



TECHNICAL PAPER

# Veeam Backup & Replication with Nimble Storage



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## Introduction

#### Audience

Veeam Backup & Replication administrators and Nimble Storage administrators are encouraged to read this document. The recommendations and usage scenarios presented set out to create an understanding of how to take advantage of Nimble Storage capabilities when deployed as part of a Veeam Backup & Replication solution.

#### Assumptions

- General knowledge of and familiarity with the Nimble Storage user interface and basic setup tasks
- Experience with and knowledge of Veeam Backup & Replication

## Limitations and Other Considerations

Descriptions and examples provided in this document are constrained to Nimble Storage software versions 2.1.2 and higher with iSCSI network connectivity. Veeam Backup & Replication descriptions and examples are based on version 8.

## Overview

The deployment of Nimble Storage in conjunction with Veeam Backup & Replication falls into two general categories; 1) Taking advantage of Veeam Backup & Replication to protect data stored on a Nimble Storage array, and 2) Taking advantage of Nimble Storage when used within Veeam Backup & Replication as backup infrastructure components.

Nimble Storage is widely deployed as storage for VMware in the form of datastores. Leveraging Veeam Backup & Replication as the vehicle to orchestrate protection and recovery of these datastores includes the ability to use different virtual disk transport methods. Configuring LAN, SAN, and HotAdd transport modes with Nimble Storage is detailed to assist in meeting data protection requirements.

Veeam Backup & Replication is widely deployed and includes backup infrastructure components that enable both basic and advanced functionality. Nimble Storage can be used as a backup repository, the location used to store backup files. Nimble Storage can also be used as vPower NFS root folder storage, playing a high performance role in Veeam SureBackup, and Instant VM Recovery. Additionally, Nimble Storage is the logical choice for use as a Veeam virtual lab datastore, where redo logs are temporarily stored while virtual machines run from read-only backup files.

Subsequent sections of this paper take a deeper look into these use case categories.

# Protecting VMware Datastores on Nimble Storage

By definition a VMware datastore is a storage location for virtual machine files. When the datastore resides on a Nimble Storage array, it consists of a Nimble volume presented to one or more ESXi hosts and has been formatted as a VMFS (Virtual Machine File System) volume. Veeam Backup & Replication can be configured to protect the datastore via three supported virtual disk transport methods: LAN, SAN, and HotAdd.

	Edit VMware Proxy	×
Choose serv which are no	er for new backup proxy. You can only select between Microsoft Windows servers added to t proxies already.	the managed servers
Server	Choose server:	
Traffic Pulse	This server	✓ Add New
Hallic hules	Proxy description:	
Summary	Created by Veeam Backup & Replication	
	Transport mode: Automatic selection	Choose
	Connected datastores: Automatic detection (recommended)	Choose
	Max concurrent tasks:	
	< <u>P</u> revious <u>N</u> ext > <u>F</u> inish	Cancel

Figure 1: Automatic Transport Selection

By default Veeam Backup & Replication will use automatic backup proxy transport selection, where the backup proxy and connected VMFS datastore are analyzed to determine the most efficient transport mode that can be used. The default mode can be altered by editing the properties of the backup proxy.

•	Automatic selection
	Data retrieval mode is selected automatically by analyzing backup proxy configuration and connected VMFS datastores. Transport modes allowing for direct storage will be used whenever possible.
C	Direct SAN access
	Data is retrieved directly from shared storage without impacting production hosts. Backup proxy server must be connected into SAN fabric via hardware or software HBA, and have VMFS volumes mounted.
С	Virtual Appliance
	Data is retrieved directly from storage through hypervisor I/O stack by hot adding backed up virtual disks to a backup proxy VM. Datastores containing protected VMs must be available to a host running backup proxy VM.
С	Network
	Data is retrieved from storage through hypervisor network stack using NBD protocol over host management interface. This mode has no special setup requirements. Recommended for 10 Gb or faster Ethemet only.
Op	tions
12	<ul> <li>Failover to network mode if primary mode fails, or is unavailable</li> </ul>

Figure 2: Transport Mode Selection

The transport mode can be modified to use a specific transport:

- Direct SAN access mode to use the SAN transport
- Virtual Appliance mode to use the HotAdd transport
- Network to use the LAN (NBD) transport

There are also two optional parameters that can be altered. The first is "Failover to network mode if primary mode fails or is unavailable". This option is enabled by default. The second optional parameter enables NBDSSL when the LAN transport is used.

## LAN (NBD) Transport

Within Veeam Backup & Replication, this transport mode is referred to as "Network" transport mode. LAN transport for data access uses NBD (Network Block Device) or NBDSSL (Encrypted Network Block Device) to move data over a TCP/IP connection. By default this transport mode is used when no other transport mode is available or when it is explicitly selected. It is generally considered to be the least efficient transport mode.



Figure 3: LAN Transport

The data retrieval flow for a LAN transport backup can be summarized in four different steps:

- In step 1 the backup proxy sends a request to the ESXi host to locate the necessary VM on the datastore
- In step 2 the ESXi host locates the VM on storage
- In step 3 VM data blocks are copied from storage and sent to the backup proxy over the LAN
- In step 4 the backup proxy sends the data to the backup repository

On the Nimble array, no changes or alterations are required to support the LAN transport mode. The ESXi host or hosts accessing the datastore volume already have access permission.

#### SAN Transport

Within Veeam Backup & Replication, this transport mode is referred to as "Direct SAN access" transport mode. SAN transport mode reads data directly from the SAN or iSCSI LUN where a virtual disk resides. It is generally considered to be the most efficient transport mode as no data is transferred through the production ESXi host.



