

**SCHEDULE B: SERVICE DEFINITION FOR SERVER REPLICATION (ZERTO) SERVICES**

**1. Server Replication (Zerto) Service Description**

Exponential-e’s Server Replication (Zerto) Service uses replication capabilities to create near-synchronous virtual clones (“Clone Server(s)”) of the Customer’s selected servers (“Protected Server(s)”). Server Replication can be performed on Virtual Machines residing within:

- private cloud environments (Exponential-e, Customer or third party-provided),
- Exponential-e’s Virtual Data Centre,
- Microsoft Azure Public cloud environment, and

can be performed from “Virtual Server to Virtual Server”. The Customer may elect to replicate Protected Servers to one destination location (“One-to-one Replication”) or to multiple destination locations (“One-to-Many Replication”) using supported system configurations documented in the Server Replication Requirements set out in Appendix B to this Service Definition.

The Service is comprised of the following two standard components:

- **Software Agent** - to be installed onto the hypervisor host of the Protected Server to be replicated.
- **Management Interface** - downloadable software or web portal interface to allow Customer management and monitoring.

The Service may also include the following optional component:

- **Storage** - of the Clone Server within Exponential-e’s virtual data centre storage environment, as set out on the Order Form.

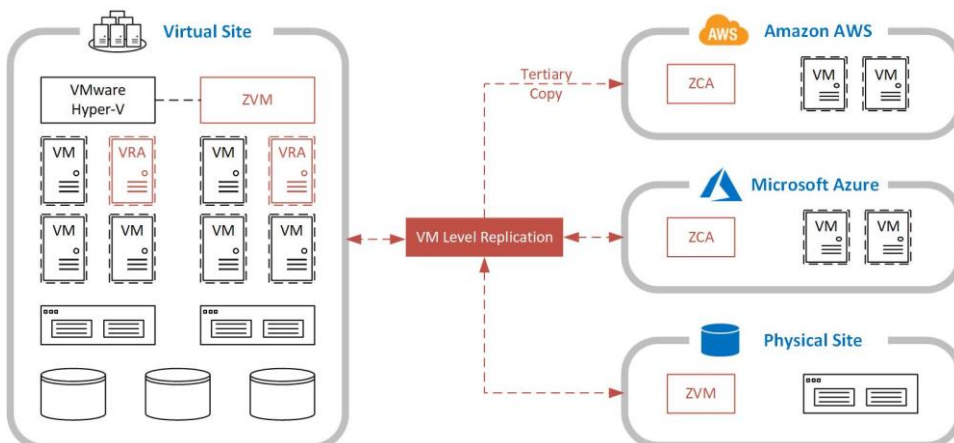
If the Customer elects to use Azure public cloud storage consumed through Exponential-e’s Azure Cloud Solution Provider arrangements, this will be contracted as a separate service and any such use shall be subject to the then-current Service Definition for Microsoft Azure Services and the Customer shall be charged on a Pay As You Go basis for any usage of Azure resources.

If the Customer elects to use Amazon AWS public cloud storage consumed through Exponential-e’s Amazon AWS Solution Provider arrangements, this will be contracted as a separate service and any such use shall be subject to the then-current Service Definition for Amazon AWS Services and any such usage shall be chargeable in accordance with this Service Document and the Order Form.

The Customer may elect to provide their own (non-Exponential-e provided) storage for the Clone Server, which may be appliance based or public cloud based, in which case the Order Form will specify the Customer-provided storage location. It is the Customer’s responsibility to ensure that sufficient storage is available within any Customer-provided storage location.

Service Design

The following graphic provides the current supported shared cloud, private cloud and public cloud design. For the avoidance of doubt, replication is only available into, and not out of, Amazon AWS and is available for a tertiary copy of Protected Servers.



