

VMware vSphere Replication Administration

vSphere Replication 5.1

This document supports the version of each product listed and supports all subsequent versions until the document is replaced by a new edition. To check for more recent editions of this document, see <http://www.vmware.com/support/pubs>.

EN-000829-04

vmware[®]

You can find the most up-to-date technical documentation on the VMware Web site at:

<http://www.vmware.com/support/>

The VMware Web site also provides the latest product updates.

If you have comments about this documentation, submit your feedback to:

docfeedback@vmware.com

Copyright © 2012– 2014 VMware, Inc. All rights reserved. [Copyright and trademark information.](#)

VMware, Inc.
3401 Hillview Ave.
Palo Alto, CA 94304
www.vmware.com

Contents

vSphere Replication Administration	5
Updated Information	7
1 Overview of VMware vSphere Replication	9
Contents of the vSphere Replication Appliance	9
vSphere Replication Client Plug-In	10
Primary Sites and Secondary Sites	10
vSphere Replication Roles Reference	11
vSphere Replication Architecture	13
2 vSphere Replication System Requirements	15
vSphere Replication Licensing	15
vSphere Replication Network Ports	16
Operational Limits of vSphere Replication	16
Compatibility of vSphere Replication with Other vSphere Features	16
vSphere Replication Compatibility with Other Software	17
Bandwidth Requirements for vSphere Replication	17
3 Upgrading vSphere Replication	21
Upgrade the vSphere Replication Appliance	22
Upgrade vSphere Replication Without Internet Access	23
4 Installing vSphere Replication	25
Deploy the vSphere Replication Virtual Appliance	25
Configure vSphere Replication Connections	26
Uninstall vSphere Replication	27
Unregister vSphere Replication from vCenter Server if the Appliance Was Deleted	27
5 Reconfigure the vSphere Replication Appliance	29
Reconfigure General vSphere Replication Settings	30
Change the SSL Certificate of the vSphere Replication Appliance	30
Change the Password of the vSphere Replication Appliance	33
Configure vSphere Replication Network Settings	33
Configure vSphere Replication System Settings	34
Reconfigure vSphere Replication to Use an External Database	35
Use the Embedded vSphere Replication Database	39
6 Replicating Virtual Machines	41
Replicating a Virtual Machine in a Single vCenter Server Instance	41
Configure Replication for a Single Virtual Machine	42

Configure Replication for Multiple Virtual Machines	43
Replicating Virtual Machines Using Replication Seeds	44
Reconfiguring Replications	44
7 Performing a Recovery with vSphere Replication	47
Recover Virtual Machines by Using vSphere Replication	47
Failback of Virtual Machines in vSphere Replication	49
8 Monitoring and Managing Replications in vSphere Replication	51
View the Replication Summary for a Site	51
Identifying Replication Problems in the Issues Tab	53
Manage Target Sites	53
9 Troubleshooting vSphere Replication	55
Access the vSphere Replication Logs	55
Solutions for Common vSphere Replication Problems	56
Index	65

vSphere Replication Administration

vSphere Replication Administration provides information about installing, configuring, and using VMware vSphere Replication.

Intended Audience

This information is intended for anyone who wants to protect the virtual machines in their virtual infrastructure by using vSphere Replication. The information is written for experienced Windows or Linux system administrators who are familiar with virtual machine technology and datacenter operations.

Updated Information

vSphere Replication Administration is updated with each release of the product or when necessary.

This table provides the update history of *vSphere Replication Administration*.

Revision	Description
000829-04	Added information about browser support for the virtual appliance management interface (VAMI) in “vSphere Replication Compatibility with Other Software,” on page 17.
000829-03	Added new topics: <ul style="list-style-type: none">■ “Bandwidth Requirements for vSphere Replication,” on page 17■ “Calculate Bandwidth for vSphere Replication,” on page 18■ “vSphere Replication Cannot Establish a Connection to the Hosts,” on page 64■ “Anti-virus Agent in Firewall Terminates Virtual Machine Replication,” on page 64 Updated the following topics: <ul style="list-style-type: none">■ “Configure Replication for a Single Virtual Machine,” on page 42■ “Configure Replication for Multiple Virtual Machines,” on page 43■ “vSphere Replication Does Not Start After Moving the Host,” on page 62■ “Upgrade the vSphere Replication Appliance,” on page 22
000829-02	Added new topics: <ul style="list-style-type: none">■ “Unregister vSphere Replication from vCenter Server if the Appliance Was Deleted,” on page 27■ “Upgrade vSphere Replication Without Internet Access,” on page 23■ “vSphere Replication RPO Violations,” on page 62■ “Error Recovering Virtual Machine in a Single vCenter Server Instance,” on page 61■ “vSphere Replication Appliance Extension Cannot Be Deleted,” on page 62■ “vSphere Replication Does Not Start After Moving the Host,” on page 62■ “Unexpected vSphere Replication Failure Results in a Generic Error,” on page 63■ “vSphere Replication Does Not Start After Moving the Host,” on page 62 Updated the following topics: <ul style="list-style-type: none">■ “Recover Virtual Machines by Using vSphere Replication,” on page 47■ “vSphere Replication Roles Reference,” on page 11■ “Replicating a Virtual Machine in a Single vCenter Server Instance,” on page 41■ “Upgrade the vSphere Replication Appliance,” on page 22■ “Operational Limits of vSphere Replication,” on page 16■ “vSphere Replication Compatibility with Other Software,” on page 17■ “Configure Replication for a Single Virtual Machine,” on page 42
000829-01	<ul style="list-style-type: none">■ Updated “Recover Virtual Machines by Using vSphere Replication,” on page 47 for vSphere Replication 5.1.0.1.■ Corrected support statements for Storage DRS and Storage vMotion in “Compatibility of vSphere Replication with Other vSphere Features,” on page 16.
000829-00	Initial release.

Overview of VMware vSphere Replication

1

VMware vSphere Replication is an extension to VMware vCenter Server that provides hypervisor-based virtual machine replication and recovery.

vSphere Replication replaces storage-based replication. It protects virtual machines from partial or complete site failures by replicating the virtual machines from a primary site to a secondary site.

vSphere Replication provides several benefits as compared to storage-based replication.

- Data protection at lower cost per virtual machine.
- A replication solution that allows flexibility in storage vendor selection at the primary and secondary sites.
- Overall lower cost per replication.

With vSphere Replication, you can replicate virtual machines from a primary datacenter to a secondary site quickly and efficiently. After you set up the replication infrastructure, you can choose the virtual machines to be replicated at a different recovery point objective (RPO).

You can configure all vSphere Replication features in the vSphere Web Client. You monitor the status of a replication through the replication management and monitoring dashboard.

- [Contents of the vSphere Replication Appliance](#) on page 9
The vSphere Replication appliance provides all the components that vSphere Replication requires.
- [vSphere Replication Client Plug-In](#) on page 10
The vSphere Replication appliance adds a plug-in to the vSphere Web Client.
- [Primary Sites and Secondary Sites](#) on page 10
In a typical vSphere Replication installation, the primary site provides business-critical datacenter services. The secondary site is an alternative facility to which you can migrate these services.
- [vSphere Replication Roles Reference](#) on page 11
vSphere Replication includes a set of roles. Each role includes a set of privileges, which enable users with those roles to complete different actions.
- [vSphere Replication Architecture](#) on page 13
After you deploy the vSphere Replication appliance, vSphere Replication integrates with your vSphere infrastructure and allows you to replicate virtual machines from one site to another.

Contents of the vSphere Replication Appliance

The vSphere Replication appliance provides all the components that vSphere Replication requires.

- A plug-in to the vSphere Web Client that provides a user interface for vSphere Replication.

- An embedded database that stores replication configuration and management information.
- A vSphere Replication Management Server and a vSphere Replication Server that provide the core of the vSphere Replication infrastructure.

You must deploy the vSphere Replication appliance on the primary and secondary sites in your virtual environment.

You can use vSphere Replication without performing any configuration of the vSphere Replication appliance after you deploy it. However, the vSphere Replication appliance provides a virtual appliance management interface (VAMI), that you can optionally use to reconfigure the appliance after deployment, if necessary. For example, you can use the VAMI to change the appliance security settings, change the network settings, or configure an external database.

vSphere Replication Client Plug-In

The vSphere Replication appliance adds a plug-in to the vSphere Web Client.

You use the vSphere Replication client plug-in to perform all vSphere Replication actions.

- Configure the connections between vSphere Replication sites.
- Configure the replication of individual or multiple virtual machines.
- Monitor and manage the status of the replications that you set up.
- Recover virtual machines.

Primary Sites and Secondary Sites

In a typical vSphere Replication installation, the primary site provides business-critical datacenter services. The secondary site is an alternative facility to which you can migrate these services.

The primary site can be any site where vCenter Server supports a critical business need. The secondary site can be in another location, or in the same room to establish redundancy. The secondary site is usually located in a facility that is unlikely to be affected by environmental, infrastructure, or other disturbances that might affect the primary site.

vSphere Replication has the following requirements for the vSphere® configurations at each site:

- Each site must have at least one datacenter.
- The secondary site must have hardware, network, and storage resources that can support the same virtual machines and workloads as the primary site.
- The sites must be connected by a reliable IP network.
- The secondary site must have access to networks (public and private) comparable to those on the primary site, although not necessarily the same range of network addresses.

Connecting Primary and Secondary Sites

When you replicate a virtual machine using vSphere Replication, a wizard guides you through the replication process, which includes establishing a connection between the primary and secondary sites. When you replicate a virtual machine, you must pair the sites and provide authentication information for the two sites so they can exchange information. Connecting sites requires vSphere administrative privileges at both sites. You must know the user name and password of a vSphere administrator at each site.

vSphere Replication Roles Reference

vSphere Replication includes a set of roles. Each role includes a set of privileges, which enable users with those roles to complete different actions.

For information about how to assign roles, see *Assigning Roles in the vSphere Web Client* in *vSphere Security*.

NOTE When assigning permissions with no propagation, make sure that you have at least Read-only permission on all parent objects.

Table 1-1. vSphere Replication Roles

Role	Privilege	Action	Target Object in vCenter Server Inventory
VRM replication viewer	VRM remote.View VR VRM remote.View VRM VRM datastore mapper.View Host.Replication.Manage replication Virtual machine .Replication.Monitor replication	View replications. Cannot change replication parameters.	vCenter Server root folder with propagation, at primary site (outgoing replications) and secondary site (incoming replications). Alternatively, vCenter Server root folder without propagation on both sites and virtual machine without propagation on the primary site.
VRM virtual machine replication user	VRM remote.View VR VRM remote.View VRM VRM datastore mapper.Manage VRM datastore mapper.View Host.Replication.Manage replication Virtual machine.Replication.Configure replication Virtual machine.Replication.Manage replication Virtual machine.Replication.Monitor replication	View replications. Manage datastores. Configure and unconfigure replications. Manage and monitor replications. Requires a corresponding user with the same role on the secondary site and additionally vSphere Replication target datastore user role on both source and target datacenters, or source and target datastore folders or on each source or target datastore.	vCenter Server root folder with propagation on both sites. Alternatively, vCenter Server root folder without propagation on both sites and virtual machine without propagation on the primary site.

