

# Veritas™ Resiliency Platform 10.2 Overview and Planning Guide

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Veritas Technologies LLC

2625 Augustine Drive  
Santa Clara, CA 95054

<http://www.veritas.com>

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[https://sort.veritas.com/data/support/SORT\\_Data\\_Sheet.pdf](https://sort.veritas.com/data/support/SORT_Data_Sheet.pdf)

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# Overview of Resiliency Platform

This chapter includes the following topics:

- [About Veritas Resiliency Platform](#)
- [About Resiliency Platform features and components](#)
- [Recovery options using Resiliency Platform](#)

## About Veritas Resiliency Platform

Veritas Resiliency Platform offers a unified solution that helps you proactively maintain business uptime across private, public, and hybrid clouds. Resiliency Platform gives you complete automation for all resiliency operations involving the virtual machines, applications, and multi-tier business-services in your data center. It safeguards the current technology investments by plugging into your existing environments and infrastructure.

For data replication, you can use the Resiliency Platform Data Mover or any third-party solution that is supported by Veritas Resiliency Platform. For a list of supported vendors and products, see *Veritas Resiliency Platform Hardware and Software Compatibility Guide*.

- For recovery of VMware virtual machines to VMware virtual machines
- For recovery of Linux and Windows physical machines to VMware virtual machines
- For recovery of VMware and Hyper-V virtual machines to cloud data center
- For recovery of vCloud Director virtual machines to vCloud Director data center
- For recovery of virtual machines from Azure Stack to Azure Stack

- For recovery of virtual machines from Azure Stack to Azure region
- For recovery of virtual machines from Azure region to Azure region
- For recovery of virtual machines from Azure region to Azure Stack
- For recovery of virtual machines from AWS region to AWS region
- For recovery of virtual machines to Azure using MSDP-C and Veritas Alta Recovery Vault
- For recovery of VMware and Hyper-V virtual machines to Google Cloud Platform
- For recovery of physical machines to cloud data centers like Azure, AWS, vCloud Director and, Orange Recovery Engine

Resiliency Platform has the following core capabilities:

Security and Compliance	Veritas Resiliency Platform provides enhanced data encryption for data-in-flight.
Predictability	Customers can predictably meet critical business Recovery Time Objectives (RTOs) and Recovery Point Objectives (RPOs).
Compliance	Customers can prove compliance to internal and external business continuity mandates with audit reporting and non-disruptive, real-time disaster recovery testing.
Automation	Customers get complete automation for all resiliency operations including recovery run books, and start and stop recovery orchestration for multi-tier applications. This reduces risk of downtime from human error.
Flexibility	Customers get the flexibility to keep their existing infrastructures and can innovate on their terms, with the flexibility that Resiliency Platform provides, to enable workload migration across sites and even to the cloud.

See [“About Resiliency Domain”](#) on page 10.

## About Resiliency Platform features and components

The following is a brief introduction to Veritas Resiliency Platform key components and their relationships. Administrators responsible for deploying and configuring the product need to understand these in more detail.

Resiliency Manager	<p>The component that provides resiliency capabilities within a resiliency domain. It is composed of loosely coupled services, a distributed data repository, and a management console. The Resiliency Manager is deployed as a virtual appliance.</p> <p>See <a href="#">“About Resiliency Manager”</a> on page 8.</p>
Infrastructure Management Server (IMS)	<p>The component that discovers, monitors, and manages the asset infrastructure within a data center. The IMS transmits information about the asset infrastructure to the Resiliency Manager. The IMS is deployed as a virtual appliance.</p> <p>To achieve scale, multiple IMSs can be deployed in the same data center.</p> <p>See <a href="#">“About Infrastructure Management Server (IMS)”</a> on page 8.</p>
Resiliency Domain	<p>The logical scope of a Resiliency Platform deployment that includes Resiliency Manager , IMS, and hosts in both the data centers.</p> <p>It can extend across multiple data centers.</p> <p>See <a href="#">“About Resiliency Domain”</a> on page 10.</p>
Data center	<p>For a disaster recovery use case, the resiliency domain must contain at least two data centers in different locations, a source data center and a target data center. Each data center has a Resiliency Manager and one or more IMSs. If you are using Resiliency Platform Data Mover for replication, each data center must also have at least one Replication Gateway.</p>
Asset infrastructure	<p>The data center assets that you add to Resiliency Platform for discovery and monitoring by the IMS.</p>
Resiliency Group	<p>The unit of management and control in Resiliency Platform. You organize related assets into a resiliency group and manage and monitor them as a single entity.</p>

Service objective	<p>A template to define the type of operations and technologies that are supported for a group of assets. You apply a service objective to each resiliency group.</p> <p>A template which identifies the characteristics of a service. These could be availability related characteristics such as local redundancy, and number of nodes in a cluster or DR characteristics such as remote recovery, Recovery Point Objective (RPO) SLAs, rehearsal support etc. Service objective is applied when a group of assets are being added to a resiliency group.</p> <p>Resiliency Platform monitors the resiliency groups based on the service objective definition and raises the risks as applicable.</p>
Virtual Business Service (VBS)	<p>A multi-tier business service where each VBS tier hosts one or more resiliency groups. A VBS lets you group multiple services as a single unit for visualization, automation, and controlled start and stop in the desired order. VBS uses the vertical grouping mechanism to group the multiple services. You can perform the disaster recovery operations on the entire VBS.</p>

## About Resiliency Manager

The Resiliency Manager includes a set of loosely coupled services, a distributed data repository, and a management web console. The Resiliency Manager provides the services required for protecting assets, such as virtual machines, within a resiliency domain. It also provides workload automation services.

