

HYPER-UNIFIED STORAGE

Nexsan Unity

Microsoft Best Practices Guide

Firmware version Unity v. 6.0 (HTML5 interface)

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Contents

Contents	ν
Chapter 1: Microsoft iSCSI	11
- Adding an iSCSI target	12
Sten 1: Setting iSCSI target properties	۲۲ 12
Step 7: Verifying settings	
Step 2. Veniging settings	
Connecting to an iSCSLUIN from Windows	
Discovering your LUNs with the Windows iSCSI Initiator	16
Adding a CHAP user to the Management target	20
Configuring the LUNs in Disk Management	21
Fibre Channel recommendations	23
Chapter 2: Configuring Multipathing	
Configuring MPIO Device manager	
Configuring the LUNs in Disk Management	
Configuring Windows iSCSI Initiator settings	
iSCSI LUNs	
Fibre Channel LUNs	
Chapter 3: Setting up Hyper-V	
Network recommendations	36
IP network infrastructure	
IP network recommendations	
Storage configuration recommendations	37
Block/record size requirements	
When to disable Thin Provisioning	
When to use Thin Provisioning	
Using Unity snapshots	
Enabling jumbo frames using the nxadmin CLI	
Troubleshooting LACP	
Microsoft Hyper-V 2012 R2 recommendations	
Network configurations	
Modifying the Microsoft iSCSI Initiator settings:	