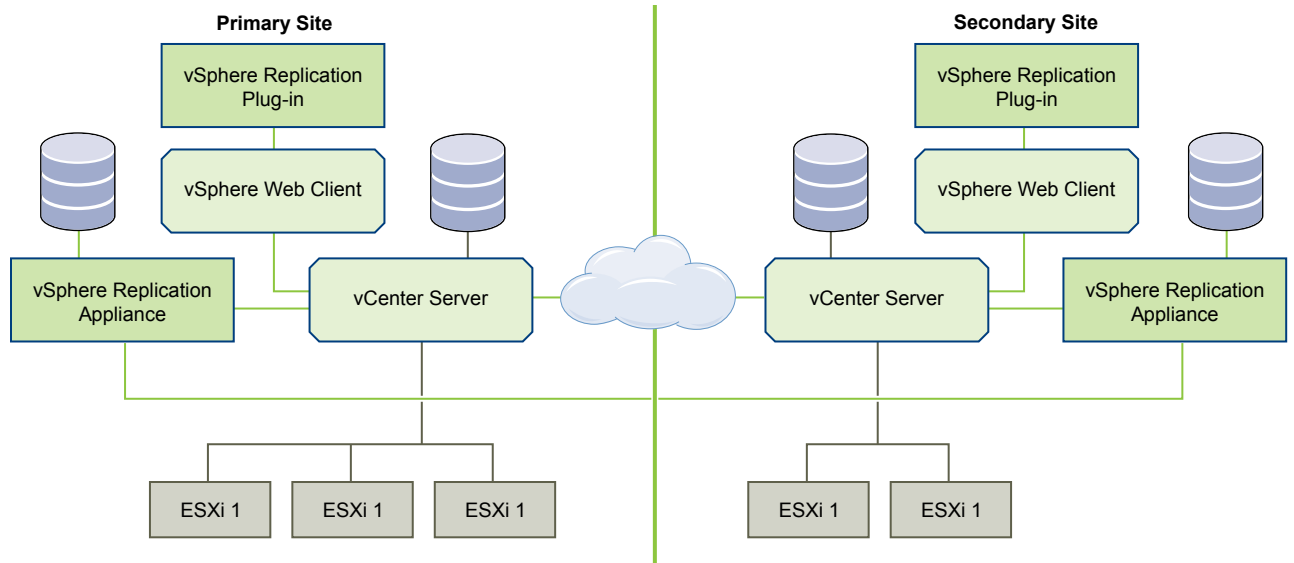
Table 1-1. vSphere Replication Roles (Continued)

Role	Privilege	Action	Target Object in vCenter Server Inventory
VRM administrator	VRM remote.Manage VR VRM remote.View VR VRM remote.Manage VRM VRM remote.View VRM VRM datastore mapper.Manage VRM datastore mapper.View VRM diagnostics .Manage VRM session .Terminate Datastore.Browse datastore Datastore.Low level file operations Host.Replication.Manage replication Resource.Assign virtual machine to resource pool Virtual machine.Configuration.Add existing disk Virtual machine.Configuration.Add or remove device Virtual machine.Interaction.Power On Virtual machine.Interaction.Device connection Virtual machine.Inventory.Register Virtual machine.Replication.Configure replication Virtual machine.Replication.Manage replication Virtual machine.Replication.Monitor replication	Incorporates all vSphere Replication privileges.	vCenter Server root folder with propagation on both sites. Alternatively, vCenter Server root folder without propagation on both sites, virtual machine without propagation on the primary site, target datastore, target virtual machine folder with propagation on the secondary site, target host or cluster with propagation on the secondary site.
VRM diagnostics	VRM remote.View VR VRM remote.View VRM VRM diagnostics .Manage	Generate, retrieve, and delete log bundles.	vCenter Server root folder on both sites.
VRM target datastore user	Datastore.Browse datastore Datastore.Low level file operations	Configure and reconfigure replications. Used on both sites in combination with the VRM virtual machine replication user role on both sites.	Source and target datastore objects, or datastore folder with propagation, or source and target datacenters with propagation.
VRM virtual machine recovery user	Datastore.Browse datastore Datastore.Low level file operations Host.Replication.Manage replication Virtual machine.Configuration.Add existing disk Virtual machine.Configuration.Add or remove device Virtual machine.Interaction.Power On Virtual machine.Interaction.Device connection Virtual machine.Inventory.Register Resource.Assign virtual machine to resource pool	Recover virtual machines.	Secondary vCenter Server root folder with propagation. Alternatively, secondary vCenter Server root folder without propagation, target datastore, target virtual machine without propagation, target virtual machine folder with propagation, target host or cluster with propagation.

vSphere Replication Architecture

After you deploy the vSphere Replication appliance, vSphere Replication integrates with your vSphere infrastructure and allows you to replicate virtual machines from one site to another.

Figure 1-1. vSphere Replication Architecture



vSphere Replication System Requirements

2

The environment in which you run the vSphere Replication virtual appliance must meet certain hardware requirements.

vSphere Replication is distributed as a 64-bit virtual appliance packaged in the .ova format. It has a dual core CPU, a 10GB and a 2GB hard disk, and 4GB of RAM. You must deploy the virtual appliance in a vCenter Server environment by using the OVF deployment wizard on an ESXi host.

This chapter includes the following topics:

- [“vSphere Replication Licensing,”](#) on page 15
- [“vSphere Replication Network Ports,”](#) on page 16
- [“Operational Limits of vSphere Replication,”](#) on page 16
- [“Compatibility of vSphere Replication with Other vSphere Features,”](#) on page 16
- [“vSphere Replication Compatibility with Other Software,”](#) on page 17
- [“Bandwidth Requirements for vSphere Replication,”](#) on page 17

vSphere Replication Licensing

Certain vSphere editions include the license for vSphere Replication.

vSphere Replication does not have a separate license. You can use vSphere Replication if you have an edition of vSphere that includes the vSphere Replication license.

- vSphere Essentials Plus
- vSphere Standard
- vSphere Enterprise
- vSphere Enterprise Plus

If you have the correct vSphere license, there is no limit on the number of virtual machines that you can replicate by using vSphere Replication.

You cannot use vSphere Replication to replicate virtual machines on ESXi hosts that do not have the correct vSphere license. You can install vSphere Replication on an ESXi host that does not have the correct license, but attempts to configure replication on virtual machines on that host fail with a licensing error.

If you configure a virtual machine for replication on a host with the correct vSphere license and move it to a host with an unsupported license, vSphere Replication stops replication of that virtual machine. You can disable vSphere Replication on a configured virtual machine on the unlicensed host.

vSphere Replication Network Ports

vSphere Replication uses default network ports for intrasite communication between hosts at a single site and intersite communication between hosts at the protected and recovery sites.

For a list of all the ports that must be open for vSphere Replication, see <http://kb.vmware.com/kb/1009562>.

For the list of default ports that all VMware products use, see <http://kb.vmware.com/kb/1012382>.

Operational Limits of vSphere Replication

vSphere Replication has certain operational limits.

To ensure successful virtual machine replication, you must verify that your virtual infrastructure respects certain limits before you start the replication.

- You can only deploy one vSphere Replication appliance on a vCenter Server instance. Deploying more than one vSphere Replication appliance is not prohibited, but might lead to unexpected results.
- Each vSphere Replication management server can manage a maximum of 500 replicated virtual machines.

See <http://kb.vmware.com/kb/2034768> for more information.

Compatibility of vSphere Replication with Other vSphere Features

vSphere Replication is compatible with certain other vSphere management features.

You can safely use vSphere Replication in combination with certain vSphere features, such as vSphere vMotion. Some other vSphere features, for example vSphere Distributed Power Management, require special configuration for use with vSphere Replication.

Table 2-1. Compatibility of vSphere Replication with Other vSphere Features

vSphere Feature	Compatible with vSphere Replication	Description
vSphere vMotion	Yes	You can migrate replicated virtual machines by using vMotion. Replication continues at the defined recovery point objective (RPO) after the migration is finished.
vSphere Storage vMotion	No	Not supported.
vSphere High Availability	Yes	You can protect a replicated virtual machine by using HA. Replication continues at the defined RPO after HA restarts a virtual machine. vSphere Replication does not perform any special HA handling. You can protect the vSphere Replication appliance itself by using HA.
vSphere Fault Tolerance	No	vSphere Replication cannot replicate virtual machines that have fault tolerance enabled. You can protect the vSphere Replication appliance itself with FT.
vSphere DRS	Yes	Replication continues at the defined RPO after resource redistribution is finished.
vSphere Storage DRS	No	Not supported.

Table 2-1. Compatibility of vSphere Replication with Other vSphere Features (Continued)

vSphere Feature	Compatible with vSphere Replication	Description
vSphere Distributed Power Management	Yes	vSphere Replication coexists with DPM on the primary site. vSphere Replication does not perform any special DPM handling on the primary site. Disable DPM on the secondary site to allow enough hosts as replication targets.
vCloud APIs	Not applicable	No interaction with vSphere Replication.
vCenter Chargeback	Not applicable	No interaction with vSphere Replication
VMware Data Recovery	Not applicable	No interaction with vSphere Replication.

vSphere Replication Compatibility with Other Software

vSphere Replication is compatible with versions of ESXi Server, vCenter Server, Site Recovery Manager, databases, and Web browsers.

vSphere Replication is compatible with the same versions as vCenter Server, except for ESXi: vSphere Replication requires ESXi 5.0 or greater. See:

- VMware Product Interoperability Matrixes at http://partnerweb.vmware.com/comp_guide2/sim/interop_matrix.php
- VMware Compatibility Guide at http://partnerweb.vmware.com/comp_guide2/search.php?testConfig=16&deviceCategory=software
- Browser compatibility at vSphere Client and vSphere Web Client Software Requirements in *vSphere Installation and Setup*
- Browser compatibility of the VAMI depends on browsers supported by VMware Studio. See https://www.vmware.com/support/developer/studio/studio25/release_notes.html

Bandwidth Requirements for vSphere Replication

Before configuring replications, you must determine storage and network bandwidth requirements for vSphere Replication to replicate virtual machines efficiently.

Storage and network bandwidth requirements can increase when using vSphere Replication. The following factors play a role in the amount of network bandwidth vSphere Replication requires for efficient replication.

Network Based Storage

If all storage is network based, data operations between the host and the storage also use the network. Each piece of replicated data travels over the network several times:

- Between the host running the replicated virtual machine and the vSphere Replication server.
- Between the vSphere Replication server and a host with access to the replication target datastore.
- Between the host and storage.
- Between storage and the host during redo log snapshots.

Network based storage is a concern when you are replicating virtual machines within a single vCenter Server instance that shares the network. When you have two sites with a vCenter Server instance on each site, the link speed between the two sites can slow traffic. Be aware of these levels of traffic and obtain more networking hardware and resources to support your workload.

Dataset Size

vSphere Replication does not replicate every virtual machine nor every VMDK file in the replicated virtual machines. To evaluate the dataset size that vSphere Replication replicates, calculate the percentage of the total storage used for virtual machines, then calculate the number of VMDKs within that subset that you have configured for replication.

For example, you might have 2TB of virtual machines on the datastores and use vSphere Replication to replicate half of these virtual machines. You might only replicate a subset of the VMDKs and assuming all the VMDKs are replicated, the maximum amount of data for replication is 1TB.

Data Change Rate and Recovery Point Objective

The data change rate is affected by the recovery point objective (RPO). To estimate the size of the data transfer for each replication, you must evaluate how many blocks change in a given RPO for a virtual machine. The data change rate within the RPO period provides the total number of blocks that vSphere Replication transfers. This number might vary throughout the day, which alters the traffic that vSphere Replication generates at different times.

vSphere Replication transfers blocks based on the RPO schedule. If you set an RPO of one hour, vSphere Replication transfers any block that has changed in that hour to meet that RPO. vSphere Replication only transfers the block once in its current state at the moment that vSphere Replication creates the bundle of blocks for transfer. vSphere Replication only registers that the block has changed within the RPO period, not how many times it changed. The average daily data change rate provides an estimation of how much data vSphere Replication transfers or how often the transfers occur.

If you use volume shadow copy service (VSS) to quiesce the virtual machine, replication traffic cannot be spread out in small sets of bundles throughout the RPO period. Instead, vSphere Replication transfers all the changed blocks as one set when the virtual machine is idle. Without VSS, vSphere Replication can transfer smaller bundles of changed blocks on an ongoing basis as the blocks change, spreading the traffic throughout the RPO period. The traffic changes if you use VSS and vSphere Replication handles the replication schedule differently, leading to varying traffic patterns.

If you change the RPO, vSphere Replication transfers more or less data per replication to meet the new RPO.

Link Speed

If you have to transfer an average replication bundle of 4GB in a one hour period, you must examine the link speed to determine if the RPO can be met. If you have a 10Mb link, under ideal conditions on a completely dedicated link with little overhead, 4GB takes about an hour to transfer. Meeting the RPO saturates a 10Mb WAN connection. The connection is saturated even under ideal conditions, with no overhead or limiting factors such as retransmits, shared traffic, or excessive bursts of data change rates.

Only about 70% of a link is available for traffic replication. This means that on a 10Mb link you obtain a link speed of about 3GB per hour. On a 100Mb link you obtain a speed of about 30GB per hour.

To calculate the bandwidth, see [“Calculate Bandwidth for vSphere Replication,”](#) on page 18.

Calculate Bandwidth for vSphere Replication

To determine the bandwidth that vSphere Replication requires to replicate virtual machines efficiently, you calculate the average data change rate within an RPO period divided by the link speed.

If you have groups of virtual machines that have different RPO periods, you can determine the replication time for each group of virtual machines. For example, you might have four groups with RPO of 15 minutes, one hour, four hours, and 24 hours. Factor in all the different RPOs in the environment, the subset of virtual machines in your environment that is replicated, the change rate of the data within that subset, the amount of data changes within each configured RPO, and the link speeds in your network.

Prerequisites

Examine how data change rate, traffic rates, and the link speed meet the RPO. Then look at the aggregate of each group.

Procedure

- 1 Identify the average data change rate within the RPO by calculating the average change rate over a longer period then dividing it by the RPO.
- 2 Calculate how much traffic this data change rate generates in each RPO period.
- 3 Measure the traffic against your link speed.

For example, a data change rate rate of 100GB requires approximately 200 hours to replicate on a T1 network, 30 hours to replicate on a 10Mbps network, 3 hours on a 100Mbps network.

Upgrading vSphere Replication

If you installed vSphere Replication 1.0 as part of a previous SRM 5.0 installation, you must upgrade vSphere Replication to version 5.1.

The quickest way to upgrade vSphere Replication is to use vSphere Update Manager. If you cannot use Update Manager, you can upgrade vSphere Replication by using the VAMI of the vSphere Replication management server and vSphere Replication server. Upgrading vSphere Replication by using the VAMI requires more steps than upgrading by using Update Manager.

vSphere Replication has no earlier releases as a standalone appliance. You might have installed an earlier version of vSphere Replication as part of an SRM installation.