Figure 4: SAN Transport

The data retrieval flow for a SAN transport backup can be summarized in six different steps:

- In step 1 the backup proxy sends a request to the ESXi host to locate the necessary VM on the datastore
- In step 2 the ESXi host locates the VM on storage
- In step 3 the ESXi host retrieves metadata about the layout of VM disks on the storage
- In step 4 the ESXi host sends metadata to the backup proxy
- In step 5 the backup proxy uses metadata to copy VM data blocks directly from storage via the SAN
- In step 6 the backup proxy processes copied data blocks and sends them to the backup repository

Enabling SAN transport mode backups requires a minor configuration change on the Nimble Storage array. Datastore volume access permission changes are necessary. This change grants volume level access to one or more Veeam Backup & Replication proxy servers.

Seneral Properties Volume Size	Protection Access				
Allow multiple initiator access	Enable ONLY on volun multiple initiators (suo Non-coordinated acce	nes that are <b>optimized f</b> h as VMware VMFS or Mi ss by multiple initiators n	f <b>or simu</b> crosoft ( nay lead	I <b>ltaneous</b> access by Cluster Server). to data corruption.	
Apply to	iSCSI Initiator Group	CHAP Username		Add	
Volume Only	dpl-veeamproxy	Unrestricted Access	×		
Volume Only	dpl-veeamproxy2	Unrestricted Access	×		
Volume & Spanshots	VDI1000-1	Unrestricted Access	×		

Figure 5: Nimble Volume Access

The Nimble array volume used as a VMware datastore should be edited to add access permission for one or more Veeam Backup & Replication proxy servers. This change makes it possible for the backup

proxy server(s) to copy VM data blocks directly from storage over a SAN connection, bypassing the production ESXi server during the retrieval process. Note that the "Allow multiple initiator access" property also needs to be enabled. See "Appendix 1" in this document for additional information about initiator groups.

On each Veeam Backup & Replication proxy server that may be used to perform SAN transport mode retrieval, the VMware datastore volume needs to be connected.

<mark>\$</mark>			Nimble	e Conne	ction M	lanager (2.1.3.233	3)		-		×
System Settings Nin	mble Volume	IS									
Discovered Nimble	Volumes										
Volume Name		Mapping Info		Size	Propert	ties Array Count	Connections	Array Version			
🕞 dpl-veeam8	-repository	Disk1, B:\		2048GB	*	1	2	2.x			1
R dpl-veeam8	-vpowernfs	Disk2, V:\		100GB	*	1	2	2.x			
R dpl-vmware	-guests-3	Disk3		512GB	*	1	2	2.x			
Recent Tasks											
Action		Status	Start Time	Elapse	ed Time	Details					^
Get ISCSI Targets Get Discovery Targe Get Configuration D	et Portals ata	Succeeded Succeeded Succeeded	1:41 PM 1:41 PM 1:41 PM	0.19 0.12 0.20	secs secs secs	Total targets disc Discovery Target MinConnections	overed=3 Portals Found PerTarget=2, M	=1 laxConnectionsPe	erTarget=8	, Wait Ir	nte
<		ш									>
Help										<u>C</u> lose	

Figure 6: Nimble Connection Manager - Nimble Volumes

Use the Nimble Connection Manager to discover and connect the VMware datastore volume. During the connect process accept the default "Connect on startup" property. See "Appendix 2" in this document for additional information about the Nimble Connection Manager.

Note that a Windows drive letter should not be assigned to the volume.

#### HotAdd Transport

Within Veeam Backup & Replication, this transport mode is referred to as "Virtual Appliance" transport mode. This transport mode reads data directly from storage through the hypervisor I/O stack by hot adding a virtual disk to the backup proxy VM guest.



Figure 7: HotAdd Transport

The data retrieval flow for a HotAdd transport backup can be summarized in six different steps:

- In step 1 the backup proxy sends a request to the ESXi host to locate the necessary VM on the datastore
- In step 2 the ESXi host locates the VM
- In step 3 Veeam Backup & Replication triggers VMware vSphere to create a VM snapshot
- In step 4 VMware vSphere creates a linked clone VM from the VM snapshot
- In step 5 disks of the linked clone VM are hot-added to the backup proxy VM
- In step 6 Veeam Backup & Replication reads data directly from disks attached to the backup proxy VM through the ESXi I/O stack

On the Nimble array, no changes or alterations are required to support the HotAdd transport mode. The ESXi host or hosts accessing the datastore volume already have access permission.

# **Backup Repositories on Nimble Storage**

This section examines the use of a Nimble Storage volume deployed as a Veeam backup repository. A backup repository is a storage location used by Veeam Backup & Replication jobs to store backup files.

## Create a Nimble Storage Volume for use as a Backup Repository

Create a new volume on the Nimble Storage array. From the user interface select "Manage > Volumes" and then click the "New Volume" button.

nimblestorage	Home Manage  Monitor	Events Administration - Help -
Volumes		
New Volume Move	View Volumes + Replicas V	

Figure 8: New Volume

Name the volume and then select a performance policy. The Nimble volume should be configured to use the optimal performance policy based on the host platform that will mount the volume, in this example that's the server backing the repository.

reate a volume	
Create a volume General Properties >	Volume Size > Protection
Volume Name	dpl-veeam8-repository
Description	Optional
Performance Policy	Windows File Server V New Performance Policy

Figure 9: General Properties

This example uses a Veeam proxy server running on Microsoft Windows Server 2012 R2 that will function as the server backing the repository. The Nimble volume performance policy has been set to "Windows File Server", the recommended setting for this use case. Note that a customized performance policy can be created and used instead of a preconfigured performance policy.

Name	Example Performance Policy
PERFORMAN	CE PARAMETERS
Storage	Block Size 4KB (4096) v in bytes
Com	pression ling
SPACE MANA	GEMENT PARAMETERS
Quota Ex	cceeded Behavior 🔿 Set Offline 🙃 Set to Non-Writable 🚦

Figure 10: Custom Performance Policy

Creating a new performance policy provides the ability to explicitly set values for both compression and caching.

Native Nimble Storage compression does not impact array performance and should be enabled in most use cases. Veeam compression may affect the duration of backups. The use of Nimble Storage compression may negate any need to enable Veeam compression. This may assist in eliminating any backup proxy CPU utilization associated with Veeam compression.

