachi Universal Replicator reside on storage systems at the primary site and the recovery site to maintain the replication of data between P-VOLs and S-VOLs. Command control interface from Hitachi allows you to manage, monitor, and control the Hitachi Universal Replicator process.

To configure the command control interface, follow these steps:

1. Install Command Control Interface
2. Configure Command Devices
3. Configure Remote Replication Using Command Control Interface
4. (Optional) Enabling replication for ShadowImage

Repeat these steps on the primary site and the recovery site.

Install Command Control Interface

To install command control interface from Hitachi on the VMware Site Recovery Manager virtual machine, follow these steps:

1. Insert the installation media for command control interface into an I/O device (for example, CD-ROM) connected to the virtual machine.
2. Run Setup.exe on the installation media. Follow the on-screen instructions to complete the installation.
3. Verify installation of the latest version of command control interface by typing the following command at a command prompt from the Hitachi Open Remote Copy Manager installation directory (C:\HORCM\etc):

   `raidqry -h`

   The output looks something like the following:

   Model: RAID-Manager/WindowsNT
   Ver&Rev: 01-25-03/11
   Usage: raidqry [options] for HORCM
Configure Command Devices
A command device is a dedicated logical volume on the storage system that functions as the interface to the storage system from the host. The command device accepts a command from the host that it then executes on the storage system.

This procedure assumes the creation and mapping of a command device LDEV to the ESXi host using Hitachi Storage Navigator.

To configure a command device, do the following:

1. From the VMware vSphere client, add the command device LDEV to the Site Recovery Manager virtual machine as a physical RDM virtual disk.

2. Configure the command device in the guest operating system.
   
   (1) In Microsoft Windows 2008, from the Server Manager menu, point to Storage and then click Disk Management.
   
   (2) Right-click the RDM disk and click Online.
   
   (3) Right-click the RDM disk and click Initialize Disk.
   
   (4) Click MBR (Master Boot Record) as the partition style.

Do not install a volume. Define and configure the command device as a raw device with no file system and no mount operation.

Configure Remote Replication Using Command Control Interface
There are two command control interface components. They reside on the following:

- **Storage System**—Command devices and Hitachi TrueCopy or Hitachi Universal Replicator volumes (P-VOL and S-VOL)

- **Server**—Hitachi Open Remote Copy Manager (HORCM), configuration definition files (for example, horcm0.conf), and command control interface commands

The Hitachi Open Remote Copy Manager operates as a daemon process on the VMware Site Recovery Manager virtual machines. When activated, Open Remote Copy Manager refers to the configuration definition files. The instance communicates with the storage sub-system and remote servers.

Modify the services file in the C:\Windows\System32\drivers\etc folder to register the port name and number for each Open Remote Copy Manager instance on each server. The port name entries for Open Remote Copy Manager in the services file must be the same on all the servers. For example, if the service number for port name horcm0 is 11000/udp, the service number for port name horcm1 must be 11001/udp in the services file on the Site Recovery Manager server at the local and the remote site.
Figure 5 shows a two-server, two-HORCM instance configuration used with command control interface to manage TrueCopy or Universal Replicator replication.

Hitachi TrueCopy and Hitachi Universal Replicator require two instances of Open Remote Copy Manager to be operational.

- One instance manages the P-VOLs,
- The other instance manages the S-VOLs.

The Open Remote Copy Manager configuration file defines the communication path and the logical units to be controlled. Each instance has its own configuration file saved in the C:\Windows directory.

The content of the `horcm0.conf` file and the `horcm1.conf` file used to define a TrueCopy pair are available in "Hitachi TrueCopy Remote Replication Bundle Files."

The content of the `horcm0.conf` file and the `horcm1.conf` file used to define a Universal Replicator pair are available in "Hitachi Universal Replicator Files."
After adding the port name entries and defining the configuration files, start the Hitachi Open Remote Copy Manager instance. At the command prompt, type the following:

```
cd c:\HORCM\etc
horcmstart.exe *
```

An asterisk [*] is used in place of the instance number in the command. For example, for the server containing horcm0.conf, type `horcmstart.exe 0`.

After executing the instructions described in the previous section at both sites, Open Remote Copy Manager instances should be running on the Site Recovery Manager servers at both sites. Verify the pair relationship by running the pairdisplay command from the `horcm0` instance on the primary site’s Site Recovery Manager server:

```
pairdisplay.exe -g <grp> -1H<HORCM instance #> -fcx
```

Initially, the volumes are in simplex (SMPL) mode. The volumes are not paired and synchronized until running the paircreate command.