- vSphere Replication 1.0 was delivered with SRM 5.0.
- vSphere Replication 1.0.1 was delivered with SRM 5.0.1.

You can upgrade vSphere Replication 1.0 and all 1.0.x versions to vSphere Replication 5.1. The upgrade preserves the configuration from the previous installation, including the database configuration, vSphere Replication site pairings, registered vSphere Replication servers, and configured replications.

NOTE After you upgrade vSphere Replication, the port on which the vSphere Replication appliance publishes the VAMI changes from 8080 to 5480.

If you deploy vSphere Replication on a vCenter Server instance that already has SRM vSphere Replication, you cannot discover the existing SRM vSphere Replication appliances through the vCenter Extension Manager. All replications that you already configured are set to an error state. If you deployed vSphere Replication 5.1 by mistake, you must shut down the vSphere Replication appliance and restart the existing SRM vSphere Replication appliance. Then you can return the virtual machines to green status using the multiple virtual machine configuration wizard in SRM.

Using Standalone vSphere Replication 5.1 with SRM 5.1

vSphere Replication 5.1 is also available as a standalone extension of vCenter Server, that is independent of SRM. If you installed the standalone version of vSphere Replication 5.1 and then install SRM 5.1, all existing pairings and replications are immediately accessible through the SRM user interface, except for pairings and replications in a single vCenter Server. Pairings and replications in a single vCenter Server are visible only in the vSphere Replication user interface.

Migration of the vSphere Replication database is not supported. If you upgrade vSphere Replication 5.1 to SRM 5.1, vSphere Replication uses the embedded database. The standalone version of vSphere Replication 5.1 and SRM 5.1 can coexist and work together in the same infrastructure. For example, you can replicate 100 virtual machines with vSphere Replication but choose to protect only 50 of them with SRM. You can manage all of the replications by using either the vSphere Replication interface in the vSphere Web Client or by using the SRM interface. Some limitations apply to the management of the replications, depending on which interface you use.

- You cannot manage replications in a single vCenter Server instance in the SRM interface.
- You cannot use the vSphere Replication interface in the vSphere Web Client to manually recover virtual machines that SRM protects.
- You cannot deploy additional vSphere Replication servers by using the vSphere Replication interface in the vSphere Web Client.

Update Releases

You can obtain update releases of vSphere Replication 5.1 by using Update Manager or by using the VAMI of the vSphere Replication appliance.

This chapter includes the following topics:

- [“Upgrade the vSphere Replication Appliance,”](#) on page 22
- [“Upgrade vSphere Replication Without Internet Access,”](#) on page 23

Upgrade the vSphere Replication Appliance

You can upgrade the vSphere Replication appliance by using the virtual appliance management interface (VAMI) or vSphere Update Manager.

IMPORTANT Do not select the option in **Update > Settings** in the VAMI to automatically update vSphere Replication to the latest version which might not be compatible with the version of vCenter Server that you have currently installed. Leave the update setting set to **No automatic updates**.

To upgrade the vSphere Replication appliance using the VAMI, perform the following steps.

Procedure

- 1 Connect to the VAMI of the vSphere Replication appliance in a Web browser.
The URL for the VAMI is `https://vr-appliance-address:5480`.
- 2 Type the root user name and password for the appliance.
You configured the root password during the OVF deployment of the vSphere Replication appliance.
- 3 Click the **Update** tab of the currently installed vSphere Replication appliance.
- 4 Click **Check Updates**.

By default, the VAMI shows the most recently available version. If you want to upgrade to an update release of an older version when the next major release is already available, you must manually change the upgrade URL:

- a Click **Settings**.
- b Select **Use Specified Repository** and paste the update URL into the **Repository URL** text box.
See the release notes of the update release for the exact URL.
- c Click **Save Settings**.

- d Click **Status**.
- e Click **Check Updates**.

The update checker shows that a new version is available.

- 5 Click **Install Updates** and click OK.
- 6 When the update finishes, select the **System** tab, click **Information**, and click **Reboot** to restart the vSphere Replication server.
You can see details for the update process in the `/opt/vmware/var/log/vami/vami.log` file.
- 7 Repeat the process on the recovery site.

Upgrade vSphere Replication Without Internet Access

In environments where you do not have access to the Internet, you can upgrade vSphere Replication by using a downloaded ISO image.

Prerequisites

Download the `VMware-vSphere_Replication-5.1.x.x-build_number.iso` ISO image from the vSphere downloads page. Copy the ISO image file to a datastore that is accessible from the vCenter Server instance that you use with vSphere Replication.

Procedure

- 1 Right-click the vSphere Replication virtual machine and select **Edit Settings**.
- 2 Select **Add > CD/DVD Drive > Next**.
- 3 Select **Use ISO Image** and click **Next**.
- 4 Click **Browse** and navigate to the ISO image in the datastore.
- 5 Select **Connect at power on** and follow the prompts to add the CD-ROM drive to the vSphere Replication virtual machine.
- 6 Restart the vSphere Replication virtual machine.
- 7 In a Web browser, log in to the virtual appliance management interface (VAMI).
If you are updating vSphere Replication 5.1, go to `https://vr_appliance_address:5480`.
- 8 Click the **Update** tab.
- 9 Click **Settings** and select **Use CDRom Updates**, then click **Save**.
- 10 Click **Status** and click **Check Updates**.
The appliance version appears in the list of available updates.
- 11 Click **Install Updates** and click **OK**.
- 12 After the updates install, click the **System** tab and click **Reboot** to complete the upgrade.
- 13 Log out of the vSphere Web Client and log in again to see the upgraded appliance.

Installing vSphere Replication

vSphere Replication uses the replication technologies included in ESXi with the assistance of virtual appliances to replicate virtual machines between primary and secondary sites.

To use vSphere Replication, you must deploy one vSphere Replication appliance at each site. The vSphere Replication appliance is registered with the corresponding vCenter Server instance on each site. For example, on the primary site, the vSphere Replication appliance registers with the vCenter Server instance on the primary site.

The vSphere Replication appliance provides a virtual appliance management interface (VAMI). You can use this interface to reconfigure the vSphere Replication database, network settings, public-key certificates, and passwords for the appliances.

Procedure

- 1 [Deploy the vSphere Replication Virtual Appliance](#) on page 25
vSphere Replication is distributed as an OVF virtual appliance. You must deploy the appliance at both of the primary and secondary sites.
- 2 [Configure vSphere Replication Connections](#) on page 26
To use vSphere Replication between two sites managed by different vCenter Server instances, you must configure a connection between the two vSphere Replication appliances.
- 3 [Uninstall vSphere Replication](#) on page 27
You uninstall vSphere Replication by unregistering the appliance from vCenter Server and removing it from your environment.
- 4 [Unregister vSphere Replication from vCenter Server if the Appliance Was Deleted](#) on page 27
If the vSphere Replication appliance virtual machine does not exist because it was deleted, you cannot use the virtual appliance management interface (VAMI) to unregister vSphere Replication from vCenter Server. Instead, you can use the Managed Object Browser (MOB) to delete the vSphere Replication extension.

Deploy the vSphere Replication Virtual Appliance

vSphere Replication is distributed as an OVF virtual appliance. You must deploy the appliance at both of the primary and secondary sites.

You deploy the vSphere Replication appliance by using the standard vSphere OVF deployment wizard.

Prerequisites

- Verify that you have vSphere and vSphere Web Client installations for the primary site and the secondary site.

- Download the vSphere Replication OVA file to a local directory or obtain its online URL.
- In the vSphere Web Client, select the vCenter Server instance on which you are deploying vSphere Replication and click **Manage > Settings > Advanced Settings**. Verify that the `VirtualCenter.FQDN` value is set to a fully-qualified domain name or a literal address.

Procedure

- 1 Log in to the vSphere Web Client on the primary site.
- 2 Select **vCenter > Hosts and Clusters**.
- 3 Right-click a host and select **Deploy OVF template**.
- 4 Provide the location of the OVA file from which to deploy the vSphere Replication appliance, and click **Next**.
 - Select **URL** and provide the URL to deploy the appliance from an online URL.
 - Select **Local file > Browse** to locate the `.ova` file if you downloaded the file to a local machine.
- 5 Review the virtual appliance details and click **Next**.
- 6 Accept the default name and destination folder or provide a new name and folder for the virtual appliance, and click **Next**.
- 7 Select a destination datacenter, datastore, and disk format for the virtual appliance and click **Next**.
- 8 Select a network from the list of available networks and click **Next**.
- 9 Provide a root password for the appliance, set the network properties, and click **Next**.
If you do not set network settings, the appliance uses DHCP. Set a static IP address for the appliance. You can also configure network settings by using the virtual appliance management interface (VAMI).
- 10 Review the binding to the vCenter Extension vService and click **Next**.
- 11 Select the check box to power on the virtual appliance after deployment and click **Finish**.
The vSphere Replication appliance is deployed.
- 12 Log out of the vSphere Web Client, then log back in.
vSphere Replication is present on the **Home** tab in the vSphere Web Client.
- 13 Repeat the procedure to install vSphere Replication on the secondary site.

vSphere Replication is ready for use immediately after you deploy the appliance. No manual configuration or registration is required.

What to do next

Perform optional reconfiguration of the vSphere Replication appliance by using the virtual appliance management interface (VAMI). You can install a certificate, change the appliance root password, change the trust policy, or configure vSphere Replication to use an external database.

Configure vSphere Replication Connections

To use vSphere Replication between two sites managed by different vCenter Server instances, you must configure a connection between the two vSphere Replication appliances.

You can complete this process on either site on which you have installed a vSphere Replication appliance. If you are using an untrusted certificate, certificate warnings might appear during the process.

Alternatively, you can use vSphere Replication to replicate virtual machines between different ESXi hosts that the same vCenter Server manages. In this case, you deploy only one vSphere Replication appliance and you do not need to connect the primary and secondary sites.

Prerequisites

Verify that vSphere Replication appliances are deployed at two sites.

Procedure

- 1 Click **vSphere Replication** on the **Home** tab of the vSphere Web Client.
- 2 Click the **Summary** tab.
- 3 In the Local sites pane, click the name of the site on the primary site.
- 4 Right-click the site in the left pane, select **Connect to remote site**, select a secondary site.

Option	Description
To select an existing target site	Click Select a target site and select a site from the list.
To configure a new target site	Click Connect to remote site and type the IP address or name of the remote site vCenter Server, and provide the user name and password for the target site.

- 5 Click **OK** to confirm connection between the sites.

Uninstall vSphere Replication

You uninstall vSphere Replication by unregistering the appliance from vCenter Server and removing it from your environment.

Prerequisites

- Verify that the vSphere Replication virtual appliance is powered on.
- Stop all existing outgoing or incoming replications to the site.
- Disconnect any connections to other vSphere Replication sites.

Procedure

- 1 Connect to the VAMI of the vSphere Replication appliance in a Web browser.
The URL for the VAMI is `https://vr-appliance-address:5480`.
- 2 Select the **Configuration** tab.
- 3 Click **Unregister from vCenter Server**.
- 4 In the vSphere Web Client, power off and delete the vSphere Replication appliance.
The vSphere Replication plug-in is uninstalled automatically.

You removed vSphere Replication from your environment.

Unregister vSphere Replication from vCenter Server if the Appliance Was Deleted

If the vSphere Replication appliance virtual machine does not exist because it was deleted, you cannot use the virtual appliance management interface (VAMI) to unregister vSphere Replication from vCenter Server. Instead, you can use the Managed Object Browser (MOB) to delete the vSphere Replication extension.

Prerequisites

Log in to `https://<vCenter_Server_address>/mob/?moid=ExtensionManager` with vCenter Server credentials.

Procedure

- 1 In the extensionList property, click the corresponding link for the com.vmware.vcHms extension key to check the key details.
- 2 Verify that the displayed data is for a vSphere Replication appliance that is already lost.
- 3 In ExtensionManager, click **unregisterExtension**.
- 4 Type **com.vmware.vcHms** for the extension key value, and click **Invoke Method**.
- 5 Verify that the result displays void and not an error message.
An error message might appear if the specified extension is not registered, or if an unexpected runtime error occurs.
- 6 Close the window.
- 7 Refresh the ExtensionManager page and verify that the extensionList entry does not include com.vmware.vcHms.

What to do next

Deploy a new vSphere Replication appliance and perform any optional configuration.

Reconfigure the vSphere Replication Appliance

5

If necessary, you can reconfigure the vSphere Replication appliance settings by using the virtual appliance management interface (VAMI).

You provide the settings for the vSphere Replication appliance in the Deploy OVF wizard when you deploy the appliance. You can use the vSphere Replication appliance immediately after deployment. However, if necessary you can modify the configuration of the vSphere Replication appliance after you deploy it.