On Nimble Storage sequential writes are not cached, and backups typically generate a sequential write workload. Disabling caching within the performance policy is not expected to provide any benefit. Additionally, a customized performance policy also allows setting the volume "Quota Exceeded Behavior". Selecting "Set to Non-Writable" is preferred over the "Set Offline" behavior as it will allow restores to be executed in the event that the volume space quota has been exceeded.

On the access control section add the initiator group that contains the iSCSI initiator IQN of the server backing the repository. See "Appendix 1" in this document for additional information about initiator groups.

C Allow unrestricted access					
Limit access					
Limit access to iSCSI initiator g	roup	dpl-veeam8	×	New Initiator Group	
CHAP user	name	None	~	New CHAP Account	
	Non-co	ordinated access b	y multiple init	tiators may lead to data corr	ruption

Figure 11: Access Control

The iSCSI initiator group correlating to the Veeam Backup & Replication proxy server backing the repository has been added to the volume. Click the "Next" button to continue.

Backup repository volume size is configured in the "Volume Size" section. Select a volume size that meets or exceeds anticipated usage requirements.

Size 2.0 TB	*		This is the size reported to the application, rounded up to the next MB.
SPACE			
	% of Size	Bytes	
Volume Reserve	0.0	0.0 TB	To take advantage of the compression, set
Volume Quota	100.0	2.0TB	the amount or reserved space to less than the volume size. Actual compression depends on the application but twoisely
Volume Warning	80.0	1.6 TB	reaches compression of 50%.
Snapshot Reserve	0.0	0.0 TB	
Snapshot Quota		Unlimited	VIIImited snapshot quota
Snapshot Warning	0.0	0.0 TB	
STORAGE			
Capacity	22.89 TB		
Used Space	12.92 TB		
Free Snace	9.95 TB		

Figure 12: Volume Size

In this example a volume size of 2 TB has been specified. The "Volume Reserve" property has been left at its default value of 0%. Thin provisioning the Nimble Storage volume minimizes the chance of wasted

space in cases where compression or Veeam Backup & Replication deduplication results in the use of less space than was originally allocated.

In the protection section select "None".

'olumes assigned to a volun chedule. Standalone volum	ne collection are prote es can be protected us	cted according to ing a protection to	the volume collecti mplate or by creat	on's protection ting a custom
rotection schedule.			,,,	,
None	Not Protected			
C Join volume collection	dpl-veeam8	~		
C Create new volume collection				
C Protect as standalone volume				

Figure 13: Volume Protection

A volume protection property equal to "None" indicates that the Nimble Protection Manager, a feature that provides native data protection for Nimble Storage array volumes, will not be used on this volume. Click the "Finish" button to complete the volume creation process.

On the server backing the repository launch the Nimble Connection Manager to discover and connect the volume that will be used for the repository. See "Appendix 2" in this document for additional information about the Nimble Connection Manager.

\$			Nimble	Connection N	lanager (2.1.3.233	)		_		x
	System Settings Nimble Volume	s								
Γ	Discovered Nimble Volumes									_
	Volume Name	Mapping Info		Size Proper	ties Array Count	Connections	Array Version			
	民 dpl-veeam8-repository	Disk1, B:\		2048GB 👷	1	2	2.x			
	dpl-veeam8-vpowernfs	Disk2, V:\		100GB 🌟	1	2	2.x			
	R dpl-vmware-guests-3	Disk3		512GB 👷	1	2	2.x			
	Refresh	Connected	l Volumes 3,	Total Connectior	ns 6	Connee	ct Disconnect	Prope	rties	
F	Recent Tasks									
ł	Action	Status	Start Time	Elapsed Time	Details					^
	Connect Target=dpl-vmware-gue	Succeeded	11:50 AM	1.19 secs	Connection succe	eded, ArrayCo	unt=1, InitiatorPorts	s=2, Optir	malPat	th _
	Get ISCSI Targets	Succeeded	11:42 AM	2.11 secs	Total targets disco	overed=3				=
	Disconnect Target=dpl-vmware-g	Succeeded	11:42 AM	0.05 secs	Requested=2, Dis	connected=2				
	Remove from 'Favorites'	Succeeded	11:42 AM	0.22 secs	Succeeded, Rem	oved=2, Target	=dpl-vmware-guest	s-3		
	Get ISCSI Targets	Succeeded	11:41 AM	0.19 secs	Total targets disco	overed=3				$\mathbf{\nabla}$
Ľ									2	2
[	Help								<u>C</u> lose	

Figure 14: Nimble Volumes

In this example the volume named "dpl-veeam8-repository" has been connected. The connected volume has also been assigned a drive letter, "B:\", using Windows Server Manager.

Filter		() م	) • (II)	•						
Number Virtual Disk	Status	Capacity	Unallocated	Partition	Read Only	Clustered	Subsystem	Bus Type	Name	
<ul> <li>dpl-veeam8 (4)</li> </ul>										
3	Offline	512 GB	0.00 B	GPT				iSCSI	Nimble Server	Multi-Path Disk Device
0	Online	128 GB	0.00 B	MBR				SAS	VMware Virtual	disk SCSI Disk Device
	Online	2.00 TB	1.00 MB	MBR				iscsi	Nimble Server	Multi-Path Disk Device
2	Online	100 GB	1.00 MB	MBR				iSCSI	Nimble Server	Multi-Path Disk Device
2 Last refreshed on 11/25	Online 5/2014 12:09	100 GB :47 PM	1.00 MB	MBR				iscsi	Nimble Server	Multi-Path Disk Device
2 Last refreshed on 11/25 OLUMES elated Volumes   1 total	Online 5/2014 12:09	100 GB :47 PM	1.00 MB	MBR				iscsi	Nimble Server	Multi-Path Disk Device STORAGE POOL Nimble Server Multi-
2 Last refreshed on 11/25 OLUMES elated Volumes   1 total Filter	Online 5/2014 12:09	100 GB :47 PM	1.00 MB ■ ▼ (R)	MBR				iscsi	Nimble Server	Multi-Path Disk Device STORAGE POOL Nimble Server Multi-
2 Last refreshed on 11/25 OLUMES elated Volumes   1 total <i>Filter</i> A Volume 4 dpl-veeam8 (1)	Online 5/2014 12:09	100 GB :47 PM	1.00 MB E)	MBR	olication Rate	Deduplication	Savings Percer	iSCSI	Nimble Server	Multi-Path Disk Device STORAGE POOL Nimble Server Multi-

Figure 15: Server Manager – Disks

Note that an additional 100 GB Nimble volume has already been connected for use a vPower NFS root folder. The use of this volume will be detailed later, at the point where it is configured within the backup repository.

