Environment

The Zerto Virtual Replication test plan environment should be designed to support the required software components and TCP connectivity illustrated below.

Note: For a description of the ports by reference number, see Zerto Virtual Replication Installation Guide.

Test Environment Information

The following tables can be used to record the information required for each site.

<table>
<thead>
<tr>
<th>Site 1</th>
<th>Component</th>
<th>Role</th>
<th>IP Address</th>
<th>DNS-FQDN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SCVMM</td>
<td>SCVMM instance</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hyper-V Host</td>
<td>Host guest VMs</td>
<td></td>
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<tr>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ZVM</td>
<td>Zerto Virtual Manager</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>VRA</td>
<td>Virtual Replication Appliance</td>
<td></td>
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<td></td>
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<td>Virtual Replication Appliance</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Site 2</th>
<th>Component</th>
<th>Role</th>
<th>IP Address</th>
<th>DNS-FQDN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SCVMM</td>
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</tr>
<tr>
<td></td>
<td>VRA</td>
<td>Virtual Replication Appliance</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Provide a brief summary of the test environment. (Replace all blue text with your own summary.) For example, VMs to be protected:

- **Win2k3-Prod01** – Windows Virtual Machine used for replication testing. Win2k3-Prod01 has MS SQL Server installed. A “tall” table was created to write data to and read data from during testing. The write script inserts one data record every 5 seconds. The read script reads a random number of rows in the table every 5 seconds. Processing power limits VM workload.
- **UbuntuVM** – Ubuntu LINUX VM

Connecting the two sites is a CISCO Catalyst 3560G switch/router. On the router there are 3 VLANs created to isolate network traffic. VLAN1 is the Domain control and Management VLAN. This network handles all Management, DNS, NTP and file sharing communication traffic between servers. VLAN2 is used for Site1 Zerto Virtual Replication Appliances (VRAs). VLAN3 is used for Site2 VRAs. A router is also used to verify that the VRAs don’t rely on any type of broadcast traffic to effect communication.

### Testing Environment System Configuration

<table>
<thead>
<tr>
<th>HYPER-V HOST OR VM NAME</th>
<th>OS VERSION/PATCH LEVEL</th>
<th>CPU/RAM</th>
<th>ROLE IN TESTING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

### Accessing the Zerto User Interface

You manage replication in your Hyper-V environment, including the protection and replication of virtual machines between the protected and recovery sites, using the Zerto User Interface.

**To access the Zerto User Interface:**

1. In a browser, enter the following URL: `https://zvm_IP:9669`
   where `zvm_IP` is the IP address of the Zerto Virtual Manager for the site you want to manage.
2. Log in using the user name and password for the machine where you installed Zerto Virtual Replication.
   - **Username** – The user name for the user for the machine where the Zerto Virtual Manager is installed. If the user is part of a domain, you must also specify the domain, with the following format: `domain\username`
   - **Password** – A valid password for the given user name.

### Zerto Virtual Replication Tests

This document includes the following tests:

- **Test 1:** Create a VPG
- **Test 2:** Test failing over the VPG
- **Test 3:** Fail over the VMs from the recovery site
- **Test 4:** Move the VPG (1-click failback)
- **Test 5:** Test a recovery operation before committing
- **Test 6:** Add a VM to an existing VPG
- **Test 7:** Define a boot order for VMs inside a VPG
- **Test 8:** Configure a recovery VM IP address
- **Test 9:** Preseed: Create a VPG using a copy of the VM disk on the remote site
- Test 10: Set up and create offsite backups
- Test 11: Restore a VPG from a repository
- Test 12: Restore a file from the recovery site

These tests demonstrate the basic Zerto Virtual Replication functionality.
**TEST 1: CREATE A VPG**

**Procedure**

- In the Zerto User Interface, select **ACTIONS > CREATE VPG**.

The NEW VPG step of the Create VPG wizard is displayed.

- Specify the name of the VPG. Leave the default value for **Priority**.

- Click **NEXT** and select the virtual machine to be protected and click the arrow pointing right to include this machine in the VPG.

- To select virtual machines that are already protected in other VPGs, click **Select VMs**.
**TEST 1: CREATE A VPG (CONTINUED)**

- Click NEXT and enter the host and datastore for replication.

![Image of Create VPG window with Host and Storage fields highlighted.]