- [Reconfigure General vSphere Replication Settings](#) on page 30
You can use vSphere Replication immediately after you deploy the vSphere Replication appliance. If necessary, you can reconfigure the general settings after deployment in the virtual appliance management interface (VAMI).
- [Change the SSL Certificate of the vSphere Replication Appliance](#) on page 30
vSphere Replication appliance uses certificate-based authentication for all connections that it establishes with vCenter Server and remote site vSphere Replication appliances. You can change the SSL certificate that vSphere Replication uses.
- [Change the Password of the vSphere Replication Appliance](#) on page 33
You set the password of the vSphere Replication appliance when you deploy the appliance. You can change the password after installation by using the virtual appliance management interface (VAMI).
- [Configure vSphere Replication Network Settings](#) on page 33
You can review current network settings and change address and proxy settings for vSphere Replication. You might make these changes to match network reconfigurations.
- [Configure vSphere Replication System Settings](#) on page 34
You can view the vSphere Replication system settings to gather information about the vSphere Replication appliance. You can also set the system time zone, and reboot or shut down the appliance.
- [Reconfigure vSphere Replication to Use an External Database](#) on page 35
The vSphere Replication appliance contains an embedded vPostgreSQL database that you can use immediately after you deploy the appliance, without any additional database configuration. If necessary, you can reconfigure vSphere Replication to use an external database.
- [Use the Embedded vSphere Replication Database](#) on page 39
If you configured vSphere Replication to use an external database, you can reconfigure vSphere Replication to use the embedded database.

Reconfigure General vSphere Replication Settings

You can use vSphere Replication immediately after you deploy the vSphere Replication appliance. If necessary, you can reconfigure the general settings after deployment in the virtual appliance management interface (VAMI).

The general settings of the vSphere Replication appliance include the name and IP address of the vSphere Replication appliance, the address and port of the vCenter Server instance to which it connects, and an administrator email address. You can change the general settings from the default values in the virtual appliance management interface (VAMI).

For example, you can reconfigure the address of the vSphere Replication appliance if you did not specify a fixed IP address when you deployed the appliance, and DHCP changes the address after deployment. Similarly, you can update the address of the vCenter Server instance if the address changes after deployment.

Prerequisites

- Verify that the vSphere Replication appliance is powered on.
- You must have administrator privileges to configure the vSphere Replication appliance.

Procedure

- 1 Connect to the VAMI of the vSphere Replication appliance in a Web browser.

The URL for the VAMI is `https://vr-appliance-address:5480`.

- 2 Review and confirm the browser security exception, if applicable, to proceed to the login page.
- 3 Type the root user name and password for the appliance.

You configured the root password during the OVF deployment of the vSphere Replication appliance.

- 4 Select the **VR** tab and click **Configuration**.

- 5 Type the address of the vSphere Replication appliance or click **Browse** to select an IP address from a list.

- 6 Type the address of the vCenter Server instance to use with this installation.

You must use the same address format that you used when you installed vCenter Server.

For example, if you used a fully qualified domain name during installation, you must use that FQDN. If you used an IP address, you must use that IP address.

- 7 Type an administrator email address.
- 8 Click **Save and Restart Service** to apply the changes.

You reconfigured the general settings of the vSphere Replication appliance.

Change the SSL Certificate of the vSphere Replication Appliance

vSphere Replication appliance uses certificate-based authentication for all connections that it establishes with vCenter Server and remote site vSphere Replication appliances. You can change the SSL certificate that vSphere Replication uses.

vSphere Replication also uses certificate-based authentication for connections between two vSphere Replication appliances. vSphere Replication does not use username and password based authentication.

vSphere Replication generates a standard SSL certificate when the appliance first boots and registers with vCenter Server. The default certificate policy uses trust by thumbprint.

You can change the SSL certificate, for example if your company's security policy requires that you use trust by validity and thumbprint or a certificate signed by a certification authority. You change the certificate by using the virtual appliance management interface (VAMI) of the vSphere Replication appliance. For information about the SSL certificates that vSphere Replication uses, see [“vSphere Replication Certificate Verification,”](#) on page 31 and [“Requirements When Using a Public Key Certificate with vSphere Replication,”](#) on page 32.

Prerequisites

- Verify that the vSphere Replication appliance is powered on.
- You must have administrator privileges to configure the vSphere Replication appliance.

Procedure

- 1 Connect to the VAMI of the vSphere Replication appliance in a Web browser.
The URL for the VAMI is `https://vr-appliance-address:5480`.
- 2 Type the root user name and password for the appliance.
You configured the root password during the OVF deployment of the vSphere Replication appliance.
- 3 (Optional) Click the **VR** tab and click **Security** to review the current SSL certificate.
- 4 Click **Configuration**.
- 5 (Optional) To enforce verification of certificate validity, select the **Accept only SSL certificates signed by a trusted Certificate Authority** check box.

See [“vSphere Replication Certificate Verification,”](#) on page 31 for details of how vSphere Replication handles certificates.

- 6 Generate or install a new SSL certificate.

Option	Action
Generate a self-signed certificate	Click Generate and Install . Using a self-signed certificate provides trust by thumbprint only and might not be suitable for environments that require high levels of security. You cannot use a self-signed certificate if you selected Accept only SSL certificates signed by a trusted Certificate Authority .
Upload a certificate	Click Browse to select a PKCS#12 certificate and click Upload and Install . Public key certificates must meet certain requirements. See “Requirements When Using a Public Key Certificate with vSphere Replication,” on page 32.

- 7 Click **Save and Restart Service** to apply the changes.

You changed the SSL certificate and optionally changed the security policy to use trust by validity and certificates signed by a certificate authority.

NOTE If you change a certificate on one of the primary or recovery sites, its status changes to **Disconnected**. You can reconnect the primary and secondary sites manually. Alternatively, the sites reconnect when you run an operation between them.

vSphere Replication Certificate Verification

vSphere Replication verifies the certificates of vCenter Server and remote vSphere Replication servers.

All communication between vCenter Server, the local vSphere Replication appliance, and the remote vSphere Replication appliance goes through a vCenter Server proxy at port 80. All SSL traffic is tunnelled.

vSphere Replication can trust remote server certificates either by verifying the validity of the certificate and its thumbprint or by verifying the thumbprint only. The default is to verify by thumbprint only. You can activate the verification of the certificate validity in the virtual appliance management interface (VAMI) of the vSphere Replication appliance by selecting the option **Accept only SSL certificates signed by a trusted Certificate Authority** when you upload a certificate.

Thumbprint Verification vSphere Replication checks for a thumbprint match. vSphere Replication trusts remote server certificates if it can verify the the thumbprints through secure vSphere platform channels or, in some rare cases, after the user confirms them. vSphere Replication only takes certificate thumbprints into account when verifying the certificates and does not check certificate validity.

Verification of Thumbprint and Certificate Validity vSphere Replication checks the thumbprint and checks that all server certificates are valid. If you select the **Accept only SSL certificates signed by a trusted Certificate Authority** option, vSphere Replication refuses to communicate with a server with an invalid certificate. When verifying certificate validity, vSphere Replication checks expiration dates, subject names and the certificate issuing authorities.

In both modes, vSphere Replication retrieves thumbprints from vCenter Server. vSphere Replication refuses to communicate with a server if the automatically determined thumbprint differs from the actual thumbprint that it detects while communicating with the respective server.

You can mix trust modes between vSphere Replication appliances at different sites. A pair of vSphere Replication appliances can work successfully even if you configure them to use different trust modes.

Requirements When Using a Public Key Certificate with vSphere Replication

If you enforce verification of certificate validity by selecting **Accept only SSL certificates signed by a trusted Certificate Authority** in the virtual appliance management interface (VAMI) of the vSphere Replication appliance, some fields of the certificate request must meet certain requirements.

vSphere Replication can only import and use certificates and private keys from a file in the PKCS#12 format. Sometimes these files have a .pfx extension.

- The certificate must be issued for the same server name as the value in the **VRM Host** setting in the VAMI. Setting the certificate subject name accordingly is sufficient, if you put a host name in the **VRM Host** setting. If any of the certificate Subject Alternative Name fields of the certificate matches the **VRM Host** setting, this will work as well.
- vSphere Replication checks the issue and expiration dates of the certificate against the current date, to ensure that the certificate has not expired.
- If you use your own certificate authority, for example one that you create and manage with the OpenSSL tools, you must add the fully qualified domain name or IP address to the OpenSSL configuration file.
 - If the fully qualified domain name of the appliance is `VR1.example.com`, add `subjectAltName = DNS: VR1.example.com` to the OpenSSL configuration file.
 - If you use the IP address of the appliance, add `subjectAltName = IP: vr-appliance-ip-address` to the OpenSSL configuration file.
- vSphere Replication requires a trust chain to a well-known root certificate authority. vSphere Replication trusts all the certificate authorities that the Java Virtual Machine trusts. Also, you can manually import additional trusted CA certificates in `/opt/vmware/hms/security/hms-truststore.jks` on the vSphere Replication appliance.

- You cannot install a certificate that uses the MD5 signature algorithm. vSphere Replication will not communicate with remote servers that present a certificate with an MD5 signature.
- vSphere Replication does not accept RSA or DSA certificates with 512-bit keys. Use 2048-bit public keys.

Change the Password of the vSphere Replication Appliance

You set the password of the vSphere Replication appliance when you deploy the appliance. You can change the password after installation by using the virtual appliance management interface (VAMI).

Prerequisites

- Verify that the vSphere Replication appliance is powered on.
- You must have administrator privileges to configure the vSphere Replication appliance.

Procedure

- 1 Connect to the VAMI of the vSphere Replication appliance in a Web browser.
The URL for the VAMI is `https://vr-appliance-address:5480`.
- 2 Type the root user name and password for the appliance.
You configured the root password during the OVF deployment of the vSphere Replication appliance.
- 3 Click the **VR** tab and click **Security**.
- 4 Type the current password in the **Current Password** text box.
- 5 Type the new password in the **New Password** and the **Confirm New Password** text boxes.
vSphere Replication does not support blank passwords.
- 6 Click **Apply** to change the password.

Configure vSphere Replication Network Settings

You can review current network settings and change address and proxy settings for vSphere Replication. You might make these changes to match network reconfigurations.

Prerequisites

- Verify that the vSphere Replication appliance is powered on.
- You must have administrator privileges to configure the vSphere Replication appliance.

Procedure

- 1 Connect to the VAMI of the vSphere Replication appliance in a Web browser.
The URL for the VAMI is `https://vr-appliance-address:5480`.
- 2 Type the root user name and password for the appliance.
You configured the root password during the OVF deployment of the vSphere Replication appliance.
- 3 Click the **Network** tab.
- 4 Click **Status** to review current network settings.

- 5 Click **Address** to review or modify IPv4 and IPv6 address settings.

IP Address Type	Option	Description
IPv4	DHCP	DHCP is not recommended if the IP address of the appliance might change if it reboots.
IPv4	Static	With a static IPv4 address, you can modify the IP settings, DNS settings, netmask, and host name information.
IPv4	None	Deactivates IPv4 addresses.
IPv6	Auto	Automatic assignment of IPv6 addresses is not recommended if the IP address of the appliance might change if it reboots.
IPv6	Static	With a static IPv6 address, you can modify the IP address and the address prefix.

- 6 Click **Save Settings**.

If you do not click **Save Settings**, changes are discarded.

- 7 Click **Proxy** to review or modify proxy settings.

- a Select **Use a proxy server** to use a proxy server.
- b Type a proxy server name in the **HTTP Proxy Server** text box.
- c Type a proxy port in the **Proxy Port** text box.
- d (Optional) Type a proxy server user name and password.

- 8 Click **Save Settings**.

If you do not click **Save Settings**, changes are discarded.

What to do next

A network address change might require you to reconnect the primary and secondary sites and might also require a change of certificate if you have activated verification of certificate validity.

Configure vSphere Replication System Settings

You can view the vSphere Replication system settings to gather information about the vSphere Replication appliance. You can also set the system time zone, and reboot or shut down the appliance.

Prerequisites

- Verify that the vSphere Replication appliance is powered on.
- You must have administrator privileges to configure the vSphere Replication appliance.

Procedure

- 1 Connect to the VAMI of the vSphere Replication appliance in a Web browser.
The URL for the VAMI is `https://vr-appliance-ip-address:5480`
- 2 Type the root user name and password for the server.
- 3 Click the **System** tab.

4 Click **Information**.

For this server virtual appliance, you can review information about the following items:

Option	Description
Vendor	Vendor name
Appliance Name	vSphere Replication appliance name
Appliance Version	vSphere Replication version
Hostname	Hostname of the appliance
OS Name	Operating system name and version
OVF Environment: View	Displays information about the OVF environment
Reboot	Reboots the virtual appliance
Shutdown	Shuts down the virtual appliance

Shutting down the vSphere Replication appliance stops configured replications and prevents you from configuring replication of new virtual machines as well as modifying existing replication settings.

5 Click **Time Zone**.

Option	Description
System Time Zone	Time zones are available from the drop-down list
Save Settings	Saves settings
Cancel Changes	Discards changes

Reconfigure vSphere Replication to Use an External Database

The vSphere Replication appliance contains an embedded vPostgreSQL database that you can use immediately after you deploy the appliance, without any additional database configuration. If necessary, you can reconfigure vSphere Replication to use an external database.

Each vSphere Replication appliance requires its own database. If the database at either site is corrupted, vSphere Replication does not function. vSphere Replication cannot use the vCenter Server database because it has different database schema requirements. However, if you do not use the embedded vSphere Replication database you can use the vCenter database server to create and support an external vSphere Replication database.