## **2. Division of Responsibilities**

The Parties shall have the following respective responsibilities:

### Exponential-e Responsibilities

- Management of the Service in accordance with Appendix A to this Service Definition.
- Invocation of Clone Server
- Verifying that the Clone Server is accessible

### Customer Responsibilities

- Management of Server applications
- Installation of the Software agent on Customer-provided servers
- Monitoring Customer managed replicated servers
- Decision on the Journal length (Journal lengths of up to 4 hours, up to 7 days, up to 14 days, and up to 28 days are supported)
- Decision of the location(s) to replicate all Server Replication servers to
- Decision to invoke Clone Server
- Requesting Exponential-e to invoke Clone Server for all servers that are managed by Exponential-e under a Flex Manage Service
- Decision to invoke Clone Server for all servers that are not managed by Exponential-e under a Flex Manage Service using Self-Managed failover, carried out by the Customer directly. This option is available to all targets excluding the Exponential-e Virtual Data Centre
- Activating applications on the Clone Server
- Requesting the use of test days
- Provision of an "Invocation Initialisation Document" to Exponential-e detailing the agreed process to be followed by Exponential-e (including authorised personnel) in the event of Invocation and update and reissue to Exponential-e as required, but not less frequently than every six (6) months or upon any change to the Customer's infrastructure
- Ensuring sufficient bandwidth is in place to meet replication requirements
- Meeting the requirements set out in Appendix B to this Service Definition
- Ensuring the required software licence mobility for virtualisation is in place and complying with all software licensing requirements.

## **3. Invocation of Clone Server**

The Customer's authorised personnel must contact Exponential-e as per Section 3.1 of the main body of this Service Document and request invocation of the Clone Server. Exponential-e shall carry out invocation in accordance with the Invocation Initialisation Document.

Exponential-e will carry out the invocation in accordance with the Invocation Initialisation Document for all servers to be invoked by Exponential-e. The Customer will carry out the invocation in accordance with the Invocation Initialisation Document for all servers to be invoked by the Customer.

If the Customer elects to use Exponential-e Virtual Data Centre storage for the Clone Server, such use shall be subject to the then-current Service Definition for VDC Services and such use shall be chargeable in accordance with this Service Document and the Order Form.

Exponential-e has multiple customers for its Server Replication (Zerto) Service(s) using the same underlying infrastructure. Accordingly, Exponential-e cannot guarantee that there will not be competing demands in the event of multiple simultaneous disasters or a major disaster affecting numerous customers. If such disaster(s) occur, all invocation requests shall be dealt with on a 'first come, first served' basis in the order in which they are received. Exponential-e shall not be liable if, due to such disaster(s), invocation of the Clone Server(s) cannot be commenced within the Invocation Start Time set out in Section 6 below.

## **4. Failover Testing**

The Customer is entitled to one failover test of the Service per annum<sup>1</sup>, or such greater amount as stated in the Contract. This Failover Test operation can be used to test the usability of the Service and to confirm that the protected virtual

machines (“VMs”) are correctly replicated to the recovery site. The failover test operation creates test VMs in the recovery site, using an isolated test network specified in the VPG definition as opposed to a production network. This operation recovers the VMs to a specified point-in-time, using the virtual disks managed by the VRA.

All changes made during the failover test are written to a hypervisor scratch volume. The longer the test period lasts the more scratch volumes are used until the maximum size is reached, at which point no more testing can be performed. The maximum size of all the scratch volumes is determined by the journal size hard limit and cannot be changed. The scratch volumes reside on the same datastore defined for the journal.

During the failover test any changes to the protected VMs at the protected site are sent to the recovery site and new checkpoints continue to be generated, since replication of the protected VMs continue throughout the failover test. It is also possible to add additional checkpoints during the failover test.

Testing will be scheduled and conducted in accordance with Exponential-e’s reasonable policies and procedures in effect from time to time. Exponential-e may cancel a failover test in order to undertake invocation of another customer’s Clone Server. Exponential-e will use reasonable endeavours to reschedule cancelled tests, but no allowances or credits will be given.

If the Customer elects to failover to the Microsoft Azure public clouds, virtualised resources consumed through Exponential-e’s Azure Cloud Solution Provider arrangements shall be subject to the then-current Service Definition for Microsoft Azure Services and the Customer shall be charged on a Pay As You Go basis for any usage of Azure resources. If the Customer elects to failover to Amazon AWS public cloud, virtualised resources consumed through Exponential-e’s Amazon AWS Solution Provider arrangements shall be subject to the then-current Service Definition for Amazon AWS Services and any such usage shall be chargeable in accordance with this Service Document and the Order Form.

If the Customer elects to failover to Exponential-e Virtual Data Centre, any use of Virtual Data Centre virtualised resources during failover testing shall be subject to the then-current Service Definition for VDC Services and such use shall be chargeable in accordance with this Service Document and the Order Form.