Figure 6 shows a pairdisplay output of the TrueCopy pair defined in "Hitachi TrueCopy Remote Replication Bundle."

```
C:\HORCM\etc>pairdisplay.exe -g TC-SRM -IH0 -fcx
Group    PairVol(L/R)    (Port#, TID, LU),Seq#,LDEV#, P/S,Status,Fence, %P-LDEV# M
TC-SRM   SRM_Sync(L)    (CL5-D-1,25, 4)54555  2. SMPL -----,-----,----,----- -
TC-SRM   SRM_Sync(R)    (CL5-B-3,26, 7)54594  a. SMPL -----,-----,----,----- -

Figure 6
```

For more information about setting up the Open Remote Copy Manager instances and Open Remote Copy Manager configuration file, see the Hitachi Command Control Interface (CCI) Users and Reference Guide that accompanies the Hitachi Command Control Interface software.

```
C:\HORCM\etc>pairdisplay.exe -g HUR-SRM -IH0 -fcx
Group    PairVol(L/R)    (Port#, TID, LU),Seq#,LDEV#, P/S,Status,Fence, %P-LDEV# M
HUR-SRM  SRM_Async(L)   (CL5-B-1,26, 6)54555  5. SMPL -----,-----,----,----- -
HUR-SRM  SRM_Async(R)   (CL5-B-1,26, 6)54594  c. SMPL -----,-----,----,----- -

Figure 7
```
(Optional) Configure Local Replication Using Command Control Interface

The recovery function of Site Recovery Manager is an optional feature that allows for non-disruptive failover testing. Administrators can test failover without affecting the production remote replication. It requires an additional locally replicated datastore at the recovery site's storage system. Follow the instructions in the Configure Storage section to create an LDEV identical in size to the existing replicated volume.

Use Hitachi ShadowImage Heterogeneous Replication to create an in-system replication of the TrueCopy or Universal Replicator’s S-VOL to another LDEV. Similar to remote replication, Hitachi ShadowImage requires two instances of Hitachi Open Remote Copy Manager (HORCM) to be operational. Both instances run from the Site Recovery Manager server on the recovery site. Each instance has its own configuration file saved in the C:\Windows directory.

This solution modifies the TrueCopy horcm1.conf configuration file from "Hitachi TrueCopy Remote Replication Bundle Files" to include a definition for the ShadowImage pair.

"Hitachi ShadowImage Heterogeneous Replication Files" has the content of the horcm1.conf and the horcm2.conf files used to define a ShadowImage pair. In this example, the S-VOL for the TrueCopy pair acts as the P-VOL for the ShadowImage pair.

Figure 8 shows a two-server, three-HORCM instance configuration used with command control interface (CCI) to manage TrueCopy with ShadowImage replication.
After adding the port name entries and the defining the configuration files, start the Hitachi Open Remote Copy Manager instance. At a command prompt, type the following:

```
cd c:\HORCM\etc
horcmstart.exe *
```

An asterisk [*] is substituted for the instance number in the command. For example, to start the remote server containing horcm1.conf and horcm2.conf, type `horcmstart.exe 1 2`.

Verify the pair relationship by running the pairdisplay command from the horcm1 instance on the recovery site's Site Recovery Manager server:

```
pairdisplay.exe -g <grp> -IM<HORCM instance #> -fcx
```

Initially, the volumes are in simplex (SMPL) mode. The volumes do not pair and synchronize until running the paircreate command.
Figure 9 shows a pairdisplay output of the ShadowImage pair defined in "Hitachi ShadowImage Heterogeneous Replication ."

```plaintext
C:\HORCM\etc>pairdisplay.exe -g SI-SRM -IM1 -fcx
Group PairVol(L/R) (Port#TID, LU-M),Seq#,LDEV#,P/S,Status, %P-LDEV# M
SI-SRM SI-Async(L) (CL5-B-3,26, 7-0)54594 a. SMPL ---- ----- ----- -
SI-SRM SI-Async(R) (CL5-B-1,26, 7-0)54594 e. SMPL ---- ----- ----- -
```

Figure 9

Implement Storage Replication for Site Recovery Manager

After defining volume pair relationships and starting the Hitachi Open Remote Copy Manager (HORCM) daemon, initiate storage replication using HORCM commands.

