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## About this document

This guide provides a comprehensive documentation of the considerations and configuration steps required for using <u>VMware® Live Site Recovery™ (VLSR)</u> to protect and recover a reference multi-tiered set of businesscritical applications from a source VMware datacenter (on-premises or cloud-based) to a supported target VMware datacenter (on-premises or cloud-based), with the least cost (time, financial, and administrative intervention) possible.

#### Audience

Technical architects, administrators, or operators can use this guide as a foundation to build similar solutions for their own enterprise infrastructure.

## What we don't include in this document

This guide demonstrates how to use VMware Live Site Recovery to protect virtualized business critical applications on VMware vSphere® installed on-premises or in a hybrid cloud. Because we assume you're familiar with the general concepts of business continuity and recovery, we don't define or explain such concepts in detail. We also don't discuss or explain the setup, configuration, operation, or administration of VMware Live Site Recovery, virtualization, a VMware hybrid cloud or the applications and services hosted on or provided by the protected workloads.

We assume you've configured the infrastructure to perform these tasks:

- Installation, setup, configuration and/or administration of VMware vSphere infrastructure
- Installation, setup, configuration and/or administration of specific VMware vSphere-based Cloud infrastructure
- Installation, setup, configuration and/or administration of VMware Live Site Recovery
- Virtualizing Active Directory Domain Services on VMware vSphere
- <u>Architecting Microsoft SQL Server on VMware vSphere</u>
- Installation, setup, configuration and/or administration of Microsoft Active Directory Domain Services or
   Domain Controllers
- Installation, setup, configuration and/or administration of Microsoft SQL Server, Windows Failover Cluster or <u>Always On</u>
- VMware vSphere Client

This document doesn't include detailed descriptions of these topics.



## Before you begin

## Requirements

You should complete the following tasks before continuing with the instructions in this guide:

- Set up network connectivity for:
  - The **protected site:** This is the source infrastructure.
  - The recovery site: A new or existing VMware Cloud Foundation<sup>®</sup> environment or any of the publicly available brands of the VMware cloud infrastructure options, such as Azure VMware Solution (AVS), or Google Cloud VMware Engine (GCVE).

**Note:** The VMware cloud brand and version dictates the type of network connectivity type required for VMware Live Site Recovery. Consult the cloud provider's guides for more information.

- Install VMware Live Site Recovery on both the protected and recovery sites.
- On each of the sites, install VMware vSphere Replication appliances in the same VMware vCenter® where the VMware Live Site Recovery instance is registered.
- Configure the VM IP addresses, DNS server IP addresses, network segment, and datastore required to complete the protection and recovery plans.
- Make sure all the VMs that will be protected and recovered have an up-to-date version of VMware Tools installed

**Note:** This is a standard recommendation, but it's especially relevant if the VMs will be reconfigured or customized as part of the recovery process.

## Terms to know

#### Cold site recovery

Distributing servers and services over multiple datacenters is a common business continuity and disaster recovery (BCDR) strategy, but a cloud-based solution can reduce the associated costs of maintaining a dedicated disaster recovery (DR) site like staffing, cooling, heat, and duplicate hardware. You can further reduce these associated costs by minimizing the actual utilization of the cloud-located resources until it is necessary to do so: when an actual disaster event has happened, or during a simulation, testing, or validation exercise. This type of "use only when needed" utilization is commonly described as having a cold site for BCDR. In this configuration, live (hot) devices, servers, and services aren't hosted in the target DR site. This saves you money and resources in your BCDR systems. We demonstrate how VMware Live Site Recovery achieves this cost-saving objective while providing a simplified, flexible, automated, and repeatable BCDR solution for your enterprise.

#### Application high availability

The ability of an application to function and deliver services even when one or more of its components fail is the focus of **application high availability (HA)**. The resilience of this application—whether native or through the use of



third-party solutions or add-ons—determines its capacity to withstand and recover from failures. The combination of Microsoft SQL Server Always On and Windows Server Failover Clustering (WSFC) provides application-level resilience in the scenario described in this guide. Because of these features, Microsoft SQL Server services can remain available after a brief interruption even when the original server providing the service has become unavailable for any reason. WSFC restores its resources on a functioning node in the event of the original server failure, typically without the need for administrative intervention.

#### Disaster recovery event

A **disaster recovery (DR) event** is a failure that affects more than one server or part of the system. A DR event is a collection of multiple HA events that can't be easily fixed by the resilience of an application, component, or service. Because it's not usually transient in nature, the effects of a DR event are more impactful, disruptive, and destructive. Recovering from a DR event is more difficult, more expensive, and slower than recovering from a HA event. This is because multiple layers of the infrastructure are affected. In turn, this means that planning and getting ready for a DR event costs more.

## Architecture

We configured a VCF-based protected site on-premises with several VMs. These VMs are part of a multi-tiered mission-critical workloads. Some VMs are Domain Controllers providing Active Directory Domain Services (ADDS) for the infrastructure, and the rest are VMs running Microsoft SQL Server instances (MSSQL). We are replicating these VMs to a remote VCF-based infrastructure, configured as our cold DR site. The protected site could be on-premises, or in a VMware-supported cloud environment. The same is true for the recovery site.

The following figure shows our setup. For the exercises in this guide, your setup will be similar.





## Applications

We chose three applications that show the capabilities of automation, orchestration, and the recovery tasks possible with VMware Live Site Recovery:

- Windows Active Directory Domain Controllers
- Microsoft SQL Server
- Windows client

#### Windows Active Directory Domain Controllers

Most BCDR plans include considerations and provisions for Domain Controllers because most applications depend on the services they provide, so they are common in most enterprise network infrastructure. Recovering modern versions of Windows Domain Controllers (anything newer than Windows Server 2008 R2) in the event of a disaster is somewhat difficult and can be complicated in our DR scenario. This is partly due to the security features Microsoft introduced into virtualized Domain Controllers beginning in Windows Server 2012. This guide addresses this issue and shows how VMware Live Site Recovery helps minimize these challenges.



#### Microsoft SQL Server

Because of its integration with so many front-end applications, services, and solutions, Microsoft SQL Server is one of the most prevalent business-critical applications found in any Microsoft-based corporate IT infrastructure. SQL Server has native, built-in resilience to maximize its availability and minimize the possibility of service disruption in the event of an outage. Combining Windows Server Failover Cluster (WSFC) with the SQL Server Always On feature is a high availability option that ensures faster service availability, particularly for databases, in the event of a node failure. Even then, this resilience is more useful and intended for high availability (which protects against component or service failures) rather than for disaster recovery events.

#### Windows client

We chose an ordinary Windows client from which we tested connectivity and access to the servers and services we recovered in our failure scenarios.

# How to set up the business continuity/disaster recovery environment and workflow

Let's jump into the VMware Live Site Recovery configuration. For most exercises in this section, you'll need access to the <u>vSphere Client</u>. You'll also confirm the functionality of the recovered workloads inside these applications: Windows OS, Active Directory domain services (ADDS), and SQL Server.

Make sure you read the **Before you begin > Requirements** section above. This includes <u>installing and configuring</u> <u>VMware Live Site Recovery</u>.

#### Pair the recovery and protected sites

Here, we'll connect the vCenter and VMware Live Site Recovery instances on each site to one another. This is called pairing the sites.

1. In the vSphere Client on the recovery site's vCenter, select **Site Recovery**. The **Summary** page appears, as shown below.



		vcf wdc-m01-vc01.vcfcom V		Ċ û ⊘ Administrator⊕VSP
😑 vSphere Client 🛛 Q Se	Site Pair Replications	rotection Groups 📃 Recovery Plans		
1 Home	Summary	Summary		RECONNECT
Shortcuts	Issues			
윤 Inventory	Configure 🗸	VMware Live Site Recovery		EXPORT/IMPORT VLS
Content Libraries	vSphere Replication 🗸	Protection Groups:2     Recovery Plans:	2	
Workload Management     Global Inventory Lists	Replication Servers	Name	TSA-VLR RENAME	ISV-VLR RENAME
E Delicies and Drefiles	Array Based Replication	Server	isv-vcf-srm01.vcf 443 ACTIONS ~	wdc-sm01.vdf C
Auto Deploy	Storage Replication Adapters	Version	9.0.1, 24035640	9.0.1, 24035640
Hybrid Cloud Services     Hybrid Cloud Services	Array Pairs	ID	com.vmware.vcDr	com.vmware.vcDr
- Developer Center	Network Mappings	Logged in as	VSPHERE.LOCAL\Administrator	VSPHERELOCAL\Administrator
Administration	Folder Mappings	Remote VLSR connection	✓ Connected	✓ Connected
Events	Resource Mappings Storage Policy Mappings	vSphere Replication		
Lifecycle Manager	Placeholder Datastores	Replicated VMs from bca-vcf-vc01.vcf.		
Cloud Provider Services	Advanced Settings >	Name	bca-vcf-vc01.vcf.	wdc-m01-vc01.vcf
Site Recovery	Permissions	Server	isv-vcf-vrm01.vcf	wdc-vrm01.vcf 9043 ACTIONS ~
VMware Aria Operations	Recovery Plans History	Version	9.0.1.17500, 24037981	9.0.1.17500, 24037981
	vSphere Replication reports	Domain Name / IP	isv-vcf-vrm0t.vcf.	wdc-vrm01.vcfom
	Licensing	Remote VR connection	✓ Connected	✓ Connected

Site Recovery INST	ANCE WDC-VRI	ANPE.VMWARE.CO	M:443 ∽			
Local vCenter Server in a new browser tab.	instances with inst	alled vSphere Replication o	r Site Recovery Manager are displayed below. If you	u want to se		
	🔂 wd	sanpe.vmwar	e.com			
> vSphere Replica	tion	📀 ок				
> Site Recovery M	anager	🛛 ок				
	0	PEN Site Recovery 🗹				

2. Click **OPEN Site Recovery** to access the protected site.



vSphere Client Q Searct	n in all environments	
Site Recovery INSTANCE ISV-VCF	.AB.LOCAL:443 ~	
Local vCenter Server instances with in a new browser tab.	installed vSphere Replication of	Site Recovery Manager are displayed below. If you
đ	bc tsalab.local	
> vSphere Replication	🕑 ок	
> Site Recovery Manager	🕑 ок	
	OPEN Site Recovery 🖸	

3. Click NEW SITE PAIR.

vmw Live Sit	te Recovery	Menu 🗸		
NEW SITE P	AIR			
🛃 bc	tsala	ab.local ↔ @ wdc	)2.vsanpe.v	
VMware Live S	Site Recovery			
Protection	Groups 2	Recovery Plans 2		
vSphere Repli	cation			
Cutgoing 5		Incoming O		
VIEW DETAILS	S ACTIONS ~			
🔊 VMwar	re Live Site	Recovery		
Center Server		Connection Status	Conne	cted Through
<mark>P</mark> bca	f.tsalab.local	🔇 ОК	🛞 isv	cf.tsalab.local
OPEN CLOUD C	ONSOLE 🛛	SETUP CONNECTION		

4. On the Pair type screen, select the applicable SSO domain and click **NEXT**.



New Pair	Pair type Select a local vCenter Server.	×
1 Pair type 2 Peer vCenter Server	VCenter Server     Server     tsalab.local	Ŧ
<ul><li>3 Services</li><li>4 Ready to complete</li></ul>	Pair type  Pair with a peer vCenter Server located in a different SSO domain  Pair with a peer vCenter Server located in the same SSO domain	
	CANCEL	NEXT

You'll be prompted for the vCenter credentials.

Because we're doing this from the recovery site's vCenter instance, the credentials we provide here will be for the **protected** site's vCenter instance.

5. Provide the remote vCenter's information and credentials, click **FIND VCENTER SERVER INSTANCES**, and click **NEXT**.

New Pair	Peer vCent	er Server					×
1 Pair type	Enter the Platform	Services Controller detail:	s for the peer vCenter Se	erver.			
2 Peer vCenter Server	PSC host name		e.vmware.com				
3 Services	PSC port	443					
4. Ready to complete	User name	administrator@vsphe	re.local				
r nousy to complete	Password	•••••		0			
	FIND VC	ENTER SERVER INSTAN	ICES				
	Select a vCenter S	erver you want to pair.					
	vCenter Ser	ver					Ŧ
			Y				
					CANCEL	ВАСК	NEXT



**Note:** If you're using default self-signed certificates in your environment, you'll need to click **Connect** to ignore the vCenter's self-signed certificate security warning to proceed.

User name administrat	or@vsphere.local
Security Alert	
Site Recovery Client cannot	validate the following security certificates:
Thumbprint for host wdc	.vmware.com
CD:F9: D:AB:CD:5B:A1:0	):7A:1E:0A:C0:80:B
Connect anyway?	
	CONNECT

We used VMware vSAN for the storage subsystem in our environments. vSAN is the default storage option for all VMware vSphere cloud infrastructure. In this configuration, we see that the VMware Live Site Recovery and the VMware vSphere Replication appliance are both registered on our vCenter.

6. Click **Next** to continue.



New Pair	Services The following services were identified on the selected vCenter Server instances. Select the ones you want to pair.
1 Pair type	Service 🕆 Y bca- salab.local Y wdc anpe.vmware.com
2 Peer vCenter Server	Image: Site Recovery Manager (com.vmware.vc     TSA-VLR     ISV-VLR       Image: Site Replication     bca-1     alab.lo     wdc     anpe.vmware
3 Services	
4 Ready to complete	
	< >
	CANCEL BACK NEXT

**Note:** You'll need to click **Connect** to ignore the vCenter's self-signed certificate security warnings if you're using them before you can proceed.



Site Recovery Manager at is the following security certificat	salab.local cannot validate tes:
Thumbprint for host wd	anpe.vmware.com
27:B9:38: 9:25:1D:B4:32:0C:0B:08	)E:16:58:2C:B2:2D:3
Thumbprint for host wdc	npe.vmware.com
CD: D:AB:CD:5B:A1:08:31:AD:5B	)A:C0:80:B
Connect anyway?	

7. Click **Finish** to complete the site pairing process.



New Pair	Ready to complete Review your settings selections before finishing the wizard.					
1 Pair type	Pair type	vCenter Server instances in different SSO domains				
2 Peer vCenter Server	vCenter Server instances	t lab.local	wc vsanpe.vmwar	e.com		
	vSphere Replication	;alab.local	)2.vsanpe.vmwar	e.com		
3 Services	Site Recovery Manager	TSA-VLR	ISV-VLR			
4 Ready to complete						
			CANCEL BACK	FINISH		

Now we're done with the site pairing exercise. We're ready to starting protecting our mission-critical workloads. The Site Recovery page will look like this screenshot.

vmw Site Recovery	Menu 🗸					
NEW SITE PAIR						
æ	salab.local $\leftrightarrow \mathbb{P}$ )	cf02.vsanpe	e.v	Replicati	tions within the same vCenter Server	
Site Recovery Manager Protection Groups 0 vSphere Replication Outgoing 0 VIEW DETAILS ACTION	E Ri € In	ecovery Plans O		C within I	n buu ver veuriverieunub.local O	
🐼 VMware Live	Site Recovery					
vCenter Server @ bc	cal	Connection Status	Connec	ted Through	3b.local	
OPEN CLOUD CONSOLE	SETUP CONNECTION					

#### Set up site recovery protection

1. From the site pairing page, click View Details.



vmw Live Site Recover	r <b>y</b> Menu ~	
NEW SITE PAIR		
øv	2.vsanpe ↔ 🝘	:salab.local
VMware Live Site Recover	ry	
Protection Groups 0	Recovery Plan	ns O
vSphere Replication		
Cutgoing O	Incoming O	
VIEW DE AILS ACTIONS	× .	

2. Provide the admin credentials for the **protected site's vCenter**, and then click **Login** to complete the initial pairing.

y Lovery Plans:0	og In Site			×	
En	ter vCenter Server cre	edentials			ISV-VL
vo	Center Server		anpe.vmware.com		WOC-sh
Us	ser name	administrator@vsphere.	local		
Pa	ssword	•••••	0	.	
					Not au
			CANCEL	.OG IN	() Un

Here is our Live Recovery configuration and administration landing page.



vmw Live Site Recovery		.je.vmware.com	v	$\mathbb{C}$ $\hat{\square}$ $(\mathbb{O})$ Administrator#VSPHERE.LOCAL $\sim$ $(\mathbb{O})$
Site Pair Replications	<b>Prot</b>	ection Groups 🔲 Recovery Plans		
Summary		Summary		RECONNECT BREAK SITE PAIR ?
Issues Configure vSphere Replication Replication Servers Enhanced Replication Mappings	~	vCenter Server: vCenter Version: vCenter Host Name: Platform Services Contr Cloud Connection Statu Connected Through: Organization Name:	abb.ccal         wc         anpe.vmware.com           8.0.3, 2409160         8.0.3, 2409160           8.0.3, 2409160         ianpe vmware com:443           oller:         iucoal:443         ianpe vmware com:443           is:         OK         OK           is:         VCF TMM         VCF TMM	
Storage Replication Adapters Array Pairs	Ť	VMware Live Site Recovery  Protection Groups:0	nso	EXPORT/IMPORT VLSR CONFIGURATION ~
Network Mappings		Name	TSA-VLR RENAME	ISV-VLR RENAME
Folder Mappings		Server	i: Jocal:443 ACTIONS ~	v e.vmware.com.443 ACTIONS ~
Storage Policy Mappings		Version	9.0.1, 24035640	9.0.1, 24035640
Placeholder Datastores		ID	com.vmware.vcDr	com.vmware.vcDr
Advanced Settings	>	Logged in as	VSPHERE.LOCAL\Administrator	VSPHERELOCALVAdministrator
Permissions		Remote VLSR connection	✓ Connected	✓ Connected
Recovery Plans History		vSphere Replication		
vSphere Replication reports		Replicated VMs from bc	b.local:0 🔁 Replicated VMs from wd- sanpe.vmware.com:0	
Licensing		Name	ilab.local	· ////////////////////////////////////
		Canvar	inu vet vendt vet tealak laask0042 + CTIONE sammi	3046 Jum01 Lef03 Leanes Limutes com/00.03 ACTIONE

## Factors influencing our design and configuration choices

VMware Live Site Recovery allows you to configure an orchestrated workflow of all the actions and steps required to recover a VM, including the guest operating system, applications, processes, and other components. VMware Live Site Recovery does this by using the features and capabilities of the VCF infrastructure and the storage subsystem to create a point-in-time copy of the VM from the source (protected site) to the target (recovery site). VMware Live Site Recovery can use either array-based replication or vSphere Replication to replicate VM data from the source site to the target site. For this paper, we used vSphere Replication.

#### vSphere Replication can replicate VMs between different storage types

Because vSphere Replication is host-based, it doesn't depend on the underlying storage, so it works with a variety of storage types, including vSAN, traditional SAN, NAS, and direct-attached storage (DAS). Unlike many array replication solutions, vSphere Replication can replicate VMs between the same or even different storage types, like vSAN to DAS, SAN to NAS, and SAN to vSAN, to name a few.

#### VMware Live Site Recovery can pre-configure recovery plans

When a real or simulated failure occurs at the protected site, admins can initiate the pre-configured recovery steps and actions in their recovery plans. These steps include, among others:

- The order in which VMware Live Site Recovery recovers the protected VMs.
- The network to which the recovered VMs are connected.



- Whether to customize or change the IP addresses for the recovered VM, or let them obtain such addresses from an available/accessible DHCP server.
- In-guest configuration scripts to run on the recovered VMs.

When an admin initiates this recovery plan, VMware Live Site Recovery prepares the VMs for recovery using the vSphere Replication-created copy of the VM data. The VMs are added to inventory, connected to the necessary resources (networks, folders, resource pools, and storage policies), powered on in the specified order, and customized as needed. If the workflow includes running scripts inside the VMs, the guest operating system is instructed to call and execute the scripts (of course, the scripts must exist on the VMs and be accessible during the recovery process).

Here's a description of the protection and recovery workflow you'll configure for the exercise:

- The SQL Server instances run on Windows VMs and are joined to the Active Directory domain services (ADDS) infrastructure. For this reason, you should have the Domain Controllers available and functional before powering on the SQL Server VMs.
- The SQL Server instances are clustered in a 3-node, Always-on Availability Group configuration. Clustering SQL Servers requires the use of a Windows Server Failover Cluster (WSFC). You'll use a file share witness (a folder located on one of the Domain Controllers) as the quorum option for this configuration.
- We specifically use availability groups in this guide and demonstration because (at the time of this writing):
  - The default storage option for VMware clouds is vSAN.
  - The default replication option for vSAN is vSphere Replication.
  - vSphere Replication doesn't currently have the capabilities to replicate disks used for shared-disk Windows clustering.
  - Although the scripts and all other required steps are similar, the factors mentioned above preclude the use of the steps documented in this guide for protecting and recovering Microsoft SQL Servers configured in shared-disk mode—Always On Failover Clustering Instance (FCI).
- In steady-state operation, applications, scripts, and processes access the SQL Server instance and the database through a common name: the **listener**. The listener is a host name that resolves to a specific IP address (or set of IP addresses). The Domain Controllers provide the DNS service, which manages this resolution. The listener must be available and accessible to the services provided by the SQL servers.
- Usually, the IP address segments in the protected site are different from the ones used in the recovery site.
- It is possible to extend the network segments from the protected site to the recovery site. Because the mechanism for achieving this configuration differs among the various VMware cloud brands, including it in this guide is impractical. For simplicity, the exercise includes a workflow for changing the IP addresses of recovered VMs to match those available at the recovery site.
- This IP address change means that you'll need to change the IP addresses of the VM (a trivial task in VMware Live Site Recovery) and the listener.
- VMware Live Site Recovery can't automatically change VM application configurations because it doesn't have knowledge of the applications that run inside the VM. For this purpose, you'll use the VMware Live Site



Recovery script-triggering feature to instruct the guest operating system to run a script that will change the IP address of the listener and update the DNS record after the recovery.