- **Host** – The default cluster or host in the recovery site that handles the replicated data.
- **Storage** – The default storage volume to use for all the recovered virtual machine files as well as for their data volumes.
  - Leave default values in the other fields.
- Click NEXT to review the STORAGE settings. Leave the default values and click NEXT to select the default recovery settings.

![Image of Create VPG window with Storage Networks fields highlighted.]

- Specify networks to use for a move, failover and a test failover operations.
- Continue clicking NEXT to review the remaining settings (**NICs**, **BACKUP**, and **SUMMARY**) but leave the default values.
- Click DONE.

**Expected result**

A VPG is created with initial syncing, resulting in **Meeting SLA**, as the protecting status.

**Notes**

Leave all default values.

When creating a VPG, add all the virtual machines that are part of an application to the VPG. For example, add the machines hosting the application as well as the web server and database machines, if these are required to successfully run the application.

**Actual Result**

---
TEST 2: TEST FAILING OVER THE VPG

Procedure

- In the Zerto User Interface, in the bottom right corner, with TEST set, click FAILOVER: The Failover Test wizard is displayed.

- Select the VPG to test and click NEXT to review the test settings.

- Leave the default checkpoint setting and click NEXT. In the FAILOVER TEST step, the topology shows details of what is being tested.

- Click START FAILOVER TEST to start the test. The protected virtual machine is recovered with the name <vm_name> - testing recovery.

- Check the recovered virtual machine files are up-to-date to verify the recovery.

- Click the STOP icon to stop the test in the RUNNING TASKS section of the DASHBOARD tab. The Stop Test dialog is displayed.
TEST 2: TEST FAILING OVER THE VPG (CONTINUED)

- In the Result field specify whether the test succeeded or failed.
- Optionally, in the Notes field, add a description of the test. For example, specify where external files that describe the tests performed are saved.
- Click STOP.
- Create a text file on each protected virtual machine. After creating the text, file wait a few minutes and then create a second text file on each machine.
- In the Zerto User Interface set the operation to TEST and click FAILOVER. The Failover Test wizard is displayed.
- In the Failover Test wizard, select the VPG to test and click NEXT to set the checkpoint for the test.

![Failover Test wizard](image)

- Click the Checkpoint link. The {VPG-Name}: Checkpoints dialog is displayed.

![Checkpoint dialog](image)

- Select a checkpoint to recover to. Choose a checkpoint that is after you created the first text file on each machine and before you created the second text file on each machine.
- Click OK.
- Click NEXT and to start the test, click START FAILOVER TEST.
- Verify that the protected test VMs were recovered successfully to the desired points-in-time by verifying the text files on the recovered virtual machines files.
- Click the STOP icon to stop the test as described above and in the Stop Test dialog in the Result field specify whether the test succeeded or failed and then click STOP.

**Expected result** The recovery virtual machine is created in the recovery site with the names vmname – failover test.

**Notes** Zerto Virtual Replication enables recovering to any checkpoint that is displayed, even as soon as 10 seconds after the disaster. This provides an almost zero RPO.

**Actual Result**
## TEST 3: FAIL OVER THE VMS FROM THE RECOVERY SITE

### Procedure
Site 1, the protected site, has no local or remote access. The Zerto Virtual Manager and all VMs and hosts are down. Use Zerto Virtual Replication from the recovery site to fail over the VMs.

- In the Zerto User Interface for the recovery site, in the bottom right corner, with LIVE set, click **FAILOVER**.
- In the Failover wizard, select the VPG to test and click **NEXT**.

- In the **EXECUTION PARAMETERS** step, leave the checkpoints as they are and also leave the other options with their defaults:
  - Automatically commit the failover without waiting for testing.
  - Do not shut down the protected virtual machines.
  - Do not specify reverse protection.
- Click **NEXT**.
- To start the test, click **START FAILOVER**.

### Expected result
The virtual machines successfully fail over; the virtual machines now run in the new recovery site, which is the original protected site.

### Notes
- The default checkpoint is the **Latest Checkpoint**.
- Site 1 is assumed to be unavailable (if the site is not available, the **Reverse Protection** checkbox is disabled).