You might need to use an external database to improve performance or load balancing, for easier backup, or to meet your company's database standards.

NOTE If you reinitialize the database after you deploy vSphere Replication, you must go to the vSphere Replication virtual appliance management interface (VAMI) to reconfigure vSphere Replication to use the new database connection.

Prerequisites

- Verify that the vSphere Replication appliance is powered on.
- You must have administrator privileges to configure the vSphere Replication appliance.
- You must create and configure the external database before you connect it to vSphere Replication. See [“Databases that vSphere Replication Supports,”](#) on page 36 for the configuration requirements for each supported type of database.

Procedure

- 1 Connect to the VAMI of the vSphere Replication appliance in a Web browser.

The URL for the VAMI is `https://vr-appliance-address:5480`.

- 2 Type the root user name and password for the appliance.
You configured the root password during the OVF deployment of the vSphere Replication appliance.
- 3 Select the **VR** tab and click **Configuration**.
- 4 Select **Manual configuration** to specify a configuration or select **Configure from an existing VRM database** to use a previously established configuration.
- 5 In the DB text boxes, provide information about the database for vSphere Replication to use.

Option	Setting
DB Type	Select SQL Server , Oracle , or DB2 .
DB Host	IP address or fully qualified domain name of the host on which the database server is running.
DB Port	Port on which to connect to the database.
DB Username	Username for the vSphere Replication database user account that you create on the database server.
DB Password	Password for the vSphere Replication database user account that you create on the database server.
DB Name	Name of the vSphere Replication database instance.
DB URL	Auto-generated and hidden by default. Advanced users can fine-tune other database properties by modifying the URL, for example if you use a named instance of SQL Server.

- 6 Click **Save and Restart Service** to apply the changes.

You configured vSphere Replication to use an external database instead of the database that is embedded in the vSphere Replication appliance.

Databases that vSphere Replication Supports

The vSphere Replication virtual appliance includes the VMware standard embedded vPostgreSQL database. You can also configure vSphere Replication to use an external database.

Automated migration between the embedded database and any external databases is not supported in any direction. If you must configure an external database, you must manually migrate the data or manually recreate all replications.

You can configure vSphere Replication to use one of the supported external databases.

- Microsoft SQL
- Oracle
- DB2

External vPostgreSQL databases are not supported. vSphere Replication supports the same database versions as vCenter Server. For supported database versions, see the *VMware Product Interoperability Matrixes* at http://partnerweb.vmware.com/comp_guide2/sim/interop_matrix.php?

- [Configure Microsoft SQL Server for vSphere Replication](#) on page 37
When you create a Microsoft SQL Server database, you must configure it correctly to support vSphere Replication.
- [Configure Oracle Server for vSphere Replication](#) on page 38
You must configure an Oracle Server database correctly to support vSphere Replication.
- [Configure DB2 for vSphere Replication](#) on page 38
If you use vSphere Replication with a DB2 database, vSphere Replication requires system temporary table space with at least 16K page size and user temporary table space.

Configure Microsoft SQL Server for vSphere Replication

When you create a Microsoft SQL Server database, you must configure it correctly to support vSphere Replication.

You use SQL Server Management Studio to create and configure an SQL Server database for vSphere Replication.

This information provides the general steps that you must perform to configure an SQL Server database for vSphere Replication. For instructions about how to perform the relevant steps, see the SQL Server documentation.

Prerequisites

Verify that the SQL Server Browser service is running.

Procedure

- 1 Select **Mixed Mode Authentication** when you create the database instance.

The vSphere Replication appliance and the database server run on different hosts, so you must use mixed mode authentication and not Windows Authentication.

- 2 Use either a named instance or the default instance of SQL Server.

If you intend to use dynamic TCP ports, you must use a named instance of SQL Server.

- 3 Enable TCP on the database instance.

- 4 Set a TCP port.

Option	Action
Static TCP port	Set the TCP port to the default of 1433.
Dynamic TCP port	<ol style="list-style-type: none"> a Use a named instance of SQL Server. You can only use dynamic ports with a named instance of SQL Server. b Select the Show DB URL check box in the virtual appliance management interface (VAMI) of the vSphere Replication appliance. c Modify the DB URL value. Replace <code>port=<i>port_number</i></code> with <code>instanceName=<i>instance_name</i></code> in the URL. d Use the <code>PortQuery</code> command from a remote machine to check that the port on which the SQL Server Browser service runs is not blocked by a firewall. The SQL Server Browser runs on port 1434. Type the <code>PortQuery</code> command in a terminal window. <code>PortQry.exe -n <i>Machine_Name</i> -p UDP -e 1434</code>

- 5 Verify that the firewall on the database server permits inbound connections on the TCP port.
- 6 Create the vSphere Replication security login.
- 7 Create the vSphere Replication database and set the vSphere Replication security login as the database owner.
- 8 Keep the dbo user and dbo schema settings.

Because the vSphere Replication security login is the database owner, it maps to the database user dbo and uses the dbo schema.

Configure Oracle Server for vSphere Replication

You must configure an Oracle Server database correctly to support vSphere Replication.

You create and configure an Oracle Server database for vSphere Replication by using the tools that Oracle Server provides.

This information provides the general steps that you must perform to configure an Oracle Server database for vSphere Replication. For instructions about how to perform the relevant steps, see the Oracle documentation.

Procedure

- 1 When creating the database instance, specify UTF-8 encoding.
- 2 Create the vSphere Replication database user account.
- 3 If they are not selected already, select the **CONNECT** and **RESOURCE** roles.

These roles provide the privileges that vSphere Replication requires.

Configure DB2 for vSphere Replication

If you use vSphere Replication with a DB2 database, vSphere Replication requires system temporary table space with at least 16K page size and user temporary table space.

You use DB2 Configuration Assistant to create and configure a DB2 database for vSphere Replication.

Procedure

- 1 When you create the database instance, specify UTF-8 encoding and 16K page size.

If the database exists already and it is not configured with 16K page size, type the following commands.

```
CREATE BUFFERPOOL "IBMBP16"
  ALL DBPARTITIONNUMS SIZE 1000
  NUMBLOCKPAGES 0
  PAGESIZE 16 K;
```

```
CREATE SYSTEM TEMPORARY TABLESPACE "TEMPSPACE16"
  PAGESIZE 16 K
  MANAGED BY AUTOMATIC STORAGE
  BUFFERPOOL "IBMBP16"
```

- 2 Configure the database to allow the creation of user temporary tables.

For example, type the following commands to configure the database for user VR.

```
CREATE USER TEMPORARY TABLESPACE TEMPSPACE_VR MANAGED BY AUTOMATIC STORAGE
GRANT USE OF TABLESPACE TEMPSPACE_VR TO USER VR
```

- 3 Specify the domain account as the database owner.

This is required because DB2 uses authentication by the operating system.

Use the Embedded vSphere Replication Database

If you configured vSphere Replication to use an external database, you can reconfigure vSphere Replication to use the embedded database.

The vSphere Replication appliance includes an embedded vPostgreSQL database. The embedded database is preconfigured for use with vSphere Replication and is enabled when you deploy the vSphere Replication appliance. If you reconfigured vSphere Replication after deployment to use an external database, you can restore the connection to the embedded database. After switching databases, you must manually configure replications again as the replication management data is not migrated to the database. You can use the reset feature in the embedded database to drop replications, site connections and external vSphere Replication registrations.

Prerequisites

- Verify that the vSphere Replication appliance is powered on.
- You must have administrator privileges to configure the vSphere Replication appliance.
- You must have reconfigured vSphere Replication to use an external database.

Procedure

- 1 Connect to the VAMI of the vSphere Replication appliance in a Web browser.
The URL for the VAMI is `https://vr-appliance-address:5480`.
- 2 Type the root user name and password for the appliance.
You configured the root password during the OVF deployment of the vSphere Replication appliance.
- 3 Select the **VR** tab and click **Configuration**.
- 4 Select **Configure using the embedded database**.
- 5 (Optional) Click **Reset Embedded Database** to reset the database.
- 6 Click **Save and Restart Service** to apply the changes.

You configured vSphere Replication to use the embedded vSphere Replication database.

Replicating Virtual Machines

With vSphere Replication you can replicate virtual machines from a primary site to a secondary site.

You can set a recovery point objective (RPO) to a certain time interval depending on your data protection needs. vSphere Replication applies all changes made to virtual machines configured for replication at the primary site to their replicas at the secondary site. This process reoccurs at the RPO interval that you set.

To replicate a virtual machine using vSphere Replication, you must deploy the vSphere Replication appliance at the primary and secondary sites. A vSphere Replication infrastructure requires one vSphere Replication appliance at each site.

The primary and secondary sites must be connected for you to be able to configure replications. If one of the sites is unreachable from the other site, is offline, if authentication fails, or if the certificates have changed, it shows the disconnected state in the vSphere Replication interface. You cannot perform replications if one of the sites is in the disconnected state due to these reasons. The sites can also appear in the disconnected state if you log in to the vSphere Web Client when a previous login session has expired. In this case, scheduled replications continue as normal. See [“vSphere Replication Sites Appear in the Disconnected State,”](#) on page 61.

vSphere Replication does not support the recovery of multiple virtual machines from the same workflow. Each recovery workflow is for an individual virtual machine.

You cannot replicate powered-off virtual machines. Replication begins when the virtual machine is powered on. You cannot use vSphere Replication to replicate virtual machine templates.

This chapter includes the following topics:

- [“Replicating a Virtual Machine in a Single vCenter Server Instance,”](#) on page 41
- [“Configure Replication for a Single Virtual Machine,”](#) on page 42
- [“Configure Replication for Multiple Virtual Machines,”](#) on page 43
- [“Replicating Virtual Machines Using Replication Seeds,”](#) on page 44
- [“Reconfiguring Replications,”](#) on page 44

Replicating a Virtual Machine in a Single vCenter Server Instance

You can use vSphere Replication to replicate a virtual machine in a single vCenter Server even if the vCenter Server instance has only one host in its inventory.

When you configure replication in a single vCenter Server instance, you can select the primary site as the target site for replication. You then configure replication in the same way as for an infrastructure with a primary and a secondary site. For example, you can replicate a virtual machine to a different datastore attached to the same host or another host. vSphere Replication prevents you from using the source or replicated virtual machine's vmdk files as the target of the replication.

The virtual machine name must be unique in the same folder in the vCenter inventory. If the virtual machine name is the same in both the source and target folders, you might see an error message. See [“Error Recovering Virtual Machine in a Single vCenter Server Instance,”](#) on page 61 for more information.

NOTE If you install vSphere Replication as part of a vCenter Site Recovery Manager (SRM) deployment, any replications that you configure in the same vCenter Server instance are not visible in the SRM user interface. You can still monitor and manage these replications in the vSphere Replication user interface in the vSphere Web Client.

Configure Replication for a Single Virtual Machine

vSphere Replication can protect individual virtual machines and their virtual disks by replicating them to another location.

When you configure replication, you set a recovery point objective (RPO) to determine the period of time between replications. For example, an RPO of 1 hour seeks to ensure that a virtual machine loses no more than 1 hour of data during the recovery. For smaller RPOs, less data is lost in a recovery, but more network bandwidth is consumed keeping the replica up to date.

Every time that a virtual machine reaches its RPO target, vSphere Replication records approximately 3800 bytes of data in the vCenter Server events database. If you set a low RPO period, this can quickly create a large volume of data in the database. To avoid creating large volumes of data in the vCenter Server events database, limit the number of days that vCenter Server retains event data. See [Configure Database Retention Policy](#) in the *vCenter Server and Host Management Guide*. Alternatively, set a higher RPO value.

The available quiescing types are determined by the virtual machine's operating system. See <http://kb.vmware.com/kb/2041909> for Microsoft Volume Shadow Copy Service (VSS) quiescing support for Windows virtual machines.

You configure replication by selecting all or a subset of the virtual machine's disks. You specify the target location for your virtual machine. You can either replicate the whole virtual disk initially, or use the existing disk as a replication seed to limit the replication to just the parts of the disk that have changed since the last replication.

Prerequisites

Verify that you have deployed a vSphere Replication appliance at both sites.

Procedure

- 1 On the vSphere Web Client Home page, click **VMs and Templates**.
- 2 Browse the inventory to find the single virtual machine to replicate using vSphere Replication.
- 3 Right-click the virtual machine and click **All vSphere Replication Actions > Configure replication**.
- 4 Select the target site.
 - If you have already connected the source and target sites, select the target site from the list.
 - If you have not connected the source and target sites, and the target site is local, select the target site from the list.
 - If you have not connected the source and target sites, and the target site is remote, click **Add Remote Site** and enter the IP or name, and credentials to connect to the site.
- 5 Select the target location datastore.

vSphere Replication does not support storage distributed resources scheduler (Storage DRS). Select a datastore that is not part of a datastore cluster.

- 6 If you select **Advanced disk configuration**, select the virtual disk format from the list for each individual disk.
The default is **Same format as source**.
- 7 Use the RPO slider or enter a value to configure the maximum amount of data that can be lost in the case of a site failure.
The available range is from 15 minutes to 24 hours.
- 8 Select a Guest OS Quiescing configuration, if applicable to the source virtual machine operating system.
- 9 Review the settings and click **Finish** to establish replication.

