Abstract

The guide is intended for VMware vSphere Web Client administrators and database administrators who are responsible for backing up databases. This guide provides information on how to install, configure, and use HPE Recovery Manager Central for VMware vSphere Web Client with HPE 3PAR StoreServ and HPE StoreVirtual storage systems and HPE Express Protect.
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Overview

Recovery Manager Central for VMware

The HPE Recovery Manager Central for VMware (RMC-V) allows VMware Server administrators to protect vSphere Web Client-Server instances and databases with application-consistent recovery points. The application-consistent and crash-consistent snapshots are created, scheduled, and managed on HPE 3PAR StoreServ or HPE StoreVirtual. The RMC Express Protect feature provides a second-tier of data protection with backup from storage systems to backup systems. Backups to HPE StoreOnce are self-contained volumes, de-duplicated to save space, and can be used to recover back to the original or a different HPE 3PAR StoreServ system, even if the original base volume is lost.

NOTE:
RMC-V supports the following two flavors of HPE StoreVirtual: HPE Hyper Converged 250 System and HPE StoreVirtual VSA.

For information on the supported hardware and software platforms, see SPOCK.

Features

Easy and intuitive installation and deployment
Preconfigured, ready to use appliance with simple installation wizard.

Recovery Set management
RMC-V allows you to take volume level Snapshots of VMs and datastores.

Remote snapshots
A consistent copy of the data is readily available at the remote site.

Efficient and fast backups
The Express Protect feature enables a direct backup from HPE 3PAR StoreServ to HPE StoreOnce. Fast and efficient backups are created as RMC reads only the changed data during the backup.

Element Recovery Technology (ERT)
The Element Recovery Technology provides instant access to the backups and granular restores. Using ERT you can recover a VM from the mounted Express Protect objects.

Extra tier of data protection
Catalyst Copies allow you to replicate backups to multiple HPE StoreOnce Catalyst stores (local or remote) efficiently.

Email notification policy
You can receive notifications to your mailbox, when you perform create, delete, or restore operations on VMs, datastores, or Remote Copy groups.

Restoring virtual machines
You can effectively restore VMs from Express Protects or Catalyst Copies and restore datastores from Snapshots, Express Protects, or Catalyst Copies.

Support for VMware vCenter Linked Mode
RMC-V can be installed on VMware vCenter servers configured in linked mode and enhanced linked mode.

Scheduling options
Scheduler can be used for minutely, hourly, daily, weekly, monthly, or one-time creation of Snapshots, Express Protects, or Catalyst Copies.

**RMC-V deployment model**

RMC-V is deployed as a vCenter Web Client plug-in. First log on to the vCenter Server before accessing the RMC-V features. Restart the VMware vCenter Web Client services before logging in for the first time.

Plug-in integration for RMC-V is available only with the vSphere Web Client.
Licensing

Licensing is used to enable Recovery Manager for VMware product functionality. HPE 3PAR StoreServ arrays are delivered with an All Inclusive license that includes license to use RMC-V. You need to purchase the RMC Application Suite License if you are using HPE 3PAR StoreServ 7000 Storage and HPE 3PAR StoreServ 10000 Storage arrays.

Certain features are enabled only if they are licensed. For more information on licensing, see the HPE Recovery Manager Central User Guide.

License models supported by RMC-V

The Recovery Manager for VMware vSphere License is required for RMC-V.

RMC Application Suite License

The RMC Application Suite license covers licensing of RMC and all the RMC application plug-ins.

HPE 3PAR StoreServ and HPE StoreVirtual licensing

RMC and RMC-V licenses must be installed on the HPE 3PAR StoreServ Storage Systems and the HPE StoreVirtual Systems.

NOTE:

RMC does not allow users to install or delete RMC Base or RMC-V licenses. These licenses are directly installed on the HPE 3PAR StoreServ Storage and HPE StoreVirtual Systems. For information on installing these licenses, see the HPE 3PAR StoreServ Storage and HPE StoreVirtual documentation.

HPE StoreOnce licensing

StoreOnce Catalyst license must be installed on HPE StoreOnce Backup systems.

NOTE:

RMC does not allow users to install or delete a StoreOnce Catalyst license. This license is directly installed on the HPE StoreOnce Backup system.

For information on the required HPE 3PAR StoreServ, HPE StoreVirtual, and HPE StoreOnce licenses, see http://www.hpe.com/storage/spock.

Licensing scenarios

The table Licensing scenarios describes how the appliance handles licensing for different user actions:
<table>
<thead>
<tr>
<th>User action</th>
<th>License policy or type</th>
<th>Result</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Create snapshot</td>
<td>• RMC Application Suite license</td>
<td>If a valid license exists, create a snapshot.</td>
<td>The license required is either Permanent or valid Temporary license.</td>
</tr>
<tr>
<td>• Create snapshot with expiration and retention time</td>
<td>• RMC-V license</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Create snapshot with expiration and retention time</td>
<td>• Virtual Copy license</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Create snapshot with expiration and retention time</td>
<td>• Virtual Lock license</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create Backup</td>
<td>StoreOnce Catalyst license</td>
<td>If a valid license exists, you can back up your required files.</td>
<td>The license required is either Permanent or valid Instant-On license.</td>
</tr>
<tr>
<td>Mount, unmount, delete, and restore of snapshots.</td>
<td>License not required</td>
<td>All these operations functions without licenses provided a valid license exists when a snapshot is created.</td>
<td></td>
</tr>
<tr>
<td>Restore and delete all backups.</td>
<td>License not required</td>
<td>All these operations functions with licenses provided a valid license exists when a backup is created.</td>
<td></td>
</tr>
</tbody>
</table>
Installing RMC-V

The simple RMC installation wizard guides you through a set of screens with custom fields for installing RMC-V. The following sections explain the installation process and the prerequisites required.

Installation workflow

The figure Installation Wizard workflow represents the RMC installation workflow and options. The installation wizard provides the following options:

- **HPE RMC Only**: Deploys RMC without VMware vCenter plug-in. HPE RMC standalone VM can be used for other Recovery Manager products (RMC-S, RMC-O, RMC-SH).
- **HPE RMC integrated with VMware**: Manages recovery instances for single VMware vCenter Server.

The highlighted section (green color) in the figure Installation Wizard workflow explains installing HPE RMC integrated with VMware.
Figure 1: RMC Installation Wizard workflow

Prerequisites

- Ensure that your system meets the **system requirements** for installing RMC.
- Extract the HPE RMC Installer 4.0.0 ZIP folder to a Windows host. Windows vCenter server can also be used. The supported Windows hosts are:
  - Windows 7
  - Windows 8
  - Windows 10
  - Windows 2008 R2
  - Windows 2012 R2
  - Windows Server 2016

Following are the contents of the ZIP file:
### Table 2: Installer files

<table>
<thead>
<tr>
<th>Installer files</th>
<th>Number of files</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application</td>
<td>1</td>
<td>Execution file</td>
</tr>
<tr>
<td>RPM file</td>
<td>1</td>
<td>Required for upgrading</td>
</tr>
<tr>
<td>VMDK file</td>
<td>3</td>
<td>Required for deploying RMC VM and StoreOnce VSA.</td>
</tr>
<tr>
<td>MF file</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>OVF file</td>
<td>4</td>
<td>Required for deploying RMC through vCenter or ESXi.</td>
</tr>
<tr>
<td>JSON file</td>
<td>1</td>
<td>Configuration file of the installer</td>
</tr>
</tbody>
</table>

- Ensure that all the files are extracted to the same folder.
- For FC deployments, your environment must meet the following requirements:
  - All the FC HBAs required for FC-based backups must be of the same vendor.
  - Appropriate zoning configuration to access storage and backup systems.
  - QLogic FC HBA is pass-through to the RMC VM.
- For iSCSI deployments, your environment must meet the following requirements:
  - HPE 3PAR StoreServ must be configured for iSCSI.
  - Assigned IP address for iSCSI port must be reachable from the RMC appliance.
- If FQDN is used, the domain server must be accessible by the installer host and the RMC VM to be deployed.
- Ensure appropriate CPU, RAM, and licenses are available on the ESXi and vCenter servers.
- Ensure that you have enough free space (minimum 120 GB) on the datastore, to install RMC on a thick provisioned vdisk.

**NOTE:**
If a backup system is not configured with RMC, the system prompts to install an optional HPE StoreOnce VSA during RMC deployment. If you select VSA installation, ensure that:

- Extra 120GB is available for VSA deployment. The total storage requirement for VSA deployment is 240 GB.
- Ensure the availability of additional storage space if you utilize 1 TB storage space on VSA with RMC Express Protect feature.

- Ensure that you have the required privileges for deployment and RMC-V plug-in integration. For more information, see [What are the required user privileges](#).

## Connectivity requirements

The Connectivity Diagram figure details the connections between the RMC VM, vCenter, HPE 3PAR StoreServ or HPE StoreVirtual, and HPE StoreOnce Backup System.
For successful RMC deployment, ensure that connectivity is established between the following components:

- Installer host and vCenter server
- vCenter server and the (to be deployed) Installer RMC VM
- Installer RMC VM (to be deployed) and the Installer host
- Storage system and RMC VM (management link)
- Backup system and RMC VM (management link)

**Connectivity between storage systems and RMC appliance**

- The connectivity between HPE 3PAR StoreServ and RMC appliance is on:
  - FC
  - iSCSI
- The connectivity between HPE StoreVirtual and RMC appliance is on iSCSI.

**Connectivity between Backup Systems and RMC appliance**

- The connectivity between HPE StoreOnce to RMC appliance is over:
  - CoFC (Catalyst Over Fibre Channel)
  - Co-Ethernet (Catalyst Over Ethernet)

**RMC-V installation options**

- RMC install and register RMC-V plug-in
- Register plug-in only
- Multi RMC deployment
- RMC-V upgrade
RMC-V installation options for vCenter linked mode

RMC-V can be installed on VMware vCenter servers configured in linked mode and enhanced linked mode. A single vSphere web client is used to manage all the running vCenters and to see a consolidated view of the inventory list from all the linked vCenter servers.

Installation of RMC-V on one of the vCenter servers in linked mode

You can deploy RMC and register RMC-V plug-in on vCenter 5.5, vCenter 6.0 or vCenter 6.5 linked mode servers. Based on your requirement, you can decide on the number of vCenter servers and RMC-V plug-ins that you want to install.

Assume that you have installed RMC-V on vCenter1 while vCenter1 and vCenter2 are in linked mode. You can log in to vCenter1 to see a consolidated view of all the inventory resources from vCenter servers in linked mode. In this environment, you can perform RMC-V tasks only on vCenter1 where you have installed RMC-V. You cannot perform tasks related to vCenter2. For example, if you are trying to create a snapshot of the inventory object belonging to vCenter2, the GUI displays the message No Actions Available.

![Diagram showing single RMC-V deployment across two linked vCenters](image)

Installation of RMC-V on all the vCenter servers in linked mode

Assume that you have installed RMC-V on two vCenters (vCenter1 and vCenter2) in linked mode. The vCenters are in linked mode, but the RMC-V plug-ins are independent of each other. Only RMC-V that is registered on VCenter1 handles any recovery operation performed on vCenter1.

![Diagram showing dual RMC-V deployments across two linked vCenters](image)

**NOTE:**

Assume that you have installed RMC-V in linked mode on vCenter 5.5, vCenter 6.0, or vCenter 6.5. If the primary vCenter where the Single Sign-On (SSO) server is installed, is down, then you cannot log in to the other vCenter servers in linked mode.
Installing RMC-V using the installation wizard

Procedure

1. In the extracted HPE RMC Installer 4.0.0 folder, double click the HPE RMC Installer 4.0.0.exe file.

   The introduction screen appears:

   ![Introduction Screen]

   - Introduction
   - License Agreement
   - Deploy HPE Recovery Manager Central
   - Install / Upgrade
   - ESXi Server and Datashare Selection
   - RMC Configuration
   - Network Configuration
   - Network Interface Settings
   - Array Configuration
   - Backup
   - System Configuration
   - Configure Remote Data Collection
   - Summary
   - Diagnostics
   - StoreOnce VSA Deployment
   - Install / Upgrade Complete
   - Summary

   - Welcome to the RMC Installation Wizard!

   - HPE Recovery Manager Central (RMC) - Your gateway to fast, simple, efficient, and reliable data protection for your business critical applications!

   - This wizard will help you install or upgrade RMC with either of the following options:

     - HPE RMC Virtual Machine Instance
       - Allows you to use RMC for MS SQL (RMC-S), RMC for Oracle (RMC-O) as well as protect any other application with crash-consistent snapshots and backups
     - HPE RMC Virtual Machine Instance + RMC for VMware (RMC-V)
       - Additionally includes the installation of RMC plug-in to VMware vCenter for HPE StoreOnce Backup Systems.

   - HPE Recovery Manager Central

     ![Diagram: HPE Recovery Manager Central]

     - Primary Storage Array
     - RMC VM
     - HPE StoreOnce

2. On the Introduction screen, click Next.
3. On the License Agreement screen, review the license agreement and if you agree, select I accept the terms of the License Agreement, and then click Next.
4. On the Deploy HPE Recovery Manager Central screen:
a. Select HPE RMC integrated with VMWare (Install/Upgrade).
b. Specify the following details of vCenter:
   - Hostname/IP address
   - Username
   - Password
c. Click Next.

NOTE:
If you are using TLS v1.0 version of HTTPS security protocol, ensure that you upgrade to VMware vCenter that supports TLS v1.1 or v1.2 versions. If you do not want to upgrade VMware vCenter, enable TLS v1.0 in RMC.

For information on enabling TLS v1.0, see Enabling TLS v1.0 using the console in {HPE Recovery Manager Central 4.0.0 User Guide}.

5. On the Install/Upgrade screen, select Install and then click Next.
6. On the RMC-V Install screen:
a. Select one of the following options:
   • **Install RMC-V Plug-in and RMC Appliance**: Installs a new instance of RMC VM along with RMC-V plug-in.
   • **Install RMC-V Plug-in and Register Existing RMC Appliance**: Registers an RMC-V plug-in with the current instance of standalone RMC.

b. Specify the following details of RMC:
   • **Hostname/IP address**
   • **Username**
   • **Password**

c. Click **Next**.

7. On the **ESXi Server and Datastore Selection** screen, select an ESXi host and a datastore and then click **Next**.
8. **On the RMC Configuration** screen:
a. Select a **CPU and Memory Configuration**.

**NOTE:**

- To increase the number of concurrent backups to HPE StoreOnce, select a higher CPU and memory configuration.
  - To achieve maximum performance, Hewlett Packard Enterprise recommends you to use physical vCPUs for deploying RMC VM. It is because if logical cores (hyperthreading) are enabled in the ESXi host, RMC installer considers only the physical cores while validating the selection. The RMC installer permits the selection only if physical cores of the total available vCPUs are equal or more than the selection made.
  - The **CPU and Memory Configuration option** of 2vCPU, 8GB vRAM can be used only to perform Snapshots. This configuration does not support Express Protects or data replications.

b. Specify RMC **Hostname/VM name** and **Timezone**.

c. Specify the password for the RMC Admin user account.

d. Click **Next**.

9. On the **Network Configuration** screen, select one of the following configurations and then click **Next**: 
Configuration | Connections | Management and Data | Ports
---|---|---|---
**Single virtual NIC** | A Single virtual network interface is connected to Storage System and storage device. | Virtual network interface for management operations, and FC interface for datapath. | If using FC for data traffic, Hewlett Packard Enterprise recommends 8G or 16G physical HBA. |
**Two virtual NIC** | Two virtual network interfaces are connected to two different subnets. | Shared management and datapath. | Assign two different port groups. |
**Three virtual NIC** | Three virtual network interfaces are connected to three different subnets. | Dedicated management interface and two datapath interfaces. | Assign three different port groups. |

10. On the **Network Interface Settings** screen, specify the following details and then click **Next**:
<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FQDN</td>
<td>If enabled, RMC uses the specified FQDN for all operations.</td>
</tr>
<tr>
<td>Network Port</td>
<td>Select the network port.</td>
</tr>
<tr>
<td>Switch</td>
<td>Displays the switch associated with the network port that you selected.</td>
</tr>
</tbody>
</table>
| Boot protocol     | - **DHCP**: If selected, automatically provides IP address.  
                    - **Static**: If selected, specify IP address and Subnet Mask. |

**NOTE:**
Hewlett Packard Enterprise recommends you to use the **Static** boot protocol.

<table>
<thead>
<tr>
<th>Default Gateway</th>
<th>The IPv4 gateway IP address.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preferred DNS</td>
<td>The IPv4 address of the DNS server</td>
</tr>
</tbody>
</table>

*Table Continued*
<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternate DNS</td>
<td>If the preferred DNS times out, the alternate DNS is used.</td>
</tr>
<tr>
<td>Search Domains</td>
<td>Specify the search domain. For example, lab.hpe.com</td>
</tr>
</tbody>
</table>

11. (Optional) On the **Array Configuration** screen:

   ![Diagram](image.png)

   a. Specify the following **Storage System** details:
      - **Storage Type**: Select HPE 3PAR StoreServ or HPE StoreVirtual.
      - **FQDN/IP address**
      - **Username**
      - **Password**
   b. Click **Add**.
   c. Click **Next**.

12. (Optional) On the **Backup System Configuration** screen:
a. Specify the following details of the Backup System (HPE StoreOnce):
   - FQDN/IP address
   - Username
   - Password
b. Click Add.
c. Click Next.
13. On the Configure Remote Data Collection screen, specify the following details and then click Next:
## Table 3: Remote Data Collection

<table>
<thead>
<tr>
<th>Title</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Settings</td>
<td>General Settings</td>
<td>If you select Yes, Hewlett Packard Enterprise and partners may contact you to discuss optimization options for your RMC appliance.</td>
</tr>
<tr>
<td>Proxy</td>
<td>Do you need a proxy server for Remote Data Collection?</td>
<td>Select this option if network proxy is required to access the Internet.</td>
</tr>
<tr>
<td></td>
<td>Protocol</td>
<td>Select the protocol used by the proxy server.</td>
</tr>
<tr>
<td></td>
<td>Address</td>
<td>Specify IP address/Host name of the proxy server.</td>
</tr>
<tr>
<td></td>
<td>Port</td>
<td>Specify the port used by the proxy server.</td>
</tr>
</tbody>
</table>

*Fields marked with * are mandatory.*

Remote Data Collection enables Hewlett Packard Enterprise (HPE) to improve future HPE RMC products and updates.

Remote Data Collection sends HPE RMC information such as configuration and performance data to HPE.

All remote communications are encrypted and transferred securely to HPE and no customer application data is ever transferred. No other business information is collected, and the data is managed according to HPE data privacy policy. For more information, see [https://www.hpe.com/us/en/legal/privacy.html](https://www.hpe.com/us/en/legal/privacy.html)

*By selecting yes, if the data collected indicates support or optimization is needed for your appliance, Hewlett Packard Enterprise or a Hewlett Packard Enterprise partner may contact you.*

*Do you need a proxy server for Remote Data Collection?*  
- Yes (Recommended)  
- No
| Proxy server authentication | Select this option if proxy server authentication is required. If selected, specify the proxy server login credentials.  
• Username  
• Password |
| Customer Information |  
• Email Address  
• Phone Number  
• Company Name  
• First Name  
• Last Name  
• Country | Specify your contact details. |
| Advanced | Remote Data Collection Level | Select one of the following options:  
• Passive (Recommended): The appliance automatically sends information to Hewlett Packard Enterprise.  
• No Support (Not recommended): The appliance does not automatically send information to Hewlett Packard Enterprise. |

**NOTE:**
All information collected from the RMC appliance is sent to the Enterprise server ([https://storage-support.glb.itcs.hpe.com](https://storage-support.glb.itcs.hpe.com)).

14. On the Summary screen, review the details.  
   a. Review the details and then click **Start**.
Installation starts and the wizard shows the progress.

b. Click Done.

15. (Optional) On the Diagnostics screen:
a. Click Start Diagnostics.

The wizard performs validation checks specific to services, hardware, Storage Systems, Backup Systems, Catalyst Copy, Element Recovery Technology, and remote appliances. The screen displays the health of deployed RMC. You can diagnose issues related to RMC components, and resolve the issues.

b. Click Next.
After RMC has successfully installed, you are prompted to install a trial version of HPE StoreOnce VSA.

c. (Optional) If you want to install a 60-day trial version of HPE StoreOnce VSA, click **Yes**.

**NOTE:**
- You are prompted to install HPE StoreOnce VSA only if a Backup System is not already configured in step 12.
- After the installation, the HPE StoreOnce VSA is registered with RMC and by default, a backup policy is created.

16. (Required for installing HPE StoreOnce VSA) On the **StoreOnce VSA Deployment screen**, select one of the following options:
• **Basic**: HPE StoreOnce VSA is configured with IP address fetched from DHCP server. If the DHCP server IP address is unavailable, the installation fails. In this case, you can manually configure the network using the command `net set`. Also, the HPE StoreOnce VSA is installed on the same ESXi server and datastore as that of RMC and with same network configuration. By default, the login credentials are Admin\admin for this installation type.

Specify HPE StoreOnce VM name and then click **Next**.

**NOTE:**

VSA installed with basic option will have admin credentials by default.

• **Custom**: HPE StoreOnce VSA can be installed on the same ESXi server as that of RMC or on a different server.

Specify the following details:

- Select an ESXi and datastore.
- Select a CPU and Memory Configuration.
- Specify HPE StoreOnce VM name.
- Select the timezone.
- Set the password for HPE StoreOnce VM.
- Click Next.

**Exit Installation:** Exits HPE StoreOnce VSA installation.

17. (Required for custom installation of HPE StoreOnce VSA) On the **ESXi Server and Datastore Selection** screen, select an ESXi host and datastore and then click **Next**.

18. (Required for custom installation of HPE StoreOnce VSA) On the **Network Interface Settings** screen, specify the details in **Network Interface Settings** and then click **Next**.

**NOTE:**

The default Data and Management interface for VSA is network interface1 eth0. To use the interface eth1, use the HPE StoreOnce VSA command `net set wizard`. Ensure that the installer Host and vCenter server have access to the default Network Interface1 eth0 for deploying and configuring StoreOnce VSA. For more information, see the **HPE StoreOnce VSA deployment and configuration guide**.

19. On the **Summary** screen, review the details and then click **Start**.

Installation starts and wizard shows the progress.

20. Click **Next**.

21. On the **Install/Upgrade Complete Summary** screen, click **Done**.
Upgrading to RMC-V 4.0.0

Table 4: Upgrade scenarios

<table>
<thead>
<tr>
<th>Current version</th>
<th>Upgrade to RMC-V 4.0.0 possible?</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMC-V 1.1.0, 1.2.0, 1.2.1</td>
<td>No</td>
</tr>
<tr>
<td>RMC-V 2.0.0, 2.0.2</td>
<td>Yes. For upgrade procedures see, Upgrading to RMC-V 4.0.0.</td>
</tr>
<tr>
<td>RMV 2.5.0 or later</td>
<td>No</td>
</tr>
<tr>
<td>RMC-V 3.0.0</td>
<td>Yes. Use the installation wizard to upgrade to RMC-V 4.0.0.</td>
</tr>
</tbody>
</table>

If the deployment option selected is HPE RMC integrated with VMware (Install/Upgrade), and if an RMC-V plug-in is already registered, the Install/Upgrade screen displays the following details of the registered RMC-V plug-in:

- RMC Host Name/IP address.
- RMC version.
- Upgrade required.
- Current RMC-V vCenter plug-in version.

If the RMC VM or RMC-V plug-in is not of the latest version, you are prompted to upgrade. After clicking Next, the RMC installation wizard upgrades all components (RMC-V plug-in and RMC Appliance) that require an upgrade. If there are multiple RMCs (multi RMC configuration) configured with the same vCenter, then the installation wizard upgrades all RMCs that require an upgrade.