The Resiliency Manager discovers and manages information about data center assets from an Infrastructure Management Server (IMS), which is another required Resiliency Platform component. The Resiliency Manager stores the asset information in its data repository and displays the information in its management console.

See [“About Resiliency Domain”](#) on page 10.

See [“About Infrastructure Management Server \(IMS\)”](#) on page 8.

## About Infrastructure Management Server (IMS)

Each Resiliency Manager requires one or more Infrastructure Management Servers (IMSs). An IMS discovers and monitors assets within a data center. You use the web console to add the asset infrastructure to Resiliency Platform so that assets can be discovered and monitored by an IMS.

The IMS sends information about the assets to the Resiliency Manager so that the Resiliency Manager can manage the assets. Management operations on assets (for example, starting or stopping virtual machines) that you initiate from the web console are carried out by the IMS.

You can also configure multiple Infrastructure Management Servers in the same data center. For example, to achieve scale, you can add a separate IMS for a separate business unit such as Human Resources or Finance. More than one IMS can be managed by the same Resiliency Manager.

See [“About Resiliency Domain”](#) on page 10.

See [“About Resiliency Manager”](#) on page 8.

## About Replication Gateways

If you plan to use Resiliency Platform Data Mover for replication of data in your environment, you need to deploy and configure at least one Replication Gateway in your source as well as target data center.

The Replication Gateway component of Veritas Resiliency Platform is a staging server that aggregates and batches data from multiple virtual machines during replication. The Gateway also performs data optimization like local deduplication and compression. The Gateway on source data center is always paired with a Gateway on target data center. The target data center Gateway is a staging server that applies the data from the source data center storage.

Each Replication Gateway includes the following components:

- I/O receiver  
Receives the application I/Os that were tapped and sent by the application host in a continuous fashion.
- Transceiver  
Transfers and receives data over the WAN link periodically.
- Applier  
Applies the data to the storage after it is received on the cloud Gateway.
- Scheduler  
Manages the jobs and policies in the Gateway.
- Engine  
Maintains the state of replication and also coordinates with all other components.

## About Data Gateway

If you want to choose Object Storage replication mode for migration of your assets to AWS, you need to deploy a Data Gateway in AWS environment.

The Data Gateway acts like a communication channel between the on-premises Replication Gateway and cloud Replication Gateway. The data being replicated from the on-premises data center gets compressed and stored in S3 bucket in the form of objects. The cloud Replication Gateway pulls this data from S3 bucket, decompresses it and applies to the target disk.

You can use a single Data Gateway for replicating data between multiple Replication Gateways.

To deploy the Data Gateway in AWS, you need to download a zip file that is shipped along with Veritas Resiliency Platform.

A few resources get created in AWS when you deploy a Data Gateway in the AWS environment. You must not delete these resources while the Data Gateway is in use as it may impact the functionality of the feature and the product. These resources automatically get deleted when you delete the Data Gateway.

## About Resiliency Domain

A resiliency domain is the management domain of a Veritas Resiliency Platform deployment. It represents the scope of the deployment, which can spread across multiple data centers and can include multiple Resiliency Managers and other components such as IMS, along with the infrastructure that is being managed and protected. Within the resiliency domain, Resiliency Platform can protect assets and orchestrate automation of workload tasks for the assets.

The resiliency domain is a logical object that you create from the web console after you deploy the first Resiliency Manager in your environment and access the Resiliency Manager console.

For disaster recovery, the resiliency domain must contain at least two data centers: a source data center and a target data center that can be on-premises or in the cloud.

A resiliency domain can optionally be implemented at a single data center for automation of workload tasks.

The asset infrastructure includes the data center assets that you add to Resiliency Platform for IMS discovery and monitoring. The asset infrastructure can include virtual and physical hosts (Windows or Linux servers) and virtualization servers for Hyper-V and VMware.

Depending on the technology used for replication, the asset infrastructure can also include Replication Gateways or enclosures (storage arrays). This diagram does not show the replication details for the asset infrastructure.

See [“Replication in a Resiliency Platform deployment”](#) on page 22.

See [“About Resiliency Manager”](#) on page 8.

See [“About Infrastructure Management Server \(IMS\)”](#) on page 8.

See [“Planning a resiliency domain for efficiency and fault tolerance”](#) on page 24.

## About networking in Resiliency Platform

Networking in Resiliency Platform comes into picture when the assets are discovered by the IMS. Resiliency Platform discovers and displays information about the layer 2 and layer 3 networks from the discovered assets.

Examples of layer 2 networks : Port group/VLAN, vSwitch, and cloud network if the target data center is in cloud.

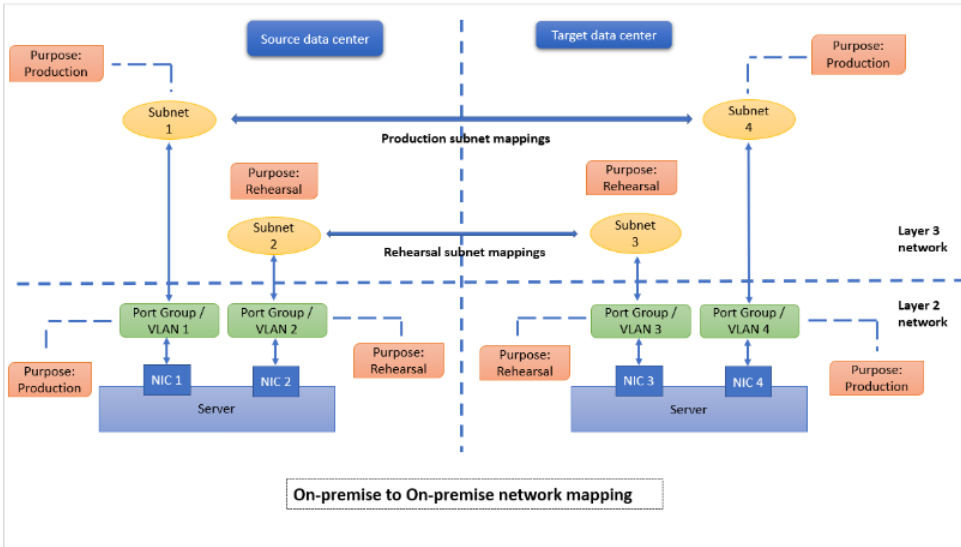
Examples of layer 3 networks : Subnets and cloud subnets.