Configure Replication for Multiple Virtual Machines

vSphere Replication can replicate multiple virtual machines.

When you configure replication, you set a recovery point objective (RPO) to determine the period of time between replications. For example, an RPO of 1 hour seeks to ensure that a virtual machine loses no more than 1 hour of data during the recovery. For smaller RPOs, less data is lost in a recovery, but more network bandwidth is consumed keeping the replica up to date.

Every time that a virtual machine reaches its RPO target, vSphere Replication records approximately 3800 bytes of data in the vCenter Server events database. If you set a low RPO period, this can quickly create a large volume of data in the database. To avoid creating large volumes of data in the vCenter Server events database, limit the number of days that vCenter Server retains event data. See [Configure Database Retention Policy](#) in the *vCenter Server and Host Management Guide*. Alternatively, set a higher RPO value.

The available quiescing types are determined by the virtual machine's operating system. See <http://kb.vmware.com/kb/2041909> for Microsoft Volume Shadow Copy Service (VSS) quiescing support for Windows virtual machines.

Prerequisites

To replicate virtual machines using vSphere Replication, you must deploy the vSphere Replication appliance at the primary and secondary sites. You must power on the virtual machines to begin replication.

Procedure

- 1 On the vSphere Web Client Home page, click **VMs and Templates**.
- 2 Select a datacenter, click the **Related Objects** tab, then click the **Virtual Machines** tab.
A list of virtual machines appears in the right pane.
- 3 Select the virtual machines to replicate using the Ctrl or Shift keys.
- 4 Right-click the virtual machines and click **All vSphere Replication Actions > Configure replication**.
- 5 Acknowledge the number of virtual machines to replicate.
- 6 Verify the virtual machine validation and click **Next**.
- 7 Select the target site.
 - If you have already connected the source and target sites, select the target site from the list.
 - If you have not connected the source and target sites, and the target site is local, select the target site from the list.
 - If you have not connected the source and target sites, and the target site is remote, click **Add Remote Site** and enter the IP or name, and credentials to connect to the site.

- 8 Select the target location datastore.

vSphere Replication does not support storage distributed resources scheduler (Storage DRS). Select a datastore that is not part of a datastore cluster.

- 9 Use the RPO slider or enter a value to configure the maximum amount of data that can be lost in the case of a site failure.

The available range is from 15 minutes to 24 hours.

- 10 Select a Guest OS Quiescing configuration, if applicable to the source virtual machine operating system.

- 11 Choose whether or not to use replication seeds.

This option searches the selected target datastore for replication seeds. If candidate files are found, confirm whether to use the found files as seeds. See [“Replicating Virtual Machines Using Replication Seeds,”](#) on page 44.

- 12 Review the settings and click **Finish** to establish replication.

Replicating Virtual Machines Using Replication Seeds

You can use replication seeds if a duplicate file is found for the virtual machine on the destination datastore. vSphere Replication compares differences and replicates only the changed blocks.

To avoid network bandwidth consumption for the amount of data that has to be replicated on initial full synchronization, vSphere Replication allows you to copy your virtual disk files to the remote datacenter and point those as replication seeds during configuring replication. vSphere Replication compares the differences and replicates only the changed blocks.

When configuring replication for a virtual machine, vSphere Replication looks for a disk with the same filename in the target datastore. If a file with the same name exists, vSphere Replication prompts you with a warning and offers you the option to use the target disk as a seed for replication. If you accept the option, vSphere Replication compares the differences and replicates only the changed blocks after the virtual machine replication is fully configured and enabled. If you do not accept the prompt, then you must change the target location for your replication.

Reconfiguring Replications

You can reconfigure a replication to specify a different target datastore for your virtual machine disk files. You can also enable or disable a virtual machine disk file for replication, or modify replication settings, such as RPO and quiescing method.

To reconfigure the replication parameters, go to **Monitor**, where you can make changes to the replication.

Reconfigure Recovery Point Objectives (RPO) in Replications

You can adjust the settings for vSphere Replication to specify different recovery point objectives (RPOs).

Procedure

- 1 Click **Sites** in the left pane, and select the site whose settings you want to change.
- 2 In the **Monitor** tab, right-click the virtual machine in the **Outgoing Replications** or **Incoming Replications** views and select **Reconfigure**.
- 3 Click **Next** until you reach **Replication settings**.
- 4 Modify the RPO settings for this replication.
- 5 Click **OK** to save your changes.

Recovery Point Objective

The Recovery Point Objective (RPO) value you set during replication configuration affects replication scheduling.

The definition of an RPO of x minutes is that the latest available replication instance can never reflect a state that is older than x minutes. A replication instance reflects the state of a virtual machine at the time the replication starts.

For example, if the replication starts at 12:00 and it takes five minutes to transfer to the secondary site, the instance becomes available on the secondary site at 12:05, but reflects the state of the virtual machine at 12:00.

You set the RPO during replication configuration to 15 minutes. You start the replication at 12:00 and expect the replication to take 5 minutes to transfer. The next replication can start no later than 12:10. This replication instance is then available at 12:15 when the first replication instance that started at 12:00 expires.

If you set the RPO to 15 minutes and the replication takes 7.5 minutes to transfer an instance, vSphere Replication transfers an instance all the time. If the replication takes more than 7.5 minutes, the replication encounters periodic RPO violations. For example, if the replication starts at 12:00 and takes 10 minutes to transfer an instance, the replication finishes at 12:10. You can start another replication immediately, but it finishes at 12:20. During the time interval 12:15-12:20, an RPO violation occurs because the latest available instance started at 12:00 and is too old.

The replication scheduler tries to satisfy these constraints by overlapping replications to optimize bandwidth use and might start replications for some virtual machines earlier than expected.

To determine the replication transfer time, the replication scheduler uses the duration of the last few instances to estimate the next one.

Resize Virtual Machine Disk Files During Replication Using Replication Seeds

vSphere Replication prevents you from resizing the virtual machine disk file during replication. If you used replication seeds for the target disk, you can resize the disk manually.

Procedure

- 1 Unconfigure replication on the virtual machine.
- 2 Resize the disk on the primary site.
- 3 Resize the target disk that is left over after you unconfigure replication.
- 4 Reconfigure replication on the virtual machine.

Resize Virtual Machine Disk Files During Replication Without Using Replication Seeds

vSphere Replication prevents you from resizing the virtual machine disk file during replication. If you did not use replication seeds during configuration of the target disk, vSphere Replication deletes the target disk when you stop the replication.

To resize a virtual machine disk if you did not initially use replication seeds, you must perform a recovery and reconfigure the disk manually using replication seeds.

Procedure

- 1 Perform a recovery.
- 2 Unconfigure the replication.
- 3 Resize the disk on the primary site.

- 4 Resize the disk on the recovered virtual machine on the secondary site.
- 5 Unregister the recovered virtual machine on the secondary site, but do not delete the disks.
- 6 Enable replication by using the disks of the recovered virtual machine as seeds.

Performing a Recovery with vSphere Replication

7

With vSphere Replication, you can recover successfully replicated virtual machines at the secondary site. vSphere Replication performs a sequence of steps to recover replicated virtual machines.

- Checks that the primary site is available. If it is available, vSphere Replication makes sure that the source virtual machine is powered off before recovering the virtual machine on the secondary site.
- Synchronizes the latest changes to the virtual machine if the primary site is available. Otherwise, vSphere Replication uses the latest available data at the secondary site.
- Rebuilds the replicated .vmdk files.
- Reconfigures the newly replicated virtual machine with the correct disk paths.
- Registers the virtual machine with vCenter Server at the secondary site.

You can recover one virtual machine at a time on the replicated site on the **Incoming Replications** tab. Optionally, you can power on the recovered virtual machine. The recovered virtual machine's network devices are disconnected. You might need to modify a recovered virtual machine to render it fully operational.

This chapter includes the following topics:

- [“Recover Virtual Machines by Using vSphere Replication,”](#) on page 47
- [“Failback of Virtual Machines in vSphere Replication,”](#) on page 49

Recover Virtual Machines by Using vSphere Replication

With vSphere Replication you can recover successfully replicated virtual machines at the secondary site, one at a time.

vSphere Replication performs a check to confirm that the source virtual machine is shut down if the primary site is available.

Prerequisites

Verify that the virtual machine at the primary site is powered off.

IMPORTANT Due to a critical issue with recovery in vSphere Replication 5.1, you must upgrade to vSphere Replication 5.1.0.1 before you can perform a recovery on a virtual machine. See [“Upgrade the vSphere Replication Appliance,”](#) on page 22 for information about how to upgrade vSphere Replication by using the virtual appliance management interface (VAMI). Alternatively, you can upgrade vSphere Replication by using VMware vSphere Update Manager.

Procedure

- 1 Log in to the vSphere Web Client.
- 2 Click **vSphere Replication**.
- 3 Click **Sites**.
- 4 Select the secondary site.
- 5 On the **Incoming Replications** tab, right-click the virtual machine to recover and select **Recover**.
- 6 Select whether to recover the virtual machine with all the latest data, or to recover the virtual machine with the most recent data from the target site.

Option	Description
Recover with recent changes	Performs a full synchronization of the virtual machine from the source site to the target site before recovering the virtual machine. Selecting this option avoids data loss, but it is only available if the data of the source virtual machine is accessible. You can only select this option if the virtual machine is powered off.
Recover with latest available data	Recovers the virtual machine by using the data from the most recent replication on the target site, without performing synchronization. Selecting this option results in the loss of any data that has changed since the most recent replication. Select this option if the source virtual machine is inaccessible or if its disks are corrupted.

- 7 Select the recovery folder and click **Next**.
- 8 Select the target compute resource and click **Next**.
- 9 If the virtual machine contains hard disks for which you have not enabled replication, select a target destination for the disk or detach the disk, and click **Next**.

This page only appears if the virtual machine contains hard disks for which you have not enabled replication.

- To select a target destination, click **Browse** and navigate to a folder on a datastore in which to recover the virtual machine disk files.
- To detach the disk and exclude the disk files from the recovery, click **Detach**.

- 10 (Optional) Select **Power on after recovery**.
- 11 Click **Finish**.

vSphere Replication validates the provided input and recovers the virtual machine. If successful, the virtual machine status changes to **Recovered**. The virtual machine appears in the inventory of the secondary site.

If the recovery fails, the replication of the virtual machines reverts to the replication state before the attempted recovery. For more information about the failed recovery attempt, check vCenter Server tasks.

The recovery might also fail if you use the same name for the virtual machine in a scenario where you use vSphere Replication to replicate a virtual machine in a single vCenter Server and the vCenter Server instance has only one host in its inventory. See [“Error Recovering Virtual Machine in a Single vCenter Server Instance,”](#) on page 61 for more information.

After a successful recovery, vSphere Replication disables the virtual machine for replication if the primary site is still available. When the virtual machine is powered on again it does not send replication data to the recovery site. To unconfigure the replication, select **Stop replication**.

When the source virtual machine is no longer in the vCenter Server inventory, the replication is unconfigured. Unconfigured replications do not appear in the **Summary** tab counter nor in the **Incoming Replications** or **Outgoing Replications** tabs. Check vCenter Server task history for information on performed recoveries.

Failback of Virtual Machines in vSphere Replication

Failback of virtual machines is a manual task in vSphere Replication.

After performing a successful recovery from the primary site to the secondary site, you can perform failback. You manually configure a new replication in the reverse direction, that is, from the secondary site to the primary site. The disks on the primary site are used as replication seeds, so that vSphere Replication only synchronizes the changes made to the .vmdk files. Before you configure the reverse replication, you must manually unregister the virtual machine from the inventory on the primary site. See [“Replicating Virtual Machines Using Replication Seeds,”](#) on page 44.

Automated failback is not available in vSphere Replication.

Monitoring and Managing Replications in vSphere Replication

8

vSphere Replication provides a management interface where you can monitor and manage virtual machine replication and connectivity states for local and remote sites.

The **Summary** tab in vSphere Replication home displays lists of local and remote sites with details about the sites.

When you select a site, you can see summary, monitoring, and management information about the site.

This chapter includes the following topics:

- [“View the Replication Summary for a Site,”](#) on page 51
- [“Identifying Replication Problems in the Issues Tab,”](#) on page 53
- [“Manage Target Sites,”](#) on page 53

View the Replication Summary for a Site

You can view the status of incoming and outgoing replications and the target sites of the virtual machines that you have configured for replication.

You can view the following information about a site.

- Site name, version, and address.
- The last four replication issues for the site, if any.
- A graphical representation of all incoming and outgoing replications with color-coded states of the replicated virtual machines.
- The target sites and their current status.

Prerequisites

Verify that vSphere Replication is running.

Procedure

- 1 Log in to the vSphere Web Client.
- 2 Click **vSphere Replication**.
- 3 Click **Sites**.
- 4 Select the site.
- 5 Click the **Summary** tab.

Replication States for Virtual Machines

vSphere Replication shows the replication states of virtual machines that you configured for replication.