#### Stability and security of virtualized Domain Controllers

Around 2012, with compute resources growing and virtualization becoming mainstream in IT environments, dedicating a physical server to running a Domain Controller became impractical and inefficient from a cost and ROI perspective. But there were some issues with the stability and security of virtualized Domain Controllers. To address these problems, Microsoft implemented measures to make virtualized Domain Controllers safer and more stable, including guardrails to prevent a malicious actor from cloning or copying them.

#### VM-Generation ID makes Domain Controller virtualization safer

At a high level, a Domain Controller has a complete copy of the domain's users, passwords, and other secrets, making it difficult to minimize or mitigate an attack. VM-Generation ID (among other capabilities) helps protect virtualized Domain Controllers in several ways:

- It stores and tracks a unique counter for every copy of a virtualized Domain Controller. The hypervisor assigns a counter to the VM. In vSphere, this is the VM Gen-IDx value you see in a Windows VM's .vmx file.
- When the Domain Controller boots up, it reads this counter from its configuration file and then stores it internally.
- This counter persists over the lifetime of the VM unless a <u>specific type of operation</u> is performed on it. These actions alter the state and identity of the VM, so whenever any are performed, the hypervisor changes the counter.
- The next time the Domain Controller is powered on, Windows reads its generation ID, compares it to what was previously stored, and discovers there is a mismatch.
- When this happens, Windows immediately performs several steps in response to the disparity and triggers the VM-Generation ID safety measures. Refer to the following document for a more detailed discussion of virtualization-based safeguards: <u>Safely virtualizing Active Directory Domain Services (AD DS)</u>.

#### Restoring a Domain Controller triggers VM-Generation ID change

- VLSR recovery workflow includes bringing up A REPLICATED COPY of a Protected VM at the Recovery Site when (in a real Disaster event) the real Domain Controller is unavailable) or in a simulated DR exercise (when the VM is recovered to a fenced-off "Test" network). Recovering a Domain Controller requires us to instantiate a replicated copy of a real Domain Controller. Such a "Copy" operation automatically changes the VM-generation ID of the Domain Controller, which then automatically triggers the Domain Controller safety responses from Windows.
- One of the responses is an instruction to the Domain Controller to (among other things) reset its InvocationID and discard its RID Pool. For all practical purposes, the Domain Controller is no longer a Domain Controller at this point, due to the change in its VM-generation ID. Windows then updates the VM-generation ID it had stored previously to match the new one provided by the hypervisor. The VM then obtains a new set of RID



Pool from the RID Master, and life is good. Well, we have abbreviated the complete narrative for our purposes, but what is of relevance to us for this Guide is that, in spite of the fact that recovering a Domain Controller with VLSR triggers Windows to invoke the Virtualized Domain Controller Safety feature, doing so is a supported, repeatable, more efficient, reliable, and faster option than anything else available as of the time of this writing.

## Logical topology of the VMware Live Site Recovery infrastructure

Now that we know our desired outcome and the considerations governing our ability to achieve it, we are ready to proceed.

Here's an approximate representation of the logical topology of our VMware Live Site Recovery infrastructure:





In our example, our storage platform is vSAN (the default option for vSphere-based Cloud platforms), so the VMware vSphere Replication Server will be responsible for replicating our protected VMs from the Protected Site to the Target Site (and vice versa). No special configuration is required for this part at this point.

## Create mappings with network pairing

We'll ignore Array Based Replication because it doesn't apply to vSAN, which is the default storage option for VCF and all vSphere-based cloud offerings.

**NOTE:** VLSR supports non-vSAN platforms which provide their own VLSR-compatible storage replication adapters.

vmw Live Site Recovery		vsanpe.vmware.com - Ł	lab.local 🗸				
Site Pair Replications	<b>Pro</b>	tection Groups 📃 Re	covery Plans				
Summary		Replication Ser	vers				
Issues			e.vmware.com		:f.tsalab.local		
Configure	~	REGISTER					
vCabora Daplication		Replication Server		Υ τ	Domain Name / IP	т	Status
vsphere Replication	~	0   🗍 1	lost based)			anpe.vmware.com	🔌 Connected
Replication Servers		0   🔲 1	iost based)			anpe.vmware.com	🔌 Connected
		1	ost based)			npe.vmware.com	🔌 Connected
			host based)			npe.vmware.com	🔌 Connected
Array Based Replication	~	🔿   🔲 E	lication Server			are.com	🔌 Connected
Storage Replication Adapters							
Array Pairs		***					

1. Select Replication Servers.

Network pairing lets you map the network segments on one side to a corresponding segment on the other.

2. Click **New** to begin creating a mapping.



	local - wr npe vmware.com ∨		С Д 🕐 Administrator@VSPHERE.LOCAL 🗸 🝚
	ction Groups 🔲 Recovery Plans		
	Network Mappings		Learn more 🗗
	vcf.tsalab.iocal pe.vmware	com	
~	NEW		
>	bca-vcf-vc01.vcf.tsalab.local		T IP Customization T
>			
		Y	
>			
			Items per page <u>AUTO ^</u> 0 network mapping(s)
		No network mapping selected.	
	Prote	Vertextend Groups       Recovery Plans         Network Mappings       rcf.tsalab.local         Netw       Image: bcsvcfrvc0tvcf.tsalab.local         Netw       Image: bcsvcfrvc0tvcf.tsalab.local         Image: bcsvcfrvc0tvcf.tsalab.local       Image: bcsvcfrvc0tvcf.tsalab.local	Vertex          recovery Plans             Vetwork Mappings         ret tsalab.local         pe vmware.com             New             besever/vet/txalab.local             m             besever/vet/txalab.local             m             besever/vet/txalab.local             m             besever/vet/txalab.local             m             besever/vet/txalab.local             No             besever/vet/txalab.local             besever/vet/txalab.local

3. Select Prepare mappings manually and click Next.

New Network Mappings	Creation mode	×
1 Creation mode	Select the way you want to create mappings.	
2 Recovery networks	The system automatically prepares mappings for networks with matching names under the selected network containers.	
3 Reverse mappings	Manually select which exact networks to map.	
4 Test networks		
5 Ready to complete		
	CANCEL	NEXT

You have the option to create a mapping of the networks at either the virtual distributed switch (vDS) level as a unit, or you can create a mapping at the individual port group level. We'll demonstrate the fine-grained flexibility in VMware Live Site Recovery by mapping select port groups from the protected site to corresponding port groups on the recovery site.

4. Select the check box near each port group on the protected site and the corresponding port group on the recovery site you want to map each to. Then click **Add Mappings** and **Next**.



New Network Mappings	Recovery networks	×
1 Creation mode	Configure recovery network mappings for one or more netw or prepared.	rorks. The mappings for objects marked with * are already created
		Q Search
2 Recovery networks	Carlo Contraction	✓ @ w upe.vmware.com
3 Reverse mappings	C Management Networks     G bca-vcf-cl01-vds01	✓ ■ wdc-m01-dc01
4 Test networks		✓ ☐ Management Networks
1 1000100100	VN-xReg	✓
5 Ready to complete		🔿 🔓 । १ -Segment
		🔿 🗟 s 🛛 ;01-pg-mgmt
		🔿 🗟 s 🛛 ;01-pg-vm-mgmt
		🔿 🗟 s i01-pg-vmotion
		🔿 🗟 s i01-pg-vsan
		·
		/ MAPPINGS
	bca .vcf.tsalab.local	т w с01.vcf0
	-dc01 > Management Networks >	-vds01 > b -pg-vm-mg 4 101-dc0
	-dc01 > Management Networks >	-vds01 > b -pg-mgmt # 101-dc0
	-acol > Management Networks >	-vas01 > b -pg-vmotion 📇 101-ac0
		3 mapping(s)
		CANCEL BACK NEXT

5. Check the option to automatically create a reverse mapping (so you don't have to do it manually) and click **Next**.



New Network Mappings	Reverse mappings	×
1 Creation mode	Select configured mappings for which to automatically create reverse mappings. This might overwrite existing m	appings. bca-vcf-vc01
2 Recovery networks	Image: Margement Networks > wd         Imagement Networks > wd         Imageme	🛆 bca-vcf-
3 Reverse mappings	✓ A weight of a standard strength of the s	🛆 bca-vcf-
4 Test networks		
5 Ready to complete		
	3	3 mapping(s)
	CANCEL BACK	NEXT

6. Click **Finish** to complete the configuration.

New Network Mappings	Ready to complete	ng the wizard		×
1 Creation mode	wdc-m01-vc01.vcf02.vsanpe.vm	bca-vcf-vc01.vcf.tsalab.local	Reverse Mapping	Test Network
2 Recovery networks	لا wdc-m01-dc01 > Manage	🙈 bca-vcf-dc01 > Managem	Yes	TSA-Test-Recovery-Segm
3 Reverse mappings				
4 Test networks				
5 Ready to complete				
				CANCEL BACK FINISH

7. Click **Continue** to acknowledge and dismiss the warning about possible impact to existing protected VMs.





## Create a test recovery network

One of the most compelling features in VMware Live Site Recovery and why it is much preferred over competing BDCR orchestration solutions (or a manual option) is being able to conduct simulated/test disaster recovery exercises without impacting the production environment. Admins can demonstrate and prove their infrastructure disaster recovery readiness by conducting a recovery of the protected workloads into the recovery site while the protected workloads continue to provide uninterrupted services at the protected site. VMware Live Site Recovery does this by bringing up a copy of the protected workload in an isolated network segment at the recovery site. VMware Live Site Recovery creates this isolated network by default, but admins can specify their own recovery test (aka "bubble") network. The default isolated network is inaccessibile to anything outside of the bubble. But what if admins want to demonstrate the functionality and accessibility of recovered workloads to their auditors? They can do this by recovering the workloads into a specific network of their choice (assuming they have such a controlled network in place).

#### Create an isolated network port group

Creating an isolated network port group in a VCF infrastructure is a simple operation. Although NSX administrative tasks are outside the scope of this paper, let's briefly describe how to create such isolated segments for ease of reference and completeness.

1. In NSX Manager, from Segments, click Add Segment.



vmw NSX	Default	~	
Home Networking	Security Inventory	y Plan & Troubleshoot System	
	« Segments	5	
Network Overview	NSX Distril	buted Port Groups Profiles	
🞄 Network Topology			
Connectivity		Name	Connected Gateway
💮 Tier-0 Gateways			
💮 Tier-1 Gateways	: > &	a N-RegA	201-T1
Segments			
		້ລຸ I N-xReg	201-T1

- 2. Give the new segment a descriptive name.
- 3. Don't specify a gateway in the **Connected Gateway** menu.
- 4. Select an appropriate **Overlay Transport Zone** for the segment.
- 5. Click Save.

Segments						
ADD SEGMENT	ted Port Groups Promes					
	Name		Connected Gateway	Transport Zone	Subnets	Ports / Sta Interfaces
	VLR Test Rec Segment		None	jca-vcf-m01-tz-overlay01 ∨	Gateway CIDR IPv4 CIDR e.g. 10.22.12.2/23 Gateway CIDR IPv6 CIDR e.g. fc7e:1206:db42::1/48 SET DHCP CONFIG	
	> L2 VPN > Additional Settings					
	Description	Description		Tags	S _Tag Max 27 allowed. Click (+) to	
	NOTE - Before further configu	arations can be done, fill out mandatory fields	s ( * ) above and click <b>Save</b> .			
>	SEGMENT PROFILES					



#### Specify the test recovery network

The segment you created in the previous section will appear as a port group on all the connected ESXi hosts in the cluster. Because it is unrouted, network traffic over the port group will be restricted to only the VMs directly connected to it.

You'll use this unrouted segment/port group to manually specify your desired isolated test recovery network in VMware Live Site Recovery.

By default, VMware Live Site Recovery automatically creates an internal, isolated network for test failovers. You'll change these.

- 1. Select the network mapping for which you want to specify a desired routed network.
- 2. Select the elipses (...) menu.
- 3. Select Edit Test Network Mapping.

VTTW Live Site Recovery N									
Site Pair Replications Protection Groups Reco	overy Plans								
Summary		Ne	twork Map	pings					
Issues		w		vsanpe.vm	ware.com	alab.local	]		
Configure	~	NE	W EDIT	DELETE CR	EATE REVERSE MAPPING	2		2	
vSphere Replication	~		A si	e.vmw	Edit Test Network Mapping	:01-pa-ma	T T	Reverse Mapp 👻	Isolated network (auto created)
Replication Servers			l A s	/ds01-pg-v	Remove Test Network Mapping	501-pg-vm	E.	Yes	Isolated network (auto created)
Enhanced Replication Mappings		C	s'	/ds01-pg-v	Add IP Customization Rule	501-pg-vm	te:	Yes	Isolated network (auto created)
Array Based Replication	~				Edit IP Customization Rule				
Storage Replication Adapters					Remove IP Customization Rule				
Array Pairs									
Network Mappings									

- 4. Select the Select a specific network option.
- 5. Select the pre-configured isolated network/segment and click Save.

Edit Test Network - sf $$ ^ $$ $$ $$ $$ $$ vds01-pg- $$ $\times$ mgmt
Select a test network. This affects all network mappings that use "sfo01-m01-cl01- vds01-pg-mgmt" as a recovery network.
<ul> <li>Isolated network (auto created)</li> <li>Select a specific network</li> </ul>
Q Search
w -dc01     Management Networks
w ds01
CANCEL



#### 6. When done, click Next.

New Network Mappings	Test networks       ×         Test networks are used instead of the recovery networks while running tests. Isolated networks are automatically created and used during tests for all networks.         If you want to use different networks for testing, you can do so in the table. This affects all network mappings that use the same network on the remote site.							
2 Recovery networks								
3 Reverse mappings	Recovery Network	<u>↑</u> т	Test Network					
4 Test networks	₩ dcO1 > sfe	g-mgmt 🔚	ISV-Test-Recovery-Segment	E CHANGE				
	₩ 3c01 > sfe	g-vm-mgmt 🏣	ISV-Test-Recovery-Segment	HANGE				
5 Ready to complete	w dcO1 > sfe	3-vmotion	ISV-Test-Recovery-Segment	E CHANGE				
			CANCEL	3 network(s) BACK NEXT				

#### 7. Click **Finish** to proceed.

I	New Network Mappings	Ready Review you	to complete	ing the wiz	ard		×
	1 Creation mode	bca-vcf-v	c01.vcf.tsalab.local	wdc-m01	-vc01.vcf02.vsanpe.vm	Reverse Mapping	Test Network
	2 Recovery networks	🔏 b	c01 > Managem	<u></u> ₩	-dc01 > Manage	Yes	🔝 ISV-Test-Recovery-Segm
	3 Reverse mappings	🔏 b	c01 > Managem	<u> </u>	-dcO1 > Manage	Yes	🔝 ISV-Test-Recovery-Segm
	4 Test networks	A b	c01 > Managem	& ₩	-dcO1 > Manage	Yes	🔒 ISV-Test-Recovery-Segm
	5 Ready to complete						
							CANCEL BACK FINISH

#### Create folder mappings

Folder mappings help to organize protected and recovered VMs in a logical and intuitive fashion, so let's create one:

1. Click **New** to begin.



vmw Live Site Recovery wd	<i>r</i> mware.c	ab.local 🗸		
Site Pair Replications Protection Gr	oups 📃 Recovery Plans			
Summary	Folder Mapping	js		
Issues	wde	npe.vmware.com	t tsalab.local	
Configure	NEW			
vSphere Replication	□ · w	vmware.com	∱ ▼ b .local	▼ Reverse Mapping Exists
	Live-Recovery	1	Live-Recovery	tes Yes
Array Based Replication	,			
Network Mappings				
Folder Mappings				
Resource Mappings				

2. Click Next.

New Folder Mappings	Creation mode Select the way you want to create mappings.		×
1 Creation mode	• Automatically prepare mappings for folders with matching names		
2 Recovery folders 3 Reverse mappings	The system automatically prepares mappings for folders with matching names under the selected folder containers.  Prepare mappings manually Manually select which exact folders to map.		
		CANCEL	NEXT

3. Select the VM folders to match up and click **Next**.



New Folder Mappings	Recovery folders	
1 Creation mode	Configure recovery folder mappings for one or more fold prepared.	ders. The mappings for objects marked with * are already created or
2 Recovery folders	Q Search	Q Search
	✓ @ wdc-m01-vc01.vcf02.vsanpe.vmware.com	✓ 🕝 bca-vcf-vc01.vcf.tsalab.local
3 Reverse mappings	✓ ○    wdc-m01-dc01	✓ ◯ 📑 bca-vcf-dc01
4. Ready to complete	> () 🗂 Discovered virtual machine	> C 🗖 4Kn-Test
is ready to complete	> C 🗖 Live-Recovery	✓ ○ □ App-Notification
	> C T vCLS	> C T Auto-SQL
	✓	> C C AVS-MGMT-VMs
	> () 🗂 wdc-m01-fd-edge	> C Discovered virtual machine
	> C 🗂 wdc-m01-fd-mgmt	> C Trom-AVS
	> () 🗂 wdc-m01-fd-nsx	> C T Jump-VMs
		COPT bes yet m01 fd mamt
	<b>↓</b>	ADD MAPPINGS
	wdc-m01-vc01.vcf02.vsanpe.vmware.com	T bca-vcf-vc01.vcf.tsalab.local T
	: 🖾 wdc-m01-dc01 > VR	bca-vcf-dc01 > VCF
		1 mapping(s)
		CARCEL BACK NEXT

- 4. Select the check box or boxes to accept the option to create a matching folder map in the opposite direction automatically.
- 5. Click Next.

New Folder Mappings	Reverse mappings Select configured mappings for which	n to automatically create	reverse mappings. This n	night overwrite	existing mappings.
1 Creation mode	bc alab.local	↑ т	w	/mware.com	т
2 Recovery folders	□   □ bca-vcf-dc01 > VCF		🖾 wdc-m01-dc01 > VR		
3 Reverse mappings					
4 Ready to complete					
					1 mapping(s)
				CANCEL	BACK

6. Click Finish.



New Folder Mappings	Ready to Review your set	complet ttings before fi	e nishing the wizard	1				×
1 Creation mode	W		'e.com	b	alab.local		Reverse	Mapping
2 Recovery folders	Ē w	.01 > VR		D b	:01 > VCF		No	
3 Reverse mappings								
4 Ready to complete								
						CANCEL	BACK	FINISH

#### Create resource mappings

You'll map resources at the highest level possible (cluster level, in this case).

1. Click **New** to begin.

vmw Live Site Recovery		
Site Pair Ceplications Protection Groups	Recovery Plans	
Summary	Resource Mappings	
Issues	l alab.local w anpe.vmware.com	
Configure	V NEW	
vSphere Replication	> salab.local $\uparrow$ v npe.vmware.com	
Array Based Replication	>	
Network Mappings		
Folder Mappings		
Resource Mappings		

- 2. Select the cluster containing your protected workloads and map it to the cluster you would like them placed in at the recovery site.
- 3. Click Add Mappings and click Next.