## Add a Veeam Backup Repository

Repository 7	Fools	Veeam Back	up & Replication		_ 0 X
Home Backup Report	sitory				۲
Add Repository Manage Repository	Rescan Upgrade Repository Tools				
Add Repository	O Type in an object name	to search for			×
Adds a new backup repository.	Name	Туре	Host	Path	Capacity
WAN Accelerators Service providers A Service providers A Service providers A polication Groups Virtual Labs Virtual Labs Virtual Labs Virtual Machines Storage Infrastructure Tape Infrastructure Tape Infrastructure Files					
D≱ *	<	Ш			>
1 repository				NFR: 347 days re	maining VEEAM



Within the Veeam Backup & Replication user interface select "Backup Infrastructure" and then click on the "Add Repository" icon.

	New Backup Repository
Name Type in a na	ne and description for this backup repository.
Name	Name:
Type	Backup Repository on Nimble
1900	Description:
Server	Created by DPL-VEEAM8\Administrator at 11/25/2014 12:39 PM.
Repository	
vPower NFS	
Heview	
Apply	
	< Previous Next > Prish Cancel

Figure 17: New Backup Repository - Name

Name the new backup repository and then click the "Next" button. In this example the repository has been named "Backup Repository on Nimble".



Figure 18: Backup Repository - Type

Select the backup repository type and then click the "Next" button. In this example "Microsoft Windows server" has been selected.

	New Windows Server	x
Name Specify DNS na	me or IP address of Microsoft Windows server.	
Name Credentials Review Apply Summary	DNS ngme or IP address: dpl-veeam8.sedemo.lab Description: Created by DPL-VEEAM8\Administrator at 11/25/2014 12:52:52 PM.	
	< <u>Previous</u> <u>Next</u> > <u>Prinish</u> Cance	

Figure 19: New Windows Server

Specify the DNS name or IP address of the server and then click the "Next" button. In this example a server named, "dpl-veeam8.sedemo.lab" has been specified.

	New Windows Server		X
Apply Please wait wh	ille required operations are being performed. This may take a few minutes		
Name	Log:		
	Message	Duration	
Credentials	Collecting hardware info		
Review	C Detecting operating system		
I ICVICII	S Detecting OS version		
Apply	Registering client DPL-VEEAM8 for package Transport		
	Solution Contract Con		_
Summary	All required packages have been successfully installed		
	Creating database records for server		
	Optecting server configuration		
	Creating configuration database records for installed packages		
	Collecting disks and volumes info	0:00:02	_
	Microsoft Windows server saved successfully		_
			_
			_
			-
			_
	< Previous Next > Finish	Cancel	1
	CLONED TEN T	- Councer	-4

Figure 20: New Windows Server - Apply

Click the "Next" button to continue.

	New Windows Server	x
You can copy the c	onfiguration information below for future reference.	
Name Credentials Review Apply Summary	Summary: Microsoft Windows Server 'dpl-veeam8.sedemo.lab' was successfully created. OS version: Microsoft Windows Server 2012 R2 Standard 64-bit (6.3.9600 build:9600). User: administrator Hardware info: Chassis type: Virtual (VMware) Cores count: 4 Components: Transport using port 6162 vPower NFS using port 6161 Installer using port 6160	
	< <u>P</u> revious <u>N</u> ext > <u>Finish</u> Cance	

Figure 21: New Windows Server - Summary

Click the "Finish" button to continue.

	New Backup Re	pository	د	ĸ
Choose server backin	g your repository. You can select server f	rom the list of managed servers a	added to the console.	
Name	Repository server: dpl-veeam8.sedemo.lab (Created by D	PL-VEEAM8\Administrator at 11/	/25/2014 ♥ <u>A</u> dd New	]
Server	Path • B:\	Capacity 2.0 TB	Free Populate	]
Repository vPower NFS		100.0 GB	99.9 GB	
Review				
		Previous Next >	Finish	
			Cancel	

Figure 22: New Backup Repository - Server

At this point in the process the server backing the repository has been configured. Clicking the "Populate" button will display available file system paths on the server. Click the "Next" button to continue.

	New Backup Repository	x
Repository Type in path to	the folder where backup files should be stored, and set repository load control options.	
Name	Location Path to folder:	
Туре	B:\Backups Brows	e
Server	Capacity: 2.0 TB Pgpul	ate
Repository	Free space: 1.9 IB	
vPower NFS	Load control	
Review	Running too many concurrent jobs against the same repository reduces overall performance, a may cause storage I/O operations to timeout. Control repository saturation with the following	and
Apply	✓ Limit maximum concurrent tasks to: 4 🔨	
	Limit combined data rate to:	
	Click Advanced to customize repository settings	xed
	< Previous Next > Einish Cance	el

Figure 23: New Backup Repository Path

Make sure the correct "Path to folder" has been specified. In this example the "B:\Backups" path has been set. Clicking the "Populate" button will display the capacity and free space available on the specified path. Click the "Advanced" button to display the "Storage Compatibility Settings" dialog window.