Procedure

1. Log in to the host where OV4VC is deployed.
2. Go to Start > Control Panel > Uninstall a program.
3. Right-click HP StoreOnce RMCV for VMware and click Uninstall/Change.
4. On the uninstall wizard, click Uninstall to complete the uninstallation.
5. Perform a cleanup of old RMC-V plug-ins on the vCenter server, from the location:
   - C:\ProgramData\VMware\vCenterServer\cfg\vsphere-client\vc-packages
   - For vCenter 5.5 VCSA: /var/lib/vmware/vsphere-client/vc-packages/vsphere-client-serenity/
   - For vCenter 6.0 VCSA and vCenter 6.5 VCSA: /etc/vmware/vsphere-client/vc-packages/vsphere-client-serenity/

   The folders to be removed from the location are: com.hp.rmcv.ngc_6.0 and com.hp.rmcv.ngc.
6. Log out and log in to the vCenter Webclient.

⚠️ CAUTION:

After upgrading to RMC 4.0.0, to register RMC-V appliances, do not use the StoreOnce RMC Credentials page.

Force upgrade

If there are running tasks in RMC-V, you can choose to either force upgrade RMC-V or wait for the tasks to complete. If you choose to force upgrade, the running tasks are aborted and moved to error state and then RMC-V is upgraded. However, after the upgrade, these aborted tasks statuses may be displayed as running.
in web client. It does not affect the upgrade or the RMC-V functionality after upgrade. Therefore you can proceed to force upgrade RMC-V.
Configuring HPE RMC-V

Working with vSphere Web Client

Procedure

1. Specify vCenter login credentials and log in to the VMware vSphere Web Client. The VMware vSphere Web Client home page appears.

   NOTE:
   If you have selected a language other than English during installation of the Operating System, the Recent Tasks displays:
   • The tasks and events generated from the RMC Appliance in English.
   • The tasks and events generated from the vCenter Server in the language that you selected during installation.

2. Click Administration > HPE RMC Management > HPE RMC Configuration.

HPE RMC Configuration tabs

![HPE RMC Configuration tabs](image)

Figure 3: RMC Configuration tabs

- vCenter Server with RMC-V Plug-in
- RMC Appliances
- Storage Systems
- Backup Systems
- vCenter Server
vCenter Server with RMC-V Plug-in

The vCenter Server with RMC-V plug-in drop-down displays all the vCenters that are in linked mode and on which the RMC-V plug-in is registered. The drop-down is disabled for vCenters that are not in linked mode.

RMC Appliances

To register RMC-V appliances, you must use the HPE RMC Configuration tab under the HPE RMC Management tab.

Using the RMC Appliances tab, you can perform the following operations:

- Register local or remote HPE RMC instances
- View details of the RMC appliance
- Edit the registered HPE RMC instance
- Delete the registered HPE RMC instance

Local or remote registration of HPE RMC instances

If RMC-V plug-in is installed using the installation wizard, RMC appliances are registered by default. Registering RMC appliances on this screen is required if you must perform the following actions:

- Add an earlier deployed RMC standalone appliance to the RMC-V plug-in.
- Change RMC Appliance password.

Procedure

1. (Required for remote registration) Enable Show Remote RMC Configuration.
2. Click the icon.
3. Specify the IP/Host Name, User Name, and Password.
4. (Required for remote registration) Select the array to be associated.
5. Click Save.

- The Refresh option is to update the latest appliance information on the page, while the Web Client is open for a long time and if RMC appliance properties have changed. For example, if RMC upgrade was done while the Web Client was open.
- If multiple RMC appliances are registered, the Sync All RMC option can be used to sync the configuration details between multiple RMC appliances. The configuration of the primary RMC is added to all secondary RMCs, but the configuration details of secondary RMCs are not added to the primary RMC.

Viewing RMC appliance details

To view the details of an existing RMC appliance, click the RMC Host Name/IP field hyperlink.

Editing RMC appliance details

Procedure

1. Select the IP/Host Name of the HPE RMC instance that you want to edit.
2. Click the icon.
3. Specify the new password.
4. Click Save.

NOTE: If the registered HPE StoreVirtual node is down, edit the storage IP to a surviving node.
Deleting RMC appliance

Procedure

1. Click the **X** icon.
2. At the prompt, click **Yes**.

Storage Systems

Using the **Storage Systems** tab, you can perform the following operations:

- **Add Storage Systems**
- **Edit Storage Systems**
- **Delete Storage Systems**
- **Refresh Storage System details**

Adding Storage Systems

Procedure

1. Click the **+** icon.
2. Select the storage type.
3. Specify the IP/Host Name, User Name, and Password.
4. Click **Save**.

Editing Storage Systems

Procedure

1. Select the IP/Host Name of the Storage System that you want to edit.
2. Click the **edit** icon.
3. Specify a new password for the existing username or specify a new username and password.

**NOTE:** You cannot modify the login credentials of the Storage Systems but you can only update the modified credentials.

4. Click **Save**.

Deleting Storage Systems

Procedure

1. Click the **X** icon.
2. At the prompt, click **Yes**.

Refreshing Storage Systems details

To refresh the screen displaying the list of Storage Systems, click the **refresh** icon.

Backup Systems

- **Add Backup Systems**
- **Edit Backup Systems**
- **Delete Backup Systems**
- **Refresh Backup System details**
Adding Backup Systems

Procedure

1. Click the + icon.
2. Specify IP/Host Name, User Name, and Password.
3. (If HPE RMC instance and HPE StoreOnce Backup connectivity is remote or over WAN link select the Remote StoreOnce (WAN Enabled)).
4. Click Save.

Editing Backup Systems

Procedure

1. Select the IP/Host Name of the Backup System that you want to edit.
2. Click the icon.
3. Specify a new password for the existing username or specify a new username and password.
   
   **NOTE:** You cannot modify the login credentials of the Backup Systems but you can only update the modified credentials.
4. (If the HPE RMC instance and HPE StoreOnce Backup connectivity is remote or over a WAN link), select the Remote StoreOnce (WAN Enabled).
5. Click Save.

Deleting Backup Systems

Procedure

1. Click the - icon.
2. At the prompt, click Yes.

Refreshing Backup System details

To refresh the screen displaying the list of Backup Systems, click the icon.

vCenter Server

The vCenter server is registered during RMC-V installation. You can use the Add, Remove, and Modify options only when there is a change in the vCenter host (FQDN), IP, username, or password. Removing an existing vCenter Server results in all RMC-V operations failing, therefore ensure the vCenter is always available with accurate credentials. You cannot have more than one vCenter Server registered.

Using the vCenter Server tab, you can perform the following operations:

Procedure

1. Register a vCenter Server
   a. Click the + icon.
   b. Specify IP/Host Name, User Name, and Password.
   c. Click Save.
2. Edit the registered vCenter Server
   a. Select the IP/Host Name of the vCenter server that you want to edit.
   b. Click the icon.
   c. Specify the new username and password.
   d. Click Save.
3. Delete the registered vCenter Server
   a. Click the icon.
   b. Click Yes.
4. Refresh the screen displaying the list of vCenter Servers
   a. Click the 🍃

Unregistering RMC-V plug-in

To unregister the plug-in, click the Unregister RMC-V plug-in button.

To unregister (from same GUI) other vCenters that are in linked mode, select vCenter in vCenter Server with RMC-V Plug-in.

Registering remote appliance

Enable Show Remote RMC Configuration to register remote appliance. For more information, see Local or remote registration of HPE RMC instances.
Working with Recovery Sets Snapshots

Recovery Set Snapshot is a snapshots collection of one or more virtual volumes that reside on the HPE 3PAR StoreServ or HPE StoreVirtual storage system, that is used to form a VMware datastore or VM. These snapshots are also called Virtual Copies in the HPE 3PAR StoreServ and HPE StoreVirtual systems. A Recovery Set Snapshot contains application-specific metadata and is registered as a custom object in Web Client that allows relationship building between the different VMware objects.

RMC-V supports Recovery Set Snapshot creation at both VM and datastore levels. Before creating Recovery Sets Snapshots, ensure that the following conditions are met:

- Creating a Recovery Set Snapshot at the VM level requires sufficient free space on the datastore where the VMDK file resides.
- Datastore creation from NFS drives is not supported for Recovery Set Snapshot operations.
- RMC-V supports only one virtual volume per datastore.
- VMware Tools is required in a VM to guarantee consistent and usable snapshots. VMware Tools must be installed on the guest VM when application consistency is required.
- The datastore and VMs must be in accessible state. RMC-V operations cannot be performed on a VM when the VM or its datastore is in inaccessible state.

**NOTE:**

- RMC-V does not support Recovery Set Snapshot operations on VVOL datastore.
- If you add or remove volumes in the VM configuration of associated datastores, the snapshots backups created are full backups. However, subsequent backups switch back to auto backups.

Prerequisites for working with Recovery Set Snapshots

- Both source and target storage systems for HPE 3PAR StoreServ, and source storage system for HPE StoreVirtual must be registered. However, while working on local Recovery Sets Snapshots, registering target storage systems is not required.
- The datastore and VMs must be in accessible state. RMC-V operations cannot be performed on a VM when the VM or its datastore is in inaccessible state.

Creating default Recovery Set Snapshot policy

If you are using multiple RMC instances, you must first create a default Recovery Snapshot Set Policy and then proceed to creating a snapshot.

Procedure

1. Navigate to the vSphere Web Client home page.
2. Select the VM or datastore for which you want to create Recovery Sets Snapshots.
3. Click **Actions > All HPE Recovery Manager Central Actions > Set Recovery Set Creation Policy**, and then click **Snapshot**.

The Default Snapshot Policy Settings screen appears.
4. Specify the following details:
Table 5: Recovery Set Snapshot policy details

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Select RMC Host Name</strong></td>
<td>In the case of multi RMC, select an RMC instance for which you want to set a policy. The first RMC instance that was registered on the vCenter Server is displayed by default.</td>
</tr>
<tr>
<td><strong>Numeric</strong></td>
<td>Specify the maximum number of Recovery Sets Snapshots. The maximum number of Recovery Sets Snapshots that you can create is 500. The maximum number of snapshots supported is 30 for a VVOL numeric policy and 32 for HPE StoreVirtual. Based on the order in which the Recovery Sets Snapshots are created, the nonexpirable Recovery Sets Snapshots are deleted when they reach a position in the queue that exceeds the set count.</td>
</tr>
</tbody>
</table>
Expiration/Retention

To remove the Recovery Sets Snapshots according to a specified schedule, select **Expiration/Retention**. Maximum count does not affect the removal of Recovery Sets Snapshots.

- If you select **Enable expirable Recovery Sets**, then in **Expire after** you must specify the time duration in hours or days from the current time that the Recovery Sets Snapshots expires. The maximum expiry period that you can specify for Recovery Set Snapshot expiry is 43,800 hours or 1,825 days.

If the expiration time you specify is less than that of the next Express Protect backup, the previous snapshot is deleted due to expiry. In this case, RMC cannot perform incremental backups.

Expirable Recovery Sets Snapshots are not included in the maximum count. If you enable expirable Recovery Sets Snapshots, you must specify how the existing nonexpirable copies are handled.

  - **Keep non-expirable Recovery Sets** This option is default.
  - **Phase out non-expirable Recovery Sets (Advanced)** Select this option if you want to create expirable Recovery Sets Snapshots to phase out the older nonexpirable Recovery Sets Snapshots. Therefore, whenever a new expirable Recovery Set Snapshot is created, the oldest nonexpirable Recovery Set Snapshot is deleted.

- If you select **Retain Recovery Set**, then specify **Retention period** and you must specify the time duration in hours or days. The maximum retention period for Recovery Sets Snapshots is 43,800 hours or 1,825 days.

  Setting the retention policy requires the HPE 3PAR Virtual Lock license on the HPE 3PAR StoreServ storage system. RMC-V checks for an existing HPE 3PAR Virtual Lock license on the Storage System when a Recovery Set Snapshot is created with retention specified.

  The expiry value must be equal to or greater than the retention value, when using both the expiry and retention options.

**NOTE:**

The **Expiration/Retention** option is not available for VVOL VMs and HPE StoreVirtual VMs. Therefore, you can create only numeric policies for VVOI VMs and HPE StoreVirtual VMs.

---

**Table Continued**
### Create Recovery Set Snapshot with VSS-aware application consistency

This option is used to create Recovery Sets Snapshots that adhere to data format standards used by the VMware tools. You can also select this option if you are using pre or post freeze scripts with other operating systems that have vmware tools installed on the guest VM (LINUX).

The following options are available only for datastore level Recovery Set Snapshots.

- **Apply to all Virtual Machines**: Creates application-consistent Snapshots for all the VMs on the datastore.
- **Apply to following Virtual Machines**: Select the VMs for which you want to create application-consistent Snapshots.

**NOTE:**

- After installing or upgrading **VMware Tools**, you must reboot the corresponding VM. If you do not reboot, the application consistent snapshots are taken as crash consistent and are reported as successful. The same behavior can be seen if the **VMware Tools** is not upgraded on the VM, after an upgrade of the ESXi server.
- If you add a VM to a datastore, update the policy to ensure VM application consistency.

### Enable Email Notification

Select to enable email notifications. For more information, see [Creating Email Notification Policies](#).

5. Click **Save**.

The **Default Recovery Set Policy Settings** dialog box appears. This dialog box appears only in a multi-RMC scenario.

6. To save the default policy, click **Yes**.

**IMPORTANT:**

When you change the affinity from one RMC instance to the other, an advisory message is displayed indicating that all schedules from the earlier RMC instance for that VM or datastore to be deleted.

7. Click **OK**.

**NOTE:**

- After selecting a different RMC instance, it must have a new default policy created. The system does not consider the old snapshots that are created through the first RMC instance.

However, snapshots or Express Protects of both the first and the second RMC instance are displayed.
- Before you decrease the numeric policy or the expiration time from the Snapshot policy, ensure that you remove the Snapshot schedule.
- You can perform the same procedure to create Recovery Set Snapshot policies on datastores.

### Editing Recovery Set Snapshot policies

The Recovery Set Snapshot policies can be defined for a given VM or datastore. This section describes how to modify policies for Recovery Sets Snapshots.
Procedure

1. Navigate to the vSphere Web Client home page.
2. Select the VM or datastore for which you want to edit the policy.
3. Click **Actions > All HPE Recovery Manager Central Actions > Set Recovery Set Creation Policy**, and then click **Snapshot**.
4. (Optional) To change the selected RMC instance, navigate to the **Default Snapshot Policy Settings** and select the required RMC instance.
5. Edit the required fields.
6. Click **Save**.

The **Default Recovery Set Policy Settings** dialog box appears. This dialog box appears only in a multi-RMC scenario.
7. To save the default policy, click **Yes**.
8. Click **OK**.

Creating Recovery SetsSnapshots

To create a Recovery Set Snapshot on an HPE 3PAR StoreServ base volume, the volume must have snapshot space allocated during its creation. The same applies for HPE StoreVirtual volumes.

RMC-V requires VMFS snapshots. However, taking a VMFS snapshot of a VM participating in disk sharing, such as Microsoft MSCS, is not a supported VMFS limitation.

Procedure

1. Navigate to the vSphere Web Client home page.
2. Select the VM or datastore for which you want to create a Recovery Set Snapshot.
3. Right-click the VM or datastore and then click **All HPE Recovery Manager Central Actions > Create Recovery Set > Snapshot**.

The **Create Recovery Set** page appears.
NOTE:
The **Expiration/Retention** option is not available for VVOI VMs and HPE StoreVirtual VMs.

4. In the *Create Recovery Sets* page, specify the following details:

**Table 6: Create Recovery Set Snapshot**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMC Host Instance</td>
<td>The RMC instance that you selected in the policy is displayed. You cannot edit this field.</td>
</tr>
<tr>
<td>Recovery Set name</td>
<td>It is optional to specify a name for the Recovery Set Snapshot. If you do not specify a name for the Recovery Set Snapshot, then the time stamp identifies the set name. The Recovery Set Snapshot name preferably must not exceed 32 characters.</td>
</tr>
<tr>
<td><em>(Not required for numeric policy)</em> Enable expirable Recovery Sets</td>
<td>To set the snapshot expiration.</td>
</tr>
<tr>
<td><em>(Not required for numeric policy)</em> Retain Recovery Sets</td>
<td>To set the snapshot retention period.</td>
</tr>
<tr>
<td>Create Recovery Sets with VSS-aware application consistency</td>
<td>To create VSS-aware application consistent snapshots.</td>
</tr>
<tr>
<td><em>(Required only while creating datastore level snapshot)</em> Continue with creation even when VMs fail to transit to the application consistent state.</td>
<td>Enable to create Recovery Sets Snapshots if known I/O errors exist.</td>
</tr>
</tbody>
</table>

5. Click *Create*.

NOTE:
- Information regarding the Recovery Set Snapshot creation process is displayed in the **Recent Tasks** pane.
- After creating the Recovery Set Snapshot, an entry appears in the **Recovery Sets** tab under the **Related Objects** tab.

### Viewing Recovery Set Snapshot details

**Procedure**

1. Navigate to the vSphere Web Client home page.
2. Select a VM.
3. Click the **Related Objects** tab and then click **Recovery Sets**.
4. Go to **Manage** tab.
5. To view the details, double-click a Recovery Set Snapshot and click the **Manage** tab.

The Recovery Set Snapshot details are displayed. The page also displays virtual disk details. To view Recovery Set Snapshot event logs, go to **Hosts and Cluster > Monitor > Events**.
NOTE:

• If the status of a Recovery Set Snapshot is mismatched, the Recovery Set Snapshot is created on a different Storage System instead of its current connected system. The HPE 3PAR Peer Motion operation might have caused the mismatch. The delete operation is allowed to remove the record. Manually remove the actual Recovery Set Snapshot from the originating Storage System.
• To view the Recovery Set Snapshot information on a datastore, perform a similar procedure.
• The Recovery Set Snapshot time stamp displayed is converted to the local time zone of the RMC Appliance. The Expiry and Retention values on the same display are set to the time zone of the RMC Appliance.
• If the virtual volumes that are used are in a Peer Persistent configuration, the local Recovery Set Snapshot creation is disabled.
• Do not delete snapshots from a snapshot set using HPE 3PAR Management Console. If you delete a snapshot, the snapshot is displayed in the Manage tab of the vSphere Web Client. However, you cannot perform any RMC-V tasks on such snapshots. You can only delete this snapshot.

Mounting Recovery Sets Snapshots

The mount option mounts the Recovery Set Snapshot to a proxy host or to a host as a datastore.

Procedure

1. Navigate to the vSphere Web Client home page.
2. Click VMs and Templates.
3. Select a VM.
4. Click the Related Objects tab and click Recovery Sets in the left navigation pane.
   The system displays all Recovery Sets Snapshots in the Recovery Sets tab.
5. Double-click a Recovery Set Snapshot to view the Manage tab.
6. From the Recovery Sets Snapshots list, select the Recovery Set Snapshot and then click Mount/Unmount.
7. On the Mount Virtual Copy screen, do the following:
   • Mount on ESX host as Datastore: Select from a list of ESXi hosts managed by the vCenter Server.
   • Mount on Proxy Host: Select from a list of hosts the vCenter Server does not manage, but which have access to the HPE 3PAR StoreServ or HPE StoreVirtual Storage System.
8. Click Mount.
   The Mount Local Recovery Set — Confirm dialog box appears.
9. To mount the Recovery Set Snapshot, click Yes.

After the Recovery Set Snapshot is successfully mounted, the status of the Recovery Set Snapshots is displayed as Mounted. The system also displays appropriate values in the following columns:

• Exported Host
• LUN ID
• Snapshot datastore

NOTE:

To mount Recovery Sets Snapshots of a datastore, you can perform a similar procedure.

For the mount operation to succeed:

• FC HBA WWNs or iSCSI Initiator must be enabled and online in the ESXi server.
• The host entry containing these WWNs or IQNs must be created on the storage system.
• Mount, unmount, attach, and detach tasks are not supported on VVOLs.
Unmounting Recovery Sets Snapshots

**NOTE:** RMC-V does not verify that the volume you unmount is active or inactive. Therefore, ensure the volume to unmount is inactive.

To unmount an already mounted Recovery Set Snapshot, perform step 1 to step 6 in [Mounting Recovery Sets](#).

### Attaching and copying virtual machine disks

You can attach a Recovery Set Snapshot to a VM only if the Recovery Set Snapshot is already mounted. The attach option attached VMDK to a VM.

**Procedure**

1. Navigate to the vSphere Web Client home page.
2. Click **VMs and Templates**.
3. Select a VM from the left pane and then click Recovery Sets Snapshots on the right pane.
4. Double-click a Recovery Set Snapshot to view the **Manage** tab.
   - The system displays Recovery Sets Snapshots in the Recovery Sets Snapshots tab under **Related Objects**.
5. Select a Recovery Set Snapshot.
6. Select a virtual disk and then click **Copy/Attach/Detach**.
7. On the **Copy/Attach** screen, do the following:
   - **Copy to Datastore**: To copy the associated VMDK of the Recovery Set Snapshot, select the datastore.
   - **Attach to Virtual Machine**: To attach the selected Recovery Set Snapshot, select the VM.

**a.** To copy the VMDK file to a datastore:
   1. Select **Copy to datastore**.
   2. The associated datastore of mounted ESXi is displayed.
   3. Select an appropriate target datastore with required space available, to which you want to copy the Recovery Set Snapshot.
   4. To overwrite the VMDK file, select **Overwrite existing Virtual Disk**.
   5. Click **Copy**.
   6. Click **Yes** when you are prompted for confirmation.
   7. The VMDK of the virtual machine is successfully copied to the datastore.

**NOTE:**
After performing copy VMDK operation once on the mounted snapshot containing VMFS snapshots associated with it, if you attempt to perform copy or attach VMDK once again in the same mounted state then it fails with the error *File xxxx.vmdk was not found.* Unmount and remount the snapshot for performing copy or attach VMDK operation for the second time.

**b.** To attach the Recovery Set Snapshot to a VM:
   1. Select **Attach to Virtual Machine**.
   2. All VMs associated with the mounted ESXi host are displayed.
   3. Select an appropriate VM to which you want to attach the VMDK.
   4. To attach the VMDK, click **Attach**.
V. Click Yes when you are prompted for confirmation.
VI. The Recovery Set Snapshot is successfully attached to the VM.

NOTE:
The same steps apply to attaching VMDKs at datastore level.

Detaching virtual machine disks
You can detach a Recovery Set Snapshot that is attached to a VM. Perform step1 to step 6 in Attaching virtual machine disks.

NOTE:
The same steps apply to detaching VMDKs at datastore level.

Restoring Recovery Set Snapshots
Normal restore scenarios involve restoring VMDKs. In a VMFS datastore, there can be many virtual disks. Typically, you can identify the virtual disk to be restored and copy it over the old virtual disk. However, in some cases, the virtual machine file system gets corrupted after all virtual disks are replaced.

If the datastore Recovery Set Snapshot that you are restoring has no virtual machines, the datastore loses all its associations with the older Recovery Sets Snapshots and job schedules.

NOTE:
The 3PAR Operating System Software supports a nondisruptive virtual volume conversion from a fully provisioned virtual volume to thinly provisioned virtual volume or from a thinly provisioned virtual volume to a fully provisioned virtual volume. RMC-V limits the restoration of a Recovery Set Snapshot taken before a virtual volume conversion. If the action occurs, the following error message is displayed:

Performing any RMC-V Recovery Set Snapshot operations such as creating or deleting must only occur after a Virtual Volume conversion is completed.

Procedure
1. Click Storage > Related Objects.

NOTE:
Ensure that you are in the datastore view because you can restore parent volume only to datastore Recovery Sets Snapshots.

2. Select the Recovery Set Snapshot to restore from the Recovery Sets Snapshots.
3. Right-click the Recovery Set Snapshot and click Restore.
   The Restore datastore to Recovery Set dialog box appears.
4. Click Yes.

The Recovery Set Snapshot restore task is submitted and a message appears indicating that the request is in process.
Restoring VVOL Virtual Machines

NOTE:
If the datastore that you are restoring has no virtual machines, the datastore loses all its associations with the older Recovery Sets Snapshots and job schedules.