These are called as network objects in Resiliency Platform.

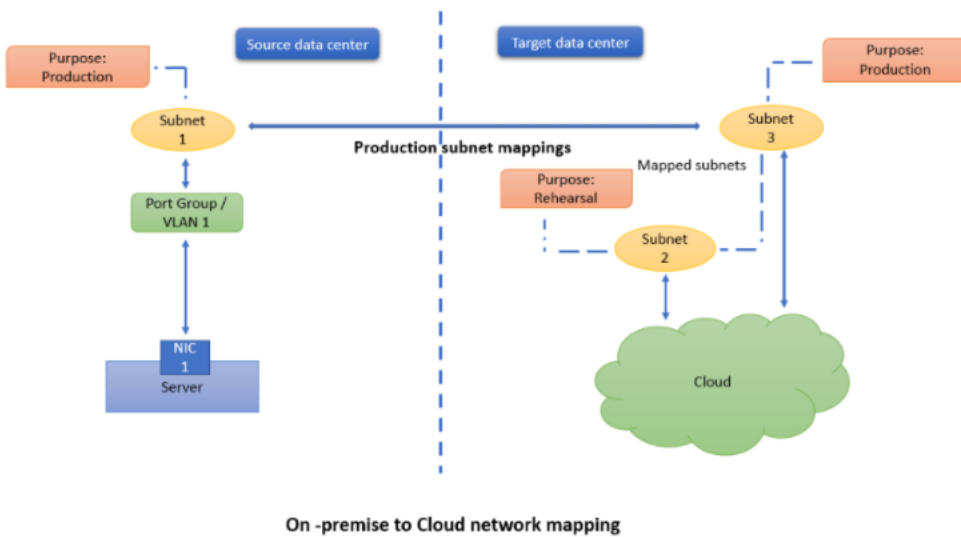
### **Network pair concept in Resiliency Platform**

A network pair is created using these network objects across data centers. Creating network pairs eliminates the need to manually connect each virtual machine to a network at the target data center. After you have paired the networks successfully, the target networks and the IP addresses are computed programmatically and applied to the virtual machines. Resiliency Platform allows you to define peer networks in different data centers and uses these definitions to connect the workloads to appropriate networks and customize the IP information when migrating workloads from one data center to another. The network pairs should be defined before a resiliency group is created. Depending on whether the participating networks in the pair are layer 2 or layer 3 networks, the pair can be used for connecting the assets to the networks, or for assisting the customization of the IP addresses in the target network.

**Figure 1-1** On-prem to On-prem network mappings



**Figure 1-2** On-prem to Cloud network mapping



# Recovery options using Resiliency Platform

There are various recovery options available with Resiliency Platform. You can use any of the supported third-party replication technologies, NetBackup, or Resiliency Platform Data Mover to replicate and recover your data across data centers. You can also recover your InfoScale applications using Resiliency Platform.

**Table 1-1** Recovery option in Resiliency Platform

Category	Recovery options
Using third-party replication	<p><b>Recovery to on-premises data center:</b></p> <ul style="list-style-type: none"> <li>■ Recovery of VMware virtual machines to on-premises data center</li> <li>■ Recovery of Hyper-V virtual machines to on-premises data center</li> <li>■ Recovery of applications to on-premises data center</li> </ul>
Using NetBackup	<p><b>Recovery to local and remote data center:</b></p> <ul style="list-style-type: none"> <li>■ Recovery of VMware virtual machines to local and remote data center</li> <li>■ Recovery of virtual machines from VMware to VMware</li> <li>■ Recovery of virtual machines from VMware to AWS using NetBackup Image Sharing</li> <li>■ Recovery of virtual machines using multiple types of recovery points</li> </ul>