Once applications are failed over to the recovery site, verify that the VPG shows the status **Needs Configuration**. This is the correct behavior for Failover when reverse protection is not selected.
## TEST 4: MOVE THE VPG (1-CCLICK FAILBACK)

<table>
<thead>
<tr>
<th>Procedure</th>
<th>The original protected site returns to full operation and you want to fail back the virtual machines that were failed over in the previous test.</th>
</tr>
</thead>
<tbody>
<tr>
<td>■</td>
<td>In the VPGs tab, select the VPG that has the Needs Configuration status and click MORE &gt; Edit VPG; enter the necessary Default Recovery settings.</td>
</tr>
<tr>
<td>■</td>
<td>The VPG state changes to Updating. During the update, the relevant virtual machines on the original protected site are deleted.</td>
</tr>
<tr>
<td>■</td>
<td>After the update completes (the status is Meeting SLA), click ACTIONS &gt; MOVE VPG. to open the Move wizard.</td>
</tr>
</tbody>
</table>

- In the Move wizard, select the VPG.
- Click NEXT.
- In the EXECUTION PARAMETERS step, leave the Commit Policy with the default: to commit the operation without waiting to manually check the virtual machines.
- If the VPG cannot be gracefully shutdown (for example, when Microsoft Integration Services is not installed on a virtual machine in the VPG), the Move operation will fail unless you check the Force Shutdown checkbox.
- Keep the Reverse Protection checkbox selected to ensure that Zerto Virtual Replication continues to protect the VPGs in the original direction.
- Click NEXT.
- To start the test, click START MOVE to start the Failback (Move).

<table>
<thead>
<tr>
<th>Expected result</th>
<th>The virtual machines are successfully migrated back to the original site.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notes</td>
<td>Moves are automatically done to the last checkpoint. A Move operation is used both for failbacks and to migrate machines to a second site in a planned migration.</td>
</tr>
<tr>
<td>Actual Result</td>
<td>You can carry out the procedure from the recovery site or from the protected site.</td>
</tr>
</tbody>
</table>
TEST 5: TEST A RECOVERY OPERATION BEFORE COMMITTING

**Procedure**

The previous failover and failback (move) tests were done using the default automatic commit policy. Before committing a recovery, you can test the virtual machines and then decide whether to commit or to rollback the recovery.

- Click ACTIONS > MOVE VPG. to open the Move wizard.
- In the Move wizard, select the VPG.
- Click NEXT.
- In the EXECUTION PARAMETERS step, configure the Commit Policy as follows: Click the commit policy and set the policy to Auto-Commit and the time to 15 or set the policy to None, in which case the operation can only be committed manually, by you.
- If the VMs cannot be gracefully shutdown (for example, when Integration Services is not installed on a VM in the VPG), the Move operation will fail unless you mark the Force Shutdown checkbox.
- Double-click the Reverse Protection field and configure the VPG for reverse protection, after the recovery back to the original site, by checking the box and clicking the REVERSE link.
- Click NEXT.
- To start the move operation, click START MOVE.
- Verify that the protected test VMs are recovered successfully on the recovery site.

Do one of the following:

- Click Rollback to roll back the operation, removing the virtual machines that were created on the recovery site and rebooting the machines on the protected site. The Rollback dialog is displayed to confirm the rollback.
- Click Commit to confirm the commit and, if the protected site is still up and you can set up reverse protection, you can reconfigure reverse protection by checking the box and clicking the Reverse link. Configuring reverse protection here overwrites any settings defined when initially configuring the move.
- If you commit the Move operation, repeat Test 4: Move the VPG (1-click failback) to move the machines back to the original site.

**Expected result**

If you commit the Move operation: The virtual machines are recovered in the recovery site and removed from the protected site until you repeat Test 4: Move the VPG (1-click failback).

If you roll back the Move operation: The virtual machines are restarted in the protected site and protection continues.

**Notes**

The default commit policy, None, Commit, or Rollback, is set in Site Settings > Policies > Failover/Move Commit Policy.

You can also commit or roll back the operation via the TASKS popup dialog in the status bar, or in the TASKS tab under the MONITORING tab.