Procedure

1. Navigate to the vSphere Web Client home page and click **VMs and Templates**.
2. Click the VVOL VM to restore.
3. Power off all the VMs in the datastore.
4. Click **Related Objects** and then click **Recovery Sets**.
   All Recovery Sets Snapshots related to the VVOL VM are displayed.
5. Right-click a Recovery Set Snapshot and click **Restore**.
   The **Restore Virtual Machine to Recovery Set** window appears.
6. At the prompt, click **Yes**.

Deleting Recovery Sets Snapshots

Prerequisites

Ensure the following:

- The Recovery Set Snapshot that you want to delete is not mounted or attached.
- Mount or backup operation is not in progress.

Procedure

1. Navigate to the vSphere Web Client home page.
2. Click **Hosts and Clusters**.
3. Select a VM and click **Recovery Sets** in the left navigation pane. The system displays all the available Recovery Sets Snapshots in the **Recovery Sets** tab under the **Related Objects** tab.
4. Select the Recovery Set Snapshot to delete from the list of Recovery Sets Snapshots.
5. Click **Actions > Delete**.
6. Click **Yes**.

NOTE:

- If a Recovery Set Snapshot is also a smartclone point, you must first delete all Recovery Sets Snapshots except for the Recovery Set Snapshot the smartclone is dependent on.
- To delete Recovery Sets Snapshots on a datastore, perform the same procedure: **Deleting Recovery Sets**.

Scheduling Recovery Sets Snapshots

You can do the following operations on schedules:

- **View**
- **Add**
- **Edit**
- **Delete**
- **Refresh**
- **Close**
Viewing a schedule list for Recovery Sets Snapshots

Procedure

1. Navigate to the vSphere Web Client home page.
2. Click Hosts and Clusters.
3. Click Virtual Machine.
4. Select a virtual machine.
5. Click Actions > All HPE Recovery Manager Central Actions > Schedule Recovery Set Creation.

The Schedule List window appears.

![Schedule List Window](image)

This window lists the RMC Instance, time zone of the RMC Instance and all tasks that are currently scheduled for VM or datastore. From the Scheduled List window, you can add a schedule, modify an existing schedule, or delete an existing schedule.

6. To close the Schedule List, click Close.

**NOTE:**

The Schedule List window lists the schedules only for the selected VM or datastore.

You can automatically create Recovery Sets Snapshots according to a specified schedule.

Creating schedules for Recovery Set Snapshot

Procedure

1. Navigate to Schedule List.

**NOTE:** For information on navigating to the Schedule List, see Viewing the schedule list.

2. To create Recovery Sets Snapshots according to a specified schedule, Click Add.

   The Welcome screen of the Create Schedule Task Wizard window appears.

3. Click Next.
The **Recovery Set Type** window appears with the following options:

**Snapshot**

Schedule creation of a snapshot for a virtual machine or datastore.

**Express Protect**

Schedule Express Protect of a snapshot for a virtual machine or datastore.

4. Click **Next**.

The **Schedule** window appears.

5. In the Schedule window:
   a. Based on the VM name and time stamp, task name is populated in **Schedule task name**. You can edit this field.
   b. Select the task frequency from **Perform Recovery Set creation task**.

More options are displayed when you select a frequency from Perform Recovery Set Snapshot creation task. The following table lists the frequency details:

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Frequency details</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>By minutes</td>
<td>Start time</td>
<td>You can specify the schedule start time in hours and minutes. Hewlett Packard Enterprise recommends that you maintain a minimum of 30 minutes between two snapshot schedules.</td>
</tr>
<tr>
<td></td>
<td>Recur Every</td>
<td>Specify the frequency of the scheduled task.</td>
</tr>
<tr>
<td>Daily</td>
<td>Start time</td>
<td>You can specify the schedule start time in hours and minutes. Also, select AM or PM.</td>
</tr>
<tr>
<td></td>
<td>Recur Every</td>
<td>Specify the frequency of the scheduled task.</td>
</tr>
<tr>
<td>Hourly</td>
<td>Start time</td>
<td>You can specify the schedule start time in hours and minutes. Also, select AM or PM.</td>
</tr>
<tr>
<td></td>
<td>Recur Every</td>
<td>Specify the frequency of the scheduled task.</td>
</tr>
<tr>
<td>Monthly</td>
<td>Start time</td>
<td>You can specify the schedule start time in hours and minutes. Also, select AM or PM.</td>
</tr>
<tr>
<td></td>
<td>Day</td>
<td>To start the scheduled task, specify the day of every month.</td>
</tr>
<tr>
<td>One time only</td>
<td>Start date</td>
<td>Select the date on which you want to schedule the Snapshot.</td>
</tr>
<tr>
<td></td>
<td>Start time</td>
<td>You can specify the schedule start time in hours and minutes. Also, select AM or PM.</td>
</tr>
</tbody>
</table>

*Table Continued*
### Editing schedules

**Procedure**

1. Navigate to the **Schedule List**.
   
   For information on navigating to the **Schedule List**, see [Viewing a schedule list for Recovery Sets](#).

2. Select the schedule and click **Edit**. The **Edit Schedule Task Wizard** appears.

3. Click **Next** until you reach the **Schedule** and **Snapshot Configuration** pages of the **Edit Schedule Task Wizard**.

4. Make appropriate changes to the schedule.
   
   For information on setting the schedule parameters, see [Scheduling Recovery Sets](#).

5. Click **Next**. The **Schedule Task Summary** window appears.

6. Verify that the details listed in **Schedule Task Summary** are correct.

7. To complete the task schedule, click **Finish**.

---

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Frequency details</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekly</td>
<td>Start time</td>
<td>You can specify the schedule start time in hours and minutes. Also, select AM or PM.</td>
</tr>
<tr>
<td></td>
<td>Select days of a week.</td>
<td>All seven days of a week are displayed. You can select one or more days to schedule the weekly Snapshot/Express Protect.</td>
</tr>
</tbody>
</table>

6. Click **Next**.

   The **Snapshot Configuration** window appears.

7. (Required for configuring scheduler) In the **Snapshot Configuration** window, do the following:
   
   a. Select **Create Recovery Set with VSS-aware application consistency**.
   
   b. Select one of the following options:
      
      • To apply the schedule to all VMs, select **Apply to all Virtual Machines** on the datastore that you selected to schedule.
      
      • To apply the schedule task to specific VMs, select **Apply to following Virtual Machines**, and then select the required Virtual Machines.

   **NOTE:** **Overwrite default policy setting** is disabled for numeric policies. For Expiration/Retention policies, this option is enabled. You can modify the values for **Set Recovery Set to expire after** and **Retain Recovery Set** of the default policy.

8. Click **Next**.

   The **Schedule Task Summary** window appears.

9. Verify that the details listed in **Schedule Task Summary** are correct.

10. Click **Finish**.

    The **Schedule Modification** window appears.

11. Click **Yes**.

    **NOTE:**

    If objects (VMs, Datastores, or RCgroups) are deleted or modified after schedule creation, you must update the corresponding schedule to reflect the change. To troubleshoot, see [Failed to create array snapshot](#).
The **Schedule Modification** window appears.
8. To confirm changes made to the schedule, click **Yes**.

### Removing schedules

**Procedure**
1. Navigate to the **Schedule List**.
   For information on navigating to the **Schedule List**, see [Viewing the schedule list](#).
2. Select schedule and then click **Delete**.
3. Click **Yes**.

### Creating Email Notification Policies

Email notifications can be enabled when creating Snapshot, Express Protect, or Catalyst Copy policies. You can receive notifications either to your mailbox or to another mail ID of your choice, when create, delete, or restore operation is performed. Also, you can choose to receive notifications either only for error, or generic information, or both.

**NOTE:**
You cannot edit or delete an existing notification policy.

To navigate to the **Create Email Notification Policy** page:

**Procedure**
1. Right-click a VM and select **Set Recovery Set Creation Policy**.
2. Click either on a **Snapshot** or an **Express Protect**.
3. The **Default Snapshot Policy Setting** or **Default Express Protect/Catalyst Copy Policy Setting** window appears.
4. Click the **Create Email Notification** button.
5. In the **Create New Email Notification Policy** screen, specify the following details:

<table>
<thead>
<tr>
<th>Field name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Email Policy Name</td>
<td>Specify a name for the Email notification policy. This field is a unique value.</td>
</tr>
<tr>
<td>Mail Server</td>
<td>Server that is used to send/receive mails.</td>
</tr>
<tr>
<td>Mail Port</td>
<td>Port that is configured for the mail server.</td>
</tr>
<tr>
<td>Sender Email Address</td>
<td>Email address of the user.</td>
</tr>
<tr>
<td>Field name</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Password</td>
<td>Password for email notification. Applicable only if you select SSL.</td>
</tr>
<tr>
<td>Enable SSL</td>
<td>Enable to authenticate password. Emails are SSL/TLS encrypted.</td>
</tr>
<tr>
<td>Timeout</td>
<td>By default, the <strong>Timeout</strong> duration is set to 60 seconds. You can increase the timeout duration on a need basis.</td>
</tr>
<tr>
<td>Receiver Email Address</td>
<td>Specify the recipient email address, multiple email addresses are separated by a comma.</td>
</tr>
</tbody>
</table>
| Select All Operations | Enable to receive notifications for Create, Delete, and Restore operations on Snapshot and Express Protect/ Catalyst Copy. Select **Info** or **Error** or both for the following:  
  • Snapshot  
  • Express Protect / Catalyst Copy |

6. To test the configuration, click **Test Email Configuration**.
   
   Wait for an email from the mail server about connectivity.

7. At confirmation prompt, click **OK**.

8. Click **Create**.

9. Click **Confirm**.
Working with Remote Recovery Sets configurations

HPE 3PAR Remote Copy Software provides RMC-V the capability to copy virtual volumes from protected site
to recovery site. The Remote Recovery Configuration feature allows you to create and manage Synchronous,
Periodic, or Synchronous Long-Distance Remote Recovery Sets at HPE 3PAR Remote Copy group level.

RMC-V supports the following replication modes for Remote Copy groups:

- Synchronous
- Asynchronous Periodic
- Asynchronous Streaming
- Synchronous Long Distance

If there is disaster or failure of a storage system, HPE 3PAR Remote Copy solution replicates data from one
site (or storage system) to another site (or storage system) for protecting data. RMC helps you to either
recover data or restore data at either site.

RMC-V supports HPE 3PAR Peer Persistence. When virtual volumes use Peer Persistence, it allows creation
of remote Virtual Copies on Remote Recovery Configurations. Therefore, when an active path fails over to a
different Storage system, the virtual copies become available on either of the Storage Systems for restoration.
For more information on establishing a Peer Persistent setup, see the HPE 3PAR Remote Copy User Guide.

NOTE:
- RMC Remote Copy Configuration supports only 1:1 configurations. The 1:N and N:1 configurations
  are not supported.
- VVOL is not supported for Remote Recovery Sets.
- The Remote Recovery Configurations node that displays the Remote Recovery Sets is removed
  from Home > HPE Infrastructure.

Remote Copy groups

Remote Recovery Configuration is a collection of replication groups that contain virtual volumes that are
exposed to the ESXi hosts managed in a vCenter Server. These replication groups are called Remote Copy
Groups in the HPE 3PAR StoreServ storage systems. HPE 3PAR Remote Copy feature provides Enterprise
and cloud data centers with autonomic replication and disaster recovery technology. It allows protection and
sharing of data between multiple arrays within the same or different geographical locations.

Assume that a Remote Copy Group is set up for the virtual volumes used by the ESXi hosts. In this case,
RMC-V allows you to take advantage of the Remote Copy Group by taking snapshots on local, remote, or
both storage systems using Remote Copy group as an entity for operation.

After a Recovery Set is created, you can mount individual virtual copy to a specific ESXi host that resides on
the local storage system. You can then attach the mounted volume to a selected Virtual Machine as additional
disk for a file-level restore.

NOTE: RMC-V does not support using volumes from a Remote Copy group as a VMDK to another VM,
that is part of the same Remote Copy group.

When you double-click a Remote Copy Group from the list, details pertaining to the selected object are
available on the following tabs:
• **Getting Started**: Displays information about Remote Copy group.
• **Summary**: Displays properties of the Remote Copy group.
• **Related Objects**: Displays objects that are related to the Remote Copy group.

Remote Recovery Configurations tab

Remote Recovery Configuration tab is available under **Related Objects** for Virtual Machines and datastores.

The following tabs are displayed when you double-click the **Remote Copy Group**:

- Recovery Sets on Source StoreServ
- Recovery Sets on Target StoreServ
- Virtual Volumes
- Datastore
- Virtual Machine

**Prerequisites to configure Remote Copy Group**

- One of the virtual volumes in the Remote Copy group must be exported to ESXi host.
- Ensure that the names of all virtual volumes in a synchronous Remote Copy group do not exceed 20 characters.
- The Remote Copy group must be in **Started** state and all virtual volumes must be in **Synced** state.

For information on creating Remote Copy groups, see the *HPE 3PAR Remote Copy Software User Guide*.

- All Virtual Machines involved in the operation must contain virtual volumes from same Remote Copy groups.
- If you need application consistent Snapshots, install **VMware Tools**.
- Ensure connectivity between all nodes in the Remote Copy environment.
- For Peer Persistence groups, both source and target volumes must be exported to same ESXi host.
Remote Copy Configuration & Deployment of RMC-V

Registering Remote Appliance at respective sites

Remote Recovery Operations

Figure 4: Deployment workflow for Remote Recovery Set configuration

The table Workflow — Remote Recovery Set Configuration lists the tasks that you must perform to configure and use the Remote Recovery Sets feature.

Table 7: Workflow — Remote Recovery Set Configuration

<table>
<thead>
<tr>
<th>Step no.</th>
<th>Action</th>
<th>Extra notes and references</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Install a vCenter Server (for example, vCenter1).</td>
<td>If a vCenter Server is already installed, you can ignore this step. Ensure that you have an ESXi Host that the vCenter Server manages.</td>
</tr>
<tr>
<td>1a</td>
<td>Install secondary vCenter Server (for example, vCenter2).</td>
<td>It is optional to have a secondary vCenter Server. During disasters, secondary vCenter Server can be used for disaster recovery solutions. RMC Remote Copy Configurations Topologies.</td>
</tr>
<tr>
<td>Step no.</td>
<td>Action</td>
<td>Extra notes and references</td>
</tr>
<tr>
<td>---------</td>
<td>--------</td>
<td>----------------------------</td>
</tr>
</tbody>
</table>
| 2       | Log in to the Web Client and perform the following tasks:  
• Deploy an RMC Appliance.  
• Register the Remote RMC Appliance.  
You can also register a local RMC as remote. | For information on logging in and performing various tasks using the Web Client, see Working with vSphere Web Client.  
For information on installing RMC instances, see Installing HPE RMC-V.  
For information on Registering Remote RMC Appliances, see RMC Appliances. |
| 3       | Create Remote Copy Groups on HPE 3PAR StoreServ Storage system, if the groups are not already created. | You can configure the Remote Copy Configuration in the following ways:  
• Synchronous  
• Asynchronous Periodic  
• Asynchronous Streaming  
• Synchronous Long Distance  
For information on setting up a Remote Copy Configuration, see the 3PAR Remote Copy Software User Guide.  
For information on the Remote Copy Configurations supported by RMC-V, see RMC Remote Copy Configurations Topologies. |
| 4       | Present the virtual volumes from the Primary StoreServ to the ESXi Host and create datastore with the presented volumes.  
• The virtual volumes appear in the Remote Copy Group only after presenting to the ESXi server and creating a datastore of the source LUN.  
• For the RC Groups to appear:  
  ◦ Update Recovery Manager Cache  
  ◦ Refresh the vCenter.  
• For information on presenting the virtual volumes, see the HPE 3PAR Management Console User Guide.  
• If a secondary vCenter Server is configured, you must export volumes from the secondary HPE 3PAR StoreServ to the secondary ESXi host. | |
| 5       | Click Remote Recovery Configurations tab. | To verify that all Remote Copy groups are displayed. |
| 6       | Remote Recovery Set tasks | |
| 6.1     | Creating Policies | For more information, see Creating policies. |
| 6.2     | Creating Remote Recovery Sets | For more information, see Creating Remote Recovery Sets. |

Table Continued
<table>
<thead>
<tr>
<th>Step no.</th>
<th>Action</th>
<th>Extra notes and references</th>
</tr>
</thead>
</table>
| 6.3     | Managing schedules for Remote Recovery Sets  
  • Add new schedules  
  • Edit schedules  
  • Delete schedules | For more information, see Managing Remote Recovery Sets schedules. |
| 6.4     | Managing Remote Recovery Sets  
  • Mounting Remote Recovery Sets  
  • Unmounting Remote Recovery Sets  
  • Attaching Remote Recovery Sets  
  • Detaching Remote Recovery Sets | For more information, see Managing Remote Recovery Sets. |
| 6.5     | Deleting Remote Recovery Sets | For more information, see Deleting Remote Recovery Sets. |

**RMC Remote Copy Configurations Topologies**

**Remote Copy Configuration—Single-site RMC Appliance**

Figure illustrates configuring Remote Copy with a single-site RMC Appliance.

![Diagram](image)

**Figure 5: Remote Copy Configuration—Single-site RMC Appliance**

For a Remote Copy configuration with a single RMC appliance and a single vCenter Server, the same RMC appliance must be registered for both primary and remote arrays. For example, RMC1 must be registered for Primary StoreServ and Secondary StoreServ.

For information on installing RMC Appliances, see Installing HPE RMC-V.
To configure RMC Appliances for Remote Copy Configuration—Single-site RMC Appliance, see RMC Appliances.

Remote Copy Configuration—Multisite RMC Appliances

![Diagram of Remote Copy Configuration—Multisite RMC Appliances](image)

Figure 6: Remote Copy Configuration—Multisite RMC Appliances

You can configure two different RMC instances with different vCenter Servers at the local and remote locations. For example, RMC1 is registered with vCenter Server1; and RMC2 is registered with vCenter Server2.

**NOTE:**
- You can register RMC instances to a vCenter from the RMC Credentials tab.
- For information on deploying RMC Appliances, see Installing HPE RMC-V.
- To configure RMC Appliances for Remote Copy configurations—Single-site RMC Appliance, see RMC Appliances.

In figure, RMC2 is remote with associated arrays of primary and secondary systems. In figure, RMC1 is remote with associated arrays of primary and secondary systems.

From the HPE RMC Configuration tab, you can register RMC Appliances for the respective HPE 3PAR StoreServ storage systems in each vCenter server.

For example, you can register RMC2 for Secondary StoreServ in vCenter server1.
Remote Copy Configuration—Multisite RMC Appliances

Figure 7: Remote Copy Configuration—Multisite RMC Appliances
RMC1 for Primary StoreServ and RMC2 for Secondary StoreServ in vCenter Server1 (RMC Configurations).

Remote Copy Configuration—Synchronous Long Distance
Remote Copy Configuration—Synchronous Long-Distance setup can be configured in one of the following ways:
- Single RMC Appliance for both Secondary Sites
- Separate RMC Appliances for each Secondary StoreServ device

Figure illustrates configuring Remote Copy in Synchronous Long Distance (SLD).
Figure 8: Remote Copy Configuration—Synchronous Long Distance

For SLD configurations, you can configure three RMC Appliances and three vCenter Servers.

SLD configuration with a Single RMC Appliance
• Single vCenter Server (vCenter1) that has RMC1 as the appliance.
• On the primary site (vCenter1), you must set the target array2 and array3 to RMC1, where array2 and array3 are secondary systems.

SLD configuration with two RMC Appliances
• vCenter1 and vCenter2: RMC1 and RMC2.
• On the primary site (vCenter1), you must set the target array2 and array3 to RMC2.
  • On the secondary site (vCenter2), you must set the target array1 to RMC1 and array3 to RMC2.

SLD configuration with three RMC Appliances
• vCenter2 and vCenter3: RMC2 and RMC3.
• On the primary site (vCenter1), you must set the target array2 to RMC2 and array3 to RMC3.
• On the Secondary Site (vCenter2), you must set the target array1 to RMC1 and array2 to RMC2.
• On the Tertiary Site (vCenter3), you must set the target array1 to RMC1 and array2 to RMC2.

For information on installing RMC Appliances, see Installing HPE RMC-V.

To configure RMC Appliances for Remote Copy Configuration—Single-site RMC Appliance, see RMC Appliances.
Managing Remote Recovery Sets

This section describes how to manage the Remote Recovery Sets. You can perform the following tasks from the Manage tab:

- **Mount Remote Recovery Sets.**
- **Unmount Remote Recovery Sets.**
- **Attach Remote Recovery Sets.**
- **Detach Remote Recovery Sets.**

To manage the Remote Recovery Sets:

**Procedure**

1. Log in to the VMware vSphere Web Client.
2. Click **vCenter > Remote Recovery Configurations**.
   All Remote Recovery Sets associated with the host or cluster are displayed.
3. Double-click a Remote Recovery Configuration from the left navigation pane.
4. Click **Recovery Sets on Source StoreServ**.
   All Recovery Sets on the Source HPE 3PAR StoreServ are displayed.
5. Double-click a Recovery Set and click the Manage tab.
6. You can perform the following tasks from the Manage tab:
   - Mounting Remote Recovery Sets: To mount Remote Recovery Sets, see [Mounting Remote Recovery Sets](#).
   - Unmounting Remote Recovery Sets: To unmount Remote Recovery Sets, see [Unmounting Remote Recovery Sets](#).
   - Attaching Remote Recovery Sets: To attach Remote Recovery Sets, see [Attaching Remote Recovery Sets](#).
   - Detaching Remote Recovery Sets: To detach Remote Recovery Sets, see [Detaching Remote Recovery Sets](#).

**NOTE:**

For more information about the tasks that are enabled for Recovery Sets on Source StoreServ and Recovery Sets on Target StoreServ, see [Managing Remote Recovery Sets in various configurations](#).

---

### Managing Remote Recovery Sets in various configurations

#### Single vCenter Server Managing both sites

Tasks possible from Recovery Sets on **Recovery Sets on Source StoreServ** and **Recovery Sets on Target StoreServ** tabs—Mount, Unmount, Attach, and Detach; if mounted to the same ESXi host.

Tasks possible from Recovery Sets on **Recovery Sets on Source StoreServ** and **Recovery Sets on Target StoreServ** tabs—Mount and Unmount; if mounted to a proxy host.

**NOTE:**

After failover, the Recovery Sets listed in **Recovery Sets on Source StoreServ** and **Recovery Sets on Target StoreServ** tabs are interchanged.

One vCenter Server at each site (one at Primary Site and another at Secondary Site)

**Tasks possible from the Primary vCenter Server:**

---
• Tasks possible from Recovery Sets on **Recovery Sets on Source StoreServ** tab: Mount, Unmount, Attach, and Detach; if mounted to the same ESXi host.
• Tasks possible from Recovery Sets on **Recovery Sets on Target StoreServ** tab: None. Use the remote site for the supported tasks.

**Tasks possible from the Secondary vCenter Server:**

• Tasks possible from Recovery Set on **Recovery Sets on Source StoreServ** tab: Mount and Unmount tasks on ESXi and proxy hosts.
• Tasks possible from Recovery Set on **Recovery Sets on Target StoreServ** tab: None. We have to use the remote site for the supported tasks.

**One vCenter Server managing Primary Site and Remote Site (with one RMC Appliance)**

Tasks possible from the Primary vCenter:

• Tasks possible from Recovery Sets on **Recovery Sets on Source StoreServ** tab: Mount, Unmount, Attach, and Detach; if mounted to same ESXi host.
• Tasks possible from Recovery Sets on **Recovery Sets on Target StoreServ** tab: None of the tasks are allowed. We have to use the remote site for the supported operations.

**Managing Remote Recovery Sets in Peer Persistence**

Tasks possible from Recovery Sets on **Recovery Sets on Source StoreServ** and **Recovery Sets on Target StoreServ** tabs—Mount, Unmount, Attach, and Detach; if mounted to same ESXi host.

Tasks possible from Recovery Sets on **Recovery Sets on Source StoreServ** and **Recovery Sets on Target StoreServ** tabs—Mount and Unmount; if mounted on a proxy host.