**Table 1-1** Recovery option in Resiliency Platform (*continued*)

Category	Recovery options
Using Resiliency Platform Data Mover	<ul style="list-style-type: none"> <li>■ <b>Recovery to on-premises data center:</b> <ul style="list-style-type: none"> <li>■ Recovery of VMware virtual machines to on-premises data center using VAIO</li> </ul> </li> <li>■ <b>Recovery to AWS data center:</b> <ul style="list-style-type: none"> <li>■ Recovery of VMware virtual machines to AWS data center</li> <li>■ Recovery of Hyper-V virtual machines to AWS data center</li> <li>■ Recovery of physical machines to AWS data center</li> </ul> </li> <li>■ <b>Recovery to vCloud Director data center:</b> <ul style="list-style-type: none"> <li>■ Recovery of VMware virtual machines to vCloud Director data center</li> <li>■ Recovery of Hyper-V virtual machines to vCloud Director data center</li> <li>■ Recovery of VMware virtual machines to vCloud Director data center without adding the vCenter Server</li> <li>■ Recovery of Hyper-V virtual machines to vCloud Director data center without adding the Hyper-V Server</li> <li>■ Recovery of physical machines to vCloud Director data center</li> </ul> </li> <li>■ <b>Recovery to Azure data center:</b> <ul style="list-style-type: none"> <li>■ Recovery of VMware virtual machines to Azure data center</li> <li>■ Recovery of Hyper-V virtual machines to Azure data center</li> <li>■ Recovery of virtual machines from Azure / Azure Stack to Azure / Azure Stack</li> <li>■ Recovery of physical machines to Azure data center</li> </ul> </li> <li>■ <b>Recovery to Orange Recovery Engine</b> <ul style="list-style-type: none"> <li>■ Recovery of VMware virtual machines to Orange Recovery Engine</li> <li>■ Recovery of physical machines to Orange Recovery Engine</li> <li>■ ■</li> </ul> </li> <li>■ <b>Recovery to Google Cloud Platform</b> <ul style="list-style-type: none"> <li>■ Recovery of VMware virtual machines to Google Cloud Platform</li> </ul> </li> </ul>
Using NetBackup MSDP-C	<p>Recovery to Azure using NetBackup MSDP-C</p> <p>Recovery to AWS using NetBackup MSDP-C</p>
Using Veritas InfoScale Operations Manager Managed Host	<p>Recovery to on-premises data center:</p> <ul style="list-style-type: none"> <li>■ Recovery of InfoScale applications to on-premises data center</li> </ul>

# Planning your environment for disaster recovery using Resiliency Platform

This chapter includes the following topics:

- [About Veritas Resiliency Platform Data Mover](#)
- [Replication in a Resiliency Platform deployment](#)
- [Planning a resiliency domain for efficiency and fault tolerance](#)
- [On-boarding with Resiliency Platform](#)

## About Veritas Resiliency Platform Data Mover

Features of Veritas Resiliency Platform Data Mover include the following:

- Replicates virtual machines including its boot and data disks from source data center to target data center over any IP network in a LAN or a WAN environment.
- Enables easy recovery of virtual machines in the target data center.
- Ensures virtual machine data consistency.
- Recovers virtual machines protected by Data Mover at the Resiliency Group level.
- Enables non-disruptive testing of recovery at target data centers.
- Enables Continuous Data Protection (CDP) by backing up of data, automatically saving the copy of the data. You can configure CDP on source and target data centers, but the recovery points are created only on the target data center. CDP support is mainly for remote recovery of data. For more details on CDP,

## How Resiliency Platform Data Mover works

Resiliency Platform Data Mover maintains write-order fidelity for a Veritas Replication Set when the replication is in the active state. The write-order fidelity ensures that the data in the target data center is consistent. Even though data at the target data center may not be the most recent copy, Data Mover makes sure that this data is always consistent.

### About replication tunables

If you are using Resiliency Platform Data Mover to replicate your data across data centers, you have the option to tune some replication parameters to optimize the performance and scalability of the replication.

Resiliency Platform Data Mover replicates data from the protected virtual machines at the source data center to the target disks at target data center. The Replication Gateway component of Veritas Resiliency Platform is a staging server that aggregates and batches data from multiple virtual machines during replication. The staging storage on the Replication Gateway component of Veritas Resiliency Platform consists of two sections:

- **Reserve storage:** Replication Gateway allocates a certain part of the staging storage disk to each of the protected virtual machine. This part of the staging storage is called reserve storage.
- **Shared pool:** This part of the staging storage is shared among all the virtual machines.

### Parameters that can be tuned

Following are the three parameters for Replication Gateway that you can tune to optimize the Recovery Point Objective (RPO), replication performance, and scalability:

- **Update set:** Before sending data to the target Replication Gateway, the source Replication Gateway implements a data optimization technique and creates a set of data. This set of data collected over a period is called an update set.
- **Replication Frequency:** The period set to delimit and cut the update set is called replication frequency. Once an update set is cut, it gets scheduled for transfer to the target Replication Gateway.
- **Quota per Veritas Replication Set:** The space reserved for each virtual machine in the reserve storage is called quota per Veritas Replication Set.

**Table 2-1**

Tunable type	Change impact
Quota per Veritas Replication Set (Quota-per-CG)	Scale (number of virtual machines protected by the Replication Gateway)
size of update set (Update-set-size)	Performance (local deduplication), compression, RPO)
Replication frequency	RPO for all the resiliency groups configured on the gateway

The following formulae are used to link above replication tunables:

Reserve storage = number of virtual machines \* Quota per Veritas Replication Set

Number of update sets = Quota per Veritas Replication Set / size of update set.

The space for these many update sets is always reserved on the gateway.

You can tune the Quota-per-CG, update-set-size, and replication-frequency using the klish menu commands.

## How Veritas Resiliency Platform Data Mover handles virtual machine writes

Veritas Resiliency Platform Data Mover uses the vtstap service running on ESXi host, to intercept and process protected virtual machine writes. The vtstap service intercepts the writes to the storage, while reads are directly processed from the virtual machine storage.

The vtstap service records the location of the write I/O, and also sequences the writes. The write is applied to the virtual machine storage and sequenced writes are then asynchronously sent to source Replication Gateway. The writes that accumulate on the source Replication Gateway are periodically sent to the target Replication Gateway. The target Replication Gateway applies the writes to the target data center storage in sequence. This ensures that data is consistent on the source and target data centers. As Resiliency Platform Data Mover employs asynchronous replication, there might be a lag between the data on source and target, but it will always be consistent.

Resiliency Platform Data Mover processes an incoming write by performing the following steps in the order listed:

- The operating system in the guest virtual machine issues a write to the virtual machine storage.
- The I/O tap module (vtstap) records the location of the I/O.