- <sup>1</sup> *Failover tests are supported for the following configurations:*
- Live Exponential-e VDC or dedicated private cloud to Exponential-e VDC or private cloud (failover and failback)*
  - Live Exponential-e VDC or dedicated private cloud to Microsoft Azure (failover and failback)*
  - Test Exponential-e VDC or dedicated private cloud to Amazon AWS (test failover only)*

**5. Target Service Commencement Date**

Server Replication (Zerto) Service 5 Working Days\*

*\*From order acceptance.*

**6. Server Replication (Zerto) Service Level Agreement**

Invocation Start Time (IST)

The Server Replication (Zerto) Service is subject to the following target IST:

	IST*
Server Replication (Zerto) Service	30 minutes

*\* the time taken for Exponential-e to start invocation of the Clone Server in accordance with the Invocation Initialisation Document measured from the raising of the trouble-ticket.*

Recovery Point Objective (RPO)\*<sup>1</sup> and Recovery Time Objective (RTO)\*<sup>2</sup>

RPO and RTO will depend upon a number of Customer-specific factors and therefore cannot be detailed within this Service Definition.

*\*<sup>1</sup> the maximum tolerable period during which data might be lost and the tolerable amount of time that the Clone Server could be recovered to.*

*\*<sup>2</sup> the time difference between the start of invocation of the Clone Server and the point at which the Clone Server is accessible to the Customer to activate applications.*

Service Credits

The following service credits are conditional upon the finalisation of an agreed Invocation Initialisation Document and any required public cloud resources being available and accessible.

	Measure	Service Credit*
IST	> 1 hour	5%
	> 1 hour 30 minutes	10%
	> 2 hours	15%

	Measure	Service Credit*
	> 2 hours and 30 minutes	20%

\* The service credit is applied as a percentage of the Monthly Charge for the Server Replication (Zerto) Service. The Monthly Charge is the Annual Charge divided by twelve (12).

## 7. Charges

Server replication is charged per protected (licensed) server plus a charge for the storage occupied by the Clone Server within Exponential-e’s Virtual Data Centre (if applicable), within Azure public cloud storage consumed through Exponential-e’s Azure Cloud Solution Provider arrangements (if applicable) and/or within Amazon AWS public cloud storage consumed through Exponential-e’s Amazon AWS Solution Provider arrangements (if applicable).

When a Clone Server stored within (i) Exponential-e’s Virtual Data Centre, (ii) Azure public cloud storage consumed through Exponential-e’s Azure Cloud Solution Provider arrangements or (iii) Amazon AWS public cloud storage consumed through Exponential-e’s Amazon AWS Solution Provider arrangements is made active, either by Exponential-e or by the Customer, it becomes chargeable as a virtual server on a Pay As You Go basis in accordance with the Service Definition applicable to that virtualised environment. This means that the Customer is not charged for, amongst other things, the CPU and Memory while the Clone Server is in a cold state. Invoking a Clone Server adds the cost of all other resources being consumed to the monthly cost; for the total number of days which it remains active and will be billed monthly in arrears in accordance with the applicable Rate Card.

## 8. Data Processing

When Exponential-e provides a Server Replication (Zerto) Service, this may result in Exponential-e Processing Customer Personal Data. The following applies to the Processing of such Personal Data by Exponential-e:

### Subject Matter of Processing

The Personal Data (if any) that the Customer stores within the Protected Servers and the Clone Servers where such Protected Servers and/or Clone Servers reside within Exponential-e’s data centre environments. Where servers are located within public cloud environments, Customer Personal Data on those servers may be Processed by the relevant public cloud provider and the Customer is referred to the relevant public cloud provider’s terms (see the applicable Service Definition within this Service Document) for data processing terms. For the avoidance of doubt, public cloud providers will be a Processor of Customer Personal Data pursuant to their terms; not as a Sub-Processor to Exponential-e.

### Nature of the Processing

Replication of Personal Data within the Customer’s Protected Servers to the Clone Servers.

Exponential-e will not block, delete, correct, pseudonymise or encrypt any data being replicated.

### Appropriate Technical and Organisational Measures

With respect to the requirement set out in the General Terms in Clause 10.15 at point (ii), the Customer agrees that as far as it is concerned the security measures set out in the Contract and Exponential-e’s maintenance of (a) the ISO27001 (Information Security Management) standard and (b) the CSA: Star Cloud standard (or any replacement or equivalent of either subsisting from time to time) (collectively the “Security Measures”) fulfils the requirement of appropriate technical and organisational measures and the Customer agrees not to contend otherwise, recognising that the Charges for the Server Replication (Zerto) Service directly relate to the Security Measures to be applied.