**NOTE:**

After failover, the Recovery Sets listed on the **Recovery Sets on Source StoreServ** and **Recovery Sets on Target StoreServ** tabs are interchanged.

For more information on Peer Persistence, see **Peer Persistence**.

**Updating Recovery Manager Cache**

If you change HPE 3PAR StoreServ or HPE StoreVirtual Storage System, update the Recovery Manager cache. Otherwise, RMC-V operations fail with an error message **Perform a cache refresh.**

To update the Recovery Manager cache:

**Procedure**

1. Navigate to the vSphere Web Client home page.
2. Click **Hosts and Clusters**.
3. Right-click on a VM.
4. To update the Recovery Manager Cache, click **All HPE Recovery Manager Actions > Update Recovery Manager Cache**.

**Creating Remote Recovery Set policies**

Based on the local Recovery Sets, you can create expiry or retention policies for each Remote Recovery Set. When you create a policy for the source Remote Copy Group, a similar policy created by the RMC Appliance for the target Remote Copy Group.
Procedure

1. Log in to the VMware vSphere Web Client.
2. Right-click **Remote Recovery Configurations**.
   All Remote Recovery Sets associated with the host and cluster are displayed.
3. Click **Actions > Set Remote Recovery Set Creation Policy**.
   The **HPE Recovery Manager Central Recovery Set Management Policy** window appears.

![Set Remote Recovery Set Creation Policy](image)

Remote Recovery Configuration RC_TEST_RZ

**Target StoreServ: 7200_2Node_35.2**

**Select RMC Host Name:**

- **Numeric**
  - Maximum number of Recovery Sets: 5

- **Expiration / Retention**
  - **Enable expirable Recovery Sets**
    - *Expirable Recovery Sets will not be included in maximum count.*
  - **Expiration after:** 1 hour(s)

**Handle existing non-expirable Recovery Sets**

- **Keep non-expirable Recovery Sets**
  - *Select this option if you plan to keep the existing non-expirable Recovery Sets.*

- **Phase out non-expirable Recovery Sets (Advanced)**
  - *Select this option if you want to phase out old non-expirable ones. Whenever a new expirable Recovery Set is created the oldest non-expirable one will be deleted.*

- **Retain Recovery Set**
  - **Retention period:** 1 day(s)

- **Create Recovery Set with VSS-aware application consistency**

- **Enable Email Notification**

[Save] [Cancel]
4. In the Target StoreServ field, select a Target StoreServ depending on the policy you want to implement (sync or periodic).

   **Sync**
   If selected, the snapshots on source StoreServ and target StoreServ are in sync at all times.

   **Periodic**
   If selected, the source StoreServ maintains only the latest snapshot while the target StoreServ maintains all the snapshots.

5. Select the target StoreServ from the drop-down list.

6. To create a numeric policy, select **Numeric** and specify the **Maximum number of Recovery Sets**.

   △ **CAUTION:**
   Based on the order in which the Recovery Sets are created, the nonexpirable Recovery Sets are deleted when they reach a position in the queue that exceeds the set count.

7. To create an expiration or retention policy, select **Expiration/Retention**.
   - To create expiration policies, perform steps 7 through 10.
   - To create retention policies, perform steps 11 through 13.

8. To create an expiration policy, select **Enable expirable Recovery Sets**.

9. Select days or hours from the drop-down menu.

10. Specify the expiration period in **Expire after** and select **days** or **hours**.

    **NOTE:**
    The maximum period that you can specify for Recovery Set expiry is 43,800 hours or 1,825 days.

11. If you enable expirable Recovery Sets, you can also specify how to handle the existing nonexpirable copies by selecting one of the following options:
   - **Keep nonexpirable Recovery Sets**
     — Select this option if you want to retain the existing nonexpirable Recovery Sets along with the new expirable Recovery Sets.
   - **Phase out nonexpirable Recovery Sets (Advanced)**
     — Select to create expirable Recovery Sets to phase out the older nonexpirable Recovery Sets.

    **NOTE:**
    When a newer expirable Recovery Set is created, the oldest nonexpirable copy is deleted. However, you can still create nonexpirable Recovery Sets as long as the aggregate count is less than the policy maximum.

12. Select **Retain Recovery Set** to retain the Recovery Sets.

13. Specify the **Retention period**.

14. Select **days** or **hours**.

    **NOTE:**
    - Setting the retention policy requires the HPE 3PAR Virtual Lock license on the HPE 3PAR StoreServ Storage System.
    - The Recovery Sets can be retained up to 43,800 hours or 1,825 days maximum.
    - If you are using both the expiry and retention options, the expiry value must be equal to or greater than the retention value.
15. To ensure application consistency, select **Create Recovery Set with VSS-aware application consistency**. This option is used to create snapshots of Recovery Sets that adhere to data format standards used by VMware Tools.

⚠️ **CAUTION:**

After installing or upgrading VMware Tools, you must reboot the corresponding VM. If you do not reboot, the application consistent snapshots are taken as crash consistent and are reported as successful. The same behavior can be seen if the VMware Tool is not upgraded on the VM, after an upgrade of the ESXi server.

**NOTE:** If you add a VM to a datastore, update the policy to ensure VM application consistency.

16. Click **Save**.

An alert message appears indicating that the new policy is saved.

17. Click **OK**.

### Creating Remote Recovery Sets

You can create Remote Recovery Sets for Remote Recovery Configurations associated with a specific ESXi Server. Other Virtual Machines from other ESXi Servers are not displayed.

When you create **Synchronous Remote Recovery Sets**, RMC-V creates a copy on both local and remote arrays. For **Periodic Remote Recovery Sets**, only a Remote Recovery Set is created on the remote array.

For Periodic Remote Recovery sets, both local and Remote Recovery Sets are created. However, HPE 3PAR StoreServ Storage system keeps only the latest Recovery Set on the HPE 3PAR StoreServ Storage system at the local site. Therefore, at any given point only one snapshot is available on the primary storage system unless retention policy is used.

**NOTE:**

- You can create snapshots of volumes that only belong to a Remote Copy group. If you attach a virtual hard disk from a datastore hosted by an HPE 3PAR StoreServ volume that does not belong to the Remote Copy group, then the volume is not considered during Remote Recovery Set creation.
- HPE 3PAR StoreServ has only the latest snapshot at the primary site. Therefore, after creating a Remote Recovery set for a periodic group, Hewlett Packard Enterprise recommends that you update the Recovery Manager cache and refresh the vCenter.

### Procedure

1. Log in to the **VMware vSphere Web Client**.
2. Do one of the following depending on the VMware vCenter version that you are using:
   - For VMware vCenter 5.5, click **Home > vCenter > Remote Recovery Configurations**.
   - For VMware vCenter 6.0, click **Home > vCenter Inventory List > Remote Recovery Configurations**.
   - For VMware vCenter 6.5, click **Home > Global Inventory List > Remote Recovery Configurations**.

   All Remote Recovery Sets associated with the host or cluster are displayed.
3. Click **Actions > Create Remote Recovery Set**.

   The **Create Remote Recovery Set** window appears.
NOTE:
If a failure, be sure that all storage systems are back in operation and the groups are in Started state and are synced for the Remote Recovery Set to be successfully created. However, you can also create a Recovery Set locally without Remote Copy.

4. Select **Create Recovery Set with VSS-aware application consistency**.
• **Enable expirable Recovery Sets**: This option is automatically selected if you have selected expiration period in the policy. This option is disabled for numeric policies.

• **Retain Recovery Set**: This option is selected if you have selected retention period in the policy. This option is disabled for numeric policies.

• **Create Recovery Set with VSS-aware application consistency**: Creates VSS-aware application consistent Recovery Set.

⚠️ **CAUTION:**

If the maximum number is already defined in the policy, the dialog box displays the maximum number of Recovery Sets defined in the policy. If the number of existing Recovery Sets reaches the maximum number specified in the policy and if you create a Recovery Set, then the oldest Recovery Set is deleted.

5. Click **Create** to create the Remote Recovery Set.

6. Click **Yes** to confirm.

**NOTE:**

You can view the status of Remote Recovery Sets creation in **Recent Tasks** or **More Tasks**.

### Viewing Remote Recovery configurations

**Procedure**

1. Log in to the **VMware vSphere Web Client**.
2. Do one of the following depending on the VMware vCenter version that you are using:
   - For VMware vCenter 5.5, click **Home > vCenter > Remote Recovery Configurations**.
   - For VMware vCenter 6.0, click **Home > vCenter Inventory List > Remote Recovery Configurations**.
   - For VMware vCenter 6.5, click **Home > Global Inventory List > Remote Recovery Configurations**.

   The Remote Copy groups mapped to the ESXi Server are displayed. In case of linked mode, Remote Copy groups across all vCenters are displayed.

**NOTE:**

If changes are made in Remote Recovery Configurations, you must perform **Updating Recovery Manager Cache** and vCenter refresh. Otherwise, the Remote Recovery Sets might not be listed.

### Viewing Remote Recovery Configuration information details

To view the details of the source or target HPE 3PAR StoreServ Storage systems:

**Procedure**

1. Navigate to the **Remote Recovery Configurations** page.
2. To view the summary of the selected storage system, select a Remote Recovery Configuration and click the **Summary** in the detail pane.
NOTE:

If Peer Persistent is enabled, the local Recovery Sets are disabled because Recovery Set snapshots are taken both locally and remotely using Recovery Set creation.

3. The Summary page displays the following details:

Table 8: Remote Recovery Configuration information summary

<table>
<thead>
<tr>
<th>Field name</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source name</td>
<td>Name of the Remote Copy group.</td>
</tr>
<tr>
<td>Source StoreServ</td>
<td>Name of the source HPE 3PAR StoreServ Storage.</td>
</tr>
<tr>
<td>Role</td>
<td>Displays one of the following roles for the HPE 3PAR StoreServ:</td>
</tr>
<tr>
<td></td>
<td>• Primary—The role of source HPE 3PAR StoreServ Storage is always primary.</td>
</tr>
<tr>
<td></td>
<td>• Secondary—The role of target HPE 3PAR StoreServ Storage is always secondary.</td>
</tr>
<tr>
<td>Field name</td>
<td>Value</td>
</tr>
<tr>
<td>--------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>StoreServ</td>
<td>Remote Copy group name that gets created on the target 3PAR StoreServ Storage.</td>
</tr>
<tr>
<td>Target Name</td>
<td>Name of the target Remote Copy group.</td>
</tr>
<tr>
<td>RMC host</td>
<td>Host name or IP address of the Remote RMC appliance.</td>
</tr>
<tr>
<td>Peer persistence</td>
<td>Indicates if Peer persistence is enabled or disabled for the virtual volumes.</td>
</tr>
<tr>
<td>Mode</td>
<td>Displays appropriate values to indicate one of the following modes:</td>
</tr>
<tr>
<td></td>
<td>• Sync—For synchronous mode</td>
</tr>
<tr>
<td></td>
<td>• Periodic—For asynchronous periodic mode</td>
</tr>
<tr>
<td>Status</td>
<td>Displays one of the following statuses:</td>
</tr>
<tr>
<td></td>
<td>• Started</td>
</tr>
<tr>
<td></td>
<td>• Stopped</td>
</tr>
<tr>
<td></td>
<td>• Syncing</td>
</tr>
<tr>
<td>Link type</td>
<td>Displays one of the following connectivity modes:</td>
</tr>
<tr>
<td></td>
<td>• FC</td>
</tr>
<tr>
<td></td>
<td>• iSCSI</td>
</tr>
</tbody>
</table>

**Viewing Source and Target StoreServ Recovery Sets**

This section describes how to view the source and target Recovery Sets for the HPE 3PAR StoreServ Storage systems.

**Procedure**

1. Log in to the **VMware vSphere Web Client**.
2. Do one of the following depending on the VMware vCenter version that you are using:
   - For VMware vCenter 5.5, click **Home > vCenter > Remote Recovery Configurations**.
   - For VMware vCenter 6.0, click **Home > vCenter Inventory List > Remote Recovery Configurations**.
   - For VMware vCenter 6.5, click **Home > Global Inventory List > Remote Recovery Configurations**.

   All Remote Recovery Sets associated with the host or cluster are displayed.
3. Double-click the Remote Copy group on which you have created Recovery Sets.
4. Click the **Related Objects** tab and then click **Recovery Sets on Source StoreServ** to view the Recovery Sets on the source HPE 3PAR StoreServ Storage systems.
5. The **Recovery Sets on Source StoreServ** tab appears.
6. Click **Recovery Sets on Source StoreServ** to view the Recovery Sets on the source HPE 3PAR StoreServ Storage systems.

The **Recovery Sets on Target StoreServ** tab appears.

### Viewing Remote Recovery Sets group details

**Procedure**

1. Log in to the **VMware vSphere Web Client**.
2. Do one of the following depending on the VMware vCenter version that you are using:
   - For VMware vCenter 5.5, click **Home > vCenter > Remote Recovery Configurations**.
   - For VMware vCenter 6.0, click **Home > vCenter Inventory List > Remote Recovery Configurations**.
   - For VMware vCenter 6.5, click **Home > Global Inventory List > Remote Recovery Configurations**.

   All Remote Recovery Sets associated with the host or cluster are displayed.

3. Double-click a Remote Recovery Set.
4. Click **Summary**.

   The details of the selected Remote Recovery Sets are displayed.
Mounting Remote Recovery Sets

This section describes how to mount Remote Recovery Sets to an ESXi host or a proxy host. Be sure that you are in the Manage tab to mount the Remote Recovery Sets. For information on navigating to the Manage tab, see steps 1 through 6 in Managing Remote Recovery Sets on page 65.

NOTE:

• In a Remote Recovery Set configuration, you must mount the Recovery Set Snapshots to an ESXi Server other than the server where the base volume is already mounted.
• You can mount snapshots that are available only on the source HPE 3PAR StoreServ Storage system.

To mount Remote Recovery Sets:

Procedure

1. To mount a Recovery Set that is not mounted to an ESXi host, click Mount/Unmount.
2. Select one of the following options:

• Mount on ESXi host as Datastore: Select from a list of ESXi host managed by the vCenter Server that shares access to the HPE 3PAR StoreServ Storage System.
Mount on proxy host: Select from a list of hosts that the vCenter Server does not manage, but which have access to the source HPE 3PAR StoreServ Storage System.

3. Click Yes to confirm.
4. The Recovery Set is mounted on the selected host.

NOTE: After the Recovery Set is successfully mounted, the status changes from Available to Mounted.
Unmounting Remote Recovery Sets

⚠️ CAUTION:
RMC-V does not verify that the volume you unmount is active or inactive. Therefore, be sure that the volume is inactive before you unmount it.

Be sure that you are in the Manage tab to unmount the Remote Recovery Sets. For information on navigating to the Manage tab, see steps 1 through 6 in Managing Remote Recovery Sets on page 65.

To unmount a Remote Recovery Set that is already mounted:

Procedure

1. Select the Recovery Set you must unmount and click Mount/Unmount.

The Unmount Volume window appears.

![Unmount Volume window](image)

Figure 15: Unmounting Volumes

2. Verify the details mentioned on the Unmount Volume window and then click Unmount.

NOTE:
- After the Recovery Set is successfully unmounted, the status changes from Mounted to Available.
- The target site Remote Recovery Set of the source HPE 3PAR StoreServ Storage allows you to perform only mount task to the proxy host if the Target StoreServ does not have any Virtual Volume path exported to the ESXi host managed by the vCenter Server.

Attaching and copying Remote Recovery Sets

This section describes how to copy a Remote Recovery Set to a datastore and how to attach a Recovery Set to a Virtual Machine.

Ensure that you are in the Manage tab to attach the Remote Recovery Sets. For information on navigating to the Manage tab, see steps 1 through 6 in Managing Remote Recovery Sets.

NOTE:
You can attach a Remote Recovery Set only if it is already mounted.

To attach a Remote Recovery Set:
Procedure

1. Select a mounted Recovery Set that you want to attach to a VM.
2. To mount a Recovery Set, click **Copy/Attach/Detach**.

   The **Copy/Attach** window appears. The **Copy to Datastore** option is selected by default.
Figure 16: Copying to a Datastore

<table>
<thead>
<tr>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>21nowvolvm</td>
</tr>
<tr>
<td>AmarVcenter</td>
</tr>
<tr>
<td>App_vm</td>
</tr>
<tr>
<td>Attach_vmdk_vm</td>
</tr>
<tr>
<td>Dev_Sync_vm</td>
</tr>
<tr>
<td>RC_VM_A</td>
</tr>
<tr>
<td>RDM_TEST_VM1</td>
</tr>
<tr>
<td>Test_rdm</td>
</tr>
<tr>
<td>VMRestoreTest</td>
</tr>
<tr>
<td>VM_Demo_01</td>
</tr>
</tbody>
</table>
3. Select one of the following options:
   a. **Copy to Datastore**: Select the datastore to which you must copy the selected Recovery Set.
   b. **Attach to Virtual Machine**: Select the Virtual Machine to which you must attach the selected Recovery Set.

   **NOTE**: If you select **Attach to Virtual Machine**, the **Copy** button changes to **Attach**.

4. To copy the Recovery Set to a datastore:
   a. Select **Copy to Datastore**.
      The associated datastores are displayed.
   b. Select the datastore to which you want to copy the Recovery Set.
   c. To overwrite an existing VMDK file, select **Overwrite existing Virtual Disk**.
   d. Click **Copy**.
   e. Click **Yes** to confirm.

      The Recovery Set is successfully copied to the datastore.

   **NOTE**: Copying Recovery Sets to a datastore is also known as **copy VMDK**.
   When you copy a VMDK file from the Express Protect object datastore, the copied VMDK is always thick provisioned.

5. To attach the Remote Recovery Set to a VM:
   a. Select **Attach to Virtual Machine**.
      All the associated virtual machines are displayed.
   b. Select the virtual machine to which you want to attach the Recovery Set.
   c. To attach the Recovery Set, click **Attach**.
   d. Click **Yes** to confirm.

      The Recovery Set is successfully attached to the VM.

### Detaching Remote Recovery Sets

Be sure that you are in the **Manage** tab to detach Remote Recovery Sets. For information on navigating to the **Manage** tab, see steps 1 through 6 in **Managing Remote Recovery Sets** on page 65.

   **NOTE**: You can detach a Remote Recovery Set only if it is already attached.

To detach a Remote Recovery Set:

**Procedure**

1. Select the Recovery Set you must detach from the list of Recovery Sets.
2. Click **Copy/Attach/Detach**.
3. The **Detach** window appears.
4. Confirm the details mentioned in the **Detach** window and click **Detach**.
Deleting Remote Recovery Sets

Procedure

1. Navigate to the vSphere Web Client home page.
2. Click vCenter > Remote Recovery Configurations.
3. Select a Remote Recovery Configuration from the left navigation pane.
4. Click Recovery Sets on Source StoreServ or Recovery Sets on Target StoreServ from the left navigation pane. All the Recovery Sets pertaining to the selection is displayed.
5. Select the Remote Recovery Set that you wish to delete from the left navigation pane.
6. Right-click, and then click Delete.
7. To confirm deletion of the Remote Recovery Set, click Yes. The Remote Recovery Set is deleted from the list.

Managing Remote Recovery Sets schedules

RMC-V allows you to create Remote Recovery Sets according to a predefined schedule. The RMC-V scheduler allows you to perform the following tasks:

- Add schedules
- Edit schedules
- Delete schedules

Procedure

1. Log in to the VMware vSphere Web Client.
2. Do one of the following depending on the VMware vCenter version that you are using:
   - For VMware vCenter 5.5, click Home > vCenter > Remote Recovery Configurations.
   - For VMware vCenter 6.0, click Home > vCenter Inventory List > Remote Recovery Configurations.
   - For VMware vCenter 6.5, click Home > Global Inventory List > Remote Recovery Configurations.

   All Remote Recovery Sets associated with the host or cluster are displayed.
3. Click Actions > Schedule Remote Recovery Set Creation.

   The Schedule Create Remote Recovery Set window appears with a list of existing schedules.
4. You can perform any of the following tasks from Schedule Create Remote Recovery Set:
   - Adding a schedule: To add a schedule, see Adding schedules.
   - Editing a new schedule: To edit an existing schedule, see Editing schedules.
   - Deleting a new schedule: To delete a schedule, see Deleting schedules.
5. After performing one or more tasks listed in step 4, click Refresh to refresh the list of schedules.
6. To close the window, click Close.

Adding schedules

To create Remote Recovery Sets in a Remote Recovery Configuration:

Procedure

1. In the Schedule Create Remote Recovery Set page, click Add.
   The Welcome window appears.
2. Click Next.
   The Schedule window appears.
3. In the Schedules screen, do the following:
   a. Specify a task name for the schedule in Schedule task name.
   b. To run the schedule, select the task frequency from Perform Recovery Set creation task. The following frequencies are available:
c. Specify details under **Select time and frequency you want this task to start** as listed in the following table.

A different set of fields are displayed for each frequency that you select in **Perform Recovery Set creation task**.

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Frequency details</th>
<th>Select this option to</th>
</tr>
</thead>
<tbody>
<tr>
<td>By Minutes</td>
<td><strong>Start time</strong></td>
<td>Specify the schedule start time in hours and minutes. Also, select AM or PM.</td>
</tr>
<tr>
<td></td>
<td><strong>Recur every</strong></td>
<td>Specify the frequency of the schedule in minutes.</td>
</tr>
<tr>
<td>Hourly</td>
<td><strong>Start time</strong></td>
<td>Specify the schedule start time in hours and minutes. Also, select AM or PM.</td>
</tr>
<tr>
<td></td>
<td><strong>Recur every</strong></td>
<td>Specify the frequency of the schedule in hours.</td>
</tr>
<tr>
<td>Daily</td>
<td><strong>Start time</strong></td>
<td>Specify the schedule start time in hours and minutes. Also, select AM or PM.</td>
</tr>
<tr>
<td></td>
<td><strong>Recur every</strong></td>
<td>Specify the frequency of the schedule in days.</td>
</tr>
<tr>
<td>Weekly</td>
<td><strong>Start time</strong></td>
<td>Specify the schedule start time in hours and minutes. Also, select AM or PM.</td>
</tr>
<tr>
<td></td>
<td><strong>Select days of week below</strong></td>
<td>All seven days of a week are displayed. You can select one or more days.</td>
</tr>
</tbody>
</table>

*Table Continued*
<table>
<thead>
<tr>
<th>Frequency</th>
<th>Frequency details</th>
<th>Select this option to</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monthly</td>
<td><strong>Start time</strong></td>
<td>Specify the schedule start time in hours and minutes. Also, select AM or PM.</td>
</tr>
<tr>
<td></td>
<td><strong>Day</strong></td>
<td>Specify the day of the month for the schedule.</td>
</tr>
<tr>
<td>One time only</td>
<td><strong>Start date</strong></td>
<td>Select the date on which you must run the schedule.</td>
</tr>
<tr>
<td></td>
<td><strong>Start time</strong></td>
<td>Specify the schedule start time in hours and minutes. Also, select AM or PM.</td>
</tr>
</tbody>
</table>

d. Click **Next**.

The **Snapshot Configuration** screen appears.

4. In the **Snapshot Configuration** screen, do the following:

   ![Create Schedule Task Wizard](image)

   a. In the **Target StoreServ** field, for SLD policy, select a Target StoreServ.
   b. To create application consistent Recovery Sets, select **Create Recovery Set with VSS-aware application consistency**.
   c. Click **Next**.

   The **Summary** screen appears.

5. Verify the details listed in the **Summary** screen and then click **Finish**.

6. At the prompt, click **Yes**.

**NOTE:**

Hewlett Packard Enterprise recommends that you create schedules such that not more than 25 Remote Copy Snapshots get triggered at the same point in time.
Editing schedules

Procedure

1. Select the schedule and click Edit.
   The Edit Schedule Task Wizard appears.

   NOTE:
   You can make appropriate changes to all schedule parameters except the Schedule task name.

2. To refresh the list of schedules, click Refresh.
3. To close the window, click Close.

Deleting schedules

This section describes how to delete an existing schedule task.