- IO is written to virtual machine storage.
- The vtstap module sends the I/O data over the network to the I/O receiver in the source Replication Gateway.
- The I/O receiver aggregates the I/Os.
- Periodically the transceiver on the source Replication Gateway sends the I/Os across the network to the transceiver on the target Replication Gateway.
- The I/Os are then sent to the applier and the applier writes them to the target data center storage.

## Replicating thin disks

Resiliency Platform supports protecting the virtual machines with thin disks optimally by provisioning corresponding thin disks on the target data center. Resiliency Platform Data Mover replicates only the used blocks from the disks on the source data center to the disks on the target data center thereby maintaining the thin nature of the disks. In addition to thin disks, Resiliency Platform Data Mover also replicates only the used blocks from a thick (lazy zero provisioned) disks to the disks on the target data center.

When you upgrade from 3.1 or an earlier version to version 3.2 or later and if you have thin disks on the source data center and the resiliency group has been configured for disaster recovery (DR), you need to delete the existing resiliency groups after upgrading. Reconfigure the resiliency groups to utilize the thin provisioning feature. If you are upgrading from 3.1 Update 1, you do not need this step.

## Architecture of Resiliency Platform Data Mover

When you want to recover VMware virtual machines from an on-premises data center to an on-premises data center then the replication technology used is Resiliency Platform Data Mover with VMware vSphere APIs for I/O Filtering (VAIO) framework. The framework provides an I/O filter for replication that has been certified by VMware. The filter runs inside an ESXi server and intercepts I/O requests moving between a guest operating system and virtual disks. For more information on VMware API I/O filtering framework, refer to VMware documentation.

Resiliency Platform Data Mover deploys a user-land module, called **vtstap**, on the ESXi host where the protected virtual machines are running. This module is built using the VMware VAIO APIs to intercept and replicate I/Os from the virtual machines.

After Veritas Resiliency Platform Data Mover filters I/Os in the user land of the ESXi host where virtual machines are running, the I/O goes through the following path

within the Replication Gateway at the source data center before it is replicated to the target data center.

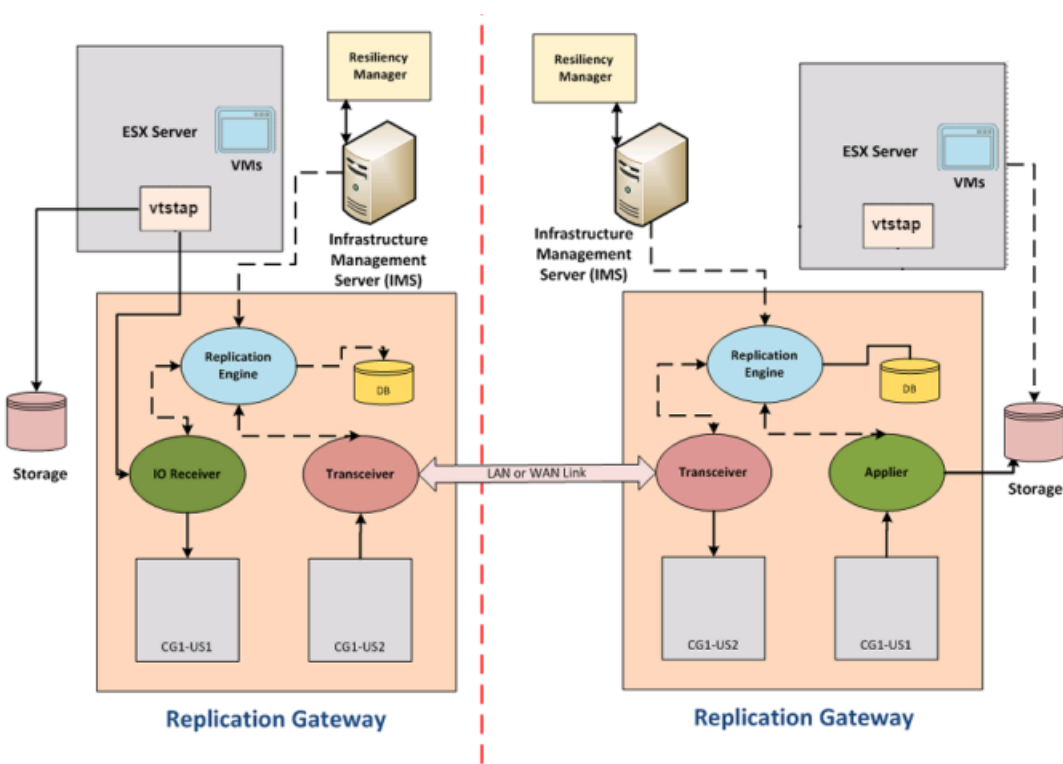
Each Replication Gateway includes five daemons that run when replication is enabled:

- I/O receiver  
Continuously receives the virtual machine I/Os that were tapped and sent by the vtstap module in the ESXi host where virtual machines are running.
- Transceiver  
Transfers and receives data over the WAN link periodically.
- Applier  
Applies the data to the storage after it is received on the target gateway.
- Scheduler  
Manages and schedules data transfer between gateways.
- Engine  
Maintains the state of replication and also coordinates with all other components.

The virtual machines on the target (recovery) data center are provisioned only when a disaster recovery operation (such as recover) is run. The disaster recovery operation then can bring the virtual machines online in the recovery data center. This avoids unnecessary resource utilization and accounting when the workload is running in the other data center.

To use Veritas Resiliency Platform Data Mover, the source Replication Gateway and the target Replication Gateway are linked together into a Replication Gateway pair. This establishes the replication channel between the source and the target data centers. You can choose to encrypt the communication between gateways, unless you are using a dedicated VPN link.