New Resource Mappings	Recovery resources Configure recovery resource mappings for one or more	resources. The mappings for objects marked with $^{\ast}$ are already
1 Recovery resources	created or prepared.	
<ul><li>2 Reverse mappings</li><li>3 Ready to complete</li></ul>	Q. Search           ✓ @ b         :f.tsalab.local           ✓ 圖 bcct dc01           ✓ ☑ 圖 bcct dc01	Q Search         ✓ 伊 w ;anpe.vmware.com         ✓ 面 v :01         > ○ 面 w cl01
	bi '.tsalab.local i b vcf-clO1	vwc     anpe.vmware.com     T       Wd <sup>1</sup> m01-cl01       1 mapping(s)

4. Accept the option to auto-configure a reverse mapping and click Next.

New Resource Mappings	Reverse mapp Select configured mappi	ings ings for which to automatically o	create reverse mappings. This r	night overwrite existing n	Nappings.
1 Recovery resources	wd(	ware.com	↑ ▼ bc	:salab.local	Ŧ
2 Reverse mappings	🗹   🗍 w	)1-clO1	🔂 bc	:f-clO1	
3 Ready to complete					
	1				1 mapping(s)
				CANCEL BACK	NEXT

5. Click **Finish** to complete the process.



New Resource Mappings	Ready to complete Review your settings before finishing the wizard				×
1 Recovery resources	b	lab.local	wd	.vmware.com	Reverse Mapping
2 Reverse mappings	d 🛐	:IO1	🗍 wdc 🎫 📑	· - cl01	Yes
3 Ready to complete					
				CANCEL	BACK

6. Click **Continue** to acknowledge and dismiss the warning about a possible impact on existing protected VMs.



When VMware Live Site Recovery uses vSphere Replication to replicate a protected VM to the recovery site, it also creates a representation of the VM in the vCenter at the recovery site. This representation is somewhat similar to the .vmx file that describes the running VM at the protected site. The major difference is that this representation is just a placeholder (aka "stub"), which can't be powered on. This placeholder file is stored in a designated datastore, which might not necessarily be the datastore with the full replicated copy of the protected VM. The "placeholder" datastore must exist on both sides for VMware Live Site Recovery to protect workloads in either direction.

7. From the Placeholder Datastores menu, click New.



vmw Live Site Recovery	salab.local - wc	vsanpe.vmware.com 🗸	
Site Pair Replications	Protection Groups	Recovery Plans	
Summary		Placeholder Datastores	
Issues		l lab.local wc sanpe.vmware.com	n
Configure	~	NEW	
vSphere Replication	>	Name	↑ ▼ Host/Cluster
Array Based Replication	>		
Network Mappings			
Folder Mappings			
Resource Mappings			
Storage Policy Mappings			
Placeholder Datastores			

8. Select the datastore you want to use to store the placeholders and click Add.

**Note:** VMware Live Site Recovery requires the specified datastore to have a minimum of 6GB of free space.



New Placeholder Datastore	ò	×
Select non-replicated datastores in which VLS machines. To enable planned migration and re datastores at both sites. It is recommended to select a datastore with more details, see the VMware Live Site Recov VMware Live Site Recovery interacts with vSp	SR creates place eprotect, you m a minimum free very documental ohere Cluster Se	holder virtual ust select placeholder capacity of 6 GB. <sup>F</sup> or tion section "How rvices".
	SELECT ALL	CLEAR SELECTION
Name		Λ τ
🔄 🗐 bca-vcf-cl01-ds-vsan01		
datastore1		
🗌 🗐 datastore1 (1)		
🗌 🗐 datastore1 (2)		
datastore1 (3)		
1		9 datastore(s)
	с	ANCEL

Here is the placeholder datastore at the protected site:



vmw Live Site Recovery bo	lab.local - w	npe.vmware.com ∨	
Site Pair Replications	Protection Groups	lecovery Plans	
Summary	Placel	nolder Datastores	
Issues	T b	tsalab.local we	pe.vmware.com
Configure	~ L_NEW		
vSphere Replication	> N	ame	↑ ▼ Host/Cluster
		bc anO1	b 101
Array Based Replication	>		
Network Mappings			
Folder Mappings			
Resource Mappings			
Storage Policy Mappings			
Placeholder Datastores			
Advanced Settings	>		

From this menu, you can click on the recovery site (see the arrow below) to specify the corresponding placeholder datastore for that site. Here's the placeholder datastore at the recovery site:

vmw Live Site Recovery	salab.local - wi	pe.vmware.com 🗸	
Site Pair Replications	Protection Groups	Recovery Plans	
Summary	Place	holder Datastores	K
Issues	•	cf.tsalab.local wi	ipe.vmware.com
Configure	✓ NEW		<b>R</b>
vSphere Replication	>	lame	↑ T Host/Cluster
Array Based Replication	>	ilwd ∹-vsan01	w :101
Network Mappings			
Folder Mappings			
Resource Mappings			
Storage Policy Mappings			
Placeholder Datastores			


## Replicate protected VMs

For VMware Live Site Recovery to protect and recover a VM, a copy of that VM must make its way from the protected site to the recovery site. Let's set up the replication part of the exercise now.

#### Create an outgoing replication

In this guide, the source (the protected site) is the on-premises VCF infrastructure, so let's switch to that and create an **Outgoing** replication.

1. Click New.

vmw Live Si	ite Recovery				
Site Pair	Replications	Protection Groups	Recovery Plans	í	
Outgoing				B b f of the initial → B weight of the initial pervmware.com     pervmware.com	
Incoming				NEV	Replicat

VMware Live Site Recovery introduces an enhanced replication feature, which enables automatic load-balancing of the replication engines to ensure high performance and more fine-grained replication schedules. With enhanced replication, VMware Live Site Recovery can provide up to a 1-minute recovery point objective (RPO), ensuring protected workloads are up to date.

 If your storage arrays and infrastructure support such high replication frequencies, choose Enhanced Replication. Otherwise, select the Legacy Replication option and click Next.



Configure Replication	Replication mode	$\times$
1 Replication mode	Site name B wdc-m01-vc01.vcf02.vsanpe.vmware.com	
<ol> <li>2 Virtual machines</li> <li>3 Target datastore</li> <li>4 Replication mapping tests</li> <li>5 Replication settings</li> <li>6 Protection group</li> <li>7 Ready to complete</li> </ol>	<ul> <li>Status ✓ Logged in</li> <li>Select the replication mode. (1)</li> <li>Chanaced replication more scalability and begazy replication</li> <li>Chegazy replication compatible with older versions of Ster</li> <li>Legazy VSphere Replication routes traffic to the replication not the trapet site. Depending on replication and Sphere Replication and Sphere Replication servers.</li> </ul>	

**Note:** If you selected the **Legacy Replication** option, and your replication engine is the VMware vSphere Replication server (or servers), you'll be prompted to select the applicable replication server or accept an automatic selection.





3. Select the VMs you want to protect with VMware Live Site Recovery and click Next.

Note: You can add or remove VMs from replication (and, consequently, protection) at will, so just select a few for now.

Configure Replication	Virtual machines			
1 Replication mode	All Selected (3)	want to protect. Aiready replicated VMs are not si	10WN IN THIS IIST.	
2 Virtual machines			SELECT ALL	CLEAR SELECTION
	Name	↑ ▼ VM Folder	⊤ Comput	e Resource 🛛 🔻
3 Target datastore	🗌   🛱 i n02	AVS-MGMT-VMs	b []	cI01
	ור 📠 זו	🗖 Jump-VMs	📋 b	cl01
4 Replication mapping tests	🗹 🛛 🗗 LabaLaba-01	App-Notification	📋 bc	cl01
5 Deplication sottings	🗹 📄 LabaLaba-02	App-Notification	📋 bc	cl01
5 Replication settings	🔽 🗄 LabaLaba-03	App-Notification	🗍 bc	cl01
6 Protection group	🗌   🛱 Pa 🐃 📑	Live-Recovery	🚺 bc	IO1
<u> </u>	🔲   🛱 Pa	Live-Recovery	📋 bc	101
7 Ready to complete	🔲   🗗 Pa	Live-Recovery	📋 bc	101
	🗌   🎰 te	Discovered virtual machine	📋 bc	101
	🔲   🌆 Τε	Discovered virtual machine	📋 bc	101
	3	31 - 40 c	f 51 VM(s) K	< 4 / 6 > >  BACK NEXT



4. Select the datastore where you want to store the replicated VM copies at the target (recovery site).

**Note:** The target/recovery site is another VCF infrastructure that the process auto-identifies because it's already paired.

Configure Replication - 5 VMs	Select a datastore for the replicated files.							×	
1 Replication mode	The selected virtual machines are using 1.11 TB. (1)								
2 Virtual machines	Disk format: Same as s	ource tastore Default	~		~				
3 Target datastore	Name		1 τ	Capacity	Free	Туре	▼ Target	Compute	Ŧ
4 Replication mapping tests	• 🗐 w	rsan01		29.1 TB	27.16 TB	vsan	W	:101	
5 Replication settings									
6 Protection group									
7 Ready to complete									
	← 1 datastore(s)								
	Select seeds								
	🗹 Auto-include new dis	ks in replication	í						
						CANC	EL BAC	K N	

The option **Auto-include new disks in replication** is one of the amazing things about vSphere Replication. It anticipates situations where a protected VM's configuration could change after we set up the disaster recovery plans. With this option, vSphere Replication automatically incorporates the changes into the replication tasks.



Configure Replication - 5 VMs	Replication mapping tests Test the connectivity between all compute resources involved in this replication								
1 Replication mode	Target datastores:     WC								
2 Virtual machines	i blocal ↑ ▼ wdmware.com ▼ Tested	1							
3 Target datastore		190							
4 Replication mapping tests									
5 Replication settings									
6 Protection group									
7 Ready to complete									
	<	> 1item(s)							
	CANCEL BACK	NEXT							

Remember the mapping tasks you performed a while back? Here's where they begin to come into play. VMware Live Site Recovery will now perform the necessary steps required to verify the connectivity and availability of the mappings.

5. If this is the first time you're doing this, select **Run All Tests** and click **Next**. If you've previously validated these, skip this or run a specific test.



Configure Replication - 5 VMs	Replication mapping tests Test the connectivity between all compute resources involved in this replication								
1 Replication mode	Target datastores:     WL								
2 Virtual machines	blocal ↑ ▼ wd mware.com ▼ Tested								
3 Target datastore									
4 Replication mapping tests									
5 Replication settings									
6 Protection group									
7 Ready to complete									
	Items per page AUTO ^ 1ite	> m(s)							
	CANCEL BACK N	хт							

6. Click **Run Tests** on the pop-up window.

Run Tests	$\times$
Run all replication mappings tests ?	
	CANCEL RUN TESTS

7. If all of the results come back good, click **Next**. Otherwise, review and fix any reported errors before proceeding.



Configure Replication - 5 VMs	Replication mapping tests         Test the connectivity between all compute resources involved in this replication         Target datastores:       wd         an01								
2 Virtual machines	I	<b>▼</b> Tested							
	• •	📋 bca-vcf-cl01	🗍 wd	ic-m01-cl01	4 s ago	p			
3 Target datastore		Source datastores: Hi Target datastores: wdc	;anO1			01-			
5 Replication settings		✓ Test details							
6 Protection group		Source Host	↑ 🔻 Targ	get Host T	Connection <b>T</b>	Latency			
		w1	.tsalab.loca w	f02.vsan	⊘ Good	O us			
7 Ready to complete		w1	.tsalab.loca w	02.vsanp	⊘ Good	0 us			
		w1	.tsalab.loca w	f02.vsan	⊘ Good	O us			
		w1	.tsalab.loca w	f02.vsan	⊘ Good	O us			
		w1	.tsalab.loca w	f02.vsan	⊘ Good	O us			
		w1	.tsalab.loca w	02.vsanp	⊘ Good	0 us			
	K Items per page AUTO ^								
CANCEL BACK NEX									

## RPO/RTO, run book, protection group, and recovery plan defined

RPO and RTO might be two of the most overused acronyms when discussing disaster recovery of mission-critical applications in the enterprise. We've consciously avoided mentioning them until now because they deserve book-length attention, which we can't accommodate in this guide. Simply put:

- A recovery time objective (RTO) specifies the acceptable duration required for an IT infrastructure to recover from a disaster event and resume operations. The objective is to make this window as short as possible. Several external, environmental, and infrastructural factors influence an RTO, so we won't demonstrate this concept here.
- A recovery point objective (RPO) specifies the acceptable loss of services or data in a disaster event. It measures how up to date the enterprise data is after such an event. Admins, operators, and business owners/stakeholders want an RPO of O, but financial, human, and technological constraints make this difficult to attain.



vSphere Replication provides RPO options from as low as 1 minute and as high as 24 hours, ensuring greater flexibility in recovery targets and allowing you to fine-tune your DR plans based on your infrastructural constraints. This means vSphere Replication attempts to synchronize and replicate every state change in the protected VM site as frequently as every minute. At any point, the copy of the VMs at the recovery site is identical to the original protected VM no more than 1 minute ago. On the extreme end of the spectrum, vSphere Replication attempts.

Customer site **Customer site** vm vm vm vm vSphere Replication VR VR VC vm VC vm vm 0 0 0 0 11111111 1111111 0 0 0 0 Per-VM RPO as low as 1 minute vSAN vSAN

Consult your storage vendor for official guidance for RPOs supported by your non-vSAN arrays.

The <u>vSphere Replication Admin Guide</u> provides comprehensive documentation for the other capabilities and features on this screen, so we won't duplicate that information here.

8. For this exercise, select a 15-minute replication frequency and click Next.



Configure Replication - 5 VMs	Replication settings Configure the replication settings for the virtual machines.						
1 Replication mode	Recovery point objective (RPO) (j)						
2 Virtual machines	1 minute 24 hours 24 hours						
3 Target datastore	Enable point in time instances (i)						
4 Replication mapping tests	Instances per day 3 0 Days 5 0						
5 Replication settings	Keep 3 instances per day for the last 5 days.						
6 Protection group	If the RPO period is longer than 8 hours, you might want to decrease the RPO value to allow vSphere Replication to create the number of instances that you want to keep.						
7 Ready to complete	Enable guest OS quiescing ()						
	✓ Enable network compression for VR data (1)						
	Enable network encryption for VR data (1)						
	1 Enhanced vSphere Replication requires network encryption. LEARN MORE 🗹						
	Enable DataSets replication (1)						
	CANCEL BACK NEXT						

We'll talk about **Protection group** and other configurations later.

9. Select **Do not add to protection group now** and click **Next**.

Configure Replication - 5 VMs	Protection group × You can add these virtual machines to a protection group.
1 Replication mode	Add to existing protection group     Add to new protection group
2 Virtual machines	• Do not add to protection group now
3 Target datastore	
4 Replication mapping tests	
5 Replication settings	
6 Protection group	
7 Ready to complete	
	CANCEL BACK NEXT



10. Review and verify the configuration settings and click **Finish** if it looks good, or click **Back** to make some modifications.

Configure Replication - 5 VMs	plication - 5 Ready to complete Review your selected settings.					
1 Replication mode	Target site	wd- vare.com				
, replication moue	Replication server	Enhanced replication				
2 Virtual machines	Auto-replicate new disks	Enabled				
3 Target datastore	VMs to be replicated	5				
4 Replication mapping tests	Quiescing Disabled					
5 Doplication sottings	Network compression Enabled					
5 Replication settings	Network encryption	Enabled				
6 Protection group	Recovery point objective 15 minutes					
7 Ready to complete	Points in time recovery	Disabled				
	DataSets replication	Enabled				
	Protection group	none				
		CANCEL BACK FINISH				

You're finished with the replication setup.

vmw Live Si	ite Recovery									
iii Site Pair	Replications	Protection Groups	Recovery Plans							
Outgoing			d	bc	RECONFIGURE	I.local	→   WC REMOVE SYNC NOW	1	.  ગ.vmwar	e.com
Incoming					Virtual Machine	↑ ▼ Status	T RPO	▼ Target	τ.	Replication Server
				$\checkmark$ >	Papilolo-01	🗸 ОК	15 minutes	Dw 🔝	vsanpe.v	Enhanced replication
				$\checkmark$ >	Papilolo-02	🗸 ОК	15 minutes	Dw 🔝	vsanpe.v	Enhanced replication
				$\sim$ >	🗗 Papilolo-03	🗸 ОК	15 minutes	🛄 wd	vsanpe.v	Enhanced replication
				$\checkmark$ >	D VLR-DC01	🗸 ОК	15 minutes	🔳 wd	vsanpe.v	Enhanced replication
				$\checkmark$ >	VLR-DC02	V OK	15 minutes	🔲 wd	vsanpe.v	Enhanced replication

# Create protection groups and recovery plan

Critical enterprise applications typically don't exist or function independently. They depend on other services and workloads, and others depend on them. When designing a BCDR plan, these dependencies influence configuration and workflow choices and options. VMware Live Site Recovery provides a feature called protection groups, which contain VMs you want to recover together as a unit. Many factors, such as the type of storage and the unit of replication, influence the decision-making processes involved in creating and using protection groups.



For this exercise, you'll create protection groups based on the services and characteristics of the VMs we want to protect and recover. There are three categories: Domain Controllers, SQL Server, and a Windows client. This is the primary influence on your configuration choice.

## Create a protection group for the Domain Controller VMs

1. Go to the Protection Groups tab and select New Protection Group.

vmw Live Site Recovery bc	ıb.local - wd	<i>r</i> mware.com ∨
Site Pair Replications	otection Groups 📃 Recovery	/ Plans
Q Search Protection Groups		NEW PROTECTION GROUP NEW FOLDER
		Y         Protection Status         Y         Recovery

2. Give the group a descriptive name. The description is optional.

Next to **Direction**, select the option that shows your protected site  $\rightarrow$  recovery site.

3. Click Next.

New Protection Group	Name and dire	ection ×
1 Name and direction	Name:	VLR-DCs-PG
3 Datastore groups	Description: (Optional)	
4 Recovery plan		4096 characters remaining
5 Ready to complete	Direction:	
	Location:	Q Search Protection Groups
		CANCEL NEXT

4. Because you're using vSphere Replication, select Individual VMs (vSphere Replication) and click Next.



New Protection Group	Туре
1 Name and direction	Select the type of protection group you want to create: O Datastore groups (array-based replication) Protect all virtual machines which are on specific datastores.
2 Туре	Individual VMs (vSphere Replication)
3 Virtual machines	Protect specific virtual machines, regardless of the datastores.
4 Recovery plan	Protect virtual machines which are on replicated vVol storage.
5 Ready to complete	
	CANCEL BACK NEXT

5. This protection group is for the Domain Controllers, so select those VMs and click Next.

Virtual machines				×
Select the virtual machines to include in the	e protection group			
Virtual machine	↑ ▼ Statu	s Ţ	Protection Status	Ŧ
	ОК			
🗌 🖹 Papilolo-03	ОК			
VLR-DC01	ОК		Add to this protection	on group
VLR-DC02	ОК		Add to this protection	on group
2 🖂		CA	NCEL BACK	5 VM(s)
	Virtual machines Select the virtual machines to include in the All Selected (2) Virtual machine Papilolo-01 Papilolo-02 Papilolo-03 VLR-DC01 VLR-DC02 2 =	Virtual machines   Select the virtual machines to include in the protection group   ▲I   Selected (2)   Virtual machine   Papilolo-01   OK   Papilolo-02   OK   Papilolo-03   OK   VLR-DC01   OK	Selected (2)   ○ Virtual machines   ○ Papilolo-01   ○ C   ○ Papilolo-03   ○ VLR-DC01   ○ X   ○ VLR-DC02   ○ X	Virtual machines         Select the virtual machines to include in the protection group         ▲I       Selected (2)         ●       Papilolo-01         ●       Papilolo-02         ●       Papilolo-03         ●       Papilolo-03         ●       VLR-DC01         ●       VLR-DC02         ●       VLR-DC02         ●       VLR-DC02         ●       Machine         ●       Emsper page         ▲UTO          CANCEL       BACK

#### Create a recovery plan for the Domain Controller VMs

A recovery plan defines and configures the steps, plans, and actions guiding your BCDR plan. Imagine it as the run book an admin would typically refer to and follow if they were to perform a disaster recovery operation manually.

In VMware Live Site Recovery, a recovery plan contains the logic and workflow of getting the copy of the protected VMs up and running in the recovery site when a disaster is declared and the recovery is initiated. You must add at least one recovery plan to the protection group. Because you don't already have a recovery plan, you'll create one now.

6. Select Add to a new recovery plan.



7. Next to **Recovery plan name**, type an intuitive and descriptive name and click **Next**.



8. Review the result and click Finish.

١	New Protection Group	Ready to complete Review your selected settings.	? ×	
	1 Name and direction	Name	VLR-DCs-PG	
	2 Туре	Description		
	3 Virtual machines	Protected site	TSA-VLR	
		Recovery site	ISV-VLR	
	4 Recovery plan	Location	Protection Groups	
	5 Ready to complete	Protection group type	Individual VMs (vSphere Replication)	
		Total virtual machines	2	
		Recovery plan	VLR-DCs-RP (new)	
			CANCEL BACK FINISH	

You're done creating the protection group and recovery plan for the Domain Controllers.

	o.local - w	∴vmware.com ∨					C	1	?	Administrator@VSPHER
Site Pair Replications	Protection Groups Recove	ry Plans								
Q Search	Protection Groups	NEW PROTECTION GROUP	NEW FOLDER							
Protection Groups	NEW PROTECTION GROUP									SELECT ALL
VLR-DCs-PG	Name	↑ T Protection Status	T Recovery Status	ΥP	Protection Type	т	Protected Site			T Recovery Site
	VLR-DCs-PG	✓ OK	Ready	li li	Individual VMs		TSA-VLR			ISV-VLR



#### Create a protection group for the SQL Server VMs

Go ahead and create another protection group and recovery plan, this time for the SQL Server VMs.