Align backup file data blocks
Allows to achieve better deduplication ratio on basic deduplicating storage which leverages constant block size deduplication algorithm. Increases the backup size when backing up to raw disk storage.
Decompress backup data blocks before storing
VM data is compressed by backup proxy according to the backup job compression settings to minimize LAN traffic. Uncompressing the data before storing allows for achieving better deduplication ratios on most deduplicating storage appliances at the cost of backup performance.
This repository is backed by rotated hard drives
Backup jobs pointing to this repository will tolerate the disappearance of previous backup files by creating new full backup, clean up backup files no longer under retention on the newly inserted hard drives, and track backup repository location across unintended drive letter changes.
01/ 0.1

Figure 24: Storage Compatibility Settings

Consider enabling the "Decompress backup data blocks before storing" if the Nimble Storage volume used for the repository is using a performance policy that includes compression. Click the "OK" button and then click the "Next" button on the "New Backup Repository Path" dialog window to continue.

## Getting Backups offsite with Veeam and Nimble Storage

Using Nimble Storage as a backup repository for Veeam Backup provides the best possible performance of Veeam backup, restore, and backup verification jobs. However, a comprehensive data protection strategy includes the creation of additional copies of backups that can be retained offsite. Nimble Storage in conjunction with Veeam Backup provides several options to retain backups in additional locations or on other media types. Examples of these include:

- Nimble Volume Collection Replication Protect Veeam Backup repositories by replicating them to a
  downstream Nimble Storage array. Nimble volume collection replication provides efficient replication
  by only transferring changed blocks.
- Veeam Backup copy jobs with WAN Acceleration Protect Veeam Backups by copying them to another Nimble Storage array through WAN accelerators to minimize replication network bandwidth utilization.
- Veeam tape copy jobs Copy Veeam backups to tape for offsite archiving.
- Veeam Cloud Connect Use a Veeam Cloud Connect partner to copy backups to offsite hosted backup repositories.

## vPower NFS on Nimble Storage

Because the repository is backed by a Windows server, it can also be configured to function as a vPower NFS server. This provides ESXi hosts with transparent access to backed up VM images stored on the repository, and enables valuable features such as "SureBackup" and "Instant VM Recovery".

Create a second Nimble Storage volume for use as the vPower NFS root folder. Add the initiator group of the server backing the new repository to the access tab of the volume. Use the Nimble Connection Manager to connect the volume to the host, and then assign a drive letter using the Windows Server Manager.

	New Backup Repository	×
Specify vPow functionality	5 wer NFS settings. vPower NFS enables running virtual machines directly from backup files, allow such as Instant VM Recovery, SureBackup, on-demand sandbox, U-AIR and multi-OS file level r	ing for advanced restore.
Name	vPower NFS	
Туре	Enable vPower NFS server (recommended)	
Server	dpl-veeam8.sedemo.Jab (Created by DPL-VEEAM8\Administrator at 11/25/20	14 12:52:52 1 ¥
Repository	Specify vPower NFS root folder. Write cache will be stored in this folder. Make selected volume has at least 10GB of free disk space available.	sure the
vPower NFS	Eolder: 121	Browse
Review		
Apply		
	Click Manage to change vPower NFS management port	Manage
	Click Ports to change vPower NFS service ports	Ports
	< <u>P</u> revious <u>N</u> ext > ⊡nish	Cancel

Figure 25: New Backup Repository – vPower NFS

Ensure vPower NFS is enabled. In this example the vPower NFS root folder has been specified as file system path "V:\".

	New Bac	kup Repository
Please review	w the settings, and click Next to continu	e.
Name Type Server Repository vPower NFS	Backup repository properties: Repository type: Mount host: Account: Backup folder: Write throughput: Max parallel tasks:	Windows dpl-veeam8.sedemo.lab administrator B:\Backups Not limited 4
Review	max parallel tasta.	120
Apply	The following components wi Installer vPower NFS	I be processed on server dpl-veeam8.sedemo.lab already exists already exists sutomatically
	I import guest tile sy	<pre>stem index </pre>

Figure 26: New Backup Repository – Review

Review the settings and then click the "Next" button to continue.

	New Backup Repository	
Please wait w	while backup repository is created and saved in configuration. This may take a few minutes.	
Name	Log:	
	Message	Duration
Туре	Registering client DPL-VEEAM8 for package vPower NFS	
Canada	S Discovering installed packages	
Server	All required packages have been successfully installed	
Repository	Obtecting server configuration	
	Reconfiguring vPower NFS service	
Power NFS	Creating configuration database records for installed packages	
	Creating database records for repository	
Review	Sackup repository has been added successfully	
Apply		
	< Previous Next > Finish	Cancel

Figure 27: New Backup Repository - Apply

Click the "Finish" button. At this point the new backup repository has been configured using a Nimble Storage volume. In addition, a second Nimble Storage volume has been configured for use as a vPower NFS root folder. The backup repository is now available for selection from within a backup job.

# Virtual Lab Datastore on Nimble Storage

Veeam Backup & Replication "SureBackup" recovery verification provides an automated method to verify recovery of backed up VMs. One component of this testing methodology is a virtual lab datastore. This section takes a look at using a Nimble Storage volume as a virtual lab datastore for use with "SureBackup".

## Create a Nimble Volume for use as a Datastore

From the Nimble Storage user interface select "Manage > Volumes" and then click the "New Volume" button.

n	nimblestorage		Home	Manage 🔻	Monitor 🔻	Events	Administration 🔻	Help 🔻
V	olumes							
	New Volume	Move	View	Volumes + R	eplicas 🗸			

Figure 28: New Volume

	upi-veeam	8-virtual-lab			
Description			Optional		
Performance Policy	Mware E	SX 5	New Perfe	prmance Policy	
CCESS CONTROL					
This access control entry control can be modified	y will be applied t and refined after	o both the volume a the volume is creat	nd its associa ed.	ted snapshots. Access	
C Allow unrestricted acce	988				
Limit access to iSCS	i initiator group	VDI1000-1	~	New Initiator Group	
	HAP username	None	<b>•</b>	New CHAP Account	
Authenticate using (					

Figure 29: New Volume – General Properties

Name the new volume, and select the appropriate VMware ESX performance policy. Configure the access control parameters to allow access to the ESXi hosts that will need to use the virtual lab. Click the "Next" button to continue.