Procedure

1. Select the schedule task to delete.
2. Click Delete.
3. To confirm deletion of the schedule task, click Yes.
4. Click Close.

   IMPORTANT:
   The scheduled jobs will fail after failover of the Remote Copy group and the Remote RMC/RMC-V fails to run the scheduled jobs. Schedule the jobs again at new source side.

Peer Persistence

Peer persistence enables redirect host I/O, either manually or automatically, from the source to the target storage system in a manner that is transparent to the host while causing minimal disruption to service. HPE 3PAR Peer Persistence is available for VMware configurations with 3PAR OS 3.1.2 MU2 and later, and for Microsoft Windows configurations with 3PAR OS 3.2.1 and later.

For information on configuring Peer Persistence, see HPE 3PAR Remote Copy Software User Guide.

If Peer Persistence is enabled for the virtual volumes, the Summary page in Remote Copy Group is displayed.

   NOTE:
   While configuring Peer Persistence, ensure the following:
   • The source and target volumes are already presented to the ESXi host.
   • For more information on managing the Remote Recovery Sets (Mount, Unmount, Attach, and Detach), see Managing Remote Recovery Sets in Peer Persistence.

You can then perform all other tasks related to Remote Recovery Sets.

Express Protect for Remote Recovery Sets

You cannot take a backup of Remote Copy groups snapshots. However, you can create a local Recovery Set of the virtual machine or datastore, and then take a backup. For more information on taking Recovery Set backup, see Creating Express Protects.
Multiple RMC Appliance support for Remote Copy configurations

Remote Copy configuration can coexist with multi-RMC configurations. However, only one RMC Appliance manages remote copy configurations, policies, and operations. The first registered RMC appliance is implicitly used for managing the Remote Copy Snapshots. If the first RMC appliance is removed from the configuration, Remote Copy Snapshots and the configuration information are not available anymore. On the removal of the first RMC appliance from the multi-RMC configuration, the next available RMC appliance is used for Remote Copy operations. However, you are required to create the Remote Copy policies and schedules again.

Figure 18: Remote Copy configurations with Multiple RMC appliances
Working with Recovery Sets Express Protect

HPE Express Protect enables you to back up snapshots that are created on HPE Storage Systems. These snapshots are stored on an HPE StoreOnce device.

For more information on Express Protect, see the documentation provided with your HPE StoreOnce product.

Prerequisites

- Ensure that HPE 3PAR StoreServ Storage Systems running 3PAR OS 3.2.1 MU1 and later versions are using Express Protect.
- Catalyst license is available on HPE StoreOnce.
- Ensure that you have added a Backup System in HPE RMC Configuration tab.

Types of Backups

RMC-V supports the following types of backups:

- **Auto**: In the Storage Systems, incremental backup is attempted first. If the operation fails, optimized backup (only those blocks with data are copied) is attempted. If even the optimized backup operation fails, a full backup is performed. Optimized backups are faster than full backups.
- **Full backup**: Performs a full backup. Perform if auto backup fails.

**NOTE**: Hewlett Packard Enterprise recommends you to select Auto as the backup type.

Creating Express Protect policies

To set up an Express Protect policy with the CoFC option enabled, the FC connectivity between the RMC Appliance and HPE StoreOnce must be appropriately configured.

**NOTE:**
RMC-V does not support editing and deleting the existing Express Protect policies.

Creating default Express Protect policies

**Procedure**

1. Navigate to the vSphere Web Client home page.
2. Click **Hosts and Clusters**.
3. Select a VM and click **Recovery Sets** on the left navigation pane. System displays all the available Recovery Sets in the **Recovery Sets** tab under **Related Objects** tab.
4. To apply a set of policies, select a Virtual Machine.
5. Click **Actions > All HPE Recovery Manager Central Actions > Set Recovery Set Creation Policy** and then click **Express Protect**.

The **Default Express Protect/Catalyst Copy Policy Settings** screen appears.
### Table 9: Creating default Express Protect policies

<table>
<thead>
<tr>
<th>Field name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMC Host Name</td>
<td>The IP address of the deployed RMC appliance. If you have deployed more than one RMC appliances, then all appliances are listed.</td>
</tr>
<tr>
<td>Express Protect Policy</td>
<td>Select an Express Protect policy from the list of policies available in the drop-down list. The listed Express Protect policies are bound to the RMC instance that you have selected.</td>
</tr>
<tr>
<td>Create Express Protect Policy</td>
<td>Click Create Express Protect Policy to create an Express Protect policy.</td>
</tr>
</tbody>
</table>

**NOTE:**
For information on creating policies, see [Creating Express Protect policies](#).

<table>
<thead>
<tr>
<th>Field name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Backup system</td>
<td>Defaulted from Create Express Protect Policy</td>
</tr>
<tr>
<td>Store</td>
<td>Defaulted from Create Express Protect Policy</td>
</tr>
<tr>
<td>Expiry Time</td>
<td>Defaulted from Create Express Protect Policy</td>
</tr>
<tr>
<td>Retention Time</td>
<td>Defaulted from Create Express Protect Policy</td>
</tr>
</tbody>
</table>
| Multi-Streaming | Multistreaming is a configuration whereby data from multiple sources is backed up concurrently to one endpoint device. Select one of the following options:  
  - Single stream  
  - Multistream  

**NOTE:**
- If you do not select the Multistream option, the Express Protect is performed as single stream.  
- RMC-V supports multistreaming of 2, 4, 8, or 16 streams for virtual volumes.  
- When you perform a multistream Express Protect with verification, Express Protect verification is also performed concurrently as multistream.  

<table>
<thead>
<tr>
<th>Field name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verify Express Protect</td>
<td>Defaulted from Create Express Protect Policy</td>
</tr>
<tr>
<td>Storage array access protocol</td>
<td>Displays either iSCSI or FC protocol that you selected in the Create Express Protect Policy.</td>
</tr>
</tbody>
</table>
Maximum Number of Express Protects

Specify the maximum number of Express Protects that you must retain. Express Protect count zero indicates that no upper limit is set on the maximum number of Express Protects.

The default value displayed is seven.

Remove Oldest Express Protect

Select this option to remove the oldest Express Protect after the maximum defined limit of Express Protect is reached. If you do not select this option, then the Express Protect that you take after the maximum number of permissible Express Protects is reached will fail.

This option is selected by default.

Enable Email Notification

Select to choose and enable email notifications as per your requirements. For more information, see Creating Email Notification Policies.

Configure Default Copy Policy Settings

Select to configure default Catalyst Copy policy settings.

**IMPORTANT:**

- Hewlett Packard Enterprise recommends that you specify the value of Maximum Number of Express Protects in the policy to be greater than one. Otherwise, incremental Express Protect will fail; because, the first Express Protect is always a full Express Protect.
- Assume that you set the value to zero and create few Express Protects and later, if you change the number of Express Protects policies to a number that is less than the number of Express Protects already created, then the system deletes the backup and Catalyst Copy if the policy count is reduced.

**NOTE:**

- Express Protects of all the registered RMC instances are displayed and is not dependent on the RMC instance that is active.
- Depending on the parameter selected in the Create New Express Protect Policy, only that value is displayed.

### Creating Express Protect policies

To create an Express Protect policy for a datastore or a VM:

**Procedure**

1. Click **Create Policy** from Create Express Protect Recovery Set or Default Express Protect Policy Settings screen.

   The Create New Express Protect Policy screen appears.

2. Specify a name for the Express Protect policy in **Express Protect Policy Name**.

   The Backup System lists the IP address or the host name of the added HPE StoreOnce to perform Express Protect operation.

3. **Service Set Id**—The ID of the Service Set on which the store resides (StoreOnce 6500 and B6200).

   If HPE StoreOnce is configured in multinode, then service set IDs for both nodes are displayed. Select an appropriate service set Id for the policy.

4. **Store**—Select an existing store from the menu.
Click **Create/Modify Store** to either create a store or to grant access to an existing catalyst client.

**TIP:**
You can also manually create a store using the **HPE StoreOnce Management Console**.

---

a. The **Modify StoreOnce Catalyst Store** window appears.

**NOTE:**
- If a Store exists, then **Modify Existing Store** option is selected by default. However, if there are no stores, then **Create Store** option is selected by default.
- For a multinode StoreOnce, RMC-V supports only one catalyst store per service set ID. However, RMC-V does not support teamed catalyst store.

b. Select one of the following options:
- **Create Store**—To create an Express protect store.
- **Modify Existing Store**—To grant access to a user for the Express protect store.

c. If you select **Modify Existing Store**, you can grant access to a user:

<table>
<thead>
<tr>
<th>Modify StoreOnce Catalyst Store</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Modify StoreOnce Catalyst Store" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create Store</td>
<td></td>
</tr>
<tr>
<td>Modify Existing Store</td>
<td></td>
</tr>
<tr>
<td>Backup System</td>
<td></td>
</tr>
<tr>
<td>Store Name</td>
<td></td>
</tr>
<tr>
<td>Store Description</td>
<td></td>
</tr>
<tr>
<td>Service Set Id</td>
<td>1</td>
</tr>
</tbody>
</table>

**NOTE:**
- Specify a valid catalyst user name in **User name**. This user must exist in the HPE StoreOnce Backup system. If you enter a wrong user name, system displays an error message prompting you to enter a valid user name.

<table>
<thead>
<tr>
<th>Field</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catalyst Client User name</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Button</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grant Access</td>
<td>Grant access to user</td>
</tr>
<tr>
<td>Cancel</td>
<td>Cancel button</td>
</tr>
</tbody>
</table>

I. **Specify a valid catalyst user name in User name.** This user must exist in the HPE StoreOnce Backup system. If you enter a wrong user name, system displays an error message prompting you to enter a valid user name.

**NOTE:**
- If you specify **All Clients** as the catalyst client user name, then access is granted to all the existing clients in the selected store.

II. **Click Grant Access.**

A confirmation message appears after the access is successfully granted.

d. If you select **Create Store**, you can create an Express Protect store:
I. **Backup System** lists the IP addresses or backup system name of the configured HPE StoreOnce Backup systems. Select an appropriate IP address.

II. Specify a name of the store in **Store Name**.

III. Specify a brief description of the store in **Store Description**.

IV. **Service Set Id** lists all the service set IDs associated with the HPE StoreOnce Backup system that you selected. For single-node HPE StoreOnce Backup systems, the service set ID is 1. For multinode HPE StoreOnce Backup systems, the service set ID is more than one set ID. Select an appropriate service set ID based on where the store resides.

V. To grant access to the Catalyst Client, navigate to the Express Protect policy window in the vSphere Web Client, click **Modify store**, provide the catalyst user name, and then grant access to the catalyst client. Alternatively, you can also grant access from the StoreOnce Management Console.
NOTE:
If the Client Access Permission is not checked in the Settings tab of the Confirm page, user credentials will not be validated for any Express Protect activity.

VI. Click Create.
VII. Click Yes when you are prompted for confirmation.
A confirmation message is displayed after the store is created.

NOTE: When Express Protect is triggered, the snapshot is mapped in RMC appliance as a raw block device in the appliance OS.

VIII. Specify Catalyst client credentials, expiry time, retention time, protocol.
5. The following fields display the status when the policy was created and you cannot modify these statuses from this screen:
   a. Backup System
   b. Store
   c. Expiry Time — Set expiry time in hours.
   d. Retention Time — Set retention time in hours.
   e. Multi-Streaming — When you select this option, the number of streams also appears. The default value is 4. For information on selecting values for multistreaming, see the SPOCK.
   f. Verify Express Protect
   g. Catalyst over Fiber Channel (CoFC)
   h. Catalyst over Ethernet (Coeth) - If HPE StoreOnce is configured in multinode, then you must provide the node IP of the corresponding service set ID that you have selected. To see the node IP of the service set ID, navigate to the tab of HPE StoreOnce Management Console.

Creating Express Protects

You can create Express Protect of a datastore or a VM using a VC-level Express Protect (Create Express Protect Recovery Set screen) or one-click Express Protect.
Creating one-click Express Protect

You can use one-click Express Protect to create a snapshot and take the Express Protect.

Procedure

1. Navigate to the home page and click **VMs and Templates**.
2. Click the Virtual Machine or datastore for which you need to create the Recovery Set.
3. Right-click the Virtual Machine or datastore, and then click **All HPE Recovery Manager Central Actions > Create Recovery Set** and then click **Express Protect**.

The **Create Express Protect Recovery Set** page appears.

![Create Express Protect Recovery Set](image)

**NOTE:**
The **Expiration/Retention** option is not available for VVOL VMs.

4. Specify the following details:
   a. **Name**
      —Specify a name for the Snapshot and Express Protect.
   b. **Description**
      —Specify a brief description for the Express Protect.
   c. **Backup Type**
      —Select either **Auto** or **Full** backup. For more information, see **Types of Backups**.
All other fields in this screen are display fields and you cannot modify them.

**NOTE:**

- If you do not provide a name for the snapshot or Express Protect, the time stamp of the RMC instance is considered as the default snapshot or Express Protect name.

- When you take a one-click Express Protect, system internally creates a snapshot for the Express Protect. If there is a numeric policy set for the snapshot, then it triggers deletion of the oldest snapshot when you take an Express Protect if **Remove Oldest Snapshot** is selected.

  HPE recommends that you set the number of snapshots such that you are able to take both snapshots and Express Protect created by RMC-V.

- Numeric policy count removes oldest snapshot must be set such that the Express Protect operation of the oldest snapshot can be completed before it reaches numeric policy limit set. If Express Protect of the oldest snapshot is not complete and numeric count reaches the limit, then the subsequent scheduled Express Protects start failing until the Express Protect operation of the oldest snapshot completes. For Express Protects, such as full Express Protects or auto Express Protects with large number of changes, that take a long time to complete.

---

**Creating Recovery Set level Express Protect**

**Procedure**

1. Navigate to the vSphere web client home page.
2. Click **Hosts and Clusters**.
3. Select a VM and click **Recovery Sets** on the left navigation pane.

   System displays all the available Recovery Sets in the **Recovery Sets** tab under **Related Objects** tab.
4. Select a Recovery Set to create Express Protect.
5. Click **Actions** (Actions for selected objects in this list), and then click **Create Express Protect/Catalyst Copy Recovery Set**.

   The **Create Express Protect/Catalyst Copy Recovery Set** window appears.
6. Specify the following information in the **Express protect** section:
   a. **RMC Host Name**—The IP address of the selected RMC instance is displayed by default.
      You cannot change this display field from the screen.
   b. **Name**—A name for the Express Protect.
   c. **Description**—A brief description of the Express Protect.

7. To apply an existing policy for the Express Protect, select a backup policy from the policies listed in **Express Protect Policy**.
   The following details are listed for the selected policy:
   **Backup System**
Default Policy

Selected by default if a default Express Protect policy is saved for the VM or datastore. If Default policy is selected, then you cannot select any other Express Protect policy listed in Policy.

To enable selecting a policy other than the default policy, you must clear the Default policy check box. If a default policy does not exist, then the following message appears indicating that you have not saved any default Express Protect policy for the VM or datastore: No default Express Protect Backup policy exists.

Backup Store

Expiry/Retention Time in Hours

Multi-Streaming

Verify Express Protect

CoFC Id (Catalyst over Fibre Channel) or Coeth IP (Catalyst over Ethernet) that you have selected

Storage array access protocol

Maximum number of Express Protects

Remove Oldest Express Protect.

Backup System, Multi-Streaming, Verify Express Protect, CoFC ID or Coeth IP, Storage array access protocol, Express Protect Store, Maximum number of Express Protects, Retention and Expiration time, and Remove Oldest Express Protect are display fields. They display the respective values used during creation of the selected Express Protect policy.

8. To create and apply a new policy, click Create Express Protect Policy.

   NOTE:
   For information on creating policies, see Creating Express Protect policies.

9. Click Create and then click Yes to confirm creation of the Express Protect.

   IMPORTANT:
   If a valid previous backup is not available, incremental express protect fails. All backups generated are full backups.

Viewing Express Protect details

Procedure

1. Navigate to the vSphere Web Client home page.
2. Click Hosts and Clusters.
3. Click the VM, and click Recovery Sets on the left navigation pane. The system displays all the available Recovery Sets and Express Protects in the Recovery Sets tab.
4. To view the details, double-click datastore.
5. Click Manage.
6. You can view the following details in the **Summary** screen:

<table>
<thead>
<tr>
<th>Field name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>vCenter</td>
<td>IP address or name of the vCenter.</td>
</tr>
<tr>
<td>Name</td>
<td>Name of the VM or datastore.</td>
</tr>
<tr>
<td>Type</td>
<td>Type of Express Protect, either VM or datastore.</td>
</tr>
<tr>
<td>Express Protect Name</td>
<td>Name of the Express Protect.</td>
</tr>
<tr>
<td>Express Protect GUID</td>
<td>GUID of the Express Protect job.</td>
</tr>
<tr>
<td>State</td>
<td>The state of the Express Protect; <strong>Partial,</strong> or <strong>Available.</strong></td>
</tr>
<tr>
<td>Application Consistent</td>
<td>If the Express Protect Snapshot is application consistent; <strong>True</strong> or <strong>False.</strong></td>
</tr>
<tr>
<td>Verified</td>
<td>Status of the Express Protect; <strong>True</strong> or <strong>False.</strong></td>
</tr>
<tr>
<td>Catalyst Item Name</td>
<td>Name of the catalyst item in HPE StoreOnce.</td>
</tr>
<tr>
<td>Timestamp</td>
<td>Time the Express Protect was created. Time is denoted in UTC time.</td>
</tr>
<tr>
<td>Express Protect Policy Name</td>
<td>Name of the Express Protect policy.</td>
</tr>
<tr>
<td>Store Name</td>
<td>Name of the Store in HPE StoreOnce.</td>
</tr>
<tr>
<td>StoreOnce Name</td>
<td>Name of the HPE StoreOnce Backup System.</td>
</tr>
<tr>
<td>Catalyst User</td>
<td>Name of the catalyst user in HPE StoreOnce.</td>
</tr>
<tr>
<td>Snapshot Name</td>
<td>Name of the snapshot.</td>
</tr>
<tr>
<td>SnapshotSet ID</td>
<td>A unique ID of the snapshot.</td>
</tr>
</tbody>
</table>

*Table Continued*
<table>
<thead>
<tr>
<th>Field name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incremental</td>
<td>Is the Express Protect incremental. True for incremental Express Protect and False for nonincremental Express Protect.</td>
</tr>
<tr>
<td>RMC Time Zone</td>
<td>Time zone of the RMC appliance.</td>
</tr>
</tbody>
</table>

**Canceling Express Protect**

During the backup process, you can choose to abort the operation.

**Procedure**

1. Right-click the Express Protect and click **Cancel running task**.

   ![VMware vSphere Web Client](image)

2. At the prompt, click **Yes**.
3. A message is displayed to indicate successful cancellation.

**Mounting Express Protect objects**

**Procedure**

1. Navigate to the vSphere Web Client home page.
2. Click **vCenter > Datastore**.
   
   All the datastores managed by the vCenter Server are displayed.
3. Select a datastore, click **Related Objects > Recovery Sets**, and then double-click the Express Protect that you must mount.
4. Click **Mount/Unmount**.

   The **Mount on ESX host as Datastore** lists the ESXi hosts managed by the vCenter Server.

5. Select an ESXi host.

6. Click **Mount**.

   The **Mount Express Protect — Confirm** dialog box appears.

7. Click **Yes** to confirm.

8. After the Express Protect is successfully mounted, the status of the Express Protect changes to **Mounted**.

   After the Express Protect is successfully mounted, the following details are displayed:
   - Mounted ESXi Host
   - Mounted Datastore Name for Express Protect Object

   **NOTE:**
   You can perform a similar procedure to mount Express Protect on Virtual Machines also.

---

**Unmounting Express Protect objects**

**CAUTION:**
RMC-V does not perform any checks to ensure that the volume you unmount is active or inactive. Therefore, before you unmount a volume, ensure that it is inactive.

**Procedure**

1. Navigate to the **Manage** tab and select the Express Protect that you need to unmount.
2. Click **Mount/Unmount**.

---

100  Unmounting Express Protect objects
3. The **Unmount Express Protect** dialog box appears.
4. To unmount the selected datastore from the ESXi host, click **Unmount**.

**Scheduling Express Protects**

- Viewing a schedule list
- **Add**: Adding a schedule
- **Edit**: Editing a schedule
- **Delete**: Deleting a schedule
- **Refresh**: Refreshing a schedule list
- **Close**: Closing the **Schedule List** window

**Viewing a schedule list for Express Protects**

Procedure

1. Navigate to the vSphere Web Client home page.
2. Click **Hosts and Clusters**.
3. Select a virtual machine or a datastore.
4. Click **Actions** > **All HPE Recovery Manager Central Actions** > **Schedule Recovery Set Creation**.

   The **Schedule List** window appears. This window lists the RMC Instance, time zone of the RMC Instance and all tasks that are currently scheduled for Express Protect. From the **Scheduled List** window, you can add a schedule, modify an existing schedule, or delete an existing schedule.

5. To close the Schedule List, Click **Close**.

   You can create Express Protects according to a specified schedule.

**Creating schedules for Express Protect**

Procedure

1. Navigate to the Schedule List.

   **NOTE:**
   
   For information on navigating to the Schedule List, see [Viewing schedule list for Express Protects](#).

2. To create an Express Protect schedule task, click **Add**.

   The **Welcome** tab of the **Create Schedule Task Wizard** window appears.

3. Click **Next**.

   The Recovery Set Type window appears with the following options:

   - **Snapshot**: Schedule creation of a snapshot for a virtual machine or datastore.
   - **Express Protect**: Schedule Express Protect of a snapshot for a virtual machine or datastore.

4. To create a schedule for an Express Protect, select **Express Protect**.

5. Click **Next**.

   The **Schedule** window appears.

6. In the Schedule window, do the following:

   a. **Schedule task name**: The schedule task name is displayed. You can edit this field.
   b. To create an Express Protect schedule, select the task frequency from **Perform Recovery Set creation task**.
### Table 10: Scheduling frequency

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Frequency details</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily</td>
<td>Start time</td>
<td>You can specify the schedule start time in hours and minutes. Also, select AM or PM.</td>
</tr>
<tr>
<td></td>
<td>Recur Every</td>
<td>Specify the frequency of the scheduled task.</td>
</tr>
<tr>
<td>Hourly</td>
<td>Start time</td>
<td>You can specify the schedule start time in hours and minutes. Also, select AM or PM.</td>
</tr>
<tr>
<td></td>
<td>Recur Every</td>
<td>Specify the frequency of the scheduled task.</td>
</tr>
<tr>
<td>Monthly</td>
<td>Start time</td>
<td>You can specify the schedule start time in hours and minutes. Also, select AM or PM.</td>
</tr>
<tr>
<td></td>
<td>Day</td>
<td>To start the scheduled task, specify the day of the month.</td>
</tr>
<tr>
<td>One time only</td>
<td>Start date</td>
<td>Select the date on which you need to schedule the Express Protect.</td>
</tr>
<tr>
<td></td>
<td>Start time</td>
<td>You can specify the schedule start time in hours and minutes. Also, select AM or PM.</td>
</tr>
<tr>
<td>Weekly</td>
<td>Start time</td>
<td>You can specify the schedule start time in hours and minutes. Also, select AM or PM.</td>
</tr>
<tr>
<td></td>
<td>Select days of a week</td>
<td>All the seven days of a week are displayed. You can select one or more days.</td>
</tr>
</tbody>
</table>

7. Click **Next**.

The **Snapshot Configuration** window appears.

8. In the **Snapshot Configuration** window, do the following:
   a. Select **Create Recovery Set with VSS-aware application consistency**.

---

**NOTE:**

The **Expiration/Retention** option is not available for VVOL VMs.
This screen appears only for datastore level schedules:

b. Select one of the following options:

• Apply to all Virtual Machines
• Apply to following Virtual Machines

**NOTE:**

• **Overwrite default policy setting** is disabled for numeric policies. For Expiration/Retention policies, this option is enabled. You can modify the values for **Set Recovery Set to expire after** and **Retain Recovery Set** of the default policy.