## APPENDIX A: SERVER REPLICATION (ZERTO) MANAGEMENT

Exponential-e will provide operational management for the elements forming the Server Replication (Zerto) Service. Exponential-e's responsibilities with respect to management of the Server Replication (Zerto) Service are as follows. The Customer is responsible for all management aspects other than those for which Exponential-e is responsible.

Aspect	Exponential-e Responsibilities
<b>Capacity Planning</b>	<ul style="list-style-type: none"> <li>• Server Replication performance capacity monitoring and analysis.</li> <li>• Ongoing planning for future growth of the Server Replication (Zerto) Service involving trending of storage performance and utilisation patterns.</li> </ul>
<b>Documentation</b>	<ul style="list-style-type: none"> <li>• Maintain solution design documentation for the Server Replication (Zerto) Service.</li> <li>• Maintain Customer usage documentation for the Server Replication (Zerto) Service.</li> <li>• Implement and maintain version control for all documentation.</li> </ul>
<b>Licensing</b>	<ul style="list-style-type: none"> <li>• Exponential-e is responsible for licensing and licensing maintenance under this Contract to cover the standard Server Replication (Zerto) Service.</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>• Monitor and alert on the availability and performance of the Server Replication infrastructure.</li> <li>• Provide proactive remediation of issues generated through the monitoring and alerting toolsets.</li> </ul>
<b>Patch &amp; Software Management</b>	<ul style="list-style-type: none"> <li>• Patch updating the Exponential-e Server Replication (Zerto) Service platform, at Exponential-e's discretion.</li> <li>• Software updating the Exponential-e Server Replication (Zerto) Service platform, at Exponential-e's discretion.</li> <li>• Patch updating the Exponential-e Server Replication (Zerto) Service management platform, at Exponential-e's discretion.</li> <li>• Software updating the Exponential-e Server Replication (Zerto) Service management platform, at Exponential-e's discretion.</li> <li>• Notify the Customer of proposed updates to the Server Replication (Zerto) Service.</li> </ul>
<b>Proactive Remediation</b>	<ul style="list-style-type: none"> <li>• Investigate the cause of issues generated through the monitoring and alerting toolsets, or reported by the Customer</li> <li>• Communicate recommended remediation activities to the Customer and request approval from the Customer for carrying out remediation activities</li> <li>• Provide proactive remediation of issues as agreed with the Customer</li> </ul>
<b>Protection Planning</b>	<ul style="list-style-type: none"> <li>• Recommend and dialog with the Customer to enact environment changes.</li> <li>• Discuss possible remediation options with the Customer to address capacity bottlenecks and location protection i.e. recommendation of where to replicate data to.</li> </ul>
<b>Storage</b>	<ul style="list-style-type: none"> <li>• Exponential-e will monitor and manage all storage components (at source and destination) that are covered as Supported Items by Exponential-e under a Flex Manage Service. Storage components (at source or destination) that are not Exponential-e Supported Items under a Flex Manage Service will be monitored and managed by the Customer exclusively.</li> </ul>

## APPENDIX B: SERVER REPLICATION REQUIREMENTS

This section details the supported source and destination environments and the versions of operating systems (OS) and software required in order to make use of the Server Replication (Zerto) Service.

### Requirements for Virtual to Virtual (VMware)

- VMware vSphere 4.0 Update 1 or newer
- VMware vSphere licensing must include vCenter (VMware Standard or above, environments using vCenter Essentials are not supported)
- VMware vCenter licensing must include vCenter (VMware vCenter Standard or above) in the source and destination environments
- VMware vCenter Server 5.0 or above as the minimum supported version, and at least one ESX/ESXi host
- Windows 2008 R2 (or newer) VM on which to run Zerto Virtual Manager (ZVM) software
- The Zerto Virtual Manager must have access to the vCenter Server via a user with administrator level privileges to the vCenter Server
- On the machine where Zerto Virtual Manager is installed:
  - The Operating System must be 64-bit
  - The Operating System version number must be Windows Server 2008 R2 SP1 with KB3033929 and KB2864202 or higher (Windows 2008 R2 or newer)
  - The Windows Operating System must be Server Edition
  - Microsoft .Net Framework 4.5.2. or higher must be installed
  - Reserve at least 2 CPUs and 4GB RAM for the ZVM machine
  - Reserve at least 20GB of free disk space for the ZVM machine
  - The clocks on the machines where ZVM is installed must be synchronised with UTC and with each other (the time zones can be different). Zerto recommends synchronizing the clocks using NTP
  - The Zerto Virtual Replication installation folder and %ProgramData%\Zerto\Data\zvm\_db.mdf must be excluded from antivirus scanning. Failure to do so may lead to the Zerto Virtual Replication folder being incorrectly identified as a threat and in some circumstances corrupt the Zerto Virtual Replication folder.
- The following CPU and RAM configurations are recommended by Zerto for the machine running ZVM, dependent on the size of the site. Zerto recommends running with a minimum amount of 16GB RAM.