Enabling replication for TrueCopy Synchronous

Initiate Hitachi TrueCopy Synchronous replication from the horcm0 instance by typing the following at a command prompt in the C:\HORCM\etc directory:

```plaintext
paircreate.exe -g <grp> -vl -fg <fence> <CTGID> -IH<HORCM instance #>
```

Figure 10 shows the command and the output of a TrueCopy pair creation based on the HORCM configuration files in "Hitachi TrueCopy Remote Replication Bundle Files."

```plaintext
C:\HORCM\etc>paircreate.exe -g TC-SRM -vl -fg never 0 -IH0
```

Figure 10

Enabling replication for Universal Replicator

Initiate Hitachi Universal Replicator replication from the horcm0 instance by typing the following at a command prompt in the C:\HORCM\etc directory:

```plaintext
paircreate.exe -g <grp> -vl -f async -jp <journal id> -js <journal id> -IH<HORCM instance #>
```

Figure 10
Figure 11 shows the command and the output of a Universal Replicator pair creation based on the HORCM configuration files in "Hitachi Universal Replicator Files."

C:\HORCM\etc>paircreate.exe -g HUR-SRM -vl -f async -jp 00 -js 00 -IH0

C:\HORCM\etc>pairdisplay.exe -g HUR-SRM -IH0 -fcxe

<table>
<thead>
<tr>
<th>Group</th>
<th>PairVol(L/R) (Port#,TID, LU),Seq#,LDEV#,P/S, Status,Fence, %,P-LDEV# M CTG JID AP EM</th>
<th>E-Seq# E-LDEV#</th>
</tr>
</thead>
<tbody>
<tr>
<td>HUR-SRM SRM_Async(L) (CL5-B-126, 6) 54555 5. P-VOL COPY ASYNC , 0 c</td>
<td>1 0 2 - - -</td>
<td></td>
</tr>
<tr>
<td>HUR-SRM SRM_Async(R) (CL5-B-126, 6) 54594 c. S-VOL COPY ASYNC ,----- 5</td>
<td>1 0 2 - - -</td>
<td></td>
</tr>
</tbody>
</table>

Figure 11

(Optional) Enabling replication for ShadowImage

Initiate Hitachi ShadowImage replication from the horcm1 instance by typing the following at a command prompt in the C:\HORCM\etc directory:

`paircreate.exe -g <grp> -vl -IM<HORCM instance #>`

Figure 12 shows the command and the output of a ShadowImage pair creation based on the HORCM configuration files in "Hitachi ShadowImage Heterogeneous Replication Files."

C:\HORCM\etc>paircreate.exe -g SI-SRM -vl -IM1

C:\HORCM\etc>pairdisplay.exe -g SI-SRM -IM1 -fcxe

<table>
<thead>
<tr>
<th>Group</th>
<th>PairVol(L/R) (Port#,TID, LU-M),Seq#,LDEV#,P/S, Status, %,P-LDEV# M CTG CM EM</th>
<th>E-Seq# E-LDEV#</th>
</tr>
</thead>
<tbody>
<tr>
<td>SI-SRM SI-Aasync(L) (CL5-B-3,28, 7-0) 54594 a. P-VOL COPY, 12 e - - N - - -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SI-SRM SI-Aasync(R) (CL5-B-1,26, 7-0) 54594 e. S-VOL COPY, 12 a - - N - - -</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Configure Storage Replication Adapter with VMware Site Recovery Manager

With VMware Site Recovery Manager and Hitachi Storage Replication Adapter installed on virtual machines at both sites and storage replication enabled, manage the disaster recovery workflow through the vSphere client. The following procedure assumes the installation of the Site Recovery Manager plug-in with the vSphere client and the pairing of the protected and recovery site vCenters.

To configure storage replication with your Site Recovery Manager environment, follow these steps:

1. From the Site Recovery Manager Management window, click **Array Managers**.

2. In the right pane, click the **SRAs** tab and click **Rescan SRAs**.
   
   As shown in Figure 13, the output shows the installed Hitachi adapter version and lists supported array models.

![Figure 13](image)

3. In the **Array Managers** pane, click the local site and click **Add Array Manager**.
   
   The **Add Array Manager** wizard opens.

4. Type a **Display Name**, click **RAID Manager Storage Replication Adapter** from the **SRA Type** list, and then click **Next**.
5. In the **Connection to HORCM Server** window, add the following connection parameters:

   (1) For **HORCMINST and IP Address of HORCM(CCI) Server**, type the following:
   
   \[
   \text{HORCMINST}=X
   \]
   
   For \(X\), use the HORCM instance number. For example, in Figure 14, shows adding the Array Manager to the primary site, \( \text{HORCMINST}=0 \) was typed in the box.