Note: Because the process is similar, we won't describe every step here.

9. Give the protection group a descriptive name.

lew Protection Group		ection Is marked (optional)
1 Name and direction	Name:	VLR-SQL-PG
2 Туре		70 characters remaining
3 Datastore groups	Description: (Optional)	
4 Recovery plan		4096 characters remaining
5 Ready to complete	Direction:	• TSA-VLR $\rightarrow$ ISV-VLR $\bigcirc$ ISV-VLR $\rightarrow$ TSA-VLR
	Location:	Q Search
		Protection Groups
		CANCEL

10. Select Individual VMs (vSphere Replication).

New Protection Group	Туре
1 Name and direction	Select the type of protection group you want to create: O Datastore groups (array-based replication) Protect all virtual machines which are on specific datastores.
2 Туре	Individual VMs (vSphere Replication)
3 Virtual machines	Protect specific virtual machines, regardless of the datastores.
4 Recovery plan	Protect virtual machines which are on replicated vVol storage.
5 Ready to complete	
	CANCEL BACK NEXT

11. Select the SQL Server VMs.



New Protection Group	Virtual machines		×
1 Name and direction	All Selected (3)	; protection group	
2 Туре	Virtual machine	↑ ▼ Status	▼ Protection Status ▼
3 Virtual machines	Papilolo-01     Papilolo-02	ОК	Add to this protection group Add to this protection group
4 Recovery plan	Papilolo-03	ОК	Add to this protection group
5 Ready to complete	<b>2</b> 3 <b>—</b>		Items per page <u>AUTO ^</u> 3 VM(s)
			CANCEL BACK NEXT

## Create a protection group for the SQL Server VMs

12. Create a corresponding **Recovery Plan** for it.

New Protection Group	Recovery plan				×
	You can optionally add t	his protection group to a recovery plan.			
1 Name and direction	Add to existing record	overy plan			
	<ul> <li>Add to new recover</li> </ul>	ry plan			
2 Туре	O Do not add to recov	very plan now			
3 Virtual machines	Recovery plan name:	VLR-SQL-RP			
4 Recovery plan		70 characters remaining			
5 Ready to complete			CANCEL	ВАСК	NEXT
			CANCEL	ВАСК	NEXT

That's it.



New Protection Group		Ready to complete Review your selected settings.	e ×	
	1 Name and direction	Name	VLR-SQL-PG	
	2 Туре	Description		
	3 Virtual machines	Protected site	TSA-VLR	
		Recovery site	ISV-VLR	
	4 Recovery plan	Location	Protection Groups	
	5 Ready to complete	Protection group type	Individual VMs (vSphere Replication)	
		Total virtual machines	3	
		Recovery plan	VLR-SQL-RP (new)	
			CANCEL BACK FINISH	

Here's what the protection group list looks like now:

vmw Live Site Recovery bc:					C 🗘 0		trator@VSPHERE.LOCAL
Site Pair Replications	ptection Groups Recovery	Plans					
Q Search	Protection Groups	NEW PROTECTION GROUP NEW FOLDER					Le
Protection Groups	NEW PROTECTION GROUP						SELECT ALL CLEAR
VLR-DCs-PG	□ · Name ↑	T Protection Status T	Recovery Status T	Protection Type T	Protected Site	т	Recovery Site
VLR-SQL-PG	VLR-DCs-PG	✓ ОК	Ready	Individual VMs	TSA-VLR		ISV-VLR
	VLR-SQL-PG	✓ ОК	Ready	Individual VMs	TSA-VLR		ISV-VLR

# Modify the recovery plan

One of the most common tasks of a recovery plan is to configure the specific test ("bubble") network you'd like to recover VMs into during a test recovery exercise.

We previously discussed the importance and use of a bubble network. We also configured a site-wide bubble network for all test recovery operations in previous steps.

vmw Live Site Recovery bc	:salab.local - w									
Site Pair Replications	Protection Groups	Recovery F	Plans							
Summary		Network Ma	ppings							
Issues		bc	alab.local wd		vmw	are.com	]			
Configure	~	NEW								
vSphere Replication	、 、	bci	).local	1 τ	Recovery Netwo	ork	Т	Reverse Mapping	Τ	Test Network
repriere repriedien		🗆   🖀 t	og-mgmt	1	🔺 sf	l-vd	t=	Yes		ISV-Test-Recovery-Segment
Array Based Replication	>	🗌 🖾 br	pg-vm-mgmt	ΈΞ	🛆 sf	J-vd	te⊟	Yes		ISV-Test-Recovery-Segment
Network Mappings		🗌 🔺 🛆 bca	vmotion	Ε	🙈 sf	I-vd	ŧ=	Yes		🔝 ISV-Test-Recovery-Segment
Folder Mappings		🗌 🖾 bx	, g-vsan	t <del>e</del>	🙈 sf	I-vd	ŧ=	No		Isolated network (auto created)
Resource Mappings										



However, the flexibility of VMware Live Site Recovery also gives us the ability to configure the test recovery network at the recovery plan level. This way, you can specify different test networks for different classes of protected workloads.

You'll modify the recovery plan to see how you can control the fencing required for test recovery operations.

1. Select the recovery plan you want to modify and click Edit.

vmw Live Site Recovery bca-vcf-vc01.vcf.tsalab.local - wdc-m01-vc01.vcf02.vsanpe.vmware.com V							
Site Pair Replications Protection Group	ps 📃 Recovery Plans						
Q Search	Recovery Plans	NEW RECOVERY PLAN	EW FOLDER				
Recovery Plans	NEW RECOVERY PLAN	EDIT MOVE DELETE	TEST CLEANUP RUN				
VLR-DCs-RP	Name	↑ Status	T Protected Site	T Recovery Site			
VLR-SQL-RP	VLR-DCs-RP	ightarrow Ready	TSA-VLR	ISV-VLR			
	VLR-SQL-RP	→ Ready	TSA-VLR	ISV-VLR			

2. You'll only modify the test network settings, so click **Next** on the next two screens.

Edit Recovery Plan - VLR- DCs-RP	Name and dire	ection marked (optional)	×
1 Name and direction	Name:	VLR-DCs-RP	-
2 Protection Groups 3 Test Networks	Description: (Optional)	70 characters remaining	
4 Ready to complete	Direction:	4096 characters remaining • TSA-VLR → ISV-VLR • ISV-VLR → TSA-VLR	
	Location:	Recovery Plans	



Edit Recovery Plan - VLR-	Protection Groups		×
DCS-RF	All Selected (1)		
1 Name and direction	Name	↑ T Description	Ŧ
	VLR-DCs-PG		
2 Protection Groups	VLR-SQL-PG		
3 Test Networks			
4 Ready to complete			
	✓ 1 —	Items per page <u>AUTO ^</u> 2 g	group(s)
		CANCEL BACK	NEXT

Notice how the test network options default to Use site-level mapping? You'll change that now.

3. Click **Change** on each of them.

Edit Recovery Plan - VLR- DCs-RP	Test Networks       Select the networks to use while running tests of this plan.         (j). If "Use site-level mapping" is selected and no such mapping exists, an isolated test network will be created.					
1 Name and direction	Recovery Network					
2 Protection Groups	En v	:01 > ISV-Test-Re	ecovery-Segment		Use site-level mapping	CHANGE
3 Test Networks	∕≜ w	:01 > sf	og-mgmt	ŧ	🔮 Use site-level mapping	CHANGE
4 Ready to complete	i ⊯w	:01 > sf	og-vm-mgmt	ŧ	🔮 Use site-level mapping	CHANGE
	🙈 w	:01 > sf	og-vmotion		🔮 Use site-level mapping	CHANGE
	🙈 w	:01 > sf	og-vsan		🔮 Use site-level mapping	CHANGE
					CANCEL	5 network(s) BACK NEXT

4. Select the fenced-off test network you created in prior steps and click Save.



Edit Recovery Plan - VLR- DCs-RP	Test Networks			
1 Name and direction	Edit Test Network - ISV-Test-Recovery- Segment	$\times$	lest network will be cre	
2 Protection Groups	Select a test network. This affects all network mappings that use "ISV-Test- Recovery-Segment" as a recovery network.		ork te-level mapping	
4 Ready to complete	<ul> <li>Use site-level mapping</li> <li>Select a specific network</li> </ul>		te-level mapping	
	Q     Search       ✓          ि w         2.vmware.com		te-level mapping	
	<ul> <li>✓ Im wi dc01</li> <li>✓ Im Management Networks</li> <li>✓ Im wid-m01-cl01-vds01</li> </ul>			
	ISV-Test-Recovery-Segment			
	O ≧ st     pg-mgmt       O ≧ sf     pg-vm-mgmt       O ≧ sf     pg-vmotion			
	◯ 🛓 sf pg-vsan			
	CANCEL			
			CANCEL	

5. Repeat the process for additional mappings you want for other test networks.





6. Click **Finish** when you're done.

Edit Recovery Plan - VLR- DCs-RP	Ready to complete Review your selected settings.	e ×
1 Name and direction	Name	VLR-DCs-RP
	Description	
2 Protection Groups	Protected site	TSA-VLR
3 Test Networks	Recovery site	ISV-VLR
4 Ready to complete	Location	Recovery Plans
	Total protection groups	1
	Test networks	ISV-Test-Recovery-Segment, ISV-Test-Recovery-Segment, ISV-Test-Recovery-Segment, ISV-Test-Recovery-Segment, ISV-Test-Recovery-Segment
		CANCEL BACK FINISH

## Define the actions in the recovery plans

You created a corresponding recovery plan for each of the protected groups. This was to ensure that one group of protected VMs (the Domain Controllers, for example) becomes completely available before the other VMs are brought online. You want to initiate the recovery of each group of VMs separately.

Here are the recovery plans:

vmw Live Site Recovery bca Nlocal - wd	: xe.vmware.com 🗸		
Site Pair Englications Protection Groups	Recovery Plans		
Q Search Recovery Plans	Recovery Plans New Recovery Plan New Folder		
VLR-DCs-RP	Name T Y Status Y	Protected Site T	Recovery Site
VLR-SQL-RP	□   □ VLR-DCs-RP → Ready	TSA-VLR	ISV-VLR
	□   □ VLR-SQL-RP → Ready	TSA-VLR	ISV-VLR

We've mentioned that recovery plans are like a run book for BCDR projects in VMware Live Site Recovery. Next, you'll define the elements of the run book in each of the recovery plans.

#### Configure the actions for the Domain Controller VMs

First, you'll configure the VMware Live Site Recovery Domain Controller recovery plan: VLSR-DCs-RP.



1. Click on the name to select it.

vmw Live Site Recovery bca-\ b.local - wdc-r nware.com v							
III Site Pair 🕞 Replications 🕠 Protection Groups 🔄 Recovery Plans							
Q Search	Recovery Plans	NEV	W RECOVERY PLAN NEW FOLDER	R			
Recovery Plans	NEW RECOVERY PLAN						
VLR-DCs-RP	Name	↑ τ	Status	T	Protected Site	Ŧ	Recovery Site
VLR-SQL-RP			→ Ready		TSA-VLR		ISV-VLR
			→ Ready		TSA-VLR		ISV-VLR

2. Select the Virtual Machines tab to display the VMs covered by the plan.

vmw Live Site Recovery bc: 3lab.local -	wdk .vmware.com V
Site Pair C Replications Protection Grou	ips Recovery Plans
Q Search Recovery Plans	VLR-DCs-RP EDIT MOVE DELETE TEST CLEANUP RUN REPROTECT CANCEL
VLR-DCs-RP	Recovery Plan: VLR-DCS-RP Protected Site: TSA-VLR Recovery Site: ISV-VLR Description:
	✓ Plan Status

3. Select the checkbox next to the VM you want to configure and click Configure Recovery.

Recovery Plans				
ULR-DCS-RP EDIT MOVE DELETE TEST CLEANUP	RUN REPROTECT CA	NCEL		
Summary Recovery Steps Issues History Permissions P	rotection Groups Virtual	Machines		
CONFIGUR RECOVERY PRIORITY GROUP & STARTUP ACTION *				
Virtual Machine 🕇 🔻 Recovery Status 🔻 Status Modifie 🔻	Protection Group T	Priority T Dependencie T	Final Power Stat 🔻	vMotion
Seady for recovery	VLR-DCs-PG	1 (Highest)	On	Disabled
» 🛱 VLR-DC02     Ready for recovery	VLR-DCs-PG	1 (Highest)	On	Disabled
	vdc     vmware.com ∨       ps     Recovery Plans       ✓ VLR-DCS-RP     EDIT       Summary     Recovery Steps       Summary     Recovery Steps       Summary     Recovery PRIORITY GROUP × STARTUP ACTION ×       ✓     Virtual Machine ↑ ▼       ✓     Status Modifie ▼       ✓     Status Modifie ▼       ✓     Status Modifie ▼       ✓     NCLR-DC01       ✓     Ready for recovery       ✓     >	Act     VINWARE CON ♥       ps     Recovery Plans       ♥ VLR-DCS-RP     EDIT       MOVE     DELETE       Test     CLEANUP       Recovery Steps     Issues       History     Permissions       Protection Groups     Virtual       CONFIGURE RECOVERY     PRIORITY GROUP × STARTUP ACTION ×       ♥     ♥ VIR-DC01     ♥ Ready for recovery       VLR-DC2     ♥ Ready for recovery     VLR-DCs-PG	Add     VINWARE.com ∨       ps     Recovery Plans       ✓ VLR-DCS-RP     EDIT       Summary     Recovery Steps       Issues     History       Permissions     Protection Groups       Virtual Machines       CONFIGURE RECOVERY     PRIORITY GROUP × STARTUP ACTION ×       ✓     Virtual Machine ↑ ▼       Recovery Status     ▼       ✓     VLR-DC01       ✓     Ready for recovery       ✓     VLR-DC02       ✓     Ready for recovery	Add     VINWARE.com V       ps     Recovery Plans       Image: VLR-DCS-RP     EDIT       MOVE     DELETE       Test     CLEANUP       Recovery Steps     Issues       History     Permissions       Protection Groups     Virtual Machines       CONFIGURE RECOVERY     PRIORITY GROUP × STARTUP ACTION ×       Image: Normal Status     T       Image: Normal Status     T </td

Recovery plans give you many configuration options and flexibility for controlling the desired outcomes for your DR run book. As you'll see, you can configure VMware Live Site Recovery to change the IP address and other necessary IP configurations of the recovered VM.

A warning about the virtualized Domain Controller safety feature: One of the challenges to overcome in recovering Domain Controllers is specifying the order for them to come up to ensure safeguards are correctly in



place. Since restoring a Domain Controller from a backup copy forces the Domain Controller to discard its RID pool, you are likely wondering, "Where does it get a new pool of RIDs if the RID Master is unavailable?" This is a legitimate question in a disaster event where we assume everything in the protected site (including the RID Master itself) is unavailable. Luckily, the Domain Controller safety feature accounts for this scenario by allowing the restored/recovered Domain Controller to regain services after multiple reboots or by manually forcing the Domain Controller's NTDS to run **restart-service NTDS-force** if it can communicate with another Domain Controller.

Start by ensuring that you're recovering the Domain Controller holding the FSMO roles first—the other Domain Controllers shouldn't be recovered until this one has been fully recovered. This is done in VMware Live Site Recovery by using the **VM Dependencies** option, which we'll talk about later in this guide).

Here is how you do this for VLSR-DC02, which depends on VLSR-DC01 (the FSMO role holder).

4. Select VLSR-DC02 and click Configure Recovery.

Vmw Live Site Recovery bca lab.local - wdv se.vmsware.com V								
Site Pair Replications Protection Grou	ps Ecovery Plans							
Q Search	VLR-DCS-RP EDIT MOVE DELETE TEST CLEANU	P RUN REPROTECT CANCEL						
Recovery Plans	Summary Recovery Steps Issues History Permissions	Protection Groups Virtual Machines						
VLR-DCs-RP								
VLR-SQL-RP	CONFIGURE RECOVERY PRIORITY GROUP V STARTUP ACTION V							
	Virted Machine ↑ ▼ Recovery Status ▼ Status Modifie ▼	Protection Group T Priority T	Dependencie 🝸 Final Power Stat 🍸 vMotion					
	> Keady for recovery	VLR-DCs-PG 1 (Highest)	On Disabled					
	🕑 🚿 🗄 VLR-DC02 🔮 Ready for recovery	VLR-DCs-PG 1 (Highest)	On Disabled					

- 5. Expand VM Dependencies and select View all. This will show you all the VMs in the recovery plan.
- 6. Select the other VM you want this VM to depend (or wait) on and click OK.



s - VLR-DC02			
to this VM in all recovery plans.			
ization			
1 (Highest) All virtual machines with machines within a priori parallel, unless ordered	nin a priority group will be started before pro ty group may be specified by adding VM der by VM dependencies.	eeding to the next priority group. The startup order of endencies. The virtual machines within a priority group	virtual will start in
ed before this VM:		SELECT ALL CLEAR SE	LECTION
↑ ▼ Status	Priority Group	Protection Group	Ŧ
	( inglicesty		
		Items per page AUTO	1 VM(s)
	s - VLR-DCO2 to this VM in all recovery plans. ization           1 (Highest) ~           All virtual machines within a priori parallel, unless ordered           ed before this VM:	s - VLR-DCO2 to this VM in all recovery plans. ization          1 (Highest) ✓         All virtual machines within a priority group will be started before proc         machines within a priority group may be specified by adding VM depr         parallel, unless ordered by VM dependencies.         ed before this VM: <b>↑</b> ▼ Status Priority Group         OK 1 (Highest)	s - VLR-DCO2 to this VM in all recovery plans. ization          1(Highest) ∨         All virtual machines within a priority group will be started before proceeding to the next priority group. The startup order of machines within a priority group may be specified by adding VM dependencies. The virtual machines within a priority group parallel, unless ordered by VM dependencies.         ed before this VM:       SELECT ALL       CLEAR SE         ↑ ▼       Status       Priority Group       ▼       Protection Group         OK       1 (Highest)       VLR-DCs-PG

Next, you'll add a **Post Power On Step** task to **VLSR-DC01** which calls a script to reboot the VM after it has been fully recovered. This is a **shutdown -r -t 0** command—nothing fancy. This reboot allows **VLSR-DC01** to self-heal and start its relevant services, which allows it to be available to heal **VLSR-DC02**, which depends on it, and to also provide Active Directory domain services to all the other domain-joined VMs to be recovered.

7. Select VLSR-DC01 and click Configure Recovery.

vmw Live Site Recovery bc	alab.local - wd 2.vmware.com V
Site Pair 🗗 Replications 🖤 Pro	tection Groups Recovery Plans
Q Search	ULR-DCS-RP edit move delete test cleanup run reprotect cancel
Recovery Plans	Summary Recovery Steps Issues History Permissions Protection Groups Virtual Machines
VLR-DCs-RP	
VLR-SQL-RP	CONFIGURE RECOVERY PRIORITY GROUP V STARTUP ACTION V
	Virtual Machine T T
	🕑 » I 🗄 VLR-DC01
	□ » B VLR-DC02

8. Expand Post Power On Steps and click New.



ges to these properties will apply to	this VM in all recovery plans.	
overy Properties IP Customiza	tion	
	1 (Highest)	
Priority Group	All virtual machines within a priority group will be started before proceeding machines within a priority group may be specified by adding VM dependenci parallel, unless ordered by VM dependencies.	to the next priority group. The startup order of virtual es. The virtual machines within a priority group will start in
Pre Power On Steps	None	
Post Power On Steps		
These steps run after the VM is power       + NEW       Ø EDIT       X DELETI	ed on. E ↑ MOVE UP ↓ MOVE DOWN	
Name	Туре Т	ïmeout
	$\bigtriangledown$	
		0 sten/s
		o step(s

- 9. Select Command on Recovered VM.
- 10. Give it a descriptive name.
- 11. Type in the command to run (in our case, we're calling a PowerShell Script named **Run-Post-Script.ps1**, located in the **C:\Install-Files** folder.
- 12. Click Add.

Type:	O Command on VLSR Server	
	Prompt (requires a user to acknowledge the prompt before the plan continues)	
	Command on Recovered VM	
Name:	Restart FSMO Role-Holder Pos 2	
	42 characters remaining	
Content:	powershell exe c:\install-files\Run-Post-Script.ps1	
	4045 characters remaining	
Timeout:	5 C minutes O C seconds	4

This brings you back to the VM Recovery Properties menu.