**Actual Result**

---
**TEST 6: ADD A VM TO AN EXISTING VPG**

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Expected result</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>To edit a VPG, in the Zerto User Interface, select the VPG in the VPGs tab and click <strong>MORE &gt; Edit VPG</strong>. You can also select the VPG to display the VPG details and click <strong>EDIT VPG</strong>. The <em>Edit VPG</em> wizard is displayed, enabling editing the VPG, including adding and removing virtual machines from the VPG.</td>
<td>The VPG definition is updated, and then the additional virtual machine is synced with the recovery site. When the sync process for the virtual machine is complete, Zerto Virtual Manager adds a checkpoint: <em>VM ’XXX’ is fully synced</em> where XXX is the name of the virtual machine that was synced.</td>
<td>While the VPG definition is being updated, you cannot perform any operation on the VPG, such as adding a checkpoint, editing its properties, or moving or failing it over. After the VPG definition is updated and while the virtual machine that was just added is being synced, the VPG can be failed over but the failover only includes the original virtual machines in the VPG, and does not include the virtual machine that you added.</td>
</tr>
<tr>
<td>In the <strong>VMs</strong> step, select the virtual machine to be added to the VPG and click the arrow pointing right to include this machine in the VPG.</td>
<td>Click <strong>DONE</strong>.</td>
<td></td>
</tr>
</tbody>
</table>

**Actual Result**

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---
TEST 7: DEFINE A BOOT ORDER FOR VMS INSIDE A VPG

**Procedure**
- In the Zerto User Interface, in the VPGs tab, select the VPG and click MORE > Edit VPG.
- In the VMs step in the Edit VPG wizard, click DEFINE BOOT ORDER to display the Boot Order dialog.

![Image of VPG and Boot Order dialog]

- a) Click **ADD GROUP** to add a group. To change the name of a group click the **Pencil** icon next to the group.
- b) Drag one of the virtual machines to move it from the **Default** group to this group.
- c) Drag the group above the **Default** group to change the order the groups are started.
- d) In **Boot Delay**, specify a time delay between starting up the virtual machine in the group and starting up the virtual machine in the **Default** group.
- e) Click **OK**.

- Click **DONE**.
- Repeat the first part of **Test 2: Test failing over the VPG** to check that the VMs start up as defined.

**Expected result**
The virtual machines are started in the recovery site for testing in the configured boot order.

**Notes**
Accessing the wizard to edit the VPG by selecting the VPG in the VPGs tab and clicking MORE > Edit VPG, is just one way to open the wizard. For example, you can also click the pencil icon next to the VPG name.

**Actual Result**
<table>
<thead>
<tr>
<th><strong>Procedure</strong></th>
<th><strong>Expected result</strong></th>
<th><strong>Notes</strong></th>
<th><strong>Actual Result</strong></th>
</tr>
</thead>
</table>
| ■ In the Zerto User Interface, in the VPGs tab, select the VPG and click *MORE > Edit VPG*.  
■ In the *Edit VPG* wizard, in the NICS step, you specify network details to use for the recovered virtual machines after a live failover, a test failover, or migration.  
■ Select the machines and click *EDIT SELECTED*. The machines must be running Microsoft Integration Services.  
a) Specify the network details to use for the recovered virtual machines when testing replication, in the Test column.  
b) Click OK.  
■ Click DONE.  
■ Repeat the first part of Test 2: Test failing over the VPG to check that the VMs on the recovery site have the IP settings you defined. | The VPG is updated with the new settings. With a failover test, the IP address of that specific VM will change according to the settings that were defined. | If you selected DHCP IP, the VM will get the IP address from the DHCP server on that specified network.  
By default the same MAC address is used.  
You can use the same procedure for a failover or move operation via the Failover/Move column. |
**TEST 9: PRESEED: CREATE A VPG USING A COPY OF THE VM DISK ON THE REMOTE SITE**

**Procedure**
- Create a copy of the virtual machine disks to protect (vhd/vhdx file) in the recovery site. The easiest way to do this is to delete the VPG, keeping the target disks (which is the default). This means that these disks can be used as preseeded disks when the virtual machines are reprotected.
- In the Zerto User Interface, recreate the deleted VPG on the local site.
  - In the STORAGE step select the virtual machine with the copied disks and click **EDIT SELECTED** to display the **Edit Volumes** dialog.
  - Specify that you want to use preseeding. The dialog is reconfigured to enable adding the path to the preseeded disk for the specified storage.
  - Changes to:
    - Browse to the vhd/vhdx file location. Note that only volumes that are the correct size can be selected.
  - Click **SAVE** and continue to finish the VPG definition.

**Expected result**
The VPG is created using Delta Sync with the preseeded disk on the remote site.

**Notes**
The location of the target disks to use as preseeded disks is specified in the event for deleting the VPG, EV0003 for the VPG or EV0040 if a single virtual machine is deleted from a VPG and then reprotected.

**Actual Result**
**TEST 10: SET UP AND CREATE OFFSITE BACKUPS**

**Procedure**

- In the Zerto User Interface, click **SETUP > REPOSITORIES** and click **NEW REPOSITORY**.