   ![Add Array Manager - Primary Site](image)

   **Figure 14**

   The parameters are case-sensitive. Always use ALL CAPS.

   (2) Type the **Username** and **Password**.

   - If user authentication is not configured on the command device, type `user` for **Username** and `password` for **Password**.
   - If user authentication is configured on the command device, use your user name and password.

   (3) Click **Next**.

   The wizard says Array Manager was added successfully.

   (4) Click **Finish**.
6. Enable the use of the array pairs.

   (1) Click one of the array managers and click the **Array Pairs** tab.

   (2) Click **Enable** to use the array pair with VMware Site Recovery Manager.

   (3) Click the **Devices** tab to confirm that Site Recovery Manager reports the storage replication correctly.

Figure 15 shows a Site Recovery Manager environment configured to monitor a TrueCopy and Universal Replicator pair. If the storage replication status does not report correctly, verify the pair relationship as follows:

1. Use the pairdisplay command with command control interface.

2. Refresh the array pair by clicking **Refresh** (circled in red in Figure 15).

![Figure 15](image.png)

The Site Recovery Manager environment is configured for storage replication.

**Other Implementation Actions**

Create **Protection Groups** and **Recovery Plans** to do the following:

- Protect your virtual machines on the storage replicated datastore
- Automate the disaster recovery process

For more information about setting up Site Recovery Manager, see the “Site Recovery Manager Administration Guide” ([http://www.vmware.com/support/pubs/srm_pubs.html](http://www.vmware.com/support/pubs/srm_pubs.html)).
Configuration Files

These are the configuration files you need for this implementation.

Hitachi TrueCopy Remote Replication Bundle Files

Hitachi TrueCopy configuration files have the following sections:

- **HORCM_MON**—Contains information needed to monitor a HORCM instance such as IP address, HORCM instance or service, pooling interval for monitoring paired volumes, and timeout period for communication with remote server
- **HORCM_CMD**—Contains device path information about the command device
- **HORCM_LDEV**—Defines the storage sub-system device address for the paired logical volume names
- **HORCM_INST**—Network address of the remote server.

Copy `horcm0.conf`, shown in Figure 16, to the C:\Windows folder on the Site Recovery Manager server at the local site.

Copy `horcm1.conf`, shown in Figure 17, to the C:\Windows folder on the Site Recovery Manager server at the remote site.

Use the IP addresses and serial numbers for your environment in the configuration files.

```
#PRIMARY_SITE - TRUECOPY
#FileName: horcm0.conf
#/******************************************** For HORCM_MON *********************************************/
HORCM_MON
#ip_address service poll(10ms) timeout(10ms)
172.17.171.233 horcm0 1000 3000
#/******************************************** For HORCM_CMD *********************************************/
HORCM_CMD
#dev_name
\\.\CMD-54555
#/******************************************** For HORCM_LDEV *********************************************/
HORCM_LDEV
#dev_group dev_name Serial# CU:LDEV(LDEV#) MU#
TC-SRM SRM_Sync 54555 00:02
#/******************************************** For HORCM_INST *********************************************/
HORCM_INST
#dev_group
TC-SRM
172.17.171.234 horcm1
```

Figure 16
Hitachi Universal Replicator Files

Hitachi Universal Replicator configuration files consist of following sections:

- **HORCM_MON**—Contains information needed to monitor a HORCM instance such as IP address, HORCM instance or service, pooling interval for monitoring paired volumes, and timeout period for communication with remote server

- **HORCM_CMD**—Contains device path information about the command device

- **HORCM_LDEV**—Defines the storage sub-system device address for the paired logical volume names

- **HORCM_INST**—Network address of the remote server

Copy `horcm0.conf`, as shown in Figure 18, to C:\Windows on the Site Recovery Manager server at the local site.

Copy `horcm1.conf`, as shown in Figure 19, to C:\Windows on the Site Recovery Manager server at the remote site.