**Figure 2-1** Replication architecture



## About synchronization used by Resiliency Platform Data Mover

Veritas Resiliency Platform Data Mover uses two types of synchronization techniques for replicating the data from source to target data center:

- See [“About full synchronization of data”](#) on page 20.
- See [“About incremental synchronization”](#) on page 21.

You do not have an option to choose between the two types of synchronization techniques. The synchronization technique being used at any time is decided internally by Resiliency Platform based upon the requirements.

### About full synchronization of data

Veritas Resiliency Platform uses full synchronization only in the following conditions:

- After disaster recovery configuration for a resiliency group:

When Data Mover is configured for a resiliency group, replication is started. At that time, the storage on the target data center must be synchronized with the data from the source data center. This process of synchronizing the entire set of data is a full synchronization.

- During Resync operation performed after a recover operation:  
 A full synchronization is also required after a recover. Recover is an activity initiated by a user when the source data center is down due to a disaster, and the virtual machines need to be brought up at the target data center to provide business continuity. After a recover, the virtual machine runs in the target data center. Once the source data center is back up and running, you must perform a Resync operation from the target data center before you can migrate back to the source data center. This Resync operation launches a full synchronization to synchronize the data on the source data center with the data in the target data center. When the synchronization completes, the source data center is up-to-date. You can then perform the Migrate operation.

The amount of time that is required for full synchronization depends on several factors. These factors include the size of the replication disks, the network bandwidth of the LAN and WAN environment, and the amount of I/O occurring during the synchronization. After the full synchronization is complete, the replication moves into active state. In the active state, Data Mover maintains write-order fidelity.

If the replication state is Syncing, you can view the status of data replication on the resiliency group details page. The progress is displayed on a status bar with percentage complete information. Time required to sync the data is also displayed on this page.

At times, you need to manually invoke a full synchronization to resume replication after a disk failure or infrastructure failure. For more information on conditions where a full synchronization is required:

See [“About synchronization used by Resiliency Platform Data Mover”](#) on page 20.

## About incremental synchronization

An incremental synchronization targets to synchronize only that data which has changed since the last synchronization (either incremental or full synchronization). Incremental synchronization saves much of the time and resources used in replication of the data between the data centers.

Except the two conditions where a full synchronization is performed in Veritas Resiliency Platform (after disaster recovery configuration and after a recover operation), at all other times, Resiliency Platform uses incremental synchronization while replicating the data from source data center to target data center. These instances where incremental synchronization is used in Resiliency Platform include the following:

- If there are any network failures in the replication path
- If there is a system reboot of Replication Gateway or protected virtual machines
- If you replace a healthy or faulted Replication Gateway with another Replication Gateway
- If you perform a migrate operation. In this case, the virtual machines are brought up on the target site and then direction of replication changes. At this point, Resiliency Platform uses incremental synchronization.

If the replication state is Syncing, you can view the status of data replication on the resiliency group details page. The progress is displayed on a status bar with percentage complete information. Time required to sync the data is also displayed on this page.

See [“About synchronization used by Resiliency Platform Data Mover”](#) on page 20.

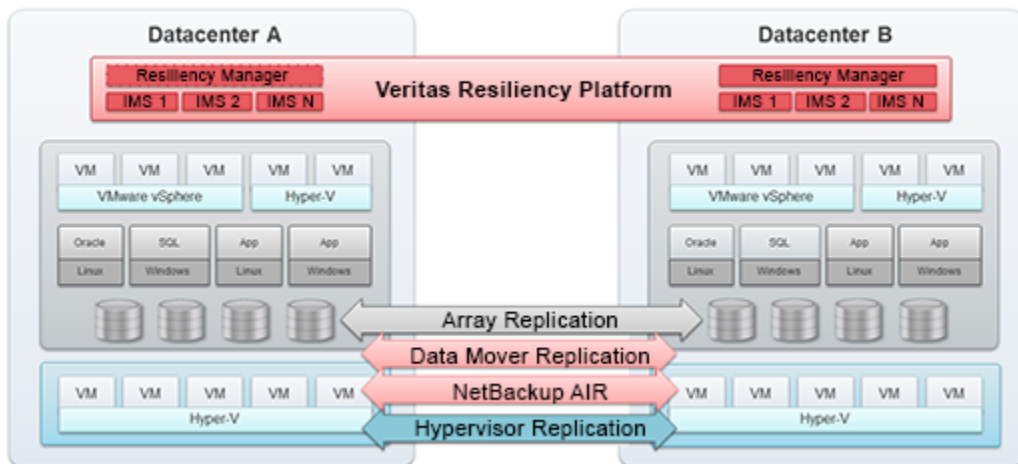
## Replication in a Resiliency Platform deployment

Veritas Resiliency Platform supports several forms of replication for data recovery from your source data center to your target data center.

- Array-based replication (block-based replication) using supported arrays
- Hypervisor-based replication using Hyper-V Replica
- NetBackup Auto Image Replication (AIR)
- Resiliency Platform Data Mover

For details on supported replication hardware and software, refer to the *Hardware and Software Compatibility List*.

**Figure 2-2** Replication in a Resiliency Platform deployment



When you use Resiliency Platform Data Mover for recovery of your data center assets to AWS, you have an option to choose between the two modes of replication: Direct mode and Object Storage mode.

NetBackup Image Sharing can also be used for recovery to AWS.

## About Direct mode replication

For migrating your data center assets to Amazon Web Services (AWS) using Veritas Resiliency Platform, you have an option to choose between two modes of replication: Direct mode and Object Storage mode.

For migrating to a data center other than AWS using Veritas Resiliency Platform, only Direct mode replication is used.