Size 5.0 TB	×		This is the size reported to the application, rounded up to the next MB.
SPACE			
	% of Size	Bytes	
Volume Reserve	0.0	0.0 TB	To take advantage of the compression, set
Volume Quota	100.0	5.0TB	the amount of reserved space to less than the volume size. Actual compression depends on the application but twicely
Volume Warning	80.0	4.0 TB	reaches compression of 50%.
Snapshot Reserve	0.0	0.0 TB	
Snapshot Quota		Unlimited	🔽 Unlimited snapshot quota
Snapshot Warning	0.0	0.0 TB	
STORAGE			
Capacity	22.89 TB		
Used Space	12.98 TB		
Free Space	9.89 TB		

#### Figure 30: Volume Size

Virtual lab volume size is configured in the "Volume Size" section. Select a volume size that meets or exceeds anticipated usage requirements. In this example a volume size of 5 TB has been specified. The "Volume Reserve" property has been left at its default value of 0%. Thin provisioning the Nimble Storage volume minimizes the chance of wasted space.

In the protection section select "None".

plumes assigned to a volume bedule. Standalone volume	e collection are prote s can be protected us	cted accordin	g to the volume collection template or by creat	on's protection
otection schedule.				
None	Not Protected			
O Join volume collection	dpl-veeam8			
Create new volume collection				
Protect as standalone volume				

Figure 31: Volume Protection

Click the "Finish" button to complete the volume creation process.

Within VMware vSphere, rescan for new storage devices and then add storage. Add the "Disk/LUN" that correlates to the new volume just created. Format the new datastore.

## Create a Veeam Virtual Lab

Within the Veeam Backup & Replication user interface, click "Backup Infrastructure", expand the "SureBackup" tree, and the right click "Virtual Labs".

	Virtual Lab Tools	
Home	Virtual Lab	
Add Connect Virtual Lab Virtual Lab	Edit Remov Virtual Lab Virtual L	e ab
Manage Vi	irtual Lab	
Backup Infrastru	cture	
<ul> <li>Backup Proxies</li> <li>Backup Reposit</li> <li>WAN Accelerate</li> <li>Service provider</li> <li>▲ SureBackup</li> <li>▲ Application</li> <li>Wirtual Labs</li> <li>▲ I Managed server</li> <li>▶ I Microsoft W</li> </ul>	tories ors rs Groups Add Virtua p Add Virtua indows	al Lab /irtual Lab

Figure 32: Add Virtual Lab

Click the "Add Virtual Lab" menu item to continue. Alternatively, clicking the "Add Virtual Lab" icon will also facilitate creation of a new virtual lab.

	New Virtual Lab	x
Name         Type in a name and         Name         Host         Datastore         Proxy         Networking         Ready to Apply         Applying Configuration	d description for this virtual lab.          Name:         DPL-Virtual Lab on Nimble]         Description:         Created by DPL-VEEAM8\Administrator at 11/19/2014 2:59:08 PM.	
	< <u>Previous</u> <u>N</u> ext > <u>Finish</u> Cance	1

Figure 33: New Virtual Lab - Name

Name the new virtual lab and then click "Next" to continue. In this example the new virtual lab has been named, "DPL-Virtual Lab on Nimble".

	New Virtual Lab	x
Host Specify host to ru	n this virtual lab on. The host can be both standalone, and a part of cluster.	
Name	Host:	0
Host Datastore Proxy	Statistics VMs: 35 total 31 running	Crigose
Networking Ready to Apply Applying Configuration	Folder: DPL-Virtual Lab on Nimble Resource pool: DPL-Virtual Lab on Nimble	Configure
	< <u>P</u> revious <u>N</u> ext > <u>F</u> inish	Cancel

Figure 34: New Virtual Lab - Host

Choose the ESXi host or cluster that will run the virtual lab. Click the "Next" button to continue.

	New Virtual Lab	×
Datastore Choose datastore machines are runn	to store redo logs on. Redo logs are temporary files where virtual disk changes are accumulated w ning from read-only backup files.	rhile virtual
Name Host	Datastore: dpl-veeam8-virtual-lab Datastore info	h <u>o</u> ose
Datastore Proxy Networking Ready to Apply Applying Configuration	Capacity: 5.0 TB Free space: 5.0 TB	
	< <u>P</u> revious <u>N</u> ext > <u>⊡</u> nish C	ancel

Figure 35: New Virtual Lab - Datastore

Select the datastore that will be used for the virtual lab. This is the volume/datastore created earlier in this section. In this example the "dpl-veeam8-virtual-lab" datastore has been selected. Click the "Next" button to continue.

	Ner	w Virtual Lab	x
Proxy Configure proxy appl recovery verification	iance to be used for this virtual and universal application item	lab. Proxy appliance is required to enable functionality such as automated restore (U-AIR).	ľ
Name Host	The proxy appliance provide isolated virtual lab. Without only be performed manually.	es Veeam Backup server with access to virtual machines running in the proxy appliance, recovery verification and item restore operations can through the VM console.	
Datastore	Use proxy appliance in the Proxy appliance VM set	this virtual lab (recommended) ttings	
Proxy	Name:	DPL-Virtual_Lab_on_Nimble Configure	
Networking	Production network cor	nnection	
Ready to Apply	Production network:	Management Configure	
Applying Configuration	IP address:	Obtain automatically	L
	DNS server:	Obtain automatically	
	Allow proxy appliance to HTTP port: Production proxy:	a act as internet proxy for virtual machines in this lab	
		< Previous Next > Enish Cancel	]

Figure 36: New Virtual Lab - Proxy

Configure the proxy appliance for the new virtual lab. Click the "Next" button to continue.