Use the IP addresses and serial numbers for your environment in the configuration files.
# PRIMARY SITE - UNIVERSAL REPLICATOR
# File Name: horcm0.conf
#****************************************************************************** For HORCM_MON******************************************************************************
HORCM_MON
# ip_address service poll(10ms) timeout(10ms)
172.17.171.233 horcm0 1000 3000
#****************************************************************************** For HORCM_CMD******************************************************************************
HORCM_CMD
# dev name dev_name dev_name
\\.\CMD-54555
#****************************************************************************** For HORCM_LDEV******************************************************************************
HORCM_LDEV
# dev_group dev_name Serial# CU:LDEV(LDEV#) MU#
HUR-SRM SRM_Async 54555 00:05
#****************************************************************************** For HORCM_INST******************************************************************************
HORCM_INST
# dev_group ip_address service
HUR-SRM 172.17.171.234 horcm1
#

Figure 18

# RECOVERY SITE - UNIVERSAL REPLICATOR
# File Name: horcm1.conf
#****************************************************************************** For HORCM_MON******************************************************************************
HORCM_MON
# ip_address service poll(10ms) timeout(10ms)
172.17.171.234 horcm1 1000 3000
#****************************************************************************** For HORCM_CMD******************************************************************************
HORCM_CMD
# dev name dev_name dev_name
\\.\CMD-54594
#****************************************************************************** For HORCM_LDEV******************************************************************************
HORCM_LDEV
# dev_group dev_name Serial# CU:LDEV(LDEV#) MU#
HUR-SRM SRM_Async 54594 00:05
#****************************************************************************** For HORCM_INST******************************************************************************
HORCM_INST
# dev_group ip_address service
HUR-SRM 172.17.171.233 horcm0
#

Figure 19
Hitachi ShadowImage Heterogeneous Replication Files

The Hitachi ShadowImage Heterogeneous Replication configuration files consist of following sections:

- **HORCM_MON**—Contains information needed to monitor a HORCM instance such as IP address, HORCM instance or service, pooling interval for monitoring paired volumes, and timeout period for communication with remote server

- **HORCM_CMD**—Contains device path information about the command device

- **HORCM_LDEV**—Defines the storage sub-system device address for the paired logical volume names

- **HORCM_INST**—Network address of the remote server

This pair definition uses the TrueCopy pair's S-VOL as the ShadowImage pair's P-VOL and modifies the TrueCopy horcm1.conf configuration file in "Hitachi TrueCopy Remote Replication Bundle Files." Only specify mirror unit numbers (MU#) when defining ShadowImage pairs. Only initiate ShadowImage replication after establishing TrueCopy replication.

Copy the horcm1.conf (Figure 20) and horcm2.conf (Figure 21) configuration files to C:\Windows on the Site Recovery Manager server at the remote site.

Use the IP addresses and serial numbers for your environment in the configuration files.
**Figure 20**

```bash
#RECOVERY SITE - TRUECOPY, SHADOWIMAGE(PVOL)
#FileName: horcml.conf
#/****************************************************************** For HORCM_MON ******************************************************************/
HORCM_MON
#ip_address  service  poll(10ms) timeout(10ms)
172.17.171.234  horcm1  1000  3000
#/****************************************************************** For HORCM_CMD ******************************************************************/
HORCM_CMD
#dev_name  dev_name
\./CMD-54594
#/****************************************************************** For HORCM_LDEV ******************************************************************/
HORCM_LDEV
#dev_group  dev_name  Serial#  CU:LDEV(LDEV#)  MU#
TC-SRM  SRM_Sync  54594  00:0A
SI-SRM  SI_Sync   54594  00:0A  0
#/****************************************************************** For HORCM_INST ******************************************************************/
HORCM_INST
#dev_group  ip_address  service
TC-SRM  172.17.171.233  horcm0
SI-SRM  172.17.171.234  horcm2
#
```

**Figure 21**

```bash
#RECOVERY SITE - SHADOWIMAGE(SVOL)
#FileName: horcml.conf
#/****************************************************************** For HORCM_MON ******************************************************************/
HORCM_MON
#ip_address  service  poll(10ms) timeout(10ms)
172.17.171.234  horcm2  1000  3000
#/****************************************************************** For HORCM_CMD ******************************************************************/
HORCM_CMD
#dev_name  dev_name
\./.cmd-54594
#/****************************************************************** For HORCM_LDEV ******************************************************************/
HORCM_LDEV
#dev_group  dev_name  Serial#  CU:LDEV(LDEV#)  MU#
SI-SRM  SI_Sync   54594  00:0E
#/****************************************************************** For HORCM_INST ******************************************************************/
HORCM_INST
#dev_group  ip_address  service
SI-SRM  172.17.171.234  horcm1
#
```
For More Information

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