The Replication Gateway on source data center is always paired with a Replication Gateway on target data center. In Direct mode replication, the Replication Gateway at source data center directly communicates with the Replication Gateway at target data center. The source site Replication Gateway acts as a staging server that aggregates and batches data from multiple virtual machines during replication. The target data center Gateway is a staging server that applies the data on the recovery data center storage.

## About Object Storage mode replication

If you want to migrate your data center assets to AWS, you have an option to choose between Object Storage mode replication and Direct mode replication. To enable the Object Storage mode replication, you need to deploy a Data Gateway in AWS environment.

See [“About Data Gateway”](#) on page 10.

The following are some of the advantages of using the Object Storage mode replication in Resiliency Platform:

- Automatically scales according to the requirements of the user by utilizing the AWS services to achieve scalability.
- Facilitates resiliency for the Replication Gateway. Since the data keeps getting replicated and stored in S3 bucket, failure of Replication Gateway on the target data center does not hamper the replication.

In case where the Replication Gateway at target data center goes down, data synchronization is performed after the Gateway is restored back or replaced. If the Replication Gateway at the source data center goes down before the synchronization gets completed, you may lose some of the data if you are using the Direct mode of Replication. But if you are using the Object Storage mode replication, then the data can be pulled from S3 bucket and you do not lose any data.

## Planning a resiliency domain for efficiency and fault tolerance

Before you deploy Veritas Resiliency Platform, you should plan how to scale the deployment for efficiency and fault tolerance.

Although a resiliency domain requires only one Resiliency Manager, you can add multiple Resiliency Managers instances to the domain. For example, you can distribute Resiliency Managers geographically for efficiency of local access. For resiliency, you can even have multiple Resiliency Managers in one data center.

If you have multiple Resiliency Managers in the resiliency domain, the recommended WAN latency between two Resiliency Managers is recommended to be less than 30 milliseconds. The maximum WAN latency allowed between the two Resiliency Managers is 50 milliseconds. This latency requirement applies to any two Resiliency Managers - within a single data center or across two different data centers.

The recommended minimum deployment for disaster recovery to on-premises data center in production environment would be four virtual appliances: a Resiliency Manager and Infrastructure Management Servers (IMS) in the source data center

and a Resiliency Manager and IMS in the target data center. In a test environment, you can have only one Resiliency Manager at the target data center.

The recommended minimum deployment for disaster recovery to cloud data center would be three virtual appliances: an IMS in the source data center and a Resiliency Manager and IMS in the target data center.

The source and target data centers do not require a one-on-one mapping of IMSs. For example, you can have two IMSs in the source data center and one IMS in the target data center. You can add multiple Infrastructure Management Servers (IMS) to a resiliency domain. For example, if there are multiple data centers in different geographical locations to be managed, you configure a separate IMS for each geographical data center location. You can also configure more than one IMS in the same data center.

If you plan to use Resiliency Platform data mover for replication, then additionally you need minimum one Replication Gateway in each data center. Resiliency Platform supports asymmetric pairing of Replication Gateways. This feature facilitates deployment of only the required number of Gateways on each side, based on data transfer rate and technology specific limits. One Gateway on source site can be paired with multiple Gateways on target site and vice versa. One Gateway can be paired with up to 16 gateways on the peer site.

Both the source and the target gateway must have external storage equivalent to 6GB for each virtual machine protected by the gateway pair. For example, if a gateway pair supports 10 virtual machines, the source and recovery (target) gateway must each have 60GB of external storage. The minimum size of the external storage must be 50GB.

Veritas Resiliency Platform is dependent on host name resolution to work between the resiliency platform appliances and its configured assets. Trying disaster recovery when there is a partial network infrastructure failure, such as DNS failure, can lead to incomplete disaster recovery activities, if the appliances and assets are not configured using network host names.

In order to avoid encountering such issues, you must use fully qualified network host names in the following scenarios:

- Joining a new resiliency manager to a domain
- Adding an infrastructure management server to a data center
- Adding a resiliency platform datamover to a data center
- Preparing hosts for replication using resiliency platform data mover
- Adding application hosts
- Adding Hyper-v servers

- Adding vCenter server
- Adding Storage Arrays
- Adding Storage Discovery Host

**Table 2-2** Reference topics

For more information on...	Refer to...
Network	<a href="#">About FIPS enablement</a> <a href="#">About NAT support</a> <a href="#">About IPv6 support</a>
Capacity planning for Resiliency Platform replication appliances	<a href="#">VMware vSphere environment</a> <a href="#">VMware vSphere and Azure environment</a> <a href="#">VMware vSphere and AWS environment</a>
Network objects and mapping of network objects required across data centers	<a href="#">About network objects</a> <a href="#">Creating network pairs between data centers</a>

See [“About Resiliency Domain”](#) on page 10.

See [“About Resiliency Manager”](#) on page 8.

See [“About Infrastructure Management Server \(IMS\)”](#) on page 8.