VM Recovery Properties -	VLR-DC01		>
Changes to these properties will apply to the Recovery Properties IP Customization	nis VM in all recovery plans. ON		
vMotion	Disabled (The protection group of the VM d	loes not support vMotion)	
> Pre Power On Steps	None		
✓ Post Power On Steps			
These steps run after the VM is powered	on.		
+ NEW 🖉 EDIT 🛛 × DELETE	↑ MOVE UP 👎 MOVE DOWN		
Name	Туре	Timeout	
Restart FSMO Role-Holder Pos	st-Recovery Run on Recovered VM	5 min 0 sec	
			1 step(s)

Here is the content **Run-Post-Script.ps1**:

			~ 🕐		
$\leftarrow$ $\rightarrow$ $\checkmark$ $\uparrow$ $\Box$ « Local Disk (C:) $\rightarrow$ install-files $\checkmark$ $\overline{\circlearrowright}$	🔎 Search install-file	25			
🖊 Downloads 🖈 ^ Name ^	Date modified	Туре	Size		
🔮 Documents 🖈 🛛 🙀 Run-Post-Script	5/17/2022 5:13 PM	Windows PowerS	1 KB		
E Pictures 🖈					
install-files					
🛃 Windows PowerShell ISE				<u></u> -	
File Edit View Tools Debug Add-ons Help					
	the second se				

# Change the recovered VMs' IP settings

Now, you'll configure the TCP/IP settings for your protected VMs.

- 1. Go back to the VM Recovery Properties menu and click on the IP Customization tab.
- 2. Select the drop-down button in **Select IP customization mode**.
- 3. Select Manual IP customization.



VM Recovery Properties	- VLR-DC01	×
Changes to these properties will apply to t Recovery Properties IP Customizat	this VM in all recovery plans.	
Select IP customization mode (j) Auto	2	
Auto Use IP customization rules if applicable	pMapperAutomatically' is set to True - VMware Live Site Recovery evaluates the IP subnet mapping rules during recovery t	:0
No IP customization	MapperAutomatically' is set to False - VMware Live Site Recovery does not evaluate the IP subnet mapping rules during	
	CANCEL	

4. Click on IP Settings - NIC 1 and then Configure next to Protected Site.

Recovery Properties - VLR-DC01	$\times$
ges to these properties will apply to this VM in all recovery plans.	
very Properties IP Customization	
IP customization mode (	^
al IP customization	
P settings - NIC 1	
Protected Site: TSA-VLR CONFIGURE 2	
Recovery Site: ISV-VLR CONFIGURE	
Property Protected Site Recovery Site	

5. Click on Use the following IPv4 address and click Retrieve. This auto-populates the fields with the VM's current IP address.



Configure Protect	ed Site IP Settings - NIC 1	×
IPv4 IPv6 DNS	WINS	
IPv4 Address for Protec	ted Site	
<ul> <li>Use DHCP to obtain an IP</li> <li>Use the following IPv4 ad</li> </ul>	address automatically dress:	
IPv4 Address:	10.156.138.81	
Subnet Mask:	255.255.240.0	
Default Gateway:	10.156.143.253	
Alternate Gateway:		
Retrieve the of manually.	urrent IP settings from the protected VM (requires VMware <sup>-</sup>	ools and ESX 4.1 or higher). Some settings may need to be entered

- 6. Repeat the process for the DNS information. Skip IPv6 and WINS for this exercise.
- 7. Click **OK** to complete the configuration.

Configure Protect	ed Site IP Settings - NIC 1	×
IPv4 IPv6 DNS	WINS	
DNS Server		
O Use DHCP to obtain DNS	address automatically	
• Use the following DNS se	rver addresses:	
Preferred DNS Server:	10.156.138.82	
Alternate DNS Server:	127.0.0.1	
DNS Suffixes	P enabled annend these DNS suffixes (in order) to resolve unqualified names	
virdom.local		
		MOVE DOWN
Retrieve the manually.	current IP settings from the protected VM (requires VMware Tools and ESX 4.1 or higher). Some settings may nee	d to be entered
		CANCEL OK



This brings you back to the VM Recovery Properties  $\rightarrow$  IP Customization screen.

8. Next to **Recovery Site**, click on **Configure** to specify the IP address information you want to apply to the VM upon recovery.

You'll notice that the **Retrieve** option isn't available on this screen—the values don't currently exist on the VM.

9. Go through the same steps you did for the **Protected Site** values and click **OK** to complete the configuration.

VM Recovery Properties - VLR-DC01			×
Changes to these properties will apply to this VM in all recovery p	lans.		
Recovery Properties IP Customization			
Select IP customization mode  (j)			^
Manual IP customization			
✓ IP settings - NIC 1			
Protected Site: TSA-VLR CONFIGURE			
Recovery Site: ISV-VLR CONFIGURE			
Property	Protected Site	Recovery Site	
IPv4 Configuration	Static	Static	
IP address	10.156.138.81	10.156.139.81	
Subnet mask	255.255.240.0	255.255.240.0	
Default gateway	10.156.143.253	10.156.143.253	
Alternate gateway			
IPv6 Configuration	DHCP	DHCP	
DNS Configuration	Static	Static	
Preferred DNS	10.156.138.82	127.0.0.1	
Alternate DNP	107 0 0 1	10 156 100 00	~
		CAN	CEL OK

10. Complete this process for all the VMs in all recovery groups unless you want them to:

- Get their IP address configuration information from a DHCP server/IPAM at the recovery site.
- Keep the same IP address because you've stretched the protected site's network segments to the recovery site.



vmw Live Site Recovery bca-v b.local - v						
Site Pair Replications Protection Grou	Recovery Plans					
Q Search	ULR-DCS-RP EDIT MOVE DELETE TEST CLEAR	NUP <b>RUN</b> REPROTECT CA	ANCEL			
Recovery Plans	Summary Recovery Steps Issues History Permissions	Protection Groups Virtual	Machines			
VLR-DCs-RP						
VLR-SQL-RP						
	Virtual Machine 1 T Recovery Status T Status Modifie	T Protection Group T	Priority T	Dependencie 🝸	Final Power Stat 🔻	vMotion
	Note: Section 2010 Section 2	VLR-DCs-PG	1 (Highest)		On	Disabled
	🕑 » 🖹 VLR-DC02 🛛 🛇 Ready for recovery	VLR-DCs-PG	1 (Highest)	VLR-DC01	On	Disabled

In this example, we create a recovery group for three SQL servers in a protection group. We create a dependency among them such that Papilolo-02 and Papilolo-03 aren't recovered and powered on before Papilolo-01 is fully recovered.

M Recovery Properties - Papilolo-02		×		
Changes to these properties will apply to this VM in all recovery plans.           Recovery Properties         IP Customization				
Priority Group All virtual machines machines within a p parallel unless on	within a priority group will be started before proceeding to the next priority group. The startup order of virtual iority group may be specified by adding VM dependencies. The virtual machines within a priority group will start in			
V VM Dependencies	vsanpe.vmware.com 🗸			
View VM dependencies V	Recovery Plans			
The following VMs will be started before this VM: Virtual Machine ↑ ▼ Status :	VLR-SQL-RP         EDIT         MOVE         DELETE         TEST         CLEANUP         RUN         REPR           Summary         Recovery Steps         Issues         History         Permissions         Protection Groups	DTECT CANCEL		
	Image: Status Modifie T         Virtual Machine ↑ T         Recovery Status         T         Status Modifie T         Protection Group	۲ Priority ۲	Dependencie 🔻	Final Power St
	X Papilolo-01     Ready for recovery     VLR-SQL-PG     VLR-SQL-PG     VLR-SQL-PG	1 (Highest)	Dapilala 01	On
VM dependencies are ignored if the VMs are not in the same priority g	□         □         □         □         □         □         ■ repulsion-v2         ■ repulsion-v2         ■ vectory for recovery         ■ VLR-SOL-P3           □         >>         □         >         □         >         ■ repulsion-v2         ■ repulsion-v2         ■ vectory         ■ VLR-SOL-P3           □         >>         □         >         □         >         ■ repulsion-v2         ■ repulsi	2 (High) 2 (High)	Papilolo-01	On

Why create a dependency? This is so the other 2 SQL Server VMs aren't recovered until the listener and cluster virtual IP configurations are normalized after recovering the first SQL Server VM. The parameters for these two Windows/SQL Server clustering configuration settings must be correct and available for the cluster and its resources to become available after recovery.

The recovery process changes the IP address of the recovered VMs and connects them to a different network segment in the recovery site. Consequently, the listener's and cluster virtual IP's IP addresses must also change. This is something that VMware Live Site Recovery can't do natively because it's application-agnostic.

11. Use VMware Live Site Recovery's in-guest script initiation capability to make the changes, just as you did for the operations master Domain Controller. You only need to do this once for the cluster, so only place the script inside Papilolo-01. This ensures the Papilolo-01 VM is recovered first and its configuration changes are completed before Papilolo-02 and Papilolo-03 are recovered.

Here's what that configuration looks like on Papilolo-01:



ges to these properties will apply to th	is VM in all recovery plans.		
overy Properties IP Customization	on		
	1 (Highest)		
Priority Group	All virtual machines within a priority group will be started machines within a priority group may be specified by ad parallel, unless ordered by VM dependencies.	I before proceeding to the next priority group. The startup order of virtual ding VM dependencies. The virtual machines within a priority group will s	al tart in
Pre Power On Steps	None		
Post Power On Steps			
These steps run after the VM is powered + NEW   Ø EDIT × DELETE	on. ↑ MOVE UP ↓ MOVE DOWN		
These steps run after the VM is powered + NEW 2 EDIT × DELETE Name	on. ↑ MOVE UP ↓ MOVE DOWN	Timeout	
These steps run after the VM is powered + NEW 2 EDIT × DELETE Name Reconfigure AG VIP	on. ↑ MOVE UP ↓ MOVE DOWN Type Run on Recovered VM	Timeout 5 min O sec	
Post Power On Steps         These steps run after the VM is powered         + NEW          Ø EDIT × DELETE         Name         Image: Name         Image: Reconfigure AG VIP	on. ↑ MOVE UP ↓ MOVE DOWN Type Run on Recovered VM	Timeout 5 min O sec 1 s	tep(s)

Here's the guest-side command that calls the in-guest PowerShell Script **Change-Cluster-AG-VIP.ps1**, located in the **E:\Install-Files** folder on the Papilolo-01 VM.

**Note:** Please follow your internal corporate security practices for storing and running in-guest scripts when deciding where to place these sample scripts.

Edit Post Po	ower On Step	×
Туре:	<ul> <li>Command on SRM Server</li> <li>Prompt (requires a user to acknowledge the prompt before the plan continues)</li> <li>Command on Recovered VM</li> </ul>	
Name:	Reconfigure-Cluster-AG-V	
	53 characters remaining	
Content:	powershell.exe E:\Install-Files\Change-Cluster-AG-VIP.ps1	
	4039 characters remaining	
Timeout:	5 🗘 minutes 0 🗘 seconds	
	C/	NCEL SAVE

Here's a screenshot of the script itself. You can find this sample script in the appendix: "Change-Cluster-AG-VIP.ps1."



```
# Change-Cluster-AG-VIP.ps1 (For reconfiguring recovered MS SQL Server cluster properties)
Import-Module FailoverClusters
# Let's Force-Start our Cluster first
# Immediately post-recovery, the whole Cluster is down
Start-ClusterNode -FO
# Let's define our new IP address and subnet mask for the Cluster IP Address
$newClusIP = "10.156.139.87" # Replace with your new IP address
$newClusMask = "255.255.240.0" # Replace with your subnet mas
                                             # Replace with your subnet mask
# Get the IP Address of the Cluster resource
$setNewClusIP = Get-ClusterResource -Name "SRM-AG01_Clus_IP"
# Set the new IP address and subnet mask for the Cluster resource
$setNewClusIP | Set-ClusterParameter -Name Address -Value $newClusIP
$setNewClusIP | Set-ClusterParameter -Name SubnetMask -Value $newClusMask
######### Next, we modify the AG VIP
# Let's define our new IP address and subnet mask for the AG VIP Address
$newAGIP = "10.156.139.88" # Replace with your new IP address
$newAGMask = "255.255.240.0" # Replace with your subnet mask
# Get the IP Address of the AG resource
$setNewAGIP = Get-ClusterResource -Name "SRM-AG01-IP"
# Set the new IP address and subnet mask for the AG resource
$setNewAGIP
               Set-ClusterParameter -Name Address -Value $newAGIP
$setNewAGIP | Set-ClusterParameter -Name SubnetMask -Value $newAGMask
# Bring the resources offline
Stop-ClusterResource "SRM-AG01_Clus_IP"
Stop-ClusterResource "SRM-AG01_Clus_IP"
Stop-ClusterResource "SRM-AG01_SRM-AG-List"
Stop-ClusterResource "Cluster Name"
Stop-ClusterResource "SRM-AG01"
Stop-ClusterResource "SRM-AG01-IP"
# We now start up everything
Start-ClusterResource "SRM-AG01"
Start-ClusterResource "SRM-AG01"
Start-ClusterResource "SRM-AG01-IP"
Start-ClusterResource "SRM-AGO1_SRM-AG-List"
Start-ClusterResource "SRM-AGO1_Clus_IP"
Start-ClusterResource "Cluster Name"
```

## Test the disaster recovery plan

You have all the configuration pieces in place. Now you're ready to test your disaster recovery plan. Testing is essential because you don't want to discover that your DR plan doesn't do what you want during an actual disaster.

- 1. From the **Recovery Plans** tab, click on **Test**.
- 2. Notice that the **Plan Status** shows **Ready**. This indicates the recovery plan is ready to run.



vmw Live Site Recovery bca- lab.local - w	vdc ie.vmware.com V
III Site Pair Replications Protection Group	os Recovery Plans
Q Search	ULR-DCS-RP EDIT MOVE DELETE TEST CLEANUP RUN REPROTECT CANCEL
Recovery Plans	Summary Recovery Steps Issues History Permissions Protection Groups Virtual Machines
VLR-DCs-RP	
VLR-SQL-RP	Recovery Plan:       VLR-DCs-RP         Protected Site:       TSA-VLR         Recovery Site:       ISV-VLR         Description:       Description:
	✓ Plan Status
	Plan Status: → Ready
	This plan is ready for test or recovery

3. Confirm that "Replicate recent changes to recovery site" is checked, then click "Next"

Test - VLR-DCs-RP	Confirmation options	×
Confirmation options     Ready to complete	Test confirmation Running this plan in test mode will recover the virtual machines in a test environment on the recovery site.	
	Protected site:       TSA-VLR         Recovery site:       ISV-VLR         Server connection:       Connected         Number of VMs:       2    Specify whether to replicate recent changes to the recovery site. This process might take several minutes and is only available if the sites are covery site. Replicate recent changes to recovery site.	T

4. Click **Finish** to begin the test recovery process.



Test - VLR-DCs-RP	Ready to complete	×			
	Review your selected settings.				
1 Confirmation options	Name	VLR-DCs-RP			
2 Ready to complete	Protected site	TSA-VLR			
	Recovery site	ISV-VLR			
	Server connection	Connected			
	Number of VMs	2			
	Storage synchronization	Replicate recent changes to recovery site			
		CANCEL BACK FINISH			

**Recovery Steps** shows detailed information about actions taken during recovery. Also, notice that DC02 was powered on only after DC01 was fully recovered and the in-guest script was run. This is the dependency you previously configured in the recovery plan.



	Test complete	
	The virtual machines have been recovered in a test	environment at the recovery site. Review the plan I
Status	Step Started	Step Completed
✓ Success	Wednesday, September 11, 2024 2:01:01 PM	Wednesday, September 11, 2024 2:01:01 PM
✓ Success	Wednesday, September 11, 2024 2:01:01 PM	Wednesday, September 11, 2024 2:01:01 PM
✓ Success	Wednesday, September 11, 2024 2:01:01 PM	Wednesday, September 11, 2024 2:01:05 PM
✓ Success	Wednesday, September 11, 2024 2:01:04 PM	Wednesday, September 11, 2024 2:01:05 PM
✓ Success	Wednesday, September 11, 2024 2:01:04 PM	Wednesday, September 11, 2024 2:04:50 PM
✓ Success	Wednesday, September 11, 2024 2:01:04 PM	Wednesday, September 11, 2024 2:04:50 PM
✓ Success	Wednesday, September 11, 2024 2:01:04 PM	Wednesday, September 11, 2024 2:02:00 PM
✓ Success	Wednesday, September 11, 2024 2:02:00 PM	Wednesday, September 11, 2024 2:02:16 PM
✓ Success	Wednesday, September 11, 2024 2:02:16 PM	Wednesday, September 11, 2024 2:02:30 PM
✓ Success	Wednesday, September 11, 2024 2:03:52 PM	Wednesday, September 11, 2024 2:03:54 PM
✓ Success	Wednesday, September 11, 2024 2:03:54 PM	Wednesday, September 11, 2024 2:04:50 PM
✓ Success	Wednesday, September 11, 2024 2:01:05 PM	Wednesday, September 11, 2024 2:03:51 PM
✓ Success	Wednesday, September 11, 2024 2:01:05 PM	Wednesday, September 11, 2024 2:01:59 PM
✓ Success	Wednesday, September 11, 2024 2:01:59 PM	Wednesday, September 11, 2024 2:02:28 PM
✓ Success	Wednesday, September 11, 2024 2:02:28 PM	Wednesday, September 11, 2024 2:02:49 PM
✓ Success	Wednesday, September 11, 2024 2:02:49 PM	Wednesday, September 11, 2024 2:02:53 PM
✓ Success	Wednesday, September 11, 2024 2:02:53 PM	Wednesday, September 11, 2024 2:03:48 PM
✓ Success	Wednesday, September 11, 2024 2:03:48 PM	Wednesday, September 11, 2024 2:03:51 PM
	Status Status Status Success S	Status       Step Started         ✓ Success       Wednesday, September 11, 2024 2:01:01 PM         ✓ Success       Wednesday, September 11, 2024 2:01:04 PM         ✓ Success       Wednesday, September 11, 2024 2:02:04 PM         ✓ Success       Wednesday, September 11, 2024 2:02:04 PM         ✓ Success       Wednesday, September 11, 2024 2:02:05 PM         ✓ Success       Wednesday, September 11, 2024 2:03:52 PM         ✓ Success       Wednesday, September 11, 2024 2:01:05 PM         ✓ Success       Wednesday, September 11, 2024 2:01:05 PM         ✓ Success       Wednesday, September 11, 2024 2:02:28 PM         ✓ Success       Wednesday, September 11, 2024 2:02:49 PM         ✓ Success       Wednesday, September

Notice that the recovered Domain Controller VMs are powered on and running in the vCenter on the recovery site.



Live-Recovery	y : ACTIONS								
Summary Monitor	Configure Permi	ssions VMs	Updates						
Virtual Machines VM	Templates vApps	VM Folders							
Quick Filter 🗸 Ent	ter value								
Name	$\downarrow$	State	Status		Provisioned Space	- L	Jsed Space	Host CPU	Host Mem
🗌   # 📅 <u>VLR-DC</u>	02	Powered On	V No	ormal	492.89 GB	2	29.42 GB	107 MHz	1.84 GB
🗌   # 📅 <u>VLR-DC</u>	<u>01</u>	Powered On	V No	ormal	492.9 GB	3	32.98 GB	53 MHz	1.83 GB
🗌   :: 🃅 <u>Papilolo</u>	-03	Powered Off	V No	ormal	18.24 GB	1	.01 KB	0 Hz	0 B
🗌   II 🃅 <u>Papilolo</u>	-02	Powered Off	V No	ormal	18.24 GB	1	.01 KB	0 Hz	0 B
🗌 🛛 🌐 🔁 🔁	-01	Powered Off	V No	ormal	18.24 GB	1	.01 KB	0 Hz	0 B
▷       □       □         Configure       □		etworks Snapshots U	Ipdates	화 VLR-D	r Configure	) බ්රී <mark>:</mark> Permissions	ACTIONS Datastores	Networks Snapshots	Updates
Guest OS II	Virtual Machine Details	٨		Guest OS		Virtual M	lachine Details		actions ~
LAUNCH WEB CONSOLE	Power Status Guest OS VMware Tools Managed By DNS Name (1) IP Addrosses (1) Encryption & C.	Powered On Microsoft Windows : (64-bit) Running, version:12416 (Cu VMware vCenter Site Recc Manager Extension ① VLR-DC02.virdom.local 10.156.139.82 Not encrypted	Server 2022 irrent) (	214 LAUNCH LAUNC	BEMOTE CONSOLE	Ð	Power Status Guest OS VMware Tools Managed By DNS Name (1) IP Addresses (1) Encryption	Powered On  Microsoft Winde (64-bit)  Running, version:12416 VMware vCenter Site Manager Extension @  VLR-DC01.vIrdom.loca 10.156.139.81 Not encrypted	ows Server 2022 8 (Current) 👔 Recovery J

The same Domain Controller and SQL Server VMs are still running uninterrupted at the protected site.