	New Virtual Lab	×
Ready to Appl Please review th	<b>Y</b> e settings for correctness, and click Next to continue.	
Name Host Datastore Proxy Networking	Virtual lab will be created with the following parameters:         Lab name:       DPL-Virtual Lab on Nimble         ESX name:       vdi 1000-1.sedemo Jab         Datastore:       dpl-veeam8-virtual-lab         Appliance:       Name:         Name:       DPL-Virtual_Lab_on_Nimble         Pool name:       DPL-Virtual Lab on Nimble         Folder name:       DPL-Virtual Lab on Nimble         IP:       <00000000000000000000000000000000000	<u>^</u>
Ready to Apply Applying Configuration	DNS: <obtain automatically=""> Network configuration type: basic single-host Network options: Isolated network: DPL-Virtual Lab on Nimble Management Masquerade IP: 11.0.0.0 Appliance IP: 10.0.1.1 DHCP: enabled Network mapping: DPL Mit of Lab on Nimble Management</obtain>	m >
	<pre>     Wanadement -&gt; DP1 -Vintual Lab on Vininge Manadement     </pre> <pre></pre>	Cancel

Figure 37: New Virtual Lab – Apply

Review the settings and then click the "Next" button.

	New Virtual Lab
Networking Specify whether the	e virtual machines to be run in this virtual lab are connected to a single, or multiple production networks.
Name Host Datastore Proxy Networking Ready to Apply Applying Configuration	<ul> <li>Basic single-host (automatic configuration) Automatic configuration of vitual lab networking. Isolated network is created using parameters of network that the Veeam Backup server is located in, which is assumed to be production network. Recommended option for configurations with a single production network.</li> <li>Advanced single-host (manual configuration) Manual configuration of vitual lab networking. Recommended for advanced scenarios, when some production vitual machines have dependencies on vitual machines located in different networks. This option also enables access to additional networking configuration settings.</li> <li>Advanced multi-host (manual configuration) Manual configuration of vitual lab networking that enables creation of vitual labs spanning multiple hosts, enabling for vitual labs for replicas located on different hosts with non-shared storage. This option leverages Distributed Vitual Switch (DVS) available in Enterprise Plus edition of VMware vSphere.</li> </ul>
	Distributed virtual switch: none Chgose
	< Previous Next > Prinish Cancel

Figure 38: New Virtual Lab - Networking

Select the desired network settings for the virtual lab and then click the "Next" button.

	New Virtual Lab	
Applying Con Please wait whi	figuration le required changes are applied, and virtual lab testing is performed.	
Name	Log:	Duration
Host	Catting infrastructure info	Duration
	Mounting Power NES datactore	0.00.24
Jatastore	Creating V/ Molder 'DPL-Vitual Lab on Nimble'	0.00.24
	Creating virtual switch 'DPL-Virtual Lab on Nimble'	
roxy	Creating not groups	
Vetworking	Conving proxy appliance files	0.00.19
	Q Updating VMX file	0:00:05
Ready to Apply	Registering proxy appliance	0:00:02
	Configuring proxy appliance network settings	0:00:06
Applying Configuration	Virtual Lab has been created	
	< Previous Next >	Cancel

Figure 39: New Virtual Lab – Apply Configuration

Click the "Finish" button to complete creation on the new virtual lab.



Figure 40: Virtual Lab as vSphere Inventory

At this stage the virtual lab will appear in vSphere as inventory. The virtual lab is now ready to use. An "Application Group" and "SureBackup" job are required to use the virtual lab.

# Summary

When protecting VMware datastores hosted on a Nimble Storage array, Veeam Backup & Replication provides a robust feature set enabling a variety of data protection strategies. This includes the ability to leverage the most efficient transport mode based on the configuration of the backup infrastructure.

High performance Nimble Storage arrays can be deployed as part of a Veeam Backup & Replication infrastructure. Backup repositories, vPower NFS root folders, and virtual labs hosted on Nimble volumes assist in creating a fast and reliable data protection solution.

# Appendix 1 – Initiator Group

Initiator groups provide a convenient way to limit volume access to only the specific iSCSI initiators that are members of the group.

Farget sub	nets				
elect target s his setting wil	ubnets that w I restrict the	ill be used for this initiato IPs used for iSCSI discov	or group to discover very as well as those	and access volumes. returned as targets for	r the volumes.
Use all config	gured subnets				
C Select target	subnets				
N <b>itiators</b> Specify a nam To gain acces the IQN or IP	ne for each ir s, an initiator address to a	nitiator and either an IQN r must match both the IQ llow unrestricted initiator	or IP address or bo N and the IP addres connections.	th. s, if provided. Use * for	
Name		IQN	IP Address		
	and total	ing 1001 05 com missooft	*		

Figure 41: Edit an Initiator Group

The example used here is for a Veeam Backup & Replication proxy server that also backs a repository. The name of the host server and the IQN of the host server have been added to the initiator group.

nitiator Groups > dp	ol-veeam8			
Edit Delete	Add Initiator			
INITIATORS				ASSOCIATED VOLUMES
Initiator Name	IQN	IP Address	-	Volume/Clones
dpl-veeam8.sedemo.lab	iqn.1991-05.com.microsoft:dpl		×	dpl-veeam8-repository
				dpl-veeam8-vPowerNFS
				del unuero guesto 2

Figure 42: Initiator Group

When viewing an initiator group a list of associated volumes is displayed. In this example a Veeam Backup & Replication host has been granted access to three different volumes.

# Appendix 2 – Nimble Connection Manager

The Nimble Connection Manager is designed to simplify making and maintaining iSCSI connections between a Windows host and Nimble Storage array volumes. The Nimble Connection Manager is available after successful installation of the Nimble Windows Toolkit, which can be downloaded from the Nimble Storage InfoSight portal.