## On-boarding with Resiliency Platform

The following table describes the various steps that are involved in the customer on-boarding with Resiliency Platform and what to expect during each of these steps:

**Table 2-3** On-boarding with Resiliency Platform

Step	Description
Deploy	<ul style="list-style-type: none"> <li>■ Deploy Resiliency Platform virtual appliances and configure them as Resiliency Manager, Infrastructure Management Server (IMS), or Replication Gateway</li> <li>■ Define the resiliency domain through Getting Started wizard</li> <li>■ Add assets to your resiliency domain for discovery:                             <ul style="list-style-type: none"> <li>■ Virtual machines</li> <li>■ Applications</li> <li>■ Storage enclosures</li> </ul> </li> </ul>

**Table 2-3** On-boarding with Resiliency Platform (*continued*)

Step	Description
Discover	<ul style="list-style-type: none"> <li>■ Resiliency Platform's deep discovery enables identification of the following:                             <ul style="list-style-type: none"> <li>■ Virtual machines</li> <li>■ Applications</li> <li>■ Storage enclosures</li> <li>■ Software/hardware replication</li> <li>■ Virtual networks (vSwitches)</li> </ul> </li> </ul>
Define service level objective	<ul style="list-style-type: none"> <li>■ Configure service level objective based on the intended Recovery Point Objective (RPO). service level objective driven configuration enables the following capabilities:                             <ul style="list-style-type: none"> <li>■ Basic monitoring of assets</li> <li>■ Recovery of assets</li> <li>■ Recovery of multi-tier business services (VBS)</li> <li>■ Health status reporting of assets</li> <li>■ Risk alerts and notifications for protected assets</li> </ul> </li> </ul>
Manage	<ul style="list-style-type: none"> <li>■ Single-click rehearsal for resiliency groups and VBS validates disaster readiness:                             <ul style="list-style-type: none"> <li>■ Automated rehearsal</li> <li>■ Automated rehearsal cleanup</li> <li>■ Option of network isolation for workloads during rehearsal</li> </ul> </li> <li>■ Single-click recovery or migration of resiliency groups and VBS:                             <ul style="list-style-type: none"> <li>■ Automated recovery or migration based on the service level objective</li> <li>■ Recovery with predefined network customization</li> <li>■ Recovery based on predefined grouping or order</li> <li>■ Controlled recovery using Resiliency Plans</li> </ul> </li> <li>■ Single-click evacuation plan for resiliency groups and VBS:                             <ul style="list-style-type: none"> <li>■ Option of defining priority levels for VBS</li> <li>■ Automated rehearsal or cleanup rehearsal for evacuation plan</li> </ul> </li> </ul>

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# Glossary

<b>activity</b>	A task or an operation performed on a resiliency group.
<b>add-on</b>	An additional software package that can be installed on hosts by the Infrastructure Management Server (IMS) for specialized uses.
<b>asset infrastructure</b>	
<b>assets</b>	
<b>data center</b>	A location that contains asset infrastructure to be managed by Veritas Resiliency Platform.
<b>host</b>	In Veritas Resiliency Platform, the term hosts means Application host, Resiliency Platform Data Mover host, Storage discovery host, VMware Discovery host, and Hyper-V host.
<b>Infrastructure Management Server (IMS)</b>	The Veritas Resiliency Platform component that discovers, monitors, and manages the asset infrastructure within a data center. The IMS transmits information about the asset infrastructure to the Resiliency Manager.
<b>klish</b>	Command Line Interface SHell. Provides the command line menu on the virtual appliance for use after the initial bootstrap configuration.
<b>migrate</b>	
<b>persona</b>	A user role that has access to a predefined set of jobs (operations). Used to assign permissions to users and groups for Veritas Resiliency Platform web console operations.
<b>rehearsal</b>	<p>A zero-downtime test that mimics the configuration, application data, storage, and the failover behavior of the resiliency group.</p> <p>Rehearsal verifies the ability of the resiliency group to fail over to the recovery data center during a disaster.</p>
<b>Replication Gateway</b>	The Veritas Resiliency Platform component that performs data replication between the source and the target data center.
<b>resiliency domain</b>	The logical scope of a Resiliency Platform deployment. It can extend across multiple data centers.
<b>resiliency group</b>	The unit of management and control in Veritas Resiliency Platform. Related assets are organized into a resiliency group to be managed and monitored as a single entity.

<b>Resiliency Manager</b>	The Veritas Resiliency Platform component that provides resiliency capabilities within a resiliency domain. It is composed of loosely coupled services, a distributed data repository, and a management web console.
<b>resiliency plan</b>	A collection of tasks or operations, along with the relevant assets, which are performed in a predefined sequence.
<b>resiliency plan template</b>	A template defining the execution sequence of a collection of tasks or operations.
<b>Resiliency Platform Data Mover Replication host</b>	To enable replication using Resiliency Platform Data Mover replication technology, you need to add an asset and prepare it for replication. Asset can be a physical machine or a virtual machine.
<b>source data center take over</b>	The data center that is normally used for business.
<b>target data center</b>	The data center that is used if a disaster scenario occurs.
<b>tier</b>	Within a virtual business service (VBS), resiliency groups are arranged as tiers. Tiers represent the logical dependencies between the resiliency groups and determine the relative order in which operations are performed on the resiliency groups.
<b>VAIO framework</b>	VMware framework consisting of vSphere APIs for I/O Filtering. This framework enables Veritas Resiliency Platform to run filters on ESXi servers and intercept any I/O requests from a guest operating system to a virtual disk.
<b>virtual appliance</b>	An appliance that includes the operating system environment and the software application which are deployed together as a virtual machine.  The Veritas Resiliency Platform virtual appliance is deployed as a virtual machine and then configured with basic settings and a role (for example, Resiliency Manager).
<b>virtual business service (VBS)</b>	A multi-tier IT service where each VBS tier hosts one or more resiliency groups. A VBS groups multiple services as a single unit for visualization, automation, and recovery in case of a disaster in the desired order.
<b>Veritas Replication Set</b>	A virtual machine, which belongs to the resiliency group, is termed as Veritas Replication Set. All the disks attached to this virtual machine, including the boot and data disk, constitute a Veritas Replication Set. The write order fidelity is maintained across all disks in a given replication set.
<b>web console</b>	The web-based management console on the Resiliency Manager that is used to configure the settings for the resiliency domain and perform operations.