Summary Monitor	Configure	Permissions V	Ms Updates						
Virtual Machines         VM Templates         vApps         VM Folders									
Quick Filter $\vee$ Er	nter value								
Name	$\uparrow$	State	Status	Provisioned Space	Used Space	Host CPU	Host Mem		
🗌   # 🔂 <u>Papilolo</u>	<u>o-01</u>	Powered On	🗸 Normal	2.04 TB	378.88 GB	77 MHz	11.18 GB		
🗌 🛛 🗄 🔂 🔁	<u>o-02</u>	Powered On	🗸 Normal	2.04 TB	348.28 GB	103 MHz	10.3 GB		
🗌 🛛 🗄 🔂 🔁	<u>o-03</u>	Powered On	🗸 Normal	2.04 TB	348.97 GB	103 MHz	12.46 GB		
🗌 🛛 🗄 🔂 🗌	<u>C01</u>	Powered On	🗸 Normal	373.24 GB	30.17 GB	51 MHz	6.91 GB		
🗌 🛛 🗄 🔂 🗌	<u>C02</u>	Powered On	🗸 Normal	373.11 GB	29.39 GB	51 MHz	4.84 GB		
Summary Monitor Configure	위 ൽ : ACTIONS Permissions Datastores	Networks Snapshots	대 VL Updates Summar	R-DC02	Permissions Datastores N	letworks Snapsho	ts Updates		
Guest OS ::	Virtual Machine Detail	5	ACTIONS - Gues	t OS II	Virtual Machine Details		ACTIONS ~		
LAUNCH REMOTE CONSOLE	Power Statu Guest OS VMware To DNS Name IP Address Encryption	us Dowered On Microsoft Wind (64-bit) Running, version:1241 (1) VLR-DCOLvirdom.loc sc (1) 10.155.138.81 Not encrypted	lows Server 2022 I6 (Current) () al		Power Status Guest OS VMware Tools DNS Name (1) IP Addresses (1) Encryption M	Powered On Microsoft Wi (64-bit) Running, version:12 VLR-DC02.vlrdom 10.156.138.82 Not encrypted	ndows Server 2022 2416 (Current) 👔 Jocal		

5. Log into the protected and recovered VMs to verify they are both accessible.

This demonstrates the unparalleled on-demand DR plan verification capabilities of VMware Live Site Recovery. You can leverage the test failover feature to satisfy internal and external regulatory compliance or SLA conformance requirements without interrupting their production infrastructure or scheduling an outage.




## Safe Active Directory Domain Controller recovery in action

Let's take a look at what happened to our protected Active Directory infrastructure after a simulated disaster recovery event completed using VMware Live Site Recover.

The first time the recovered Domain Controllers boot up, Windows automatically detects the change in their VM-Generation ID.



The Windows Domain Controller safety feature immediately kicks in, and the recovered Domain Controller VMs are taken through the remediation process. Among other effects discussed in previous sections, Netlogon, DNS, and other services cannot start during this remediation process.



📌 VLR-DC02 - VMovere Remote Cor	nole							VLR-DC01 - VMAsare Remote Co	naole					-	o ×
Wet v III v ED [1]						200	3 V	MRC - 비 - 프 11						20	
1							1								
Event viewer						- 0 /		Evere newer							· ^
								ab do not 10 mm							
							- 1								
Event Viewer (Local)	Directory Service Numb	ber of events: 495				Actives	- 4	Event Viewer (Local)	Directory Service No	mber of events: 558				Actions	
Windows Loas	Level	Date and Time	Seurce	Event ID Task Category	^	Directory Service	• (	Windows Leas	Level	Date and Time	Source	Event ID Task Category	^	Directory Service	-
✓ Applications and Services Lo	() Information	8/11/2024 1:08:49 PM	ActiveDirectory_Dorn	2172 Internal Configuration		🧉 Open Saved Log	- L -	Applications and Services Lo	() Information	9/9/2024 11:30:05 AM	ActiveDirectory_Dom	1999 Replication		Open Saved Log	
Active Directory Web Ser	() Information	8/13/2024 1:06-49 PM	ActiveDirectory_Dom	2160 Internal Configuration		Y Create Custom View		Active Directory Web Ser	Information	9/9/2024 11:30:06 AM	ActiveDirectory_Dom	1587 Replication		Treate Custom View	
DFS Replication	Distornation	8/11/2024 1:08-49 PM	ActiveDirectory_Dom	2406 Internal Configuration		Import Custom View		DFS Replication	Distornation	9/9/2024 11:30:06 AM	ActiveDirectory_Dom	1999 Replication		Import Custom View	
Child Server	Distormation	8/12/2024 1-08-49 PM	ActiveDirectory Dam	2121 Internal Configuration		Clear Log.		DNS Server	A Warning	9/9/2024 11:30:02 AM	ActiveDirectory Dom	2007 Replication		Clear Log.	
Handware Events	Warning	8/13/2024 1:08:49 PM	ActiveDirectory_Dorn	3054 Security		Titter Current Lop		Herdware Events	Warning	9/9/2024 11:30:02 AM	ActiveDirectory,Dom	2092 Replication		Titler Current Log.	
R Internet Explorer	A Warning	8/13/2024 1:08:49 PM	ActiveDirectory_Dom	3051 Security		Properties		Internet Explorer	() Information	9/9/2024 11:29:39 AM	ActiveDirectory_Dom	1394 Service Control		Propeties	
Key Management Service	() Information	8/13/2024 1:06:52 PM	ActiveDirectory_Dom	2179 Internal Configuration		00 find.		Key Management Service	A Warning	9/9/2024 11:29:32 AM	ActiveDirectory_Dom	2092 Replication		00 Find-	
> OpenSSH	(Distance)	8/11/2024 105:50 PM	ActiveDirectory_Dom	2007 DS RPC Client		Store All Foreits In-		> OpenSSH	U troc	6/4/2014 11:29:07 AM	ActiveDirectory_Dom_	2007 DS IUC Clark		Star All Events As	
Windows PowerShell	Companyation	WIE COOL LOUND PM	Acceleration of the second	1994 Device Canada		Attack a Task To this I on		> A PowerShellCore	- wanny	THE PERSON AND ADDRESS OF THE PERSON ADDRESS	Automation and a	cost ingenation		detects a Task To this Loss	
Subscriptions	Event 2087, ActiveDirectory	/_DomainService			×	View		Windows PowerShell	Event 2007, ActiveDirecto	ory_DomainService			×	Name	
	General Details						· •	C3 procedure	General Details						
	be an and					A Kellen			In the second		And a second			A KEIGA	
	changes in Active Direct	in Services could not resolve the followin dony Domain Services from replicating by	g DNS hold name of the source domain co etween one or more domain controllers in	introller to an IP address. This error prevents additions, deletions and the forest. Security groups, proup policy, users and computers and '	their	Нер	· •	Active Directory Dervisis Services could not resolve the following DMS hash name of the source domain controller to an P address. This error provents additions, distingt and changes in a Active Directory Dervisis Service for enamination of a provide manufacture to the formation resolve the source of the sourc						E Hep	•
	passwords will be incor	nsistent between domain controllers unti	if this error is resolved, potentially affecting	logon authentication and access to network resources.		Event 2087, ActiveDirectory_DomainService	-		inconsistent between	domain controllers until this error is reso	lved, potentially affecting logon authentic	ation and access to network resources.		Event 2087, ActiveDirectory_DomainSer	vice 🔺
	Source domain control	ler				🗐 Event Properties			Source domain conti	oller				Event Properties	
	VLR-DC01					S Attach Task To This Event			VLR-DC02					Attach Task To This Event	
	a23da32a-009a-4bbd-1	1142-461/1090-232_msdcs.vkdom.local				iia Copy	•		73320267-a35e-460F	te bcce-402867518a0b, msdcs.virdom.local				E Copy	•
						Save Selected Events			NOT DIAL D	-				Save Selected Events	
	diagnostics registry val	up to 10 Units failures are shown for any g lue to 1:	given 12 nour period, even in more than 10	natures occur. To log all individual failure events, set the following		G Refresh			registry value to 1:	ry up to 10 DNS failures are shown for any	given 12 hour period, even in more than 1	o failures occus. To log all individual failure events, set the rollowing diagn	1010(3	G Refeet	
						E Helo			Review Date					E Hele	
1	HRLM\System\Current	ControlSet/Services/MIDS/Diagnostics/2	2 DS RPC Client			-			HRLM.System\Curre	ntControlSet/Services/NTD9/Diagnostics/	22 DS RPC Client				
	Uner Artiser								User Action						
	in a state												-		

The FSMO role holder (DC01) isn't considered a [working?] Domain Controller now.

Remote Cor	nsole							- C	× c
VMRC 🕶 📘 👻 🛱								» E	3 💿 🕏
Event Viewer								- 6	J X
File Action View Help									
🗢 🄿 🙍 📰 🔯 🖬									
🛃 Event Viewer (Local)	Directory Service Nur	nber of events: 558						Actions	
> 📮 Custom Views	Lavel	Date and Time	Source	Event ID	Tack Category		^	Directory Service	
> 💽 Windows Logs	December	0/0/2024 11 20:05 AM	Aution Direction Down	LVEIL ID	lask categoly			🧟 Open Saved Log	
Applications and Services Lo	Information	9/9/2024 11:30 06 AM	ActiveDirectory_Dom	1087	Replication			Sopen saved Ebg	
DES Poplication	Information	9/9/2024 11:30:00 AM	ActiveDirectory_Dom	1999	Replication			Treate Custom View	
Disteptication	A Warning	9/9/2024 11:30:00 AM	ActiveDirectory_Dom	2002	Replication			Import Custom View	
DNS Server	A Warning	9/9/2024 11:30:02 AM	ActiveDirectory_Dom	2092	Replication			Clear Log	
Hardware Events		9/9/2024 11:29:39 AM	ActiveDirectory Dom	1394	Service Control			Tilter Current Log	
👔 Internet Explorer	A Warning	9/9/2024 11:29:32 AM	ActiveDirectory Dom	2092	Replication			Descention .	
📔 Key Management Service	Error	9/9/2024 11:29:07 AM	ActiveDirectory Dom	2087	DS RPC Client			Properties	
> 🛄 Microsoft	Warning	9/9/2024 11:29:02 AM	ActiveDirectory Dom	2092	Replication			Find	
> DpenSSH	(i) Information	9/9/2024 11:28:32 AM	ActiveDirectory_Dom	1000	Service Control		~	Revenue All Events As	
> PowerShellCore	Event 2092 ActiveDirecto	ry DomainService					×	Attach a Task To this Log	
Subscriptions	Corrent D							View	•
	General Details							G Refresh	
								🕜 Help	•
	This server is the own since this server has	er of the following FSMO role, but does n een restarted. Replication errors are previ	not consider it valid. For the partition which enting validation of this role	h contains the FSM	D, this server has not replic	ated successfully with any of its partners		Event 2002 ActiveDirectory DomainService	ca 🔺
								Eren 2002, Herrebrecking bonnanbern	
	Operations which rec	uire contacting a FSMO operation maste	r will fail until this condition is corrected.					cvent Properties	
	ESMO Role: CN=RID	Manager\$ CN=System DC=virdom DC=k	ocal					Attach Task To This Event	
								Сору	•
	User Action:							Save Selected Events	
	1. Initial synchronizat	ion is the first early replications done by a	a system as it is starting. A failure to initial	y synchronize may	explain why a FSMO role ca	annot be validated. This process is explained	d	Refresh	
	in K8 article 309470. 2. This server has one or more replication partners and replication is failing for all of these partners. Use the command repadmin /showrend to display the replication errors. Correct the error in								•
	question. For exampl	e there maybe problems with IP connecti	vity, DNS name resolution, or security aut	hentication that are	preventing successful repl	lication.			
	3. In the rare event th	at all replication partners are expected to a seize the role to the same server. This n	be offline (for example, because of mainte any be done using the steps provided in Ki	enance or disaster r Rarticles 255504 an	ecovery), you can force the 1 324801 on http://support	e role to be validated. This can be done by			
			ing at a set a steps provided in the	5 annen 255504 an					

After rebooting the FSMO role holder (DC01) the second time with our in-guest script, things begin to look better.



📌 VLR-DC01 - VMware Remote Cor	nsole							- 0	x I
VMRC 🕶 📕 👻 🛱								≫ 📮	0 5
Event Viewer								- 0	×
File Action View Help									
🗢 🧼 🖄 📰 🔯 🖬									
Event Viewer (Local)	Directory Service Num	ber of events: 558						Actions	
> 🕞 Custom Views > 👔 Windows Logs	Level	Date and Time	Source	Event ID	Task Category		^	Directory Service	•
✓ ▲ Applications and Services Lo	(i) Information	9/9/2024 11:28:22 AM	ActiveDirectory_Dom	2172	Internal Configuration			open Saved Log	
Active Directory Web Ser	Information     Information	9/9/2024 11:28:22 AM 9/9/2024 11:28:22 AM	ActiveDirectory_Dom ActiveDirectory_Dom	2168 2406	Internal Configuration			Create Custom View	
Directory Service	<ol> <li>Information</li> </ol>	9/9/2024 11:28:22 AM	ActiveDirectory_Dom	2406	Internal Configuration			Import Custom view	
DNS Server	<ol> <li>Information</li> </ol>	9/9/2024 11:28:22 AM	ActiveDirectory_Dom	2121	Internal Configuration			Clear Log	
Hardware Events	🔔 Warning	9/9/2024 11:28:22 AM	ActiveDirectory_Dom	3054	Security			Filter Current Log	
👔 Internet Explorer	\Lambda Warning	9/9/2024 11:28:22 AM	ActiveDirectory_Dom	3051	Security			Properties	
Key Management Service	(i) Information	9/9/2024 11:27:57 AM	ActiveDirectory_Dom	2179	Internal Configuration			AND EVAL	
> Microsoft	Information	9/9/2024 11:27:36 AM	ActiveDirectory_Dom	1394	Service Control			Find	
> OpenSSH	(i) Information	9/9/2024 11:27:36 AM	ActiveDirectory_Dom	1999	Replication		~	Save All Events As	
Windows PowerShell	Event 1394, ActiveDirecto	ry_DomainService					×	Attach a Task To this Log	
🛃 Subscriptions	General Details							View	•
								🖸 Refresh	
	All problems preventi Logon service has rest	ng updates to the Active Directory Doma arted.	in Services database have been cleared.	New updates to the A	ctive Directory Domain Ser	rvices database are succeeding. The Net		👔 Help	•
								Event 1394, ActiveDirectory_DomainService	e 🔺
								Event Properties	
								Attach Task To This Event	

At this point, the Domain Controllers have discarded their old RID pools and obtained a new set, have a new Invocation ID, and can begin to use the new batch of USNs.



Windows has also accepted the new VM-Generation ID created for the VM by our VMware Live Site Recovery Recovery exercise. Windows will now store this for subsequent comparison next time the VM is rebooted.

📌 VLR-DC01 - VMware Remote Cor	nsole									
VMRC - 📕 - 🖶 🗔										
Event Viewer										
File Action View Help										
🗢 🤿 🞽 🖬 🚺 🖬										
Event Viewer (Local)	Directory Service Nur	nber of events: 558								
> 📑 Custom Views	Level	Date and Time	Source	Event ID	Task Category		^			
<ul> <li>Applications and Services Lo</li> </ul>	🔔 Warning	9/9/2024 11:27:34 AM	ActiveDirectory_Dom	2088	DS RPC Client					
Active Directory Web Ser	(i) Information	9/9/2024 11:27:05 AM	ActiveDirectory_Dom	1000	Service Control					
DFS Replication	🔔 Warning	9/9/2024 11:27:05 AM	ActiveDirectory_Dom	3041	LDAP Interface					
Directory Service	🔔 Warning	9/9/2024 11:27:05 AM	ActiveDirectory_Dom	2886	LDAP Interface					
DNS Server	(i) Information	9/9/2024 11:26:55 AM	ActiveDirectory_Dom	2405	Internal Configuration					
Hardware Events	(i) Information	9/9/2024 11:26:55 AM	ActiveDirectory_Dom	2405	Internal Configuration					
📔 Internet Explorer	<ol> <li>Information</li> </ol>	9/9/2024 11:26:55 AM	ActiveDirectory_Dom	2120	Internal Configuration					
Key Management Service	(i) Information	9/9/2024 11:26:55 AM	ActiveDirectory_Dom	2208	Internal Configuration					
> Microsoft	Information	9/9/2024 11:26:55 AM	ActiveDirectory_Dom	2179	Internal Configuration					
> OpenSSH	(i) Information	9/9/2024 11:26:55 AM	ActiveDirectory_Dom	1109	Replication		$\sim$			
Windows PowerShell	Event 2179, ActiveDirecto	ory_DomainService					×			
Subscriptions										
	General Details									
	The msDS-Generation	The msDS-GenerationId attribute of the Domain Controller's computer object has been set to the following parameter:								
	GenerationID attribut	e:								
	9853974567046190745	5								



DC02 has also been successfully remediated. Because it's not the FSMO role holder, part of its healing process (for example, obtaining a new RID pool) was supported by the availability of the Role holder.



# Recover the SQL Server availability group

Now that the Domain Controllers have been recovered, you're ready to recover the SQL Server availability group cluster. Remember that our objective here is to ensure that we don't just recover the individual VMs. We also want to recover the services they provide. This means that, upon recovery, the cluster service and resources (databases, jobs, scripts) also must be available, accessible, and operational.

1. Start by following the same process you did above for the Domain Controller recovery plan.

Notice the startup sequence of the two VMs in your recovery plan. VMware Live Site Recovery doesn't begin to power on Papilolo-02 and Papilolo-03 until Papilolo-01 has completed bootup and the in-guest script has been called. This is a combination of dependency and recovery priority at work.



ULR-SQL-RP EDIT MOVE DELETE TEST CLEAN	UP RUN REPRO	DTECT CANCEL	
Summary Recovery Steps Issues History Permissions	Protection Groups	Virtual Machines	
Recovery Step	Status	Step Started	Step Completed
> 🔄 1. Synchronize storage	✓ Success	Wednesday, September 11, 2024 3:56:48 PM	Wednesday, September 11, 2024 3:56:48 PM
2. Restore recovery site hosts from standby	✓ Success	Wednesday, September 11, 2024 3:56:48 PM	Wednesday, September 11, 2024 3:56:48 PM
3. Suspend non-critical VMs at recovery site			
> 🛱 4. Create writable storage snapshot	✓ Success	Wednesday, September 11, 2024 3:56:48 PM	Wednesday, September 11, 2024 3:56:52 PM
> 🛱 5. Configure test networks	✓ Success	Wednesday, September 11, 2024 3:56:52 PM	Wednesday, September 11, 2024 3:56:53 PM
✓ 1 6. Power on priority 1 VMs	✓ Success	Wednesday, September 11, 2024 3:56:53 PM	Wednesday, September 11, 2024 3:59:47 PM
€ v 6.1. Papilolo-01	✓ Success	Wednesday, September 11, 2024 3:56:53 PM	Wednesday, September 11, 2024 3:59:47 PM
6.1.1. Guest startup	✓ Success	Wednesday, September 11, 2024 3:56:53 PM	Wednesday, September 11, 2024 3:57:39 PM
6.1.2. Customize IP	✓ Success	Wednesday, September 11, 2024 3:57:39 PM	Wednesday, September 11, 2024 3:57:43 PM
6.1.3. Guest shutdown	✓ Success	Wednesday, September 11, 2024 3:57:43 PM	Wednesday, September 11, 2024 3:58:20 PM
6.1.4. Power on	✓ Success	Wednesday, September 11, 2024 3:58:20 PM	Wednesday, September 11, 2024 3:58:22 PM
6.1.5. Wait for VMware tools	✓ Success	Wednesday, September 11, 2024 3:58:22 PM	Wednesday, September 11, 2024 3:59:09 PM
5.1.6. Command: Reconfigure AG VIP	✓ Success	Wednesday, September 11, 2024 3:59:09 PM	Wednesday, September 11, 2024 3:59:47 PM
✓ 2 7. Power on priority 2 VMs	✓ Success	Wednesday, September 11, 2024 3:56:53 PM	Wednesday, September 11, 2024 4:00:41 PM
✓ 7.1. Papilolo-02	✓ Success	Wednesday, September 11, 2024 3:56:53 PM	Wednesday, September 11, 2024 4:00:30 PM
7.1.1. Guest startup	✓ Success	Wednesday, September 11, 2024 3:56:53 PM	Wednesday, September 11, 2024 3:57:40 PM
7.1.2. Customize IP	✓ Success	Wednesday, September 11, 2024 3:57:40 PM	Wednesday, September 11, 2024 3:57:44 PM
7.1.3. Guest shutdown	✓ Success	Wednesday, September 11, 2024 3:57:44 PM	Wednesday, September 11, 2024 3:58:30 PM
7.1.4. Power on	✓ Success	Wednesday, September 11, 2024 3:59:47 PM	Wednesday, September 11, 2024 3:59:50 PM
7.1.5. Wait for VMware tools	✓ Success	Wednesday, September 11, 2024 3:59:50 PM	Wednesday, September 11, 2024 4:00:30 PM
V 7.2. Papilolo-03	✓ Success	Wednesday, September 11, 2024 3:56:53 PM	Wednesday, September 11, 2024 4:00:41 PM
7.2.1. Guest startup	✓ Success	Wednesday, September 11, 2024 3:56:53 PM	Wednesday, September 11, 2024 3:57:40 PM
7.2.2. Customize IP	✓ Success	Wednesday, September 11, 2024 3:57:40 PM	Wednesday, September 11, 2024 3:57:44 PM
7.2.3. Guest shutdown	✓ Success	Wednesday, September 11, 2024 3:57:44 PM	Wednesday, September 11, 2024 3:58:30 PM
7.2.4. Power on	✓ Success	Wednesday, September 11, 2024 3:59:47 PM	Wednesday, September 11, 2024 3:59:50 PM
7.2.5. Wait for VMware tools	✓ Success	Wednesday, September 11, 2024 3:59:50 PM	Wednesday, September 11, 2024 4:00:41 PM
3 8. Power on priority 3 VMs			
4 9. Power on priority 4 VMs			
5 10. Power on priority 5 VMs			

### The recovery is complete.

vmw Live Site Recovery bca alab.local - w	rc )pe.vmware.com ∨									
Site Pair 🕒 Replications 💎 Protection Group	Recovery Plans									
Q. Search Recovery Plans	Summary Recovery Steps Issues History	TEST CLEANUP RUN Permissions Protection (	REPROTECT CANCEL Groups Virtual Machines							
VLR-DCs-RP	EXPORT STEPS TEST CLEANUP RUN REPRO	PORT STEPS TEST CLEANUP RUN REPROTECT CANCEL								
	Plan status:		Test complete							
	Description:		The virtual machines have been recover	red in a test environment at the recovery site. Revie						
	Recovery Step	Status Step S	Started	Step Completed						
	> 🔄 1. Synchronize storage	✓ Success Wedr	nesday, September 11, 2024 3:56:48 PM	Wednesday, September 11, 2024 3:56:48 PM						
	2. Restore recovery site hosts from standby	✓ Success Wedr	nesday, September 11, 2024 3:56:48 PM	Wednesday, September 11, 2024 3:56:48 PM						
	3. Suspend non-critical VMs at recovery site									
	> 🙆 4. Create writable storage snapshot	✓ Success Wedr	nesday, September 11, 2024 3:56:48 PM	Wednesday, September 11, 2024 3:56:52 PM						
	> 💮 5. Configure test networks	✓ Success Wedr	nesday, September 11, 2024 3:56:52 PM	Wednesday, September 11, 2024 3:56:53 PM						
	> 1 6. Power on priority 1 VMs	✓ Success Wedr	nesday, September 11, 2024 3:56:53 PM	Wednesday, September 11, 2024 3:59:47 PM						
	> 2 7. Power on priority 2 VMs	✓ Success Wedr	nesday, September 11, 2024 3:56:53 PM	Wednesday, September 11, 2024 4:00:41 PM						
	3 8. Power on priority 3 VMs									



2. Log into Windows and check the SQL Server availability group cluster.

The Windows Server Failover Cluster supporting the SQL Server availability group should be fully functional.