• The **Expiration/Retention** option is not available for VVOL VMs. Therefore, expiration or retention details are not displayed for VVOL VMs.

9. Click **Next**.

The **Express Protect Configuration** window appears.

10. In the **Express Protect Configuration** window, specify the following details:

• **Name**: A name for the Express Protect.
• **Description**: A brief description of the Express Protect.
• **Backup Type**: Select either **Auto** or **Full** backup. For more information, see **Types of Backups**.

11. Select a backup policy from the policies listed in **Express Protect Policy**.

12. Click **Next**.
The Schedule Task Summary window appears.

13. Verify that the details listed in Schedule Task Summary are correct.

14. Click Finish.

The Schedule Modification window appears.

15. Click Yes.

Modifying Express Protect schedules

To update an existing Express Protect schedule:

Procedure

1. Navigate to Schedule List.

   **NOTE:**
   
   For information on navigating to the Schedule List, see Viewing a schedule list.

2. Select the schedule that you need to edit and click Edit. The Edit Schedule Task Wizard appears.

3. Click Next until you reach the Schedule and Snapshot Configuration page of the Edit Schedule Task Wizard.

4. Do the required changes to the schedule.

5. For information on setting the schedule parameters, see Scheduling Recovery Sets.

6. Click Next. The Express Protect Configuration page of the Edit Schedule Task Wizard appears.

7. Do the required changes to the schedule and then click Next.

   The Summary page appears.

8. Verify that the details listed in the Summary page are correct.

9. To complete the task schedule, Click Finish. The Schedule Modification window appears.

10. To confirm the changes made to the schedule, click Yes.

Element Recovery Technology

Element Recovery Technology (ERT) provides you the ability to access Recovery Sets objects as read-only entities from HPE StoreOnce protected Express Protect objects, without repopulating the primary disk array volumes.

**Transport protocols**

For ERT, the transport protocol between:

- ESXi host and RMC Appliance, must be over iSCSI.
- RMC Appliance and HPE StoreOnce can either be FC or IP depending on CoFC ID (Catalyst over Fiber Channel) or Coeth IP (Catalyst over Ethernet).

You can mount Express Protect objects on ESXi hosts, Windows, or Linux.

ERT tasks can be performed only for Express Protect of the Recovery Sets created after installing or upgrading to RMC-V v1.2.0 and later versions. For Express Protect objects that were created on versions before 1.2.0, you can perform only mount, unmount, and additional vCenter operations on the mounted Express Protect objects.

**NOTE:**

ERT feature does not support VMware VVOLs.

**ERT tasks**

You can perform the following ERT tasks on Express Protect objects from the vSphere Web Client GUI:
• Mounting Express Protect objects
• Unmounting Express Protect objects
• Copying VMDK files to datastores
• Attaching VMDK files to Virtual Machines
• Detaching VMDK files from Virtual Machines
• Virtual Machine Instant Recovery

Configuring ERT

Prerequisites

You must add RMC host as a dynamic discovery target to the ESXi host adapter to discover the Express Protect objects.

Prerequisites

Ensure that the ESXi host has an iSCSI Software Adapter as seen in the figure Configuring ERT.

![Figure 19: Configuring ERT](image)

This check is a one-time configuration task for each ESXi host.

Procedure

1. Log in to the vSphere Web Client and select a host from the Inventory panel.
2. Click Manage > Storage.
3. Click Storage Adapters and select the iSCSI adapter that you want to configure.
4. Click the Dynamic Discovery tab.
5. In Adapter Details, click Targets, and then click Dynamic Discovery.
6. Click Add.
7. Specify the IP address of the RMC Appliance and click OK.

**NOTE:**
After adding the iSCSI adapter details, you are prompted to rescan HBA for the changes to take effect.

### Copying VMDK files to datastores

Copy a VMDK file from mounted Express Protect objects to a target datastore on an ESXi host.

**NOTE:**
- When you copy a VMDK file from the Express Protect object datastore, the copied VMDK is always thick provisioned.
- If snapshot is created on a VM that has other VMFS snapshots associated with it, then the snapshot datastore also has VMFS snapshots files. This results in the failure of copy VMDK on mounted Express Protect object with the error *VMDK is part of one or more VMFS snapshots*. This is not a supported configuration for Express Protect VMDK copy operation.

**Procedure**

1. Navigate to the Manage tab.
2. From virtual disks (scroll down to see the virtual disks on the screen), select the VMDK file that you must attach and click Copy/Attach/Detach.

   The Copy/Attach window appears.

3. To copy the VMDK file to a datastore:
   a. Select **Copy to Datastore**.
   
      The datastores associated with the ESXi host are displayed.
   b. Select an appropriate datastore to which you want to copy the Express Protect.

      The following fields are populated when you select a datastore:
      - Target Datastore
      - Virtual Disk to copy
      - Virtual Disk target directory
   c. To overwrite the VMDK file, select **Overwrite existing Virtual Disk**.
4. Click **Copy**.
5. Click **Yes**.
Attaching VMDK files to Virtual Machines

This section describes how to attach a VMDK file from the mounted Express Protect objects to a VM on an ESXi host.

**NOTE:**
You can attach a VMDK file only if the Express Protect object is already mounted to an ESXi host.

To attach a VMDK file:

**Procedure**

1. Navigate to the Manage tab.
2. From virtual disks, select the VMDK file that you want to attach and then click Copy/Attach/Detach.
   
   The Copy/Attach window appears.
3. To attach the VMDK file to a Virtual Machine, click Attach to Virtual Machine.
   
   All VMs associated with the ESXi host are displayed.

   ![Copy/Attach Window]

   Figure 21: Attach VMDK files
4. Select the VM to which you want to attach the VMDK file.
5. Click Yes to confirm.

Detaching VMDK files from Virtual Machines

You can detach a VMDK file associated with an Express Protect that is attached to a Virtual Machine.

**Procedure**

1. Navigate to the Manage tab.
2. From virtual disks, select the VMDK file that you must detach and click Copy/Attach/Detach.
   
   The Detach window appears.
3. Click Detach.
4. Click Yes.
Virtual Machine Instant Recovery

This feature enables you to recover a VM from a mounted Express Protect Object datastore, and you can list Virtual Machines (VM) on the mounted Express Protect Object datastore. Also, you can recover VMs with the option to redirect the input/output (IO) to another target datastore. After the VM is registered to the vCenter, you can log in to the VM and recover the files.

Instant recovery of VMs from the Express Protect Object datastore

1. Without I/O redirect

   This option can be chosen during VM recovery if the VM is used for only instant file restores. However, the recovered VM continues to operate from the Express Protect Object datastore. Use the VM for data restore purposes only.

2. With I/O redirect

   This option can be chosen during VM recovery if the VM is used for active read and write operations. When the VM is powered on, the I/O is redirected to the target datastore. This option enables you to use the VM for file restores and new write operations without affecting the mounted Express Protect Object.

   IMPORTANT:
   - HPE recommends using the recovered VM only for instant or temporary file restores. However, for permanent file restores, you must use Storage V-Motion to transfer VMs to another datastore.
   - HPE recommends not to perform Storage V-Motion to the same I/O redirect datastore, for VMs recovered with IO redirect option enabled.

Listing VMs on Express Protect Object datastore

The Manage tab on the VM Instant Recovery window lists the VMs in the datastore. The VM table lists information of the VM register status, IO Redirect target datastore, and so on.

For VM backup set objects, the VM table lists only the VM to that belongs to the backup-set object.

For datastore backup set objects, the VM table lists all VMs in the datastore. However, VM recovery is successful only if all virtual disks in the VM are in the mounted Express Protect datastore.
NOTE:
The VM table is empty if the Express Protect Object is not mounted. After the Express Protect Object is mounted, the VM table displays the VMX file path for VMs. For VM level Express Protect, only the corresponding VM is listed in the table.

Recovering a VM from the mounted Express Protect objects on ESXi host

Procedure

1. **IMPORTANT:**
   You can recover a virtual machine only if the Express Protect object is already mounted to an ESXi host.

1. Click the Manage tab of the Express Protect Object.
2. Select the VM instant recovery option from the Virtual Machine table.
3. Specify the following VM details and then click **Finish**.
   
   **Folder**
   To register the VM. Choose the default folder if no folders are created.

   **Resource Pool**
   The resource pool of the ESXi host

   **Redirect I/O**
   - Select the check box for enabling I/O redirection to another datastore.
   - Select the datastore for I/O redirection.

   **Registered VM Name**
   The registered VM name is automatically generated with the syntax:

   `Original VM name + mounted datastore name`
For example, if Windows is the original VM name and if snap-1234-3pardatastore is the mounted datastore name. Then the registered VM name is: Windows_snap-1234-3pardatastore.

**NOTE:**

- VM recovery is not supported on VMs with RDM disks configured. Though VM registration might be successful, the power-on operation fails for the VM.
- VM recovery is not supported on VMware vApp.
- For subsequent VM recovery on the same VM, with redirect IO option, you must remount the Express Protect Object.
- If a virtual machine disk (VMDK) from the mounted Express Protect datastore is attached to an existing VM, then it is mandatory to detach the VMDK and remount the Express Protect Object before recovering the VM.

**Table 11: RDM support**

<table>
<thead>
<tr>
<th>Virtual RDM attached to VM in Datastore</th>
<th>Physical RDM attached to VM in Datastore</th>
</tr>
</thead>
<tbody>
<tr>
<td>App Consistent</td>
<td>Crash Consistent</td>
</tr>
<tr>
<td>Datastore/VM Snapshot</td>
<td>Not Supported</td>
</tr>
<tr>
<td>Remote snapshot</td>
<td>Supported</td>
</tr>
</tbody>
</table>

**Removing from inventory**

**Procedure**

1. Select the Remove from Inventory option from the Manage tab.
2. Click Unregister VM.

**Additional vCenter operations**

vCenter Server supports the following additional operations for mounted Express Protect objects:

- You can perform additional datastore-related operations on the Express Protect objects using the vCenter GUI after the Express Protect object is mounted and presented as a datastore to an ESXi host.

  In the Manage tab, the Snapshot Datastore column of the Express Protects displays the name of the Express Protect object datastore after it is mounted.

  The newly presented datastore becomes available in the Datastores section of the vCenter GUI.

- On selecting the Express Protect datastore that is listed under Manage > Files, you can browse and edit contents of the datastore.

  Hewlett Packard Enterprise recommends you to use Express Protect datastores only for restore purposes. Do not add or modify the contents on datastores.

- You can instantiate VMs directly from the Express Protect datastore using the Register VM option that is available for a datastore.

  For information on registering a virtual machine with the vSphere web client, see VMware Documentation.
- Make sure that all virtual disks of the VM belong to the mounted Express Protect datastore. It is strictly recommended not to register a VM containing virtual disks across different datastores.
- HPE recommends that you use the newly registered VM from the Express Protect datastore for temporary restore purposes and not to perform any data writes.
- After restoring a VM from an Express Protect object, if you use both the original and the restored VM at the same time, then IP address conflict might occur. Make sure that the IP addresses of the VMs are appropriately assigned to avoid any potential IP address conflict.
  - You can vMotion the VM to a different datastore (also belonging to a different ESXi host) enabling active usage for production level environment, including write operations, of the newly restored VM.

### Managing concurrent Express Protects

RMC Appliance allows you to submit any number of Express Protect jobs concurrently. You can reconfigure the vCPU and vRAM of the RMC Appliance so that the concurrent Express Protect jobs complete faster. Incremental Express Protects require double the number of streams, because it needs to read data from the HPE StoreOnce system.

For optimal Express Protect performance:

- Plan and schedule your Express Protect jobs to ensure that, at any point in time the number of data streams, is as shown in the table **Concurrent data streams**. For each RMC Appliance configuration, the number of data streams can be determined from the number of volumes that are backed up and the number of streams that are selected per volume.
- Also consider **Maximum Concurrent Data and Inbound Copy Jobs** of the HPE StoreOnce Backup system. This value is displayed in the StoreOnce catalyst under the **Status** and **Settings** tabs.

<table>
<thead>
<tr>
<th>vCPU/vRAM</th>
<th>Maximum data streams permitted</th>
</tr>
</thead>
<tbody>
<tr>
<td>2/8 GB (default)</td>
<td>32</td>
</tr>
<tr>
<td>4/16 GB</td>
<td>64</td>
</tr>
<tr>
<td>8/32 GB</td>
<td>128</td>
</tr>
<tr>
<td>16/64 GB</td>
<td>256</td>
</tr>
</tbody>
</table>

### Types of restores

RMC-V supports the following types of restores:

- Restore datastore snapshots from HPE 3PAR StoreServ Storage—This restore type is supported only on datastore level snapshots. If you have a VM level snapshot, restore operation is not allowed.
- Restore backup from HPE StoreOnce—This restore type is supported for both datastore level and VM level Express Protect to HPE StoreOnce tasks. ERT restores the mounted objects.

### Restoring from Express Protects

#### Prerequisites

- The storage system must be registered with an RMC instance.
- The Volume must exist on the storage system.
- The Volume must be read-write enabled.
- The Express Protect is in available status.
- All VMs in the datastore must be shut down before you perform a restore.
- Do not use a CPG that has a set Growth Limit for Copy CPG.
- Clear the Allow stale snapshots check box on the virtual volumes that are exported to a host.
Procedure

1. Select the Express Protect that you want to restore.

   **NOTE:**
   - Express Protects of Virtual Machines and datastores are listed under **Recovery Sets** tab.
   - Restore can be performed using the Express Protects of any of the RMC instances. However, you must not perform the restore operations simultaneously.
   - The volume to restore must be either the same size or greater size compared to the original volume.

2. Click **Restore**.

   **TIP:** You can also perform a restore by clicking **Actions > Restore**.

3. Select either of the following options:
   - **Restore to Snapshot:** If selected, system creates a snapshot first and then a restore is done. This snapshot is also listed below **Recovery Sets**. However, the field in the **Summary** screen of this snapshot, indicates that this snapshot is created as part of a restore.
   - **Restore to Parent Volume:** If selected, the backed-up data is restored to the parent virtual volume.

   **NOTE:**
   ◦ Before you do a restore to parent volume, ensure that all the VMs in the datastore are powered off.
   ◦ First incremental backup after an Express Protect restore to parent might be longer than the normal incremental backup duration.
   ◦ **Restore to any Volume:** If selected, the backed-up data is restored to any other virtual volume (existing in HPE 3PAR StoreServ Storage system) except the parent volume.

      Selecting restore for a Virtual Machine of type VMFS, restores the VMFS Virtual Machine to another HPE 3PAR StoreServ storage system registered with the RMC appliance.
      ◦ The **Array Volume** must be created prior to performing the restore. The size of the target volume must be equal to or greater than the size of the source volume.

The following screen appears if you have selected restore for a Virtual Machine of type VVOL. This task restores and recreates the VVOL Virtual Machine to another storage container known to the vCenter Server.

   **NOTE:** The **Array Volume** must be created prior to performing the restore. The size of the target volume must be equal to or greater than the size of the source volume.
Specify the following details:

- **Virtual Machine Name**: Select a Virtual Machine from the list of the parent Virtual Machine name. By default, the parent Virtual Machine name is displayed along with the current time stamp.

- **Host**: Select an appropriate ESXi host from the list of compatible ESXi hosts that are available in the vCenter Server.

- **Resource Pool**: The parent resource pool of the selected ESXi host is displayed.

- **DataStore**: The VVOL datastores associated with the ESXi host are displayed.

- **Power on Virtual Machine After Restore**: Select this option to power on the recreated Virtual Machine.

**NOTE:**

Restoring a Virtual Machine of type VVOL to the parent volume does not restore the configuration information. However, if you need to restore the configuration information, then you must use the **Restore to Another Volume (Recreate VM)** option.

4. Click **OK**.
The status of the Express Protect changes to restoring. After the restore is complete, the status changes to available.

**NOTE:** For restore to any volume, the OK button is enabled only if the Array Volume names are added.

If you perform restore in a multinode configuration and if the associated node fails, then the restore fails. To restore data, you must manually trigger the restore task and it will take the path of the secondary node and complete the restore task successfully.

**Extra steps to complete restore to any Volume**

If you have selected the Restore to Any Volume option during restore, then to complete the restore you must perform the following steps after the procedure mentioned in the beginning of this section.

1. After the restore operation is successfully completed, export the volume from the storage system to the ESXi Server.
2. Scan the storage system once again.
3. If it is the same ESXi Server where the source virtual volume was presented, then check "Create new signature and keep data intact" option.
4. Refresh the data center from the vSphere Web Client.

**Mounting snapshots and performing Copy/Attach VMDK for snapshots created during restore to snapshot**

1. Navigate to the Summary tab of the snapshot object and identify the snapshot name.
2. Log in to the HPE 3PAR StoreServ Management Console and export the previously identified snapshot to an ESXi host that you want to mount.
3. Log in to the vSphere Web Client select a host, a cluster, or a data center.
4. Click Actions > All vCenter Actions > Rescan Storage. The Datacenter — Rescan Storage window appears.
5. Select Scan for New Storage Devices and Scan for New VMFS Volumes and click OK. The datastore is listed in the Related Objects tab of the Datacenter page.
6. Right-click on datastore that is newly created. Select Browse Files (the datastore, if on same ESXi host will have the original name appended to it; otherwise, the same name will exist for the datastore).
7. Select the required file. Right-click Download from Datastore. To copy the file, navigate to another datastore and use the Upload a file to the Datastore option.
8. Or, if you need to attach a VMDK to any other VM:
   a. Right-click the VM and select Edit Settings.
   b. Select the Existing Hard Disk option from the New Device drop-down list and click Add. The Select File window appears.
   c. Select the datastore, select a virtual machine folder, and select the disk to add.
   d. Review the selected options and click OK.

**Working with Catalyst Copy Recovery Sets**

Catalyst Copy enables you to make a copy of the Express Protects that are created on an HPE StoreOnce store to another HPE StoreOnce store. Catalyst Copy supports all ERT tasks supported for Express Protect.

**Prerequisites**

- Source and target HPE StoreOnce stores must be available on the RMC appliance.
- HPE 3PAR StoreServ storage system running 3PAR OS 3.2.1 MU1 or later.
Creating Catalyst Copy policies

NOTE:
You cannot edit or delete Catalyst Copy policies from the RMC-V GUI. However, you can edit or delete Catalyst Copy policies from the RMC VM GUI.

Configuring default Catalyst Copy policies

Procedure

1. Navigate to the vSphere Web Client home page.
2. Click **VMs and Templates** and select a VM or datastore.

   The system displays all the available Recovery Sets in the **Recovery Sets** tab under **Related Objects**.
3. Click **Actions** > **All HPE Recovery Manager Central Actions** > **Set Recovery Set Creation Policy**, and then click **Express Protect**.

   The **Default Express Protect/Catalyst Copy Policy Settings** screen appears.

   **NOTE:**
   For more information on Default Express Protect Policy settings, see **Creating default Express Protect policies**.

4. Select **Configure Default Copy Policy Settings**.

   The **Default Copy Policy Settings** window appears.
5. Click **Create Copy Policy**.

   The **Create New Copy Policy** screen appears.

   **Create New Copy Policy**

   - **Copy Policy Name:**
   - **Copy Policy Description:** (Optional)
   - **Express Protect Policy:**

   **Details of Selected Express Protect Policy**

   - **Backup Policy**
   - **Backup IP**
   - **StoreName**

   [Buttons: Create, Cancel]

6. In the **Create New Copy Policy** screen, do the following:
   a. Specify a name for the Copy Policy.
   b. Specify a meaningful description for the Copy Policy.
   c. Select an Express Protect Policy.

   The details of the selected policy are displayed under the **Details of Selected Express Protect Policy** section.
Creating Catalyst Copy Recovery Sets

This section describes how to create Catalyst Copy Recovery Sets using one-click and direct methods.

Creating one-click Catalyst Copy Recovery Sets

You can use one-click Catalyst Copy to create a Snapshot, an Express Protect, and a Catalyst Copy.

Procedure

1. Navigate to the vSphere Web Client home page and click **VMs and Templates**.
2. Select a VM or datastore.
3. Click **Related Objects** > **Recovery Sets**.
   
   For vCenter 6.5, click **More Objects** > **Recovery Sets**.

   Recovery Sets related to the VM or datastore are displayed.

4. Right-click the VM or datastore, and then click **All HPE Recovery Manager Central Actions** > **Create Recovery Set** > **Express Protect**.

   The **Create Express Protect/Catalyst Copy Recovery Set** window appears.

5. Specify the Snapshot, Express Protect Backup, and Catalyst Copy details and then click Create.

Creating Catalyst Copy Recovery Sets

Procedure

1. Navigate to the home page and click **VMs and Templates**.
2. Click the Virtual Machine or Datastore for which you want to create the Recovery Set.
3. Click **Related Objects**, and then click **Recovery Sets**. All the Recovery Sets related to the Virtual Machine are displayed.
4. Right-click the backup object and click **Create Express Protect/Catalyst Copy Recovery Set**.

   The **Create Express Protect/Catalyst Copy Recovery Set** window appears.
5. In the Create Express Protect/Catalyst Copy Recovery Set window, do the following:
a. Specify a name for the Catalyst Copy Recovery Set.
b. Specify a meaningful description of the Catalyst Copy Recovery Set.
c. The default Copy Policy is displayed. To change the default policy, clear the Default Policy check box and then select a policy from the drop-down list.
d. To create and apply a new policy, click Create Copy Policy.

For more information on creating a Catalyst Copy policy, see Configuring default Catalyst Copy policies.

6. Click Create and then click Yes to confirm creating the Catalyst Copy Recovery Set.

NOTE:
Use the RMC GUI to cancel or abort the Catalyst Copy Recovery Set task that you have initiated from RMC-V. For more information on canceling the Catalyst Copy Recovery Set tasks, see the HPE Recovery Manager Central User Guide.

Managing Catalyst Copy Recovery Set schedules

RMC-V allows you to create Catalyst Copy Recovery Sets according to a predefined schedule. Using the RMC-V scheduler, you can:

- View a schedule list
- Add—Add a schedule
- Edit—Edit a schedule
- Delete—Delete a schedule
- Refresh—Refresh the schedule list

Creating Catalyst Copy schedules

You can automatically create Catalyst Copies according to a predefined schedule.

Procedure

1. Navigate to the Schedule List.
2. To create a Catalyst Copy schedule, click Add.

The Welcome tab of the Create Schedule Task Wizard window appears.

3. Click Next.

The Recovery Set Type window appears with the following options:

<table>
<thead>
<tr>
<th>Snapshot</th>
<th>To schedule Snapshot for a VM or a datastore.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Express Protect</td>
<td>To schedule an Express Protect or Catalyst Copy of a Snapshot for a VM or datastore.</td>
</tr>
</tbody>
</table>

4. Select Express Protect.
5. Click Next. The Schedule window appears.

a. The Schedule task name displays a schedule name. You can edit this field.
b. To create a Catalyst Copy schedule, select the task frequency from Perform Recovery Set creation task. The following frequencies are listed:

More options are displayed when you select a frequency from Perform Recovery Set creation task. The Scheduling frequency table lists the frequency details of a schedule.
### Table 13: Scheduling frequency

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Frequency details</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hourly</td>
<td>Start time</td>
<td>You can specify the schedule start time in hours and minutes. Also, select AM or PM.</td>
</tr>
<tr>
<td></td>
<td>Recur Every</td>
<td>Specify the frequency of the scheduled task.</td>
</tr>
<tr>
<td>Daily</td>
<td>Start time</td>
<td>You can specify the schedule start time in hours and minutes. Also, select AM or PM.</td>
</tr>
<tr>
<td></td>
<td>Recur Every</td>
<td>Specify the frequency of the scheduled task.</td>
</tr>
<tr>
<td>Weekly</td>
<td>Start time</td>
<td>You can specify the schedule start time in hours and minutes. Also, select AM or PM.</td>
</tr>
<tr>
<td></td>
<td>Select days of week</td>
<td>All the seven days of a week are displayed. You can select one or more days to schedule a weekly Catalyst Copy.</td>
</tr>
<tr>
<td>Monthly</td>
<td>Start time</td>
<td>You can specify the schedule start time in hours and minutes. Also, select AM or PM.</td>
</tr>
<tr>
<td></td>
<td>Day</td>
<td>To start the scheduled task, specify the day of the month.</td>
</tr>
<tr>
<td>One time only</td>
<td>Start date</td>
<td>Select the date on which you need to schedule the Catalyst Copy.</td>
</tr>
<tr>
<td></td>
<td>Start time</td>
<td>You can specify the schedule start time in hours and minutes. Also, select AM or PM.</td>
</tr>
</tbody>
</table>

6. Click **Next**. The **Snapshot Configuration** window appears.

7. In the **Snapshot Configuration** window, do the following:
   a. To create application consistent Recovery Sets, select **Create Recovery Set with VSS-aware application consistency**.
   b. Select one of the following options:
      - **Apply to all Virtual Machines**
      - (Required for databases only) **Apply to following Virtual Machines**
      - **Continue with creation even when VMs fail to transit to the application consistent state**—Select this option if you require RMC-V to continue creating array snapshots even if any of the
selected datastore VMs encounter I/O quiesce error while creating VMware VMFS snapshots for application consistency.