NUMBER OF VIRTUAL MACHINES OR PEER SITES		CPUS	RAM
VIRTUAL MACHINES	PEER SITES		
Up to 150 virtual machines	And up to 2 peer sites	4 CPUs	8GB
Between 150-750 virtual machines	And up to 5 peer sites	4 CPUs	8GB
Between 750-5000 virtual machines	And up to 80 peer sites	4 CPUs	16GB
Between 5000-10000 virtual machines	Or 80+ peer sites	4 CPUs	24GB

- To install a VRA the following is required:
  - 15GB storage space
  - At least 3GB of reserved memory
  - The ESX/ESXi version must be 4.0U1 or higher
  - Ports 22 and 443 must be enabled on the host during the installation

**Note:** For the duration of the installation of the VRA, the ZVM enables SSH in the vCenter Server.

- To install a VRA the following information is required:
  - The password to access the host root account, for ESXi 4.x and 5.x
  - The storage the VRA will use, and the local network used by the host

- The network settings to access the peer site; either the default gateway or the IP address, subnet mask, and gateway
- If a static IP is used, instead of DHCP, which is the Zerto recommendation, you need to know the IP address, subnet mask, and default gateway to be used by the VRA
- To install a Zerto Cloud Manager (ZCM) the following is required:
  - ZCM is installed on a machine running a Windows operating system with the following requirements:
    - The Windows Operating System must be Server Edition
    - Minimum Supported Operating System - Windows Server 2008 R2 SP1 with KB3033929 and KB2864202
  - Microsoft .Net Framework 4.5.2. or higher
  - At least 4GB of free disk space
  -

### Best Practices

Zerto recommends the following best practices:

- Zerto recommends installing the Zerto Virtual Manager with the following profile:
  - On a dedicated virtual machine
  - With a dedicated administrator account
  - Avoid installing other applications on this machine
  - No other applications installed on this machine. If additional applications are installed, the Zerto Virtual Manager service must receive enough resources and HA remain enabled
  - With the VM Restart Policy set to High
- If a proxy server is used at the site, specify the IP address of the ZVM in the exception list in the Proxy Server settings
- Install a VRA on every host in a cluster so that if protected VMs are moved from one host to another, there is always a VRA to protect the moved virtual machines
- When protecting a vApp, you must install a VRA on every host in the cluster on both the protected and recovery sites and ensure that DRS is enabled for the clusters
- Install VRAs using static IP addresses and not DHCP

### Considerations when protecting from vCenter

- VMs with IDE devices cannot be protected
- Any VM that is supported by the hypervisor can be protected. When recovering to a different hypervisor, the protected VMs must also be supported by the recovery hypervisor
- Zerto does not support protecting VMs that are connected to CDs / DVDs
- VMs with VMware Fault Tolerance cannot be protected
- The journal is always thin-provisioned

### Considerations when protecting from/to vCloud Director

- When the vCloud Director (vCD) site is set up within ZCM, as described in the ZCM Administration Guide, the vCenter Server underlying the vCD for the site cannot be specified as either the protected site or recovery site. When ZCM is not used, the vCenter Server underlying the vCD can be specified.
- Both the VM-level and vCD vApp-level metadata is also replicated to the recovery site. However, Zerto Virtual Replication does not replicate fenced mode settings. If fenced mode is configured in the vCD, it must be enabled for recovered VMs after a failover or move. This can lead to clashes with MAC addresses and IP addresses. If this occurs the MAC address or IP address must be configured after the failover or move. Both the VM-level and vCD vApp-level metadata is not replicated when the recovery site is not vCD
- In the properties for the vCD vApp to be protected make sure that the Start Action in the Starting and Stopping VMs tab is set to Power On