- Specify a unique name for a local repository and the path where you want this repository on the local drive where the Zerto Virtual Manager is installed.

- Click **VALIDATE**, set the repository as the default repository, and then click **SAVE**.

  The repository is created.

- In the Zerto User Interface, in the **VPGs** tab, select the VPG and click **MORE > Edit VPG**.

- In the **Edit VPG** wizard, in the **BACKUP** step you specify the backup requirements for the protected virtual machine. Toggle **Backup** to **ON**.
<table>
<thead>
<tr>
<th><strong>TEST 10: SET UP AND CREATE OFFSITE BACKUPS (CONTINUED)</strong></th>
</tr>
</thead>
</table>
| ■ Leave the default settings, to run a backup weekly every Saturday at midnight and click **DONE**.  
■ In the **OFFSITE BACKUP** tab, select the VPG and click **MORE > Run Backup**.  
Even though there is a scheduled run for this VPG, you can manually create a backup. Confirm that you want to create a manual backup. |
| **Expected result** | Zerto Virtual Replication creates the repository. Backups of the VPG virtual machines are stored in this repository in the recovery site. |
| **Notes** | Backup extends the ability to recover virtual machines in a VPG to one year. The manually created backup is in a folder called **Manual_VPGName_TimeStamp**. |
| **Actual Result** |  |
TEST 11: RESTORE A VPG FROM A REPOSITORY

Procedure

■ In the Zerto User Interface select ACTIONS > RESTORE.

■ Select the VPG to restore from the backup list.

■ Click NEXT. The RESTORE POINT step is displayed, showing all the available offsite backups.

■ Select the backup to restore. Selecting an offsite backup displays the list of virtual machines in the backup.

■ Click NEXT. The list of virtual machines that can be restored is displayed.

■ Specify the IP address of the host where you want the virtual machines restored. After selecting a host the Restore on Storage field is displayed. You can also set the Power On checkbox, to power on the virtual machines when they are restored.

■ Click NEXT to see a summary of the restore and then click RESTORE.

Expected result

The virtual machines are restored. In this test they are restored in the recovery site.
| Notes | If the VPG backups were saved to more than one repository, selecting the VPG collects all the offsite backups for the VPG from all the available repositories.  
To restore the virtual machines to the original protected site, you have to define a repository in the protected site that can access the backup file. |
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Actual Result</td>
<td></td>
</tr>
</tbody>
</table>
TEST 12: RESTORE A FILE FROM THE RECOVERY SITE

Procedure

1. In the Zerto User Interface select ACTIONS > RESTORE FILE. The File and Folder Restore: Select VM wizard is displayed.
2. Select the virtual machine on which the file or folder to be restored is located and click NEXT.
3. The CHECKPOINT step is displayed. By default, all available checkpoints are displayed.
4. Select the checkpoint from which to recover the file or folder and click NEXT.
5. The DISK step is displayed. All disks associated with the selected virtual machine are displayed.
6. Select a disk to mount and click NEXT.
TEST 12: RESTORE A FILE FROM THE RECOVERY SITE (CONTINUED)

The MOUNT step is displayed with the settings you selected.

- Click START MOUNT to mount the disk.
  Mounting the disk may take some time, depending on the selected checkpoint and the number of files and folders on the disk. When the disk is mounted, icons appear next to the completed task.

- Click the folder icon ( ) to browse the files and folders on the disk.
  **Note:** Click the unmount icon ( ) to unmount the disk without restoring any files or folders.
  The File and Folder Restore: Download wizard is displayed.

- Click NEXT.
  The FILE/FOLDER step is displayed.

- Select the files and folders you want to download.
  The selected files or folders are displayed in the right pane.
Click NEXT.

The **DOWNLOAD** step is displayed with details of the files and folders to restore.

**Note:** By default, when you select multiple files or one or more folders, the data is compressed before it is downloaded. If you select only one file, for download, you can choose whether or not the file is compressed.

3. Click **START DOWNLOAD**.

   The files and folders are downloaded to the downloads folder on the computer where you ran the download.

**Expected result**

The file or folder you selected to restore is downloaded to the computer from which you ran the restore. The file is restored with its name unless it is zipped, in which case it is in the **ZertoDownloads.zip** file.

**Notes**

Zerto recommends that you unmount the disk after the files or folders are downloaded.