NOTE:
- Overwrite default policy setting is disabled for numeric policies. However, for Expiration/Retention policies this option is enabled. You can modify the values for Set Recovery Set to expire after and Retain Recovery Set of the default policy.
- The Expiration/Retention option is not available for VVOL VMs. Therefore, Expiration/Retention details are not displayed for VVOL VMs.

8. Click Next. The Express Protect Configuration window appears.
   a. Specify the following information:
      Name
      Specify a name for the Express Protect.
      Description
      Enter a brief description of the Express Protect.
      Backup Type
      Select either Auto or Full backup. For more information, see Types of Backups.
   b. To apply an existing Express Protect policy, select a policy from Express Protect Policy.
      If you have to create a policy, click Create Express Protect Policy.
      For more information on selecting or creating an Express Protect policy, see Scheduling Express Protects.
9. Click Create Catalyst Copy Recovery Set.
   The Catalyst Copy Configuration window appears.
10. Do the following:
   a. Specify the following details:
      • **Name**
        Specify a name for the Catalyst Copy.
      • **Description**
        Enter a brief description of the Catalyst Copy.
   b. To apply an existing Copy Policy, select a policy from **Copy Policy**. If you have to create a Copy Policy, click **Create Copy Policy**.
      For more information, see steps 6 through 8 in section **Configuring default Catalyst Copy policies**.
   c. **Default Policy** - Select to apply the default policy.

   **NOTE:**
   Ensure that Copy policy and Express Protect policy do not refer to the same store.

11. Click **Next**.
    The **Summary** window appears. Verify that the details listed in this window are correct.
12. To complete the task schedule, click **Finish**.
    The **Schedule Modification** window appears.
13. To confirm and schedule the task, click **Yes**.
NOTE:
If a VM or datastore is removed, then the associated scheduled tasks continue to run. However, these tasks cannot be managed from the vSphere Web Client. Therefore, the task must be manually removed from RMC GUI.

Modifying Catalyst Copy schedules

Procedure
1. Navigate to Schedule List.

   NOTE: For information on navigating to the Schedule List, see Viewing the schedule list.

2. Select the schedule and click Edit.

   The Edit Schedule Task Wizard appears.

3. Click Next until you reach the Schedule and Snapshot Configuration pages of the Edit Schedule Task Wizard.

4. Do the required changes to the schedule.

   For information on setting the schedule parameters, see Scheduling Recovery Sets.

5. Click Next. The Express Protect Configuration page of the Edit Schedule Task Wizard appears.

6. Do the required changes to the schedule and then click Next.

   The Summary page appears.

7. Verify the details listed in Schedule Task Summary.

8. To complete the task schedule, click Finish.

   The Schedule Modification window appears.

9. To confirm the changes made to the schedule, click Yes.

Deleting Catalyst Copy schedules

Procedure
1. Navigate to Schedule List.

2. Select the schedule that you have to remove and click Delete.

3. To confirm deleting the schedule, click Yes.

   The schedule is removed from the schedule list.

Restoring from Catalyst Copy

Prerequisites
- The storage system must be registered with an RMC instance.
- The volume must exist on the storage system.
- The volume must be read-write enabled.
- Do not use a CPG that has a set Growth Limit for Copy CPG.
- Clear the Allow stale snapshots check box on the virtual volumes that are exported to a host.

Procedure
1. Select the Catalyst Copy from which you need to restore.
IMPORTANT:
You can restore Catalyst Copies that are in the available state only.

NOTE:
• Catalyst Copies of Virtual Machines are listed under the Recovery Sets tab.
• Restore is performed using the Catalyst Copies of any of the RMC instances. However, you must not perform the restore operations simultaneously.

2. Click Restore.

TIP: You can also perform a restore by clicking Actions > Restore.

3. Select one of the following options:
   • **Restore to Snapshot**: If you select this option, system creates a snapshot first and then a restore is done. This snapshot is also listed in Recovery Sets. However, the field in the Summary screen of this snapshot, indicates that this snapshot is created as part of a restore.
   • **Restore to Parent Volume**: If you select this option, the backed-up data is restored to the parent virtual volume.

   NOTE:
   ◦ Before you do a restore to parent volume, ensure that all the VMs in the datastore are powered off.
   ◦ The first incremental backup after a Catalyst Copy restore to parent might be longer than the normal incremental backup duration.

   • **Restore to any Volume**: If you select this option, the backed-up data is restored to any other virtual volume (existing in HPE 3PAR StoreServ storage system) except the parent volume.

The following screen appears if you select restore for a Virtual Machine of type VMFS. This task restores the VMFS Virtual Machine to another HPE 3PAR StoreServ storage system registered with the RMC appliance.
The following screen appears if you have selected restore for a Virtual Machine of type VVOL. This task will restore and recreate the VVOL Virtual Machine to the vCenter Server.
An **Array Volume** must be created before performing a restore. The size of the target volume must be equal to or greater than the size of the source volume.

- Specify the following details:
  - **Virtual Machine Name**: Select a VM from the list of the parent VMs. By default, the parent VM name is displayed along with the current time stamp.
  - **Host**: Select an appropriate ESXi host from the list of compatible ESXi hosts that are available in the vCenter Server.
  - **Resource Pool**: The parent resource pool of the selected ESXi host is displayed.
  - **DataStore**: The VVOL datastores associated with the ESXi host are displayed.
  - **Power on Virtual Machine After Restore**: Select this option to power on the recreated VM.
NOTE:
Restoring a Virtual Machine of type VVOL to the parent volume does not restore the configuration information. However, if you need to restore the configuration information, then you must use the **Restore to Another Volume (Recreate VM)** option.

4. Click **OK**.

The status of the Catalyst Copy changes to **restoring**. After the restore is complete, the status changes to **available**.

**NOTE:**
For restore to any volume, the **OK** button is enabled only if the **Array Volume** names are added.

If you perform restore in a multinode configuration and if the associated node fails, then the restore fails. To restore data, you must manually trigger the restore task and it will take the path of the secondary node and complete the restore task successfully.

**Extra steps to complete restore to any Volume**

If you have selected the **Restore to Any Volume** option during restore, then to complete the restore task you must perform the following additional steps:

1. After the restore operation is successfully completed, export the volume from the storage system to the ESXi Server.
2. Scan the storage system.
3. Select the **Create new signature and keep data intact** option if the same ESXi Server where the source virtual volume was presented.
4. Refresh the data center from the vsphere Web Client.

**Mounting snapshots and performing Copy/Attach VMDK for snapshots created during restore to snapshot**

1. Navigate to the **Summary** tab of the snapshot object and identify the snapshot name.
2. Log in to the HPE 3PAR Management Console and export the previously identified snapshot to an ESXi host that you need to mount.
3. Log in to the vsphere Web Client and select a host, a cluster, or a data center.
4. Click **Actions > All vCenter Actions > Rescan Storage**.

   The **Datacenter — Rescan Storage** window appears.
5. Select **Scan for New Storage Devices** and **Scan for New VMFS Volumes** and click **OK**.

   The datastore is listed in the **Related Objects** tab of the **Datacenter** page.
6. Right-click the newly created datastore. Select **Browse Files** (the datastore, if on same ESXi host will have the original name appended to it, otherwise, the same name exists for the datastore).
7. Select the required file. Right-click **Download from Datastore**. To copy the file, navigate to another datastore and use the **Upload a file to the Datastore** option.
8. To attach a VMDK to any other VM:
   a. Right-click the VM and select **Edit Settings**.
   b. Select the **Existing Hard Disk** option from the **New Device** drop-down list and click **Add**.
      
      The **Select File** window appears.
   c. Select the datastore, virtual machine folder, and the disk to add.
   d. Review the selected options and click **OK**.
Using HPE 3PAR Peer Motion Manager Software with RMC-V

HPE 3PAR Peer Motion Manager is a feature of the 3PAR Operating System Software and manages migration of data in between existing storage systems or third-party storage arrays. RMC-V supports HPE 3PAR Peer Motion Manager data migration activities without any impact on host operations while monitoring the primary storage system.

⚠️ IMPORTANT:

After the data migration between two HPE 3PAR StoreServ Storage systems is complete, log out of Web Client, log in again, and update the Recovery Manager cache. All scheduled tasks fail until you perform Recovery Manager cache update after the data migration.

Before migrating if the virtual volume is already in use by an ESXi host, the following conditions are applicable:

- The Virtual Copies created by a potential migrating virtual volume cannot migrate with its virtual volume during an active Peer Motion migration operation. The virtual copies become invalid from RMC-V perspective even if they continue to appear in RMC-V. Log out of Web Client, log in again, and then update the Recovery Manager cache. You can access the virtual copies using HPE 3PAR Management Console or CLI. If you do not need these virtual copies, you must manually remove them.
- RMC-V supports migration between two HPE 3PAR StoreServ storage systems only. Migration from HPE EVA P6000 storage to HPE 3PAR StoreServ storage is not supported.
- The existing snapshots are not migrated; only the base volume is migrated. After migration, the existing snapshot information for that VM is not available.
- All virtual volumes that are part of a VM or datastore must be migrated during HPE 3PAR StoreServ storage to HPE 3PAR StoreServ storage Peer Motion. If all virtual volumes are not migrated, unexpected behavior might occur.

For more information about performing Peer Motion data migration, see the HPE 3PAR Peer Motion User Guide. To download the HPE 3PAR Peer Motion User Guide click [http://www.hp.com/go/3par](http://www.hp.com/go/3par), navigate to your product page, click Support, and then click Manuals.

- To view backups taken before Peer Motion, select one of the Restore Express Protect/Catalyst options in the Restore Now window in RMC GUI.
- To Restore backups taken before Peer Motion, select the Restore Express Protect/Catalyst Copy option in the Restore Now window in RMC GUI.
- After Peer Motion, you must perform a full backup before you restart the incremental backup schedules on Virtual Machines or datastores.

For more information on RMC GUI, see the HPE Recovery Manager Central User Guide.
Troubleshooting

Common issues

To troubleshoot common issues, perform the following tasks:

- Update Recovery Manager Cache.
  
  To update Recovery Manager Cache, right-click any object and click All HPE Recovery Manager Central Actions > Update Recovery Manager Cache.
- Log out and log in to the vSphere Web Client.
- Restart the VMware vCenter Web Client service.

Registering an RMC Appliance

RMC configuration error

Symptom

The following error message is displayed on the HPE RMC Configuration page:

Web client session is not initialized.

Cause

This error message appears if the RMC appliance fails to access or add the Storage and Backup systems.

Action

Procedure

- During deployment of RMC, ensure that the DNS configuration is done correctly to resolve the hostname or fully qualified domain name (FQDN) of the vCenter server hostname, storage system, and backup system.

HPE 3PAR OS upgrade error

Symptom

After upgrading HPE 3PAR OS from 3.2.1 to 3.2.2, the Incompatible version <version_number> found on storage system StorageSystem_number>, requires '322000' or above error message is displayed.

Cause

If changes are made in the HPE 3PAR StoreServ storage system, such as, upgrading HPE 3PAR OS and changing HPE 3PAR licenses.

Action

Procedure

1. Log in to the RMC GUI (https://<IP_address> or <Host_name>).
2. Click HPE RMC Configuration > Storage System > Action Menu and then click Refresh.
3. Click Yes, Refresh for the changes to be effective.
Recovery Set Snapshot or Express Protect backup restore

Symptom

Error message Failed to restore array Snapshot is displayed.

Cause

Recovery Manager cache is not updated.

Action

Procedure

1. Power off the VM.
2. Right-click the VM and then click All HPE Recovery Manager Central Actions > Update Recovery Manager Cache.
   
Perform these steps before restoring a Recovery Set Snapshot or Express Protect backup.

RMC-V Installation

Installation fails

Symptom

Installation using the RMC installation wizard fails.

Solution 1

Cause

The .exe files are in a different folder.

Action

Procedure

• Ensure that the .exe files extracted from the zip folder are all in the same folder.

Solution 2

Cause

The free space in the Windows server is less than 4 GB.

Action

Procedure

• Ensure a minimum space of 4 GB on the Windows server for the installer to execute.

User does not have required privileges

Cause

Symptom

Action

Procedure

• Ensure that you have the required privileges for deployment and RMC-V plug-in integration. For more information, see For deployment and For RMC-V plug-in installation.

Old RMC-V plug-ins

Symptom

Error: Found an RMC-V plugin already registered with the vCenter server.

Cause

Existence of old RMC-V plug-ins.

Action

Procedure

2. Go to Content > Extension Manager.
3. Click the Unregister Extension link.
4. Enter the RMC-V plug-in name: com.hp.rmcv.ngc_6.0 or com.hp.rmcv.ngc.
5. Click **Unregister**.
6. Repeat step 2 to step 5 until all old plug-ins are removed.

### Unable to connect to the given IP/Host Name

**Symptom**

Error: Unable to connect to the given IP/Host Name. Provide valid IP/Host Name and credentials.

![Initialization Error](image)

**Action**

**Procedure**

- Ensure the following:
  - vCenter server is ON.
  - vCenter Web Client service is running on the vCenter server.
  - vCenter firewall is disabled.
  - vCenter server username and password are correctly entered.
  - vCenter server, ESXi host, RMC VM, and local machine with the installer are connected through the same network (DNS, Gateway, subnet).
  - If FQDN is used, ensure that the domain server is accessible.

### Unable to add storage or backup systems

**Symptom**

Unable to add HPE 3PAR StoreServ or HPE Hyper Converged storage systems, and HPE StoreOnce Backup systems.

**Action**

**Procedure**

- Ensure the following:
  - Valid credentials are entered for HPE 3PAR StoreServ or HPE Hyper Converged storage systems, and HPE StoreOnce Backup systems.
  - RMC VM, HPE 3PAR StoreServ or HPE Hyper Converged systems, and HPE StoreOnce Backup systems are connected through the same network and can communicate in the network (DNS, Gateway, subnet).
  - If FQDN is used, ensure that the domain server is accessible.
  - If Hostname is used, ensure that the search domain is entered, while configuring RMC during installation.

### OVF deployment failed

**Symptom**

Exception in deployOVF error during installation using the installation wizard.
Action

Procedure

1. Perform the following checks:
   1. Network connectivity. VMDK upload can fail because of network issues.
   2. Ensure that the required licenses are installed on the ESXi or vCenter host.
   3. Clean the stalled VM entry on the ESXi host and restart installation.

Not able to reach the RMC VM

Symptom

IP reachability error during RMC-V installation: Not able to reach the IP x.x.x.x. Check the default gateway of the installer host.

Action

Procedure

• Perform the following checks:
• RMC VM, Installer host, and vCenter server are connected through the same network and can communicate in the network (DNS, Gateway, subnet).
• If FQDN is used, ensure that domain server is accessible.
• If Hostname is used, ensure that search domain is entered, while configuring RMC during installation.

Not able to reach the RMC IP

Symptom

Error: Not able to reach the IP. Check the default gateway of the installer host.

Action

Procedure

1. Perform the following checks:
   1. Ensure that DHCP is configured in the network.
   2. Ensure that DHCP has available IP addresses for allocation.

Password update failed

Symptom

RMC password update failed during installation.

Action

Procedure

1. Ensure that firewall is disabled on the vCenter server and installer host.
2. Ensure that RMC is accessible through the network.

RMC-V plug-in not visible

Symptom

RMC-V plug-in is not visible after successful installation.
Action

Procedure

1. Restart the VMware Web Client service on the vCenter server.
2. Disable firewall on the vCenter server.
3. Ensure that RMC is accessible from the vCenter server. Network configuration (DNS, Gateway, Subnet).
4. Modify the network configuration for RMC. For more information, see the *HPE Recovery Manager Central User Guide*.

**Network ports not displayed**

**Symptom**

On the Network Interface Settings screen, the port group names are not displayed in the Network Port drop-down.

**Cause**

The ESXi server is configured with virtual and distributed switches, these switches have port groups. If the names of these port groups have hyphens, then the port groups are not displayed in the Network Port drop-down, on the Network Interface Settings screen.

**Action**

**Procedure**

• Rename the port group names on the ESXi server.

**Diagnostics error**

**Symptom**

The Diagnostics screen reports that: **RMC-V license not available in the storage system.**

**Cause**

Temporary RMC-V license is used.

**Action**

**Procedure**

• Ignore the error message if you can create the Snapshot from the RMC-V vCenter Webclient plugin GUI.

**RMC-V response takes more time than the vCenter timeout**

**Symptom**

Performing RMC-V operations using GUI displays the error message: *The query execution timed out because of a back-end data adapter 'com.hp.rmcv.service.RmvDataAdapter' which took more than 120 seconds.*

**Cause**

By default, the timeout for vCenter is 120 seconds. However, in some cases RMC-V response takes more than the vCenter timeout.
Invalid RMC username and password

Symptom

Deploying RMC displays the error message RMC Username and Password is invalid.

Action

Procedure

• Clean up the mob entries.

RMC-V Upgrade

Found an existing RMC-V plug-in

Symptom

Error: Found an existing RMC-V plug-in in the vCenter server.

Cause

Existence of old RMC-V and OV4VC plug-ins.

Action

Procedure

• After RMC-V upgrade, uninstall old RMC-V and OV4VC plug-ins. However, if you must use OV4VC after the upgrade, the old plug-ins are available on the web client. The old plug-ins do not affect the RMC-V operations with the new plug-in.

Unable to proceed with upgrade

Symptom

Unable to proceed with upgrade, in case old RMC-V plug-ins exist in the vCenter server.

Action

Procedure

• Unregister the old RMC-V plug-ins, perform the following steps:
  2. Go to Content > Extension Manager.
  3. Click the Unregister Extension link.
  4. Enter the RMC-V plug-in name: com.hp.rmcv.ngc_6.0 or com.hp.rmcv.ngc.
5. Click Unregister.
6. Repeat step 2 to step 5 until all old plug-ins are removed.

**Upgrade failure**

**Symptom**

Upgrade to RMC-V 4.0.0 was unsuccessful.

**Action**

**Procedure**

- Ensure the following:
  - The network configuration is correct.
  - The processes in RMC are not in running state. You can check the processes on the Activity link of the RMC GUI.
  - The RMC VM is accessible from the installer host and vCenter server.
  - The domain server is accessible when using FQDN.
  - The search domain is configured in RMC when using Hostname. For more information, see the HPE Recovery Manager Central User Guide.

**Multi RMC deployment partial failures**

**Symptom**

Multi RMC deployment partial failures observed.

**Action**

**Procedure**

1. Perform the following checks:
   1. RMC VM, Installer host, and vCenter server are connected through the same network and can communicate in the network (DNS, Gateway, subnet).
   2. If FQDN is used, ensure that domain server is accessible.
   3. If Hostname is used, ensure that search domain is entered, while configuring RMC during installation.
   4. Rerun the installer for failed RMCs and restart the VMware Web Client service on the vCenter server.

**Installer logs**

**Symptom**

Location of the installer logs on the installer host.

**Action**

**Procedure**

- Installer logs are available at C:\Program Files\HPE\RMCV on the system, where the installer was executed.

**RMC-V Snapshots**
Smartclone with multiple disks or volumes

Symptom
HPE RMC Snapshot creation fails with error: Exception in CreateVMFSSnapshot operation for VM 'test' Detected an invalid snapshot configuration.

Cause
This error appears if you create snapshots of multiple base volumes with a smartclone for each snapshot, and add a virtual machine to the inventory. And when the secondary drives of that virtual machine are removed and added to the new smartclone datastore volumes.

Action

Procedure
• Follow the recommended actions at: VMware Knowledge Base. Retry creating Snapshot from RMC.

Unable to back up Snapshots

Symptom
When you attempt a Snapshot backup, with the base volume deleted, an error is displayed: Datastore/VM object not found in the vCenter. Object may have been deleted from the inventory or the object base volume may have been deleted.

Cause
The datastore volume is unexported or deleted.

Action

Procedure
• Perform the Snapshot backup from the RMC GUI.

Snapshot creation failed

Symptom
Error: Snapshot hierarchy is too deep. Failed to create array snapshot on VVOL-VM.

Action

Procedure
• Remove existing VMware native snapshots from the VVOL VM, perform the following steps:
1. Right-click the VVOL-VM.
2. Select Manage Snapshots.
3. Delete the VMware native Snapshots.

**Snapshots and Backups are not displayed**

**Symptom**

After a VM with existing snapshots and backups is removed from the vCenter inventory and readded to the inventory, the previously existing snapshots and backups in the VM do not appear in the RMC-V GUI.

**Cause**

When a VM is removed from the vCenter Inventory, the Managed Object Reference (MoRef) ID of the VM is removed. And when the VM is readded, a new MoRef ID is set. As a result, the existing snapshots and backups are removed from the RMC catalog.

**Action**

**Procedure**

- None

**Incorrect Snapshot count**

**Symptom**

After migration, if array snapshot count for any LUN reaches the maximum (2048), the Snapshot count for VM is shown as greater than the max limit (500).

**Action**

**Procedure**

- To restore the count back to 500, delete few array Snapshots in the LUN, and create Snapshots on the VM.

**Remote Copy Groups not displayed**

**Symptom**

Remote Copy Groups are not displayed on the Remote Recovery Configurations page.

**Cause**

NAS datastore configured on the ESXi server.

**Action**

**Procedure**

1. Remove NAS datastore.
2. Run Update Recovery Manager Cache.

**RMC-V Schedules**
Failed email notifications

Symptom
A schedule is created in the RMC-V GUI, for the email notifications of virtual machines or datastores. The schedule continues to run after the virtual machine or datastore is deleted, sending failed email notifications.

Action

Procedure
• On the RMC GUI, remove the schedule.

Incorrect VMs on the Summary page

Symptom
On a datastore scheduler, if there are multiple VMs, the VMs selected on the scheduler may vary from the VMs that appear on the Summary page. This behavior can result in the creation of a schedule that does not reflect the VMs you selected.

Action

Procedure
• Close and reopen the datastore scheduler. If you are editing an existing schedule, recreate the schedule.

Failed to create array snapshot

Symptom
If objects (VMs, Datastores, or RCgroups) are deleted or modified after schedule creation, an error message is displayed: Failed to create array snapshot. HPE RMC Snapshot creation failed.

Action

Procedure
• After objects (VMs, Datastores, or RCgroups) are deleted or modified after schedule creation, you must update the corresponding schedule to reflect the change.

Element Recovery Technology

Instant VM recovery fails

Symptom
Subsequent Instant VM Recovery with Redirect I/O option operation fails with the error Invalid snapshot configuration was detected.

Cause
Invalid snapshot configuration.
Action

Procedure

• Remount the Express Protect object and register the VM again for file level recovery.

vCenter selection dialog box

Symptom

When the VM is powered on, the vCenter might display a user selection dialog box to select either the I Copied it or I moved it option.

Cause

Registering the same VM from the snapshot datastore.

Action

Procedure

• Select I moved it if you want to reuse the same VM or select I copied it if you want to use the original VM with the new VM.