Virtual disk recommendations 44 Using VHDX for virtual disks 45 Using Virtual disks for CSV 46 Virtual Machine recommendations 47 Specifying the generation of the virtual machine 48 Ensuring the virtual machine has the correct partition alignment 48 Disabiling File Last Access Time check 48 Optimizing OS performance with enlightened I/O guests 49 Installing Integration Services on Microsoft Hyper-V VMs 49 Configuring the virtual machine disks I/O timeout 50 Stetting up Unity for Hyper-V 51 Enabling LACP 51 Understanding link aggregation 51 Understanding link aggregation 53 Adding a storage pool 54 Adding a flie system 57 Before you begin 54 Adding a flie system name and storage pool 58 Step 1: Setting the flie system name and storage pool 58 Step 2: Configuring the access protocol 62 Step 3: Configuring the access protocol 62 Step 4: Configuring Attive Archive 64 Step 5: Configuring Attive Archive 64	Tuning the TCPAckFrequency:	
Using VHDX for virtual disks 45 Using virtual disks for CSV 46 Virtual Machine recommendations 47 Specifying the generation of the virtual machine 48 Ensuring the virtual machine has the correct partition alignment 48 Disabiling File Last Access Time check 48 Optimizing OS performance with enlightened I/O guests 49 Installing Integration Services on Microsoft Hyper-V VMs 50 Setting up Unity for Hyper-V 51 Enabling LACP 51 Enabling LACP 51 Enabling LACP 51 Enabling LACP using the nxadmin CLI 53 Adding a storage pool 54 Adding a file system 57 Step 2: Configuring space settings 59 Step 2: Configuring space settings 59 Step 3: Configuring Data Protection 64 Step 6: Verifying settings 67 Step 6: Configuring Cata Protection 64 Step 6: Configuring Cata Protection 64 Step 6: Configuring the cacess protocol 62 Step 7: Viewing results 68 Creating a LUN 69	Virtual disk recommendations	
Using virtual disks for CSV 46 Virtual Machine recommendations 47 Specifying the generation of the virtual machine 48 Disabiling File Last Access Time check. 48 Optimizing OS performance with enlightened I/O guests 49 Installing Integration Services on Microsoft Hyper-V VMs 49 Configuring the virtual machine disks I/O timeout 50 Stetting up Unity for Hyper-V 51 Enabling LACP 51 Understanding link aggregation 51 Requirements and guidelines for implementing LACP 51 Enabling LACP using the nxadmin CLI 53 Adding a flor system 57 Before you begin 54 Before you begin 54 Step 2: Configuring space settings 59 Step 3: Configuring the access protocol 62 Step 4: Configuring Step settings 57 Step 5: Configuring Active Archive 64 Step 5: Viewing results 68 Creating a LUN 69 Prerequistes 69 Step 4: UN Masking 73 Limitations 74 Step 5: Create	Using VHDX for virtual disks	
Virtual Machine recommendations 47 Specifying the generation of the virtual machine 48 Ensuring the virtual machine has the correct partition alignment 48 Disabling File Last Access Time check 48 Optimizing OS performance with enlightened I/O guests 49 Installing Integration Services on Microsoft Hyper-V VMs 59 Setting up Unity for Hyper-V 51 Enabling LACP 51 Inderstanding link aggregation 51 Requirements and guidelines for implementing LACP 51 Enabling LACP using the nxadmin CLI 53 Adding a storage pool 54 Adding a file system 57 Before you begin 57 Step 1: Setting the file system name and storage pool 58 Step 2: Configuring Data Protection 64 Step 5: Configuring Active Archive 64 Step 6: Verifying settings 67 Step 7: Viewing results 68 Creating a LUN 69 Prerequisites 69 Step 1: Setting the LUN name and block size 70 Step 1: Setting the LUN name and block size 73 Limitations	Using virtual disks for CSV	
Specifying the generation of the virtual machine 48 Ensuring the virtual machine has the correct partition alignment 48 Optimizing OS performance with enlightened I/O guests 49 Installing Integration Services on Microsoft Hyper-V VMs 49 Configuring the virtual machine disks I/O timeout 50 Setting up Unity for Hyper-V 51 Enabling IACP 51 Understanding link aggregation 51 Requirements and guidelines for implementing LACP 51 Enabling LACP using the nxadmin CLL 53 Adding a storage pool 54 Adding a storage pool 54 Adding a storage pool 54 Adding a file system 57 Before you begin 57 Before you begin 58 Step 2: Configuring pace settings 59 Step 3: Configuring the access protocol 62 Step 4: Configuring Data Protection 64 Step 5: Configuring Active Archive 64 Step 6: Verifying settings 67 Step 7: Viewing results 68 Creating a LUN 69 Prerequisites 69 <	Virtual Machine recommendations	
Ensuring the virtual machine has the correct partition alignment 48 Disabling File Last Access Time check 48 Optimizing OS performance with enlightened I/O guests 49 Installing Integration Services on Microsoft Hyper-V VMs 49 Configuring the virtual machine disks I/O timeout 50 Setting up Unity for Hyper-V 51 Enabling LACP 51 Understanding link aggregation 51 Nederstanding link aggregation 51 Requirements and guidelines for implementing LACP 51 Enabling LACP using the nxadmin CLI 53 Adding a storage pool 54 Before you begin 54 Adding a file system 57 Step 1: Setting the file system name and storage pool 58 Step 2: Configuring pace settings 59 Step 3: Configuring Data Protection 64 Step 5: Configuring Active Archive 69 Step 6: Verifying settings 67 Step 7: Viewing results 69 Creating a LUN 69 Prerequisites 69 Step 1: Setting the LUN name and block size 70 Step 2: Space configu	Specifying the generation of the virtual machine	
Disabling File Last Access Time check 44 Optimizing OS performance with enlightened I/O guests 49 Installing Integration Services on Microsoft Hyper-V VMs 50 Setting up Unity for Hyper-V 51 Enabling LACP 51 Understanding link aggregation 51 Requirements and guidelines for implementing LACP 51 Enabling LACP using the nxadmin CLI 53 Adding a storage pool 54 Before you begin 54 Adding a file system 57 Before you begin 57 Step 2: Configuring space settings 59 Step 2: Configuring bate rotection 64 Step 5: Configuring Data Protection 64 Step 6: Verifying settings 67 Step 6: Verifying settings 67 Step 7: Viewing results 68 Creating a LUN 64 Step 6: Verifying settings 67 Step 1: Setting the LUN name and block