📲 Failov 🖓 Cluster Manager								2
File Action View Help								
Þ 🔿 🖄 🖬								
Failover Cluster Manager	Roles (1)							Actions
SRM-AG_Clus01.vlrdom.loc	Search						🔎 Queries 🔻 🔛 👻 😪	Roles
Nodes	Name	Status	Туре	Owner Node	Priority	Information		🧑 Configure Role
> 📇 Storage	SRM-AG01	Running	Other	Papilolo-01	Medium			Virtual Machines
Networks Output of the second seco								📑 Create Empty Role
and cluster events								View
								Refresh
								[ Help
								SRM-AG01
								🛟 Start Role
							,	🛟 Stop Role
	👻 📑 SRM-AG01	I					Preferred Owners: Any node	Move
	Name			Status	Information			🚯 Change Startup Priority
	Other Resources			Status	anomatori			🚯 Information Details
	SRM-AG01			( Online				Show Critical Events
	Server Name			-				🛃 Add Storage
	🖃 📑 Name: SRM-AG	G-List		( Online				Add Resource
	IP Address:	10.156.139.88		() Online				More Actions
								🗙 Remove

All the participating nodes should be up and operational.

🗟 Bilover Cluster Manager File Action View Help								8 8 8
🗢 🏟 🖄 🗊 🚺 🖬								
Railover Cluster Manager	Nodes (3)							Actions
<ul> <li>SRM-AG_Clus01.vlrdom.loc</li> <li>Roles</li> </ul>	Search					P Queri	es 🔻 🔜 🔻 👻	Nodes
Nodes	Name	Status	Assigned Vote	Current Vote	Site	Rack	Chassis	P Add Node
> 📇 Storage	🖥 Papilolo-01	💿 Up	1	1	Site 10.156.128.0/20			View
Networks     Ouster Events	🛃 Papilolo-02	🕥 Up	1	1	Site 10.156.128.0/20			Refresh
endster Events	🛃 Papilolo-03	🕥 Up	1	1	Site 10.156.128.0/20			🛛 Help
								Papilolo-01
	<						>	🔒 Pause
	V Papilolo-01							📙 Resume
			-	<b>D</b> · · ·	1. e - 35.			Nemote Desktop
	Name	Status	lype	Priority	Information			🚯 Information Detail
	T SRM-AGUI	I Running	Uther	weaium				Show Critical Even
								More Actions

The Microsoft SQL Server listener resource should also be up and available.



Incrosoft SQL Server Management Studio         File       Edit       View       Tools       Window       Help         Image: Image of the state of th	• (? • ) 🛛   • ) 🎜 퍫 🖧 (경 호 관	- 🖓 🌶 🖻 - 🖕	
Object Explorer       ▼ # ×         Connect ~ ₩ ×       ■ ▼ & ★	Connect to Server	× SQL Server  tites Aways Encrypted Additional Connection Parameters  Database Engine  SRM-AG-List ,VCFAGINST  Windows Authentication  VLRDOM\deji  Remember password	

3. Because this is a test recovery exercise, confirm that your production SQL Server cluster is still up and functional at the protected site.

Here's the production SQL Server instance and its recovered copy, side-by-side. They should both be operational and processing queries.

Projection 0         Private Transition Conside           XXXX + 1         → Q         Q           V MIXX = Exception Constant         XXXX = Exception Constant         XXXX = Exception Constant           V MIXX = Exception Constant         XXXX = Exception Constant         XXXX = Exception Constant           V MIXX = Exception Constant         XXXX = Exception Constant         XXXX = Exception Constant           V MIXX = Exception Constant         XXXX = Exception Constant         XXXX = Exception Constant           V MIXX = Exception Constant         XXXX = Exception Constant         XXXX = Exception Constant           V MIXX = Exception Constant         XXXX = Exception Constant         XXXX = Exception Constant	Milling (7)() - Millionald SQ, Server Management Budie → X (2) = (2) - (2) - (2) - (2) T <sup>a</sup> SX (4) - (2) (2) -	· .	- 0 * 0 0 0 0 Gert Lawrh (M-0 P = 6	X R X	Popole         MAxen Remote Censile           (3AEC + 1)         - Gr         Gr           (3AE + 1)         - Gr         Gr	elli (NEOM-laj (N) - Monsth VG, Save Messgareet Rode 약 요 요 요	- <b>T</b> F#D+,	- D - D D D D D Geel Lawyin (Chr-Q) P - C
Days Development         P III Control         P IIII Control         P IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII		Contraction () Contraction () Contraction Production Papilolo-01 Contraction	Comment, Teacher     Comm		Other Advance         Image: Second advance         Image: Second advance           Image: Second advance         Image: Second advance         Image: Second advance           Image: Second advance         Image: Second advance         Image: Second advance           Image: Second advance         Image: Second advance         Image: Second advance           Image: Second advance         Image: Second advance         Image: Second advance           Image: Second advance         Image: Second advance         Image: Second advance           Image: Second advance         Image: Second advance         Image: Second advance           Image: Second advance         Image: Second advance         Image: Second advance           Image: Second advance         Image: Second advance         Image: Second advance           Image: Second advance         Image: Second advance         Image: Second advance           Image: Second advance         Image: Second advance         Image: Second advance           Image: Second advance         Image: Second advance         Image: Second advance           Image: Second advance         Image: Second advance         Image: Second advance           Image: Second advance         Image: Second advance         Image: Second advance           Image: Second advance         Image: Second advance         Image: Second advance		Contraction of the second seco	enten (* en en stalz) Comme en en en stalz Comme en

In a test recovery exercise, the recovered workloads should not be able to communicate with the production environment because they are recovered into the VMware Live Site Recovery test network we specified in previous steps. However, all workloads recovered into this test network can communicate with each other. This allows the admins and operators to more robustly test and verify the integrity of the recovery process and ascertain the availability and accessibility of their services.

Admins can fail over a client VM to the test network in VMware Live Site Recovery, or they can connect a regular client VM to the fenced-off port group in vCenter and connect to the recovered workloads to perform any validation or integrity tests required for their disaster recovery plans.



You have successfully performed test recovery of the recovery plan. If there were any failures, misconfigurations, or unexpected behaviors, you could correct them by editing the plan and retesting the changes without disrupting services in production.

vmw Live Site Recovery b lab.local - w	e.vmware.com V	
Site Pair 🕒 Replications 🔍 Protection Group	s 🗏 Recovery Plans	
Q Search Recovery Plans	Recovery Plans New Recovery Plan New Folder	
VLR-DCs-RP	Image: Interview of the status     T     Protected Site     T     Recovery Site	
😼 VLR-SQL-RP	□   💀 VLR-DCs-RP 🛛 Test complete TSA-VLR ISV-VLR	
	□   🔂 VLR-SQL-RP 🔮 Test complete TSA-VLR ISV-VLR	

### Clean up after the test recovery

Now that you're done with the test recovery, you need to clean up the test environment.

1. Select each tested recovery plan and click Cleanup.

vmw Live Site Recovery bc Jocal - w	y pesimikare.com ∨
Site Pair 🕞 Replications 🖤 Protection Group	s Recovery Plans
Q Search Recovery Plans	VLR-DCS-RP EDIT MOVE DELETE TEST CLEANUP UN REPROTECT CANCEL Summary Recovery Steps Issues History Permissions Protection Groups Virtual Machines
Là VLP-SQL-RP	Recovery Plan: VLR-DCs-RP Protected Site: TSA-VLR Recovery Site: ISV-VLR Description:
	▲ Test complete
	✓ Plan Status
	Plan Status: O Test complete
	The virtual machines have been recovered in a test environment at the recovery site. Review the plan history to view any errors or warnings. When you are ready to remove the test environment, run cleanup on this plan.
	✓ Recent History
	Test Wednesday, September 11, 2024 2:00:56 PM 🗸 Success

2. Click **Next** to confirm.



Cleanup - VLR-DCs-RP	Confirmation options ×
Confirmation options     Ready to complete	Cleanup confirmation Running a cleanup operation on this plan will remove the test environment and reset the plan to the Ready state.
	Protected site:TSA-VLRRecovery site:ISV-VLRServer connection:ConnectedNumber of VMs:2
	Cleanup options If you are experiencing errors during cleanup, you can choose the Force Cleanup option to ignore all errors and return the plan to the Ready state. If you use this option, you might need to clean up your storage manually, and you should run another test as soon as possible.
	CANCEL

3. Click **Finish** to commit the changes.

Cleanup - VLR-DCs-RP	Ready to complete Review your selected settings.	×
1 Confirmation options	Name	VLR-DCs-RP
2 Ready to complete	Protected site	TSA-VLR
	Recovery site	ISV-VLR
	Server connection	Connected
	Number of VMs	2
	Force cleanup	Do not ignore cleanup warnings
		CANCEL BACK FINISH

The recovery plans have returned to **Ready** for another test or invoke in an actual disaster event.



vmw Live Site Recovery bc alab.local - wd	ipe.vmware.com V
Site Pair 🕞 Replications 🖤 Protection Groups	Recovery Plans
Q Search	ULR-DCS-RP EDIT MOVE DELETE TEST CLEANUP RUN REPROTECT CANCEL
Recovery Plans	Summary Recovery Steps Issues History Permissions Protection Groups Virtual Machines
VLR-SQL-RP	Recovery Plan: VLR-DCs-RP Protected Site: TSA-VLR Recovery Site: ISV-VLR Description:
	✓ Plan Status
	Plan Status: → Ready
	This plan is ready for test or recovery
	✓ Recent History
	Cleanup Wednesday, September 11, 2024 4:56:29 PM 🗸 Success
	Test Wednesday, September 11, 2024 2:00:56 PM ✓ Success

Also, the recovered VMs are powered off and restored to their previous placeholder states.

Live-Recovery       : ACTIONS         Summary       Monitor       Configure       Permissions       VMs       Updates								
Virtual Machines VM Templates	vApps VM Folders							
Quick Filter value								
Name	↑ State	Status	Provisioned Space	Used Space	Host CPU	Host Mem		
🔲 🛛 🗄 📅 Papilolo-01	Powered Off	🗸 Normal	18.48 GB	244 MB	0 Hz	0 B		
Papilolo-02	Powered Off	🗸 Normal	18.49 GB	252 MB	0 Hz	0 B		
Papilolo-03	Powered Off	🗸 Normal	18.48 GB	244 MB	0 Hz	0 B		
□   # 📅 <u>VLR-DC01</u>	Powered Off	🗸 Normal	14.48 GB	252 MB	0 Hz	0 B		
🗌 🗏 🕂 📅 VLR-DC02	Powered Off	V Normal	14.48 GB	252 MB	0 Hz	0 B		

### Perform a real disaster recovery

Performing mocked-up or simulated disaster recovery exercises is one of the best features of VMware Live Site Recovery. Knowing that you're adequately prepared to recover an infrastructure in real disaster events gives you peace of mind. It also helps your organization satisfy compliance, regulatory, and other legal requirements. A simulated failure and recovery isn't usually the desired outcome for investment in a robust BCDR solution like VMware Live Site Recovery, though. What the solution can do for you in a real disaster event is always the end goal. We'll now demonstrate VMware Live Site Recovery's capabilities in a disaster event.

A disaster event is a catastrophic event that impacts IT services in a production environment. It implies that all servers and services in that specific environment are unavailable and must be reinstantiated or reinstated in another environment for business continuity.



Except for a few considerations and cosmetic differences, the process of performing real disaster recovery exercises is not much different from the test disaster recovery process you previously conducted. We'll highlight those differences in this section.

1. Select the recovery plan and click **Run** to initiate a disaster recovery exercise.

vmw Live Site Recovery bca-vcf-vc01.vcf.tsalab.local - wdc-m01-vc01.vcf02.vsanpe.vm		
Site Pair C Replications Protection Groups Recovery Plan	s	
Q. Search Recovery Plans	ULR-DCS-RP EDIT MOVE DELETE TEST CLEANUE RUN REPROTECT CANCEL	
VLR-DCS-RP	Recovery Plan: VLR-DCs-RP Protected Site: TSA-VLR Recovery Site: ISV-VLR Description:	
	Plan Status:     → Ready       This plan is ready for test or recovery	
	✓ Recent History	
	Cleanup     Wednesday, September 11, 2024 4:56:29 PM       Test     Wednesday, September 11, 2024 2:00:56 PM	✓ Success ✓ Success

VMware Live Site Recovery provides two types of disaster recovery operations:

- Planned recovery: This is good for proactively relocating business-critical workloads from one datacenter to another for any business reasons. For example, if a natural disaster event is predicted for the area where the workloads are currently located, you can invoke the recovery plans to move them to another site in a controlled fashion. In this mode, the recovery operation will (among other things) perform an up-to-date synchronization between the two sites to ensure that changes in flight are committed to the replicated copies of the workloads at the recovery site. The process will also attempt to power off the workloads at the protected site to avoid service collision. If these attempts fail, the recovery will be stopped.
- **Disaster recovery:** This is for situations where the workloads at the protected sites are no longer available. When this option is invoked, VMware Live Site Recovery attempts a last-minute replication and a controlled power-off of the VMs at the protected site. The recovery continues even if VMware Live Site Recovery cannot successfully perform these steps. When you indicate a disaster recovery, the system assumes an actual disaster event makes the protected site unreachable, and the services or servers there are unavailable.
- 2. Select the checkbox to acknowledge you understand the action is disruptive. If you miss this checkbox, you're prompted to acknowledge the disaster recovery to make sure you don't accidentally initiate one.

Confirm that you understand that this process will permanently alter the virtual machines and infrastructure of both the protected and recovery datacenters.



X

- 3. Select **Disaster recovery**.
- 4. Click Next.

Recovery - VLR-DCs-RP	Confirmation options	$\times$
1 Confirmation options	Recovery confirmation	
2 Ready to complete	Running this plan in recovery mode will attempt to shut down the VMs at the protected site and recover the VMs at the recovery site.	
	Protected site: TSA-VLR	
	Recovery site: ISV-VLR	
	Server connection: Connected	
	Number of VMs: 2	
	I understand that this process will permanently alter the virtual machines and infrastructure of both the protected and recovery datacenters.	
	Recovery type	
	O Planned migration	
	Replicate recent changes to the recovery site and cancel recovery if errors are encountered. (Sites must be connected and storage replication must be available.)	
	O Disaster recovery	
	Attempt to replicate recent changes to the recovery site, but otherwise use the most recent storage synchronization data. Continue recovery even if errors are encountered.	
	CANCEL NEX	т

5. Click **Finish** to begin the disaster recovery.

Recovery - VLR-DCs-RP	Ready to complete Review your selected settings.	×
1 Confirmation options	Name	VLR-DCs-RP
2 Ready to complete	Protected site	TSA-VLR
	Recovery site	ISV-VLR
	Server connection	Connected
	Number of VMs	2
	Recovery type	Disaster recovery
	Forced recovery	Do not force recovery
		CANCEL BACK FINISH

Here, you'll see VMware Live Site Recovery powering off the protected VMs at the protected site before it starts to recover them at the recovery site. The power-off and synchronization attempts succeeded because your



protected site wasn't offline. If it were, these tasks wouldn't succeed, and the recovery process would continue.

vmw Live Site Recovery bca							
Site Pair 🕂 Replications 🔍 Prote	ection Groups Recovery Plans						
Q Search Recovery Plans	ULR-DCS-RP EDIT MOVE DELETE TEST CLEANUP RUN	REPROTECT CANCEL					
VI.R-DCs-RP	Summary Recovery Steps Issues History Permissions Protection G	roups Virtual Machines					
VLR-SQL-RP	EXPORT STEPS TEST CLEANUP RUN REPROTECT CANCEL						
	Plan status:	III► Recovery in progress					
	81%						
	Description: Recovery in progress           Virtual Machines         VM Templates         vApps         VM Folders						
	Recovery Step						
	I. Restore hosts from standby for live migration	Quick Filter V Enter value					
	2. Suspend non-critical VMs at recovery site for live migration	Name         ↓         State         Status         F	Provisioned Space Used Space				
	3. Prepare stretched storage consistency groups for VM migration at protecte	III III VLR-DC02 Powered Off      Vormal 2	253.58 GB 30.15 GB				
	: > 🛱 4. Live migration of VMs	🔽 🗌 🛙 VLR-DC01 Powered Off 🗸 Normal 2	253.6 GB 31.08 GB				
	5. Pre-synchronize storage	🗌 🗄 🗄 <u>Papilolo-03</u> Powered On 🗸 Normal 2	2.04 TB 348.97 GB				
	🗄 🗸 📕 6. Shut down VMs at protected site	□ I III III Papilolo-02 Powered On ✓ Normal 2	2.04 TB 348.28 GB				
	6.1. Shut down the priority 5 VMs	□ III III Powered On ✓ Normal 2	2.04 TB 379.45 GB				
	6.2. Shut down the priority 4 VMs						
	6.3. Shut down the priority 3 VMs						
	6.4. Shut down the priority 2 VMs						
	6.5. Shut down the priority 1 VMs	✓ Success Thursday, September 12, 2024 9:36:04 AM Thursday, Sep	ptember 12, 2024 9:36:40 AM				
	> 6.5.1. VLR-DC02	✓ Success Thursday, September 12, 2024 9:36:04 AM Thursday, Sep	ptember 12, 2024 9:36:20 AM				
	> 6.5.2. VLR-DC01	✓ Success Thursday, September 12, 2024 9:36:20 AM Thursday, Sep	ptember 12, 2024 9:36:40 AM				

The recovery was successfully completed.

VLR-DCs-R	P EDIT MOVE DELETE TEST CLEANUP RUN REPROTECT CANCEL
Summary Recove	ery Steps Issues History Permissions Protection Groups Virtual Machines
EXPORT STEPS	TEST CLEANUP RUN REPROTECT CANCEL
Plan status:	Recovery complete
Description:	The recovery has completed. Review the plan history to view any errors or warnings. virtual machines to the original site.