VM recovery error

Symptom

VM recovery, when creating a snapshot, fails with error message: File <unspecified filename> is larger than the maximum size supported by datastore <unspecified datastore>.

Cause

VMDK on the VM is larger than 2,032 GB.

Action

Procedure

• Perform VM recovery without the I/O redirect option. For more information, see VMware Knowledge Base.

Mount/Unmount error

Symptom

Express Protect object Mount/Unmount tasks fails with the error message: An Unknown Error occurred.

Cause

HPE StoreOnce is offline.
Action

Procedure

• Ensure the HPE StoreOnce server is online.

Unable to detect Express Protect Object LUNs

Symptom

Express Protect object Mount/Unmount task fails with the error message: Unable to detect Express Protect Object LUNs.

Cause

To discover the Express Protect object iSCSI targets, add an RMC host as a dynamic discovery target to the ESXi host adapter.

Action

Procedure

1. Click the ESXi host.
2. Click Manage > Storage > Storage Adapters.
3. To add RMC IP as the iSCSI server, select the iSCSI adapter and then click Dynamic Discovery > Add.

Unable to detect Express Protect Object volumes

Symptom

Mount task fails with the error message: Unable to detect all Express Protect Object volumes. Please make sure RMC IP is added as a dynamic discovery target on the ESXi host iSCSI Initiator. You might also see that some of the target devices in iSCSI Software Adapter > Adapter Details display Inactive or Error under the Operational State column.

NOTE:

If the vCenter Server (RMC-V plug-in) locale is Japanese language, then the My Tasks might display Fault task error.

Action

Procedure

1. Make sure that you configure the RMC appliance as a dynamic discovery target with the ESXi host iSCSI software adapter.
2. Select the iSCSI software adapter on which the ERT is configured and perform a Rescan HBA operation.
3. Retry the mount task.

Inaccessible Express Protect Objects

Symptom

After mounting the Express Protect object, the status of the mounted object in the Status column of the Manage tab displays Not Accessible.
Cause

HPE StoreOnce might be powered off while the Express Protect object is still mounted.

Action

Procedure

1. Ensure that HPE StoreOnce is online.
2. Unmount the Express Protect object.
3. Mount the Express Protect object again.

Invalid Express Protect Object

Symptom

The Mount/Unmount task fails with the error message: Express Protect Object ‘attachStatus’ is invalid to continue current operation.

Cause

There might be a delay in updating the Express Protect object state depending on the backup environment you are using.

Action

Procedure

• Retry the Mount/Unmount task after some time.

Object deleted or not created

Symptom

The unmount task fails with datastore deletion error The object has already been deleted or not completely created.

Cause

Datastore is inactive if HPE StoreOnce is powered off. Web Client lists the datastore as active, until the datastore status is refreshed. It results in datastore deletion error during unmount operations.

Action

Procedure

• Retry the unmount task.

File in use from the datastore

Symptom

The unmount task fails with datastore deletion error indicating that a file is in use from the datastore.

Cause

A VMDK from the Express Protect datastore is attached to an existing VM.
Action

Procedure

• Remove the hard disk from the VM (under <uicontrol>VM settings</uicontrol>) and retry the unmount task.

Express Protect Object in use

Symptom

Mount/Unmount task fails with error message: Express Protect Object is in use.

Cause

RMC Appliance rebooted leaving the data sessions to the catalyst objects on the StoreOnce open. Further operations on the Express Protect Object fail (as previous data session is still open and the catalyst objects are locked).

Action

Procedure

• Reboot StoreOnce server to close all data sessions or wait for 2 to 4 hours for the data session to time out on the particular Express Protect Object.

Virtual Disks not displayed

Symptom

The Manage tab does not display the Virtual Disks table and Copy/Attach/Detach button for VMDK.

Cause

ERT tasks can be performed only for Express Protect of the Recovery Sets created after installing or upgrading to RMC-V 4.0.0.

For Express Protect objects that were created in previous versions, you can perform only mount, unmount, and additional vCenter operations on the mounted Express Protect objects. However, copy, attach, and detach tasks cannot be performed.

Action

Procedure

• Install or upgrade to RMC-V 4.0.0.

Failure in resignaturing the volume

Symptom

Mount operation to an Express protect fails with the error Failure of Resignaturing the volume.

Cause

A known issue with VMware.
Remote Recovery Sets Configurations

Error: Not a 3PAR Volume

Symptom
Snapshot creation fails with the error: Not a 3PAR Volume, when 3PAR Inform OS Patch is upgraded from 3.2.1 MU2 or older builds to 3.2.1 MU3 P19 and later versions.

Cause
This issue occurs if the XCOPY value is disabled on the array when Inform OS Patch is upgraded.

Action
Procedure
1. Log in to HPE 3PAR CLI.
2. Connect to the HPE 3PAR StoreServ from which the HPE 3PAR volumes are exported.
3. To enable the XCOPY value, run the command: `onallnodes tcli -e 'kvar show -n sdt_xcopy_lite_enable'`.
4. To verify if the value set is correct, run the command: `tcli -e 'kvar show -n sdt_xcopy_lite_enable'`.
5. To fetch the correct details on volumes from vCenter MOB, perform the Recovery manager Cache Update operation on the VMware vSphere Web Client.

Remote Copy groups not listed

Symptom
Existing and new Remote Copy groups are not listed in Remote Recovery Configurations.

Action
Procedure
1. Ensure that the ESXi server is in connected state.
2. Ensure that the ESXi server can discover array volumes.

Listing Remote Copy groups takes a long time

Symptom
Listing the Remote Copy groups is taking a long time in the Remote Recovery Configuration page.

Cause
- One or more HPE 3PAR StoreServ or HPE StoreVirtual Storage Systems are either down or not reachable.
- The maximum permissible number of connections with the storage systems has exceeded.
- The WSAPI service is down.
Action

Procedure

• Ensure that all Storage Systems are connected and the WSAPI service is running.

Recovery Sets not appearing

Symptom

New Recovery Sets are not appearing in the **Recovery Sets on Source StoreServ** and **Recovery Sets on Target StoreServ** tabs.

Action

Procedure

• Perform a vCenter refresh.

Snapshot creation fails

Symptom

After failover, the existing scheduled jobs fail with the error message: **snapshot creation failed**.

Action

Procedure

• Delete the existing schedule and create a schedule for the new primary system.

Manage tab not appearing

Symptom

When you double-click a Recovery Set, the **Manage** tab does not appear. The error is: **You have no privileges to view this object or it does not exist**.

Action

Procedure

• Refresh the Web Client and retry the action.

Snapshot error

Symptom

**Error:** Create remote co-ordinated snapshot error due to createsv error.

Cause

If a Synchronous Remote Copy group has multiple volumes and if the first 20 characters are same in the names of any two virtual volumes, then snapshot creation fails and the error message is displayed.
Action

Procedure

• While assigning a name to a virtual volume that is part of a Remote Copy group, ensure that the first 20 characters are unique.

Recovery Set not displayed

Symptom

Existing Recovery Sets are not displayed.

Cause

The remote RMC Appliance is changed.

Action

Procedure

• View the existing Recovery Sets, add the same Remote RMC appliance again.

Remote appliance not found

Symptom

If you create a snapshot after the remote appliance is changed, the task fails with error message: Remote Appliance not found.

Action

Procedure

• Recreate the policy and create the Recovery Sets.

Schedule fails

Symptom

If you try to schedule creation of Remote Recovery Sets for Remote Copy Group and Local (Virtual Machine on the same Remote Copy group) at the same time, either of the tasks fails.

Action

Procedure

• Ensure that tasks are scheduled at different times.

Datastores not displayed

Symptom

The Datastore tab does not display the existing datastores unless VMs are associated with it.
**Password update failed**

**Symptom**
RMC password update failed during installation.

**Action**

**Procedure**
1. Ensure that firewall is disabled on the vCenter server and installer host.
2. Ensure that RMC is accessible through the network.

**Others**

**Attaching VMDKs**

**Symptom**
While attaching a VMDK on the snapshot to a parent VM containing VMFS snapshot, the task freezes while reconfiguring the VM.

**Action**

**Procedure**
1. Go to the **Summary** tab of the parent VM.
2. Select the **Answer Question** link, a pop-up appears.
3. To attach the VMDK on the Snapshot, click **Yes**.

**Adding a storage system**

**Symptom**
When adding a storage system, either during installation or on the web client GUI, an error is displayed:

*Error in adding a storage system. Invalid input received: Bad request (HTTP 400)*

**Cause**
The `wsapi` service is not running on the HPE 3PAR StoreServ array.

**Action**

**Procedure**
1. Restart the `wsapi` service on the HPE 3PAR StoreServ array.

**Objects state**

**Symptom**
Objects in `error_creating` or `deleting` state.
Cause

If backup is terminated abruptly, the backup set is not deleted. This behavior is because the catalyst object is in locked state.

Action

Procedure

• Perform the delete after the timeout is complete.

VMware operations fail

Symptom

While creating application consistent snapshots, VMware might fail the operation and display the message Cannot create a quiesced snapshot because the create snapshot operation exceeded the time limit for holding off I/O in the frozen Virtual Machine.

Action

Procedure

• Virtual disk service status is started and startup type automatic.
• VMware snapshot provider service status is stopped and startup type disabled.
• Volume shadow copy service service status is started and startup type automatic.
• VMware tools service status is started and startup type automatic

Unable to delete VVOL Recovery Set

Symptom

Error message displayed: Failed to delete array snapshot.

Action

Procedure

• To do a refresh and then retry the task, click All HPE Recovery Manager Central Actions > Update Recovery Manager Cache.

ssh connection error

Symptom

When performing RMC-V related tasks, the following error message is displayed:

Error connecting via ssh: Error reading SSH protocol banner.

Cause

Delay in receiving response from the HPE 3PAR StoreServ management command.
**Action**

**Procedure**
- Check and verify the network responses between the RMC appliance and HPE 3PAR StoreServ storage system.

**Issue with Backup**

**Symptom**
Unable to take simultaneous backup of a VM or datastore.

**Cause**
Virtual volume is created in multiple virtual domains of HPE 3PAR StoreServ.

**Action**

**Procedure**
- If you have a single RMC appliance running, then while creating a backup, RMC creates a host either with or without a domain name. The domain name is picked up based on the existence of a virtual volume in any HPE 3PAR virtual domain. If you have ESXi in multiple HPE 3PAR virtual domains, then you must select more than one RMC appliance for the backup to HPE StoreOnce system.

**Scheduled jobs not running**

**Symptom**
Scheduled jobs are not running in the system.

**Cause**
The scheduled jobs are triggered in a time zone different from the HPE RMC appliance time zone.

**Action**

**Procedure**
- Ensure that the ESXi host time zone is appropriately set and synced. The RMC appliance, when installed through the wizard, applies the time zone set in your ESXi host.
  
  To verify the time zone:
  - RMC-V Schedule job GUI.
  - Log in to the RMC GUI and click **Settings** option.

**Unable to take snapshots or backups**

**Symptom**
Unable to take snapshots or backups after adding a datastore or a VM in the vCenter server.

**Action**

**Procedure**
- Perform **Update Recovery Manager Cache**, a system-level cache refresh is done for the registered HPE 3PAR StoreServ and HPE StoreVirtual storage systems, and vCenter server. The expected time to
Rebooting RMC appliance while a backup job is in progress

Symptom
If you reboot the RMC appliance while a backup job is in progress, the jobs that are in running state do not move to the failed state.

Cause
The RMC appliance is rebooted abruptly.

Action

Procedure

• Ensure that the scheduled jobs that are running are completed before you reboot the RMC Appliance. However, the state of the backup will be in error state and is displayed under the Recovery Sets tab in vCenter. Restore from such a backup is not possible.

Failed to attach the VV

Symptom
The error message Failed to attach the VV is displayed when you perform an Express Protect to HPE StoreOnce on iSCSI or a VM direct path FC appliance.

Action

Procedure

• Ensure that the HPE 3PAR StoreServ or HPE StoreVirtual host connectivity is appropriate.

Incorrect store client password

Symptom
After entering an incorrect store client password, system allows you to create backup to HPE StoreOnce.

Cause
The Client Access Permission check box is not selected, then HPE StoreOnce does not validate the catalyst access credentials to perform the backup and restore tasks.

Action

Procedure

• Select the Client Access Permission check box.

Driver uninitialized error

Symptom
After adding a storage system to the RMC appliance, the create snapshot task displays the Driver uninitialized error message.
Action

Procedure

• While creating or updating the storage system, make sure that the credentials can be used for accessing HPE 3PAR StoreServ or HPE StoreVirtual storage system through SSH and WSAPI.

Object not found error

Symptom

System displays object not found error while performing RMC-V tasks on vSphere Web Client.

Action

Procedure

• Perform a cache refresh in the vSphere Web Client after you add any new object in the vCenter. If object not found error message is displayed for an existing or newly added object (for example, VM, datastore, or virtual volume), click Host > Manage > HPE Management and then click the refresh icon.

   NOTE:
   After clicking the Refresh icon once, allow the refresh to complete. Clicking the Refresh icon multiple times increases the time required to complete the refresh task.

Incremental Express protect or full backup fails

Symptom

If you delete one or more snapshots directly from the HPE 3PAR StoreServ storage and do not do a refresh, then any request to take incremental Express Protect or full backup on snapshots that were taken earlier, fails.

Cause

This issue occurs because, one or more snapshots were deleted from the HPE 3PAR StoreServ or HPE Hyper Converged storage with the respective base volumes. The Task tracker displays a message stating that RMC failed to attach one or more snapshots.

Action

Procedure

• Perform a Refresh from the vSphere Web Client.

License error

Symptom

While creating snapshots, RMC-V displays the following error message:

Could not fetch license from storage system.
Action

Procedure

• Ensure that the array connectivity to your RMC appliance is available.

**Restore fails**

**Symptom**

When you perform restore on a multinode HPE StoreOnce, the restore fails and displays an error message.

**Cause**

If you perform restore in a multinode configuration and if the associated node fails, then the restore fails.

**Action**

**Procedure**

• Manually perform the restore task and it will take the path of the secondary node and complete the restore task successfully.

**Unable to operate from the vSphere Web Client**

**Symptom**

Initially, RMC Appliance is registered with a vCenter (for example, VC1). Another RMC Appliance is registered with another vCenter (for example, VC2). After logging in to the vSphere Web Client for VC1, unable to perform any operation from the vSphere Web Client.

**Cause**

RMC Appliance is not registered with VC1 since this RMC Appliance is now registered with VC2.

**Action**

**Procedure**

1. Log in to the Web Client of VC2 and remove the RMC appliance from the RMC Appliance page, by clicking the HPE RMC Configuration tab on the left pane.
2. Log in to the Web Client of VC1 and register the RMC instance from the RMC Appliance page, by clicking the HPE RMC Configuration tab on the left pane.

**Restore target issue**

**Symptom**

During restore, if the RMC Appliance is restarted, then the restore target (snapshot or base volume) is not unexported from the RMC Appliance.

**Action**

**Procedure**

1. Detach the impacted snapshot or base volume manually, from the RMC appliance.
2. Attach the snapshot or base volume to the original host.
3. Rescan the host storage adapters.
4. Retry the restore operation.
Default Snapshot policy settings error

Symptom
While accessing the Default Snapshot Policy Settings page, if one RMC instance fails in a multi-RMC configuration setup, an error is displayed.

Action

Procedure
• Identify the RMC instance that is not accessible and rectify the issue. If you are unable to rectify the issue, unregister the RMC instance.

Error: Session not initialized

Symptom
If the default snapshot policy of a VM, datastore, or a Remote Recovery Set is changed while the system is idle, the following error message appears: Session is not initialized. Please try to login again.

Action

Procedure
• Log off and log in again to the vSphere Web Client and wait until the web initialization is complete.

Snapshot mount fails

Symptom
Mount action for the Snapshot fails with the error: HP 3PAR mount operation failed : " Invalid input received: 'rwSnapshot' cannot be specified if snapshot is not read only."

Cause
If you perform a mount action on a Snapshot that was created during the restore operation.

Action

Procedure
• Perform mount and Copy/Attach VMDK actions using the procedure listed in Mounting snapshots and performing Copy/Attach VMDK for snapshots created during restore to snapshot.

Issue with updating RMC-V password

Symptom
Failed to update RMC-V login password.

Solution 1

Cause
This may be because the network connection is unstable.
**Action**

**Procedure**
1. For the installation option HPE RMC integrated with VMware (Install/Upgrade):
   1. Change the RMC password using RMC GUI.
   2. Install RMC-V plug-in and register existing RMC appliance using the installation wizard.
   3. Add Storage Systems and Backup Systems using the RMC-V GUI.

**Solution 2**

**Action**

**Procedure**
1. For the installation option HPE RMC Only (Install/Upgrade):
   1. Change the RMC password using RMC GUI.
   2. Add Storage Systems and Backup Systems using the RMC GUI.

**Restoring from a Recovery Set Snapshot for a VVOL VM fails**

**Symptom**
Restoring from a Recovery Set Snapshot fails with the message An error occurred while reverting to a snapshot: A required file was not found. Unable to load configuration file...

**Cause**
The `.vmx` file is corrupted or deleted from the datastore.

**Action**

**Procedure**
- Ensure that you have enabled **VSS aware application consistency** option when creating Recovery Set Snapshot.
# Websites

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<tr>
<td>Contact Hewlett Packard Enterprise Worldwide</td>
<td><a href="http://www.hpe.com/assistance">www.hpe.com/assistance</a></td>
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<td>Subscription Service/Support Alerts</td>
<td><a href="http://www.hpe.com/support/e-updates">www.hpe.com/support/e-updates</a></td>
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<tr>
<td>Hewlett Packard Enterprise Support Center</td>
<td><a href="http://www.hpe.com/support/hpesc">www.hpe.com/support/hpesc</a></td>
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</table>
Support and other resources

Accessing Hewlett Packard Enterprise Support

- For live assistance, go to the Contact Hewlett Packard Enterprise Worldwide website:
  
  http://www.hpe.com/assistance

- To access documentation and support services, go to the Hewlett Packard Enterprise Support Center website:
  
  http://www.hpe.com/support/hpesc

Information to collect

- Technical support registration number (if applicable)
- Product name, model or version, and serial number
- Operating system name and version
- Firmware version
- Error messages
- Product-specific reports and logs
- Add-on products or components
- Third-party products or components

Accessing updates

- Some software products provide a mechanism for accessing software updates through the product interface. Review your product documentation to identify the recommended software update method.
- To download product updates:
  
  Hewlett Packard Enterprise Support Center
  
  www.hpe.com/support/hpesc

  Hewlett Packard Enterprise Support Center: Software downloads
  
  www.hpe.com/support/downloads

  Software Depot
  
  www.hpe.com/support/softwaredepot

- To subscribe to eNewsletters and alerts:
  
  www.hpe.com/support/e-updates

- To view and update your entitlements, and to link your contracts and warranties with your profile, go to the Hewlett Packard Enterprise Support Center More Information on Access to Support Materials page:
  
  www.hpe.com/support/AccessToSupportMaterials

**IMPORTANT:**

Access to some updates might require product entitlement when accessed through the Hewlett Packard Enterprise Support Center. You must have an HPE Passport set up with relevant entitlements.

Customer self repair

Hewlett Packard Enterprise customer self repair (CSR) programs allow you to repair your product. If a CSR part needs to be replaced, it will be shipped directly to you so that you can install it at your convenience.
Some parts do not qualify for CSR. Your Hewlett Packard Enterprise authorized service provider will determine whether a repair can be accomplished by CSR.

For more information about CSR, contact your local service provider or go to the CSR website:

http://www.hpe.com/support/selfrepair

Remote support

Remote support is available with supported devices as part of your warranty or contractual support agreement. It provides intelligent event diagnosis, and automatic, secure submission of hardware event notifications to Hewlett Packard Enterprise, which will initiate a fast and accurate resolution based on your product's service level. Hewlett Packard Enterprise strongly recommends that you register your device for remote support.

If your product includes additional remote support details, use search to locate that information.

Remote support and Proactive Care information
HPE Get Connected
   www.hpe.com/services/getconnected
HPE Proactive Care services
   www.hpe.com/services/proactivecare
HPE Proactive Care service: Supported products list
   www.hpe.com/services/proactivecaresupportedproducts
HPE Proactive Care advanced service: Supported products list
   www.hpe.com/services/proactivecareadvancedsupportedproducts

Proactive Care customer information
Proactive Care central
   www.hpe.com/services/proactivecarecentral
Proactive Care service activation
   www.hpe.com/services/proactivecarecentralgetstarted

Warranty information

To view the warranty for your product, see the Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products document, available at the Hewlett Packard Enterprise Support Center:

www.hpe.com/support/Safety-Compliance-EnterpriseProducts

Additional warranty information
HPE ProLiant and x86 Servers and Options
   www.hpe.com/support/ProLiantServers-Warranties
HPE Enterprise Servers
   www.hpe.com/support/EnterpriseServers-Warranties
HPE Storage Products
   www.hpe.com/support/Storage-Warranties
HPE Networking Products
   www.hpe.com/support/Networking-Warranties
Regulatory information

To view the regulatory information for your product, view the Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products, available at the Hewlett Packard Enterprise Support Center:

www.hpe.com/support/Safety-Compliance-EnterpriseProducts

Additional regulatory information

Hewlett Packard Enterprise is committed to providing our customers with information about the chemical substances in our products as needed to comply with legal requirements such as REACH (Regulation EC No 1907/2006 of the European Parliament and the Council). A chemical information report for this product can be found at:

www.hpe.com/info/reach

For Hewlett Packard Enterprise product environmental and safety information and compliance data, including RoHS and REACH, see:

www.hpe.com/info/ecodata

For Hewlett Packard Enterprise environmental information, including company programs, product recycling, and energy efficiency, see:

www.hpe.com/info/environment

Documentation feedback

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FAQs

What are the required user privileges

For deployment

- VirtualMachine.Inventory.Create
- VirtualMachine.Config.AddExistingDisk
- VirtualMachine.Config.AddNewDisk
- VirtualMachine.Config.RawDevice
- Resource.AssignVMToPool
- Datastore.AllocateSpace
- Network.Assign
- VApp.Import
- Resource.CreatePool
- VApp.Create
- Host.Config.Date-Time

For RMC-V plug-in integration

- System.Anonymous
- System.Read
- System.View
- VirtualMachine.Config.DiskLease
- VirtualMachine.Provisioning.GetVmFiles
- VirtualMachine.State.CreateSnapshot
- VirtualMachine.State.RemoveSnapshot
- Datastore.Browse
- Host.Config.Storage
- VirtualMachine.Config.AddExistingDisk
- VirtualMachine.Config.AddNewDisk
- VirtualMachine.Config.RawDevice
- VirtualMachine.Config.RemoveDisk
- VirtualMachine.Config.EditDevice
- Datastore.FileManagement
- Global.LogEvent
- Task.Create
- Task.Update
- Sessions.TerminateSession
- Sessions.ValidateSession
- Extension.Register
- Extension.Unregister
- Extension.Update
Appliance
Preconfigured virtual machine that includes a preinstalled guest operating system and other software.

CIM
Common Interface Model

Coeth
Catalyst over Ethernet

CoFC
Catalyst over Fibre Channel

FC
Fibre Channel

iSCSI
Internet Small Computer System Interface

SLD
Synchronous Long Distance

Thick Provision Eager Zeroed
Thick virtual disk that supports clustering features, such as Fault tolerance.

Thick Provisioned Lazy Zeroed
Virtual disk in a default thick format

Thin Provision
Saves storage space. For the thin disk, you provision as much datastore space as the disk would require based on the value that you enter for the disk size. However, the thin disk starts small and at first, uses only as much datastore space as the disk needs for its initial operations.

vApps
Preconfigured virtual machine that packages applications with the operating system

VASA
vSphere APIs for Storage Awareness

Virtual Machine
A Virtual Machine (VM) is a software computer that, like a physical computer, runs an operating system and applications. Multiple virtual machines can operate on the same host system concurrently.

VVOL
VMware vSphere virtual volume

VV
Virtual Volume