State	Details for Each State
OK	OK (no RPO violation), Configuring, Moving, Recovering
Warning	Paused, OK (including RPO violation), Not Active, FullSync (including RPO violation), Sync (including RPO violation)
In Progress	FullSync, Sync, Initial Full Sync
Error	Error (including RPO violation)
Recovered	Recovered replications

A replication can be in the Moving state only if it is managed by SRM and if it is currently rebalanced to another vSphere Replication server.

NOTE If a replication is in the Not Active replication state, you might have connected the primary and secondary sites using network address translation (NAT). vSphere Replication does not support NAT. Use credential-based authentication and network routing without NAT when connecting the sites. Another cause for a Not Active replication state might be that the source virtual machine is powered off. Automatic replication works only on virtual machines that are powered on.

Monitor Replication for Virtual Machines

You can monitor the replication status and view information for virtual machines configured for replication.

For more information about how to identify replication errors, see [“Identifying Replication Problems in the Issues Tab,”](#) on page 53.

Prerequisites

- Verify that vSphere Replication is running.
- Verify that the virtual machines are configured for replication.

Procedure

- 1 Log in to the vSphere Web Client.
- 2 Click **vSphere Replication**.
- 3 Click **Sites**.
- 4 Select the site and click the **Monitor** tab.
- 5 Click the **Issues** tab to see replication problems, if any, that you can resolve by reconfiguring or resuming the replication.
- 6 Select **Outgoing Replications** to see details of the virtual machines replicated from this site.
- 7 Select **Incoming Replications** to see details of the virtual machines replicated to this site.

According to the status of a selected replication, you can perform different actions on the replication.

Identifying Replication Problems in the Issues Tab

You can view and troubleshoot possible problems that might occur during replication.

Table 8-1. Possible Replication Problems

Problem	Cause	Solution
Not Active	The replication is not active because the virtual machine is powered off and a warning icon appears. Replication is not running for that virtual machine.	Power on the virtual machine to resume replication.
Paused	If you paused the replication, a warning icon appears.	Resume the paused replication from the Issues tab.
Error	If you added a disk on a virtual machine which is already configured for replication, the replication pauses and goes to an error state.	Reconfigure the replication and enable or disable the newly added disk.
Error	While configuring replication, the replication fails with the incorrect UUID. For example, the replication seed found and intended for use has a different UUID from the original hard disk.	Reconfigure the replication.
Error	You do not use replication seeds during configuration, but a disk with the same name is found during configuration.	Reconfigure the replication.
RPO Violation	A replication contains an RPO violation.	See “Reconfigure Recovery Point Objectives (RPO) in Replications,” on page 44.

Manage Target Sites

You can reconnect and disconnect target replication sites. You can also connect new sites to the currently selected site.

To connect to a remote site, see [“Configure vSphere Replication Connections,”](#) on page 26.

Prerequisites

Verify that vSphere Replication is running.

Procedure

- 1 Log in to the vSphere Web Client.
- 2 Click **vSphere Replication**.
- 3 Click **Sites**.
- 4 Select the site and click **Manage**.

The **Manage** tab displays information about available sites for virtual machine replication.

- 5 Right-click a site and select **Disconnect** or **Reconnect**.

Troubleshooting vSphere Replication

Known troubleshooting information can help you diagnose and correct problems that occur while replicating and recovering virtual machines with vSphere Replication.

If you have problems with deploying vSphere Replication, replicating or recovering virtual machines, or connecting to databases, you can troubleshoot them. To help identify the problem, you might need to collect and review vSphere Replication logs and send them to VMware Support.

You can address replication issues on the vSphere Replication **Monitor**, **Manage**, and **Summary** tabs as well as the Recent Tasks pane. See [Chapter 8, “Monitoring and Managing Replications in vSphere Replication,”](#) on page 51.

You can also search for solutions to problems in the VMware knowledge base at <http://kb.vmware.com>.

This chapter includes the following topics:

- [“Access the vSphere Replication Logs,”](#) on page 55
- [“Solutions for Common vSphere Replication Problems,”](#) on page 56

Access the vSphere Replication Logs

You can use the vSphere Replication logs for system monitoring and troubleshooting. A VMware support engineer might request these logs during a support call.

To access and download the vSphere Replication logs, you need access to the vSphere Replication virtual appliance management interface (VAMI). vSphere Replication rotates its logs when the log file reaches 50MB and keeps at most 12 compressed log files.

To manually copy log files, see [“Manually Access the vSphere Replication Logs,”](#) on page 56.

Prerequisites

- Verify that the vSphere Replication appliance is powered on.

Procedure

- 1 Connect to the VAMI of the vSphere Replication appliance in a Web browser.
The URL for the VAMI is `https://vr-appliance-address:5480`.
- 2 Click the **VRM** tab and click **Support**.
- 3 Click **Generate** to generate a .zip package of the current vSphere Replication logs.
A link to the package containing the replication and system logs appears.
- 4 Click the link to download the package.
- 5 (Optional) Click **Delete** next to existing log packages to delete them individually.

Manually Access the vSphere Replication Logs

You can copy and use the vSphere Replication logs for system monitoring and troubleshooting. A VMware support engineer might request these logs during a support call.

Use SCP or Win SCP to copy log folders and files from the vSphere Replication appliance.

- /opt/vmware/hms/logs/
- /opt/vmware/var/log/lighttpd/
- /var/log/vmware/
- /var/log/boot.msg

Procedure

- 1 In the vSphere Web Client console for the vSphere Replication appliance, open `/etc/ssh/sshd_config` in a text editor.
- 2 Set `PermitRootLogin` to **yes**.
- 3 Restart the `sshd` daemon.
Type the command `/etc/init.d/sshd restart`.
- 4 (Optional) You can also create a new user account with **sudo** privileges to access the log files.

Solutions for Common vSphere Replication Problems

Known troubleshooting information can help you diagnose and correct problems with vSphere Replication.

Features Are Unavailable When Deploying the vSphere Replication Appliance

When you deploy the vSphere Replication appliance, you get an error about unavailable features.

Problem

When you deploy the vSphere Replication, an error appears about unavailable features and vSphere Replication fails to deploy.

Cause

This error is typically the result of the vCenter Management Web service being paused or stopped.

Solution

Attempt to start the vCenter Management Web service. If the service fails to start, confirm that Tomcat is running on the server. If the server is installed, but not running, try starting the server. If attempting to start the Tomcat server does not resolve the problem, the issue might be occurring because the vCenter Server has the wrong version of Java installed.

OVF Package is Invalid and Cannot be Deployed

When you attempt to deploy OVF for the vSphere Replication appliance, an OVF package error might occur.

Problem

The error `OVF package is invalid and cannot be deployed` might appear while you attempt to deploy the vSphere Replication appliance.

Cause

This problem is due to the vCenter Server port being changed from the default of 80.

Solution

If possible, change the vCenter Server port back to 80.

Connection Errors Between vSphere Replication and SQL Server Cannot be Resolved

You cannot resolve a connection error between the vSphere Replication appliance and SQL Server.

Problem

vSphere Replication might not be able to connect to SQL Server, and you have insufficient information to solve this problem.

Cause

Several issues can cause this problem, and initially available information about the problem is insufficient to affect a resolution.

Solution

- 1 Use a file management tool to connect to the vSphere Replication appliance.

For example, you might use SCP or WinSCP. Connect using the root account, which is the same account used to connect to the VAMI.

- 2 Delete any files you find in `/opt/vmware/hms/logs`.

- 3 Connect to the VAMI and attempt to save the vSphere Replication configuration.

This action recreates the SQL error.

- 4 Connect to the vSphere Replication appliance again and find the `hms-configtool.log` file which is in `/opt/vmware/hms/logs`.

This log file contains information about the error that just occurred. Use this information to troubleshoot the connection issue, or provide the information to VMware for further assistance. See [“Reconfigure vSphere Replication to Use an External Database,”](#) on page 35.

Configuring Replication Fails for Virtual Machines with Two Disks on Different Datastores

If you try to configure vSphere Replication on a virtual machine that includes two disks that are contained in different datastores, the configuration fails.

Problem

Configuration of replication fails with the error `Multiple source disks, with device keys device_keys, point to the same destination datastore and file path.`

Cause

This problem occurs because vSphere Replication does not generate a unique datastore path or file name for the destination virtual disk.

Solution

If you select different datastores for the VMDK files on the protected site, you must also select different datastores for the target VMDK files on the secondary site.

Alternatively, you can create a unique datastore path by placing the VMDK files in separate folders on a single target datastore on the secondary site.

DB2 Databases for vSphere Replication Require User Temporary Tablespace

vSphere Replication creates temporary tables in the vSphere Replication database. If you use a DB2 database, the database might require additional configuration.

Problem

If the vSphere Replication user account that you use to log in to the vSphere Replication database cannot create temporary tables, configuration of vSphere Replication with an external DB2 database fails.

- The virtual appliance management interface (VAMI) shows the error `Error applying startup configuration: Please check the provided DB information.`
- The `/opt/vmware/hms/logs/hms-configtool.log` file in the vSphere Replication appliance contains the following error message:

```
ERROR com.vmware.hms.configtool.App [main] (.hms.configtool.App) |
Error while configuring HMS, exit code DATABASE_ERROR
com.vmware.hms.configtool.ConfigToolException: Database requires further configuration:
Need user temporary tablespace.
```

This problem occurs only when you use a DB2 database.

Cause

The temporary tablespace was not configured for the user account that you use to connect to the vSphere Replication database.

Solution

- 1 Run an SQL script to verify that the vSphere Replication user account can create temporary tables in DB2 databases.

```
declare global temporary table testtable(fooobar integer) on commit preserve rows not logged
```

If the script runs successfully, no further configuration is required. If it fails, you see a message like the following message:

```
A default table space could not be found with a page size of at least "4096" that
authorization ID "VR_PROT" is authorized to use. SQLCODE=-286, SQLSTATE=42727, DRIVER=4.11.69
```

- 2 If the script fails, run an SQL script to configure the temporary tablespace.

```
CREATE USER TEMPORARY TABLESPACE tbsp_temp_vr_prot MANAGED BY AUTOMATIC STORAGE
```

```
GRANT USE OF TABLESPACE tbsp_temp_vr_prot TO USER VR_PROT
```

DB2 Databases for vSphere Replication Require System Temporary Tablespace with 16K Page Size

vSphere Replication requires system temporary table space with at least 16K page size, if you use a DB2 database.

Problem

If DB2 does not provide system temporary table space with at least 16K page size, configuring vSphere Replication with an external DB2 database fails.

- The virtual appliance management interface (VAMI) shows the error `Error applying startup configuration: Please check the provided DB information.`

- The `/opt/vmware/hms/logs/hms-configtool.log` file in the vSphere Replication appliance contains the following error message:

```
ERROR com.vmware.hms.configtool.App [main] (.hms.configtool.App) |
Error while configuring HMS, exit code DATABASE_ERROR
com.vmware.hms.configtool.ConfigToolException: Database requires further configuration:
Need system temporary tablespace with at least 16384 bytes pagesize.
```

Cause

The problem occurs only when you use a DB2 database.

Solution

- When creating the database instance, specify 16K page size.
- Alternatively, reconfigure an existing database that is not configured with system temporary tablespace with 16K page size.

```
CREATE BUFFERPOOL "IBMBP16"
  ALL DBPARTITIONNUMS SIZE 1000
  NUMBLOCKPAGES 0
  PAGESIZE 16 K;

CREATE SYSTEM TEMPORARY TABLESPACE "TEMPSPACE16"
  PAGESIZE 16 K
  MANAGED BY AUTOMATIC STORAGE
  BUFFERPOOL "IBMBP16"
```

Application Quiescing Changes to File System Quiescing During vMotion to an Older Host

vSphere Replication can create an application quiesced replica for virtual machines with Windows Server 2008 and Windows 8 guest operating systems running on an ESXi 5.1 host.

Problem

The ESXi 5.1 host is in a cluster with hosts from older versions and you use vMotion to move the replicated virtual machine to an older host. vSphere Replication then creates a file system quiesced replica.

Cause

A mix of ESXi 5.1 and older hosts in the cluster creates a file system quiesced replica during vMotion to an older host. The process should instead create an application quiesced replica.

Solution

Make sure that all hosts in the cluster are running ESXi 5.1 before you use vMotion to move a Windows Server 2008 and Windows 8 virtual machine with application quiescing.

vSphere Replication Service Fails with Unresolved Host Error

If the address of vCenter Server is not set to a fully qualified domain name (FQDN) or to a literal address, the vSphere Replication service can stop unexpectedly or fail to start after a reboot.

Problem

The vSphere Replication service stops running or does not start after a reboot. The error `unable to resolve host: non-fully-qualified-name` appears in the vSphere Replication logs.

Solution

- 1 In the vSphere Web Client, select the vCenter Server instance and click **Manage > Settings > Advanced Settings** to check that the `VirtualCenter.FQDN` key is set to either a fully qualified domain name or to a literal address.
- 2 Connect to the VAMI of the vSphere Replication appliance in a Web browser.
The URL for the VAMI is `https://vr-appliance-address:5480`.
- 3 Enter the same FQDN or literal address for vCenter Server as you set for the `VirtualCenter.FQDN` key.
- 4 Click **Save and Restart Service** to apply the changes.