The Domain Controllers in your recovery plan are now running and providing services in the recovery site. Business continuity is restored with just a few mouse clicks.



C Live-Recovery ACTIONS Summary Monitor Configure Permissions VMs Updates									
Virtual Machines VM Tem	plates vApps	VM Folders							
Quick Filter v	alue								
Name	$\downarrow$	State	Status	Provisioned Space	Used Space	Host CPU	Host Mem		
🗌   # 🔀 <u>VLR-DC02</u>		Powered On	🗸 Normal	252.92 GB	29.41 GB	80 MHz	1.9 GB		
🗌   # 🔀 <u>VLR-DC01</u>		Powered On	🗸 Normal	252.93 GB	30.65 GB	26 MHz	1.78 GB		
🗌 🗄 🗊 <u>Papilolo-03</u>		Powered Off	V Normal	18.48 GB	244 MB	0 Hz	0 B		
🗌 🗄 📅 <u>Papilolo-02</u>		Powered Off	V Normal	18.49 GB	252 MB	0 Hz	0 B		
🗌 🛛 🗄 📅 <u>Papilolo-01</u>		Powered Off	🗸 Normal	18.48 GB	244 MB	0 Hz	0 B		

6. Go ahead and invoke the rest of your recovery plans.

The VMs are now powered on at the recovery site and powered off at the protected site.

					Live-Recovery						
Summary Monitor Configure Permissions	VMs Updates				Summary Monitor Configure Permissions VMs Updates						
Virtual Machines VM Templates vApps VM Folders				Virtual Machines VM Templates vApps	VM Folders		Reco	overy S	ite		
Quick Filter  V Enter value		Toteolea			Quick Filter value						
□ Name ↓ State	Status	Provisioned Space	Used Space Hos	t CPU Host Mem	□   Name ↓	State	Status	Provisioned Space	Used Space	Host CPU	Host Mem
III III VLR-DC02     Powered Off	<ul> <li>Normal</li> </ul>	253.58 GB	30.15 GB 0 H	iz O B	□   # ቆ <u>VLR-DC02</u>	Powered On	<ul> <li>Normal</li> </ul>	252.94 GB	29.46 GB	53 MHz	2.63 GB
III III III Powered Off     Powered Off	<ul> <li>Normal</li> </ul>	253.6 GB	31.08 GB 0 H	iz O B	□   # 🗇 <u>VLR-DC01</u>	Powered On	V Normal	252.93 GB	30.68 GB	26 MHz	2.58 GB
III B Papilolo-03     Powered Off	<ul> <li>Normal</li> </ul>	2.04 TB	349.12 GB 0 H	Iz OB	III      Papilolo-03	Powered On	<ul> <li>Normal</li> </ul>	1.36 TB	347.7 GB	1.72 GHz	2.11 GB
III III Papilolo-02     Powered Off	<ul> <li>Normal</li> </ul>	2.04 TB	348.27 GB 0 H	iz O B	III B Papilolo-02	Powered On	<ul> <li>Normal</li> </ul>	1.36 TB	347.48 GB	1.72 GHz	2.12 GB
Bapilolo-01     Powered Off	🗸 Normal	2.04 TB	379.42 GB 0 H	iz O B	🗌 🗄 🔂 Papilolo-01	Powered On	V Normal	1.36 TB	378.73 GB	0 Hz	2.15 GB

# Reprotect business-critical applications after a disaster event

What is Reprotect needed as shown in the Recovery Plans tab?

vmw Live Site Recovery bca ala	ab.local - wc	npe.vmware.com 🗸			
Site Pair Replications Protecti	on Groups 📃 Recov	very Plans 2			
Q Search	Recovery Plans	NEW RECOVERY F	PLAN NEW FOLDER		
Recovery Plans	NEW RECOVERY PLAN				
VLR-DCs-RP	Name	<b>↑ τ</b>	Status T	Protected Site T	Recovery Site
VLR-SQL-RP	🗌 🛛 🖉 VLR-DCs-RP 🤇	Reprotect needed	Recovery complete	TSA-VLR	ISV-VLR
	🗌 🛛 🔂 VLR-SQL-RP 🤇	Reprotect needed	Recovery complete	TSA-VLR	ISV-VLR
		<b>N</b>			

VMware Live Site Recovery makes it easy to quickly configure protection for the VMs after a disaster recovery operation. In the immediate aftermath of a real disaster event, the recovered VMs don't have any protection (because the original site is unavailable). After the disaster is over and you're ready to resume operations at that site, you simply reprotect the VMs.

7. Select the recovery plan containing the VMs you want to protect.



#### 8. Click on **Reprotect**.

vmw Live Site Recovery bca-vcf-vc01.vcf.ts	salab.local - wdc-m01-vc02 vsanpe vmiware.com V
Site Pair Replications Prote	ction Groups 📃 Recovery Plans 📀
Q Search	VLR-DCS-RP EDIT MOVE DELETE TEST CLEANUP RUN REPROTECT CANCEL
Recovery Plans	Summary Recovery Steps Issues History Permissions Protection Groups Virtual Machines
VLR-DCs-RP	
₽ VLR-SOL-RP	Recovery Plan: VLR-DCS-RP Protected Site: TSA-VLR Recovery Site: ISV-VLR Description:
	Your workloads are not protected. Run reprotect.
	✓ Plan Status
	Plan Status: ORecovery complete
	The recovery has completed. Review the plan history to view any errors or warnings. You can now press Reprotect to configure protection in the reverse direction. Note that if you plan to failback the virtual machines to the original site, you must first run the plan in reprotect mode, then once protection is configured in reverse, you can run the plan in recovery mode to failback the virtual machines to the original site.

You'll notice that the source  $\rightarrow$  target direction has now been automatically reversed. The original recovery site is now the protected site (and vice versa) because the VMs are now running at the original recovery site.

9. Select **I understand that this operation cannot be undone** to signal that you understand the effects and implications of the action you're about to perform.

Reprotect - VLR-DCs-RP	Confirmation options ×
Confirmation options     Ready to complete	Reprotect confirmation          Reprotect confirmation         Image: Confirmation
	cleanup steps, you may choose the force cleanup option to ignore all errors and return the plan to the Ready state. If you use this option, you may need to clean up your storage manually, and you should run a Test as soon as possible. Force cleanup CANCEL NEXT

10. Click **Next** and then **Finish** on the next screen.



Reprotect - VLR-DCs-RP	Ready to complete Review your selected settings.	×
1 Confirmation options	Name	VLR-DCs-RP
2 Ready to complete	New protected site	ISV-VLR
	New recovery site	TSA-VLR
	Server connection	Connected
	Number of VMs	2
	Force cleanup	Do not ignore cleanup warnings
		CANCEL BACK FINISH

When the VMs are reprotected, they're converted to placeholders at the new recovery site (formerly the protected site).

Live-Recover Summary Monit	Very ACTIONS	ermissions VM	s Updates				
Virtual Machines	VM Templates vApp	vM Folders	]				
Quick Filter 🗸 🗸	Enter value						
Name	↓ St	tate	Status	Provisioned Space	Used Space	Host CPU	Host Mem
🗌 🗌 🗄 💭 🗌	R-DC02 Po	owered Off	V Normal	14.48 GB	252 MB	0 Hz	0 B
🗌 🗌 🗄 📅 🔽	R-DC01 Pe	owered Off	V Normal	14.47 GB	244 MB	0 Hz	0 B
🗌 🗌 🗄 📅 Par	bilolo-03 Pe	owered Off	V Normal	18.24 GB	1.11 KB	0 Hz	0 B
🗌 🗌 🗄 📅 Par	bilolo-02 Pe	owered Off	✓ Normal	18.24 GB	1.11 KB	0 Hz	0 B
🗌 🛛 🛛 📰 🔁	<u>pilolo-01</u> Pe	owered Off	✓ Normal	18.49 GB	252 MB	0 Hz	0 B

### Modify the in-guest script after a disaster recovery operation

You previously configured a **Run Command on Recovered VM** task in the **Post Power On Steps** section for the Domain Controller and SQL Server recovery plans.

We called a script to reboot the Domain Controller recovery plan. No modification is necessary for this step when we reprotect these VMs. However, the SQL Server recovery plan deserves some attention because the script must make site/subnet-specific configuration changes to both the Windows cluster and SQL Server Always On. Therefore, you need to modify the original script with the correct information:

- Now that the VM is running in the recovery site, you can log in and edit the script itself.
- Or, you can edit the recovery [lan and specify a different script to be used in the post power-on steps as you did previously. You'll do this process below.



- 11. Connect and log into VMware Live Site Recovery on the new recovery site.
- 12. Select the recovery plan, click the **Virtual Machines** tab, and then select the VM with the recovery steps to modify.
- 13. Click Configure Recovery.

vmw Live Site Recovery wdc-m01-vc01.vcf02.vsanpe.vmware.com - bca-vcf-vc01.vcfts	tsalabiocal 🗸	
III Site Pair Ceplications Protection Groups E Recovery Plans	ns	
Q. Search	ULR-SQL-RP EDIT MOVE DELETE TEST CLEANUP RUN REPROTECT CANCEL	
Recovery Plans	Summary Recovery Steps Issues History Permissions Protection Groups Virtual Machines	
VLR-DCs-RP		
VLR-SQL-RP		inal Dowor State
	» Dipapilolo-01 (Ouknown Unknown VLR-SQL-PG I (Highest) Ol	n
	🗌 💭 🖓 Papilolo-02 🕐 Unknown Unknown VLR-SQL-PG 2 (High) Papilolo-01 Or	Dn
	🗌 》 🗄 Papilolo-03 🕜 Unknown Unknown VLR-SQL-PG 2 (High) Papilolo-01 Or	Dn

14. Select the step to modify (here, it's Post Power On Steps), and then click Edit.

Dra Dawar On Stand	Nore	On Stone		
Pie Power On Steps	Note	On steps		
/ Dest Dewer On Stens		r On Steps		
Post Power on Steps				
These stops run after the VM is power	rad an	rup after the VM is powered on		
These steps run after the VM is powe	red on.	s run after the VM is powered on.		
These steps run after the VM is power + NEW   $\partial$ EDIT × DELE	red on. TE ↑ MOVE UP ↓ MOVE DOWN	run after the VM is powered on.		
Hose steps run after the VM is power     Hose steps run after the VM is power     Hose steps run after the VM is power	red on. TE ↑ MOVE UP ↓ MOVE DOWN Type Timeout	run after the VM is powered on.	Timeout	
	red on. TE ↑ MOVE UP ↓ MOVE DOWN Type Timeout Run on Recovered VM 5 min 0 sec	erun after the VM is powered on.	Timeout 5 min 0 sec	
These steps run after the VM is power  New  New  Reconfigure AG VIP	red on. TE ↑ MOVE UP ↓ MOVE DOWN Type Timeout Run on Recovered VM 5 min 0 sec	e run after the VM is powered on.	Timeout 5 min 0 sec	

- 15. Type in the command to run. In our case, we're calling another scrip: Change-Cluster-AG-VIP-Reverse.ps1. This is also located in the VM.
- 16. Click Save.



Type:	Command on VLSR Server	
	<ul> <li>Prompt (requires a user to acknowledge the prompt before the plan continues)</li> </ul>	
	Command on Recovered VM	
Name:	Reconfigure AG VIP	
	62 characters remaining	
Content:		
	Powershell.exe C:\Install-Files\Change-Cluster-AG-VIP-Reversedps1	
	Powershell exe C:\Install-Files\Change-Cluster-AG-VIP-Reversed ps1	,
Timeout:	Powershell exe C:\Install-Files\Change-Cluster-AG-VIP-Reversed.ps1 4030 characters remaining 5 minutes 0 seconds	

#### 17. Click **OK** to commit the changes.

	1 (Highest)		
Priority Group	All virtual machines within a priority group will be started before machines within a priority group may be specified by adding VM	proceeding to the next priority group. The startup order dependencies. The virtual machines within a priority grou	of virtual up will star
Pre Power On Steps	None		
Post Power On Steps			
These steps run after the VM is pow	vered on.		
These steps run after the VM is pov + NEW / Ø EDIT × DEL Name	vered on. ETE ↑ MOVE UP ↓ MOVE DOWN Type	Timeout	
These steps run after the VM is pow + NEW    P EDIT × DEL	ered on. ETE ↑ MOVE UP ↓ MOVE DOWN	Timeout	

Here's the script we used for this exercise. It also appears in the appendix.



```
Change-Cluster-AG-VIP-Reversed.ps1 X
        # Change-Cluster-AG-VIP.ps1 (For reconfiguring recovered M5 SQL Server cluster properties)
  1
        Import-Module FailoverClusters
   2
   3
      # Let's Force-Start our Cluster first
   4
  5
      # Immediately post-recovery, the whole Cluster is down
   6
      Start-ClusterNode -FQ
   8
   9
      # Let's define our new IP address and subnet mask for the Cluster IP Address
 10
       $newClusIP = "10.156.138.87" # Replace with your new IP address
$newClusMask = "255.255.240.0" # Replace with your subnet mas
 11
                                                       # Replace with your subnet mask
 12
 13
       # Get the IP Address of the Cluster resource
 14
       $setNewClusIP = Get-ClusterResource -Name "SRM-AG01_Clus_IP"
 15
 16
       # Set the new IP address and subnet mask for the Cluster resource
 17
      $setNewClusIP | Set-ClusterParameter -Name Address -Value $newClusIP
$setNewClusIP | Set-ClusterParameter -Name SubnetMask -Value $newClusMask
 18
 19
 20
       ######### Next, we modify the AG VIP
 21
      # Let's define our new IP address and subnet mask for the AG VIP Address
$newAGIP = "10.156.138.88" # Replace with your new IP address
$newAGMask = "255.255.240.0" # Replace with your subnet mask
 22
 23
 24
 25
       # Get the IP Address of the AG resource
 26
       $setNewAGIP = Get-ClusterResource -Name "SRM-AG01-IP"
 27
 28
       # Set the new IP address and subnet mask for the AG resource
 29
       $setNewAGIP | Set-ClusterParameter -Name Address -Value $newAGIP
$setNewAGIP | Set-ClusterParameter -Name SubnetMask -Value $newAGMask
 30
 31
 32
 33
       # Bring the resources offline
      Stop-ClusterResource "SRM-AGO1_Clus_IP"
Stop-ClusterResource "SRM-AGO1_SRM-AG-List"
Stop-ClusterResource "Cluster Name"
 34
 35
 36
      Stop-ClusterResource "SRM-AG01"
Stop-ClusterResource "SRM-AG01-IP"
 37
 38
 39
      # We now start up everything
Start-ClusterResource "SRM-AG01"
 40
 41
       Start-ClusterResource "SRM-AGO1-IP"
Start-ClusterResource "SRM-AGO1_SRM-AG-List"
Start-ClusterResource "SRM-AGO1_Clus_IP"
 42
 43
 44
        Start-ClusterResource "Cluster Name"
 45
```

## Conclusion

We've reached the end of our demonstration on how to prepare and configure a set of virtualized businesscritical application VMs in a vSphere-based infrastructure to be protected against a disaster event and recovered with VMware Live Site Recovery to restore business continuity.

We showcased a multi-tiered application stack that required special considerations. We covered using in-guest scripting to complement VMware Live Site Recovery's automated workflow and capabilities.

We demonstrated how to use VMware Live Site Recovery to conduct:

- Test recovery operations for compliance purposes and verify our recovery plans' reliability on demand.
- A real disaster recovery operation and reconfigure the recovered workloads to be protected again after we achieved stability.



We also provided the in-guest scripts used in these exercises in the appendix.

We hope you've found this comprehensive documentation useful for your own purposes. Thank you.

### Appendix A: Sample scripts

We (Broadcom) provide the following sample scripts for illustration purposes only. We don't assure, warranty, or guarantee their suitability for your purposes and usage. We don't provide support for these scripts. We disclaim any responsibility for any adverse effect that might result from your use of these sample scripts.

### Run-Post-Script.ps1

This reboots the first Domain Controller that VMware Live Site Recovery recovers.

```
Write-Output "Rebooting VM to complete recovery..." (Get-Date) > c:\install-files\recovery.txt shutdown -r -t 60
```

### Change-Cluster-AG-VIP.ps1

This reconfigures the recovered SQL Server cluster properties.

```
Import-Module FailoverClusters
```

```
# Let's Force-Start our Cluster first
```

# Immediately post-recovery, the whole Cluster is down

Start-ClusterNode -FQ

# Let's define our new IP address and subnet mask for the Cluster IP Address \$newClusIP = "10.156.139.87" # Replace with your new IP address \$newClusMask = "255.255.240.0" # Replace with your subnet mask

# Get the IP Address of the Cluster resource \$setNewClusIP = Get-ClusterResource -Name "SRM-AG01 Clus IP"

# Set the new IP address and subnet mask for the Cluster resource \$setNewClusIP | Set-ClusterParameter -Name Address -Value \$newClusIP \$setNewClusIP | Set-ClusterParameter -Name SubnetMask -Value \$newClusMask

```
######### Next, we modify the AG VIP
# Let's define our new IP address and subnet mask for the AG VIP Address
$newAGIP = "10.156.139.88" # Replace with your new IP address
$newAGMask = "255.255.240.0" # Replace with your subnet mask
```

# Get the IP Address of the AG resource \$setNewAGIP = Get-ClusterResource -Name "SRM-AG01-IP"

```
# Set the new IP address and subnet mask for the AG resource
$setNewAGIP | Set-ClusterParameter -Name Address -Value $newAGIP
$setNewAGIP | Set-ClusterParameter -Name SubnetMask -Value $newAGMask
```



```
# Bring the resources offline
Stop-ClusterResource "SRM-AG01_Clus_IP"
Stop-ClusterResource "SRM-AG01_SRM-AG-List"
Stop-ClusterResource "Cluster Name"
Stop-ClusterResource "SRM-AG01"
Stop-ClusterResource "SRM-AG01-IP"
# We now start up everything
Start-ClusterResource "SRM-AG01"
Start-ClusterResource "SRM-AG01I"
Start-ClusterResource "SRM-AG01_IP"
Start-ClusterResource "SRM-AG01_SRM-AG-List"
Start-ClusterResource "SRM-AG01_Clus_IP"
Start-ClusterResource "Cluster Name"
```

### Change-Cluster-AG-VIP-Reversed.ps1

You'd use this when the recovered SQL Server VM is reprotected.

```
Import-Module FailoverClusters
# Let's Force-Start our Cluster first
# Immediately post-recovery, the whole Cluster is down
Start-ClusterNode -FQ
# Let's define our new IP address and subnet mask for the Cluster IP Address
$newClusIP = "10.156.138.87" # Replace with your new IP address
$newClusMask = "255.255.240.0"
                                 # Replace with your subnet mask
# Get the IP Address of the Cluster resource
$setNewClusIP = Get-ClusterResource -Name "SRM-AG01 Clus IP"
# Set the new IP address and subnet mask for the Cluster resource
$setNewClusIP | Set-ClusterParameter -Name Address -Value $newClusIP
$setNewClusIP | Set-ClusterParameter -Name SubnetMask -Value $newClusMask
######### Next, we modify the AG VIP
# Let's define our new IP address and subnet mask for the AG VIP Address
$newAGIP = "10.156.138.88" # Replace with your new IP address
$newAGMask = "255.255.240.0"
                              # Replace with your subnet mask
# Get the IP Address of the AG resource
$setNewAGIP = Get-ClusterResource -Name "SRM-AG01-IP"
# Set the new IP address and subnet mask for the AG resource
$setNewAGIP | Set-ClusterParameter -Name Address -Value $newAGIP
$setNewAGIP | Set-ClusterParameter -Name SubnetMask -Value $newAGMask
# Bring the resources offline
Stop-ClusterResource "SRM-AG01 Clus IP"
Stop-ClusterResource "SRM-AG01 SRM-AG-List"
Stop-ClusterResource "Cluster Name"
```



```
Stop-ClusterResource "SRM-AG01"
Stop-ClusterResource "SRM-AG01-IP"
# We now start up everything
Start-ClusterResource "SRM-AG01"
Start-ClusterResource "SRM-AG01_SRM-AG-List"
Start-ClusterResource "SRM-AG01_Clus_IP"
Start-ClusterResource "Cluster Name"
```

### References

- Installation, setup, configuration and/or administration of VMware vSphere infrastructure
- Installation, setup, configuration and/or administration of specific VMware vSphere-based cloud infrastructure
- Installation, setup, configuration and/or administration of VMware Live Site Recovery
- <u>Virtualizing Active Directory Domain Services on VMware vSphere</u>
- <u>Architecting Microsoft SQL Server on VMware vSphere</u>
- Installation, setup, configuration and/or administration of Microsoft Active Directory Domain Services or
   Domain Controllers
- Installation, setup, configuration and/or administration of Microsoft SQL Server, Windows Failover Cluster or Always On
- VMware vSphere Client



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