- When vCD is used, the journals can be had on separate datastores from the recovery volumes. For example, the recovery volumes might be preferred to be kept on storage with better performance, security, and reliability and the journal on less expensive storage
- As part of recovery after a failover or move operation, the data in the journal is promoted to the recovered VMs. During this promotion, the VMs can be used, and Zerto Virtual Replication makes sure that what the user sees is the latest data, whether from the VM disks or from the journal. If the journal is on a slow storage device, this is reflected in the response time the user experiences
- VMs with IDE devices cannot be protected

**Requirements for Virtual to Virtual (Hyper-V)**

- Microsoft Hyper-V 2012 R2 or 2016 hypervisor host
- Microsoft System Center Virtual Machine Manager (SCVMM) 2012 R2 or 2016 with VMM must be deployed i.e. a separate SCVMM for each site, and at least one Hyper-V host
- Microsoft licensing must include SCVMM in the source and destination environments
- Windows 2008 R2 (or newer) VM on which to run ZVM software
- The ZVM must have access to SCVMM via a user with administrator level privileges to SCVMM. The user must be a member of an SCVMM User Role with a Fabric Administrator (Delegated Administrator) profile, accessible via *Settings > Security > User Roles* in the SCVMM Console.
- On the machines where Zerto Virtual Replication (ZVM and VRA's) are installed:
  - The Operating System must be 64-bit
  - The Operating System version number must be Windows Server 2008 R2 SP1 with KB3033929 and KB2864202 or higher (Windows 2008 R2 or newer)
  - The Windows Operating System must be Server Edition
  - Microsoft .Net Framework 4.5.2. or higher must be installed
  - Minimum PowerShell version: 4.0
  - Reserve at least 2 CPUs and 4GB RAM for the ZVM machine
  - Reserve at least 4GB of free disk space for the ZVM machine
  - The clocks on the machines where ZVM is installed must be synchronised with UTC and with each other (the time zones can be different). Zerto recommends synchronizing the clocks using NTP
  - The Zerto Virtual Replication installation folder and %ProgramData%\Zerto\Data\zvm\_db.mdf must be excluded from antivirus scanning. Failure to do so may lead to the Zerto Virtual Replication folder being incorrectly identified as a threat and in some circumstances corrupt the Zerto Virtual Replication folder.
  - It is not possible to take snapshots of the ZVM as snapshots cause operational problems for the ZVM, such as creating inconsistencies with peer site ZVMs.
- The following CPU and RAM configurations are recommended by Zerto for the machine running ZVM, dependent on the size of the site. Zerto recommends running with a minimum amount of 16GB RAM.

NUMBER OF VIRTUAL MACHINES OR PEER SITES		CPUS	RAM
VIRTUAL MACHINES	PEER SITES		
Up to 150 virtual machines	And up to 2 peer sites	4 CPUs	8GB
Between 150-750 virtual machines	And up to 5 peer sites	4 CPUs	8GB
Between 750-5000 virtual machines	And up to 80 peer sites	4 CPUs	16GB
Between 5000-10000 virtual machines	Or 80+ peer sites	4 CPUs	24GB

- To install a VRA the following is required:
  - 15GB storage space



- At least 1GB of reserved memory
- Port 8100 must be enabled on the SCVMM
- Minimum PowerShell version: 4.0
- To install a VRA the following information is required:
  - The storage the VRA will use, and the local network used by the host
  - The network settings to access the peer site; either the default gateway or the IP address, subnet mask, and gateway
  - If a static IP is used, instead of DHCP, which is the Zerto recommendation, you need to know the IP address, subnet mask, and default gateway to be used by the VRA

### Best Practices

Zerto recommends the following best practices:

- Zerto recommends installing the Zerto Virtual Manager with the following profile:
  - On a dedicated virtual machine
  - With a dedicated administrator account
  - No other applications installed on this machine. If additional applications are installed, the Zerto Virtual Manager service must receive enough resources and HA remain enabled
  - With the VM Restart Policy set to High
- If a proxy server is used at the site, specify the IP address of the ZVM in the exception list in the Proxy Server settings
- Install a VRA on every host in a cluster so that if protected VMs are moved from one host to another, there is always a VRA to protect the moved virtual machines
- Install VRAs using static IP addresses and not DHCP

### Considerations

- Virtual machines with pass-through disks and shared disks cannot be protected
- A Hyper-V host with a pass-through disk is ignored by the ZVM
- Any virtual machine that is supported by the hypervisor can be protected. When recovering to a different hypervisor, the protected virtual machines must also be supported by the recovery hypervisor

### Requirements for Amazon AWS

Installing the ZCA on AWS installs the Zerto Virtual Manager (ZVM), Virtual Replication Appliance (VRA), and a Zerto Backup Appliance as Windows services. There can be multiple ZCAs in a single AWS Availability Zone.

### Recommended Required AWS Permissions

For the AWS account used by the ZCA, it should have full permissions to use both S3 and EC2, including importing data from S3 to EC2. These can be set in the AWS Access Management (IAM) service.

### Requirements for Replication to AWS

- Only VMs that are supported by AWS can be protected by Zerto Virtual Replication. Refer to AWS documentation for the supported operating systems.
- A VPC must exist, and a security group and subnet must be assigned to it and to all other VPCs that will be used for recovered VMs.
- The following limitations apply when protecting to AWS:
  - Replication occurs in one direction only, to allow failover to AWS as a tertiary copy of Protected Servers. Replication from AWS back to VDC or private dedicated cloud is not supported for failback.
  - For Linux, AWS supports VMs with up to 40 volumes, including the boot volume.
  - For Windows, AWS supports VMs with up to 26 volumes, including the boot volume.

- Note that C5/M5 instances have 28 available devices and each volume/NIC utilises one device. Windows supports up to 26 volumes.
- GBT formatted disks are supported for data volumes only.
- The following table describes the limitations per Import Method:

IMPORT METHOD						
	AWS Import		zImport for Data Volumes		zImport for all volumes	
OS	Boot Volume	Other Volume	Boot Volume	Other Volume	Boot Volume	Other Volume
Linux	1 TB	1 TB	1 TB	16 TB	2047 GiB	16 TB
Windows	1 TB	1 TB	1 TB	16 TB	2047 GiB	16 TB

#### Additional AWS Considerations

- **EC2 and VPC limitations:** On-Demand instances: 20 per region per account. Instance types are also limited per region: many of them are 20 instances per region per account. <http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/using-eni.html#AvailableIpsPerENI>
- **Networking:** Network interfaces per region: 350. NICs per instance: depends on instance size. <http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/using-eni.html#AvailableIpsPerENI>
- **Volumes:** EBS disks per account: 5,000. Total volume storage of Magnetic volumes: 20 TiB. Max EBS volume size - magnetic type: 1024 GiB
- **Import Instance:** Concurrent Import-Instance tasks: 5 tasks per account. This will directly impact the amount of VPG's that can be failed over at a given time.

#### AWS Resource Considerations

##### ZCA

Size	vCPU	Memory: GiB	OS Disk (SSD) GiB
m5.xlarge	4	16	50

##### To AWS

- Replication and journal volumes – S3 storage

##### ZASA

Size	vCPU	Memory: GiB	OS Disk (SSD) GiB
m5.large	2	8	8

##### ZSAT

Size	vCPU	Memory: GiB	OS Disk (SSD) GiB	Protected Disk
m5.large	2	8	8	Same as source

The following information describes the limitations per Import Method:

- For the AWS Import and Import for Data Volumes methods, the AWS Import Instance API only supports single volume VMs. The boot volume of the protected virtual machine should not be attached to any other volume to successfully boot. For more information, see the information in the following location: [http://docs.aws.amazon.com/AWSEC2/latest/APIReference/API\\_ImportInstance.html](http://docs.aws.amazon.com/AWSEC2/latest/APIReference/API_ImportInstance.html)
- It is strongly recommended to perform a Failover Test to ensure that the recovered instance is successfully running on AWS.
- It is strongly recommended to install Zerto tools on Windows VM's as this will improve the volume import time and will support importing all volumes. This can be done using ZImporter to import data faster, and it provides



support for multiple volumes.

### Requirements for Microsoft Azure

The Azure ZCA on both Azure sites need to be Windows Server 2008 and above, and self-replication within Azure is not supported. The following rules exist for the operation of Server Replication (Zerto) Services with Microsoft Azure.

### Requirements for Replication from Azure

- For Virtual Machines to be protected from Azure, the VM volumes must be Standard Storage and reside in the Standard Storage Account, which is defined during the installation of the ZCA.
- Recovery and journal volumes reside on this Standard Storage Account.
- Only general-purpose v1 (GPv1) accounts are supported.
- Azure VMs with all disks on the Zerto Storage Account can be protected by Server Replication (Zerto) Services.
- Azure Blob Storage is not supported by Server Replication (Zerto) Services.
- VMs which are not deployed via the Azure Resource Manager cannot be protected from Azure. VMs failed over by Zerto are ready to be protected.

### Requirements for Replication to Azure

- Protected volumes are recovered in Azure as VHD disks in a page blob. Virtual machines with disks that are less than 1GB are recovered with disks of 1GB. For some instance sizes, the Azure VM is created with a Local SSD disk which is a temporary disk. This disk is in addition to the disks associated with each protected virtual machine.
- The following limitations apply when protecting to Azure:
  - Virtual machines with UEFI Firmware cannot be protected.
  - Machines that have a disk larger than 4 TB cannot be protected.
  - The protected VMs need to have at least one NIC.
  - Reserve at least 2 CPUs and 4GB RAM for the machine using a subnet accessible by other Server Replication sites.
  - The supported number of data disks and NICs per VM is dependent on the selected instance size when creating the replication job. For example, an instance size of D3\_v2 allows up to eight data disks per virtual machine.

### Additional Azure Considerations

For additional considerations, see Azure subscription and service limits, quotas and constraints:

<https://docs.microsoft.com/en-us/azure/azure-subscription-service-limits>

### Azure Resource Considerations

#### **ZCA**

A minimum of one ZCA is required in order to replicate to Azure. The ZCA should have the following specification:

Size	vCPU	Memory: GiB	OS Disk (SSD) GiB
Standard_D3_v2	4	14	200

The storage I/O from the source VMs being replicated drives the number of ZCAs that are required for successful replication. Exponential-e recommends a ratio of 20-to-1 VMs to each ZCA for ZCA replication to Azure, however an Azure calculator will be run during On Boarding of Server Replication to correctly define the number of ZCAs that are needed for the overall Server Replication solution for successful replication. This amount may change over time due to Azure changes, or if the Azure calculator logic is changed. These charges are outside of Exponential-e's control and an increase or decrease in the amount of ZCAs that are required for successful replication will be passed on directly to the Customer.

## To Azure

- Replication and journal volumes – Standard HDD

### Requirements for Source Environment

- Windows or Linux source operating systems
- Versions of Windows, Linux, hypervisors, load balancers, and public cloud environments that are supported it is available upon request from [sales@exponential-e.com](mailto:sales@exponential-e.com).
- When operating Server Replication in a One-to-Many configuration from Exponential-e VDC or Exponential-e private dedicated cloud to third party clouds, it requires additional bandwidth at the source for each Public Cloud instance being replicated to.

For the above Virtual to Virtual and Physical to Virtual replication scenarios, Windows subscription based licensing with active Software Assurance (for replicated Windows VMs) is required – OEM and Retail Box licensing cannot be used.

### Requirements for Virtual to Virtual (Cross Platform)

- **Where VMware is involved:** must meet all requirements for Virtual to Virtual (VMware)
- **Where Hyper-V is involved:** must meet all requirements for Virtual to Virtual (Hyper-V)
- VMware and Hyper-V can both be the source or destination for Server Replication

### Requirements for Virtual to Virtual (Public Cloud)

- Exponential-e VDC or Private Cloud source VMs can replicate using Server Replication to Amazon AWS in one direction only. Exponential-e cannot fail back from Amazon AWS to Exponential-e VDC or Private Cloud unless all data changed while running under Amazon AWS is discarded
- Exponential-e VDC or Private Cloud source VMs can replicate using Server Replication to Microsoft Azure for failover and back to the Exponential-e VDC or Private Cloud for failback
- Windows VM(s) (Windows AWS m5.xlarge recommended where supported, otherwise Windows AWS m4.xlarge VM to be used on AWS, Windows Azure D3 v2 VM on Azure) on which to run ZCA software. The Customer is subject to all charges incurred with Public Cloud vendors in order to facilitate Server Replication

### Requirements for Licensing

Servers that are replicated to third party cloud environments (3<sup>rd</sup> party clouds and public clouds) require the Microsoft licenses on all VMs that are replicated to be re-armed upon failover to the third party cloud environment.

### Networking and Security

#### Networks

The Server Replication architecture supports the following network configurations:

- Flat LAN networks
- VLAN networks, including private VLANs and stretched VLANs
- WAN emulation
- VPN IPsec

#### Firewalls

The Server Replication architecture does not support NAT (Network Address Translation) firewalls.