8		Nimble	Connection N	lanager (2.1.3.233)	×
System Settings Nimble Volum	ies				
Select Host MPIO IP Address	es				
Included IP Address 172.18.127.226 172.18.128.226			Exclud	Excluded IP Address	
Nimble Discovery IP (Port 326 Group Name Unknown	Discovery 172.18.1	r IP Address 127.61			
<			Ш		>
Initiator Name: iqn.1991-05	.com.microsoft	dpl-veeam8			Add
Action	Status	Start Time	Elapsed Time	Details	^
Get Discovery Target Portals Get Configuration Data	Succeeded Succeeded	11:32 AM 11:32 AM	0.14 secs 0.23 secs	Discovery Target Portals Found=1 MinConnectionsPerTarget=2, Maxi	ConnectionsPerTarget=8, Wait Inte
٢					> V
Help					Close

Figure 43: Nimble Connection Manager - System Settings

The "System Settings" tab on the Nimble Connection Manager is configured to discover volumes on one or more Nimble Storage arrays. The Nimble discovery IP address of each array is added by clicking the "Add" button.

\$		Nimble	e Connection N	lanager (2.1.3.233	3)		- 🗆 X
System Settings Nimble Volume	s						
Discovered Nimble Volumes							
Volume Name	Mapping Info		Size Proper	ties Array Count	Connections	Array Version	
R dpl-veeam8-repository	Disk1, B:\		2048GB 🛖	1	2	2.x	
e dpl-veeam8-vpowernfs	Disk2, V:\		100GB 🛖	1	2	2.x	
R dpl-vmware-guests-3			~				
<u>R</u> efresh Recent Tasks	Connected	l Volumes 2,	Total Connection	ns 4	C <u>o</u> nne	ct	Properties
Action	Status	Start Time	Elapsed Time	Details			^
Get ISCSI Targets	Succeeded	11:42 AM	2.11 secs	Total targets disc	overed=3		
Disconnect Target=dpl-vmware-g	Succeeded	11:42 AM	0.05 secs	Requested=2, Di	sconnected=2		=
Remove from 'Favorites'	Succeeded	11:42 AM	0.22 secs	Succeeded, Rem	oved=2, Targe	t=dpl-vmware-gues	ts-3
Get ISCSI Targets	Succeeded	11:41 AM	0.19 secs	Total targets disc	overed=3		
Get Discovery Target Portals	Succeeded	11:32 AM	0.14 secs	Discovery Target	Portals Found	=1	~
<							>
Help							Close

Figure 44: Nimble Connection Manager - Nimble Volumes

New volumes are discovered by clicking the "Refresh" button. Discovered volumes can be connected by first clicking the newly discovered volume, and then clicking the "Connect" button. At connection time, a "Connect to Target" dialog window will provide the option to automatically connect the volume on startup.

	Connect to Target					
iSCSI Target Name	t Name dpl-vmware-guests-3					
Target IQN	qn.2007-11.com.nimblestorage:dpl-vmware-guests-3- /47a5f2220a9575e0.0000024d.4d3087c2					
Connect on startup This will make the system automatically attempt to restore the connection every time the computer restarts						
Enable header digest checksums						
Enable data digest checksums						
Use CHAP <u>a</u> uthentication CHAP help ensure connection security by providing authentication between a target and an initiator						
	<u>O</u> K <u>C</u> ancel					

Figure 45: Connect to Target

Accepting the default "Connect on startup" parameter will cause the system to automatically attempt to restore the connection every time the computer restarts.

# Appendix 3 - NPM with Veeam Backup & Replication

NPM (Nimble Protection Manager) is included with Nimble Storage arrays and provides the ability to create application consistent snapshot backups using VMware vCenter synchronization as well as Microsoft VSS synchronization. The co-mingling of NPM snapshots with Veeam Backup & Replication backups is possible. From a high level perspective NPM & Veeam both deliver tangible benefits.

- Veeam Backup & Replication for VMware:
  - Enables granular restore
  - Enables automated tape based copies of backups
  - Enables the use of VMware Instant Recovery
  - Enables "SureBackup" and the use of virtual labs
- Nimble Protection Manager vCenter synchronized snapshots:
  - Enables aggressive data protection with frequent snapshots
  - Enables the use of efficient Nimble replication

On the surface the solutions appear to be complimentary, and when scheduling is properly coordinated NPM and Veeam Backup & Replication can be used together to fulfill business objectives. However there are known issues that may occur when both data protection solutions attempt to protect the same guest at approximately the same time.

#### Avoid Overlapping Usage

When both data protection solutions issue simultaneous or near-simultaneous requests for vCenter snapshots of the same guest, errors may occur. These errors will typically manifest themselves as failed snapshots. On the Nimble side of the equation users may experience messages such as, "failed to create vCenter snapshot". Veeam Backup & Replication may report errors that include, "failed to prepare guest for backup". Windows application events on the guest may indicate that VSS errors, or VMware tools errors have occurred. In all known cases these errors can be avoided by assuring that requests for vCenter snapshots do not overlap.

Another challenge overlapping schedules can create occurs in cases where a Veeam Backup & Replication temporary snapshot exists and NPM requests a snapshot of the same guest. In effect, the Veeam snapshot may be captured within the NPM snapshot.

	Name VEEAM BACKUP TEMPORARY SNAPSHOT
	Description Please do not delete this snapshot. It is being used by Veeam Backup.
Go to Delete All	Edit
Go to Delete Delete All	Edit

Figure 46: Overlapping vCenter Snapshots

In this scenario both backups may complete successfully. However, if the NPM snapshot is recovered it may contain an orphaned Veeam Backup & Replication snapshot. Orphaned snapshots need to be removed manually, creating additional administrative overhead.

Another side effect that may occur when performing backups with both NPM and Veeam Backup & Replication occurs when a Nimble snapshot is recovered that predates the most recent Veeam backup. In this scenario the next Veeam backup may request changed blocks referencing a point in time that doesn't yet exist on the recovered virtual disks. The backup will complete but it may post a warning message indicating that CBT (Changed Block Tracking) cannot be used.

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