Scalability Problems when Replicating Many Virtual Machines with a Short RPO to a Shared VMFS Datastore on ESXi Server 5.0

Performance might be slow if you replicate a large number of virtual machines with a short Recovery Point Objective (RPO) to a single virtual machine file store (VMFS) datastore that is accessible by multiple hosts on the recovery site.

Problem

This problem occurs when running ESXi Server 5.0 on the recovery site. It can result in missed RPO targets.

The number of virtual machines that can successfully replicate to a single, shared VMFS datastore increases if the RPO targets are longer.

Follow the guidelines when calculating the number of virtual machines that you should replicate to a single VMFS volume on the recovery site.

- If all your virtual machines have an RPO of 15 minutes, performance is affected when replicating 50 to 100 virtual machines to the same VMFS datastore.
- If all your virtual machines have an RPO of 30 minutes, performance is affected when replicating 100 to 200 virtual machines to the same VMFS datastore.

If you have heterogeneous RPO targets in a protection group, calculate the harmonic mean of the RPO targets when calculating the number of virtual machines that you can replicate to a single VMFS volume. For example, if you have 100 virtual machines with an RPO of 20 minutes and 50 virtual machines with an RPO of 600 minutes, you calculate the harmonic mean of the RPO as follows:

$$150 / (100/20 + 50/600) = \sim 30$$

In this example, the configuration is similar to a setup with 150 virtual machines, each having an RPO of approximately 30 minutes. In this case, performance is affected if these 150 virtual machines replicate to a single VMFS volume.

Cause

This problem affects only VMFS datastores that are shared by multiple hosts. It does not occur on datastores that are local to one host or on other datastore types, such as NFS. This problem affects only installations that are running ESXi Server 5.0.

The number of vSphere Replication servers is not relevant. These limits apply to the number of virtual machines that you can replicate to a single VMFS datastore.

Solution

- 1 Upgrade ESXi Server to version 5.1 on the recovery site.

- 2 If you cannot upgrade ESXi Server to version 5.1, redistribute the replicated virtual machines or adjust their RPO.
 - Reduce the number of virtual machines with a short RPO that replicate to a single VMFS volume, for example by using a larger number of smaller datastores.
 - Increase the RPO of the virtual machines replicating to a single VMFS volume to create a longer harmonic mean RPO.

vSphere Replication Sites Appear in the Disconnected State

vSphere Replication sites that you have connected appear in the disconnected state.

Problem

In configurations with two vSphere Replication sites that each include a vCenter Server instance and a vSphere Replication appliance, the vSphere Replication sites can appear in the disconnected state, even if you have successfully connected the sites.

Cause

Sites that you have successfully connected can appear in the disconnected state when you establish a new login session to the vSphere Web Client and the previous login session has timed out. In this case, the disconnected state reflects the connection to the remote site from the vSphere Web Client and not the state of the connection between the sites. If the two sites are running, vSphere Replication still performs replications at the schedules that you have configured. To restore the connected state in the vSphere Web Client, you must provide the login credentials for the remote site.

Solution

- 1 In the vSphere Replication view of the vSphere Web Client, click **Sites**.
- 2 Select the local site and click the **Manage** tab.
- 3 Right-click the remote site, select **Reconnect site**, and click **Yes**.
- 4 Enter the login credentials for the remote site, and click **OK**.

Error Recovering Virtual Machine in a Single vCenter Server Instance

You might receive an error message when you are recovering a virtual machine with the same name in a single vCenter Server instance.

Problem

Failed to register the recovered virtual machine 'VM_NAME' with config file <path_to_config_file>.

Cause

You cannot recover virtual machines with the same name in the same source and destination folder in the vCenter inventory.

Solution

Recover the virtual machine in a different **VMs** and **Templates** folder in the same datacenter. Optionally, after successful recovery, you can remove the old virtual machine from the vCenter inventory and drag the recovered virtual machine to the required virtual machine folder.

vSphere Replication RPO Violations

You might encounter RPO violations even if vSphere Replication is running successfully at the recovery site.

Problem

When you replicate virtual machines, you might encounter RPO violations.

Cause

RPO violations might occur for one of the following reasons:

- Network connectivity problems between source hosts and vSphere Replication servers at the target site.
- As a result of changing the IP address, the vSphere Replication server has a different IP address.
- The vSphere Replication server cannot access the target datastore.
- Slow bandwidth between the source hosts and the vSphere Replication servers.

Solution

- Search the `vmkernel.log` at the source host for the vSphere Replication server IP address to see any network connectivity problems.
- Verify that the vSphere Replication server IP address is the same. If it is different, reconfigure all the replications, so that the source hosts use the new IP address.
- Check `/var/log/vmware/*hbrsrv*` at the vSphere Replication appliance at the target site for problems with the server accessing a target datastore.

vSphere Replication Appliance Extension Cannot Be Deleted

If you delete the vSphere Replication appliance virtual machine, the virtual appliance management interface (VAMI) is not available to delete the appliance extension that still exists in vCenter Server.

Problem

Deleting the vSphere Replication appliance does not remove the vSphere Replication extension from vCenter Server.

Solution

- 1 Use the Managed Object Browser (MOB) to delete the vSphere Replication extension manually.
- 2 Redeploy the appliance and reconfigure the replications.

See [“Unregister vSphere Replication from vCenter Server if the Appliance Was Deleted,”](#) on page 27

vSphere Replication Does Not Start After Moving the Host

If you move the ESXi Server on which the vSphere Replication appliance runs to the inventory of another vCenter Server instance, vSphere Replication operations are not available. vSphere Replication operations are also unavailable if you reinstall vCenter Server.

Problem

If the ESXi Server instance on which vSphere Replication runs is disconnected from vCenter Server and is connected to another vCenter Server instance, you cannot access vSphere Replication functions. If you try to restart vSphere Replication, the service does not start.

Cause

The OVF environment for the vSphere Replication appliance is stored in the vCenter Server database. When the ESXi host is removed from the vCenter Server inventory, the OVF environment for the vSphere Replication appliance is lost. This action disables the mechanisms that the vSphere Replication appliance uses to authenticate with vCenter Server.

Solution

- 1 (Optional) If possible, redeploy the vSphere Replication appliance and reconfigure the replications.
 - a Power off the old vSphere Replication appliances.
 - b Remove any temporary hbr* files from the target datastore folders.
 - c Deploy the new vSphere Replication appliances and connect the sites.
 - d Configure all replications, reusing the existing replica .vmdk files as initial copies.
- 2 (Optional) If you cannot redeploy the vSphere Replication appliance, run the `va-util` command to connect vSphere Replication to the new vCenter Server instance.

- a Reconnect the ESXi host to vCenter Server.
- b Use SSH to connect to the vSphere Replication appliance as root.
- c Change directories to the `/opt/vmware/hms/libs` directory.

```
cd /opt/vmware/hms/libs
```

- d Type the following command to restore vSphere Replication.

In the following command, `vCenter_Server_username` must be a vCenter Server administrator account.

```
java -jar va-util.jar -cmd certauth -host vCenter_Server_address -port 80
  -user vCenter_Server_username -pass vCenter_Server_password \
  -extkey com.vmware.vchms -keystore /opt/vmware/hms/security/hms-keystore.jks -
  keystorealias jetty \
  -keystorepass vmware
```

- e Type the following command to restart the vSphere Replication service.

```
service hms restart
```

If you run the `va-util` command, you must repeat [Step 2a](#) to [Step 2e](#) each time that you change the vSphere Replication certificate.

Unexpected vSphere Replication Failure Results in a Generic Error

vSphere Replication includes a generic error message in the logs when certain unexpected failures occur.

Problem

Certain unexpected vSphere Replication failures result in the error message `VRM Server generic error`. Please check the documentation for any troubleshooting information..

In addition to the generic error, the message provides more detailed information about the problem, similar to the following examples.

- `VRM Server generic error`. Please check the documentation for any troubleshooting information. The detailed exception is: `'org.apache.http.conn.HttpHostConnectException: Connection to https://vCenter_Server_address refused'`. This error relates to problems connecting to vCenter Server.

- VRM Server generic error. Please check the documentation for any troubleshooting information. The detailed exception is: 'org.hibernate.exception.GenericJDBCException: DB2 SQL Error: SQLCODE=-1585, SQLSTATE=54048, SQLERRMC=null, DRIVER=4.13.80'. This error relates to problems connecting to the database.

Cause

vSphere Replication sends this message when it encounters configuration or infrastructure errors. For example, network issues, database connection issues, or host overload.

Solution

Check the detailed exception message for information about the problem. Depending on the details of the message, you can try to retry the failed operation, restart vSphere Replication, or correct the infrastructure.

vSphere Replication Cannot Establish a Connection to the Hosts

Replications fail because vSphere Replication cannot connect to the hosts.

Problem

vSphere Replication needs access to port 80. You might see forbidden HTTP connections in the vSphere Replication logs.

Solution

Make sure the vSphere Replication appliance has access to port 80 on the storage hosts.

For a list of ports that must be open for vSphere Replication, see [“vSphere Replication Network Ports,”](#) on page 16.

Anti-virus Agent in Firewall Terminates Virtual Machine Replication

If a virtual machine contains virus information, an anti-virus agent in the firewall might detect the virus data and terminate the connection during replication.

Problem

When you reconfigure the replication and start a full sync, the replication stops in the same data block with the virus information in it unless the virus data has moved on the disk. Clones of the disk fail, but other virtual machines of the same size and configuration from the same host replicating to the same destination datastore replicate successfully.

Solution

Remove the virus information from the replicated guest to avoid replicating virus information.

Make an exception in the anti-virus rules in the firewall to allow the replication to proceed.

Index

A

- accessing the Summary tab **51**
- Advanced Settings dialog box, vSphere Replication **44**
- anti virus agent terminates replication **64**
- Application quiescing during vMotion **59**
- architecture **13**

C

- calculating bandwidth for vSphere Replication **18**
- causes of RPO violations **62**
- client plug-in **10**
- compatibility with ESXi, compatibility with vCenter Server, compatibility with Site Recovery Manager, compatibility with Web browsers **17**
- compatibility with vSphere features **16**

D

- deleting vSphere Replication appliance extension **62**
- deleting vSphere Replication using MOB **27**

I

- installing **25**
- issues tab, identify replication issues **53**

L

- licensing **15**

M

- manage replication **53**
- managing **51**
- manual reprotection, failback **49**
- monitoring **51**

N

- network ports **16**
- network settings, vSphere Replication appliance **33**

O

- operational limits **16**
- overview, introduction to vSphere Replication **9**
- OVF, cannot be deployed **56**

P

- primary site, host compatibility requirements **10**
- public key certificates, vSphere Replication requirements **32**

R

- reconfiguring replication **44**
- recover virtual machine **47**
- recover virtual machines **47**
- recovering virtual machines with same name **61**
- replicate virtual machines, in a single vCenter Server **41**
- replicate virtual machines using vSphere Replication **42**
- replication
 - configuration fails **57**
 - missed RPO target **60**
 - replication seeds **44**
 - scalability issue with VMFS **60**
 - troubleshooting **57, 60**
 - virtual machines with two disks **57**
- replication monitoring, monitor replication **52**
- replication states **52**
- Resize VMDK file, with replication seeds **45**
- Resize VMDK file, without replication seeds **45**
- RPO and replication scheduling **45**

S

- secondary site, host compatibility requirements **10**
- security settings, vSphere Replication appliance **33**
- site
 - primary **10**
 - secondary **10**
- sneakernet, replication **44**
- solutions for common issues **56**
- SSL certificate
 - change **30**
 - vSphere Replication **30**
- supported databases **36**
- system logs, replication logs **55, 56**
- system requirements **15**

T

troubleshooting replication, troubleshooting recovery **55**

U

uninstall vSphere Replication **27**
 updated information **7**
 upgrading vSphere Replication without Internet access **23**

V

virtual appliance, unregister **27**
 vSphere features, compatibility with **16**
 vSphere Replication
 deployment **25**
 external database **35**
 features unavailable **56**
 generic error **63**
 host moved **62**
 installing **25**
 replicate virtual machines **43**
 sites disconnected **61**
 SQL Server connection fails **57**
 standalone **21**
 upgrade **21**
 update releases **21**
 vSphere Replication architecture **13**
 vSphere Replication access to port 80 **64**
 vSphere Replication Administration,
 introduction **5**
 vSphere Replication appliance
 certificate verification **31**
 connect **26**
 contents **9**
 embedded database **39**
 general settings **30**
 network settings **33**
 pair **26**
 reboot **34**
 reconfigure **29**
 shutdown **34**
 system settings **34**
 time zone **34**
 upgrade **22**
 VAMI **9**
 virtual appliance management interface **9**
 vSphere Replication database
 configure DB2 **38**
 configure Oracle Server **38**
 configure SQL Server **37**
 configure temporary tables **58**
 DB2 issues **58**
 troubleshooting **58**

vSphere Replication network bandwidth **17**
 vSphere Replication pairing, unresolved host error **59**
 vSphere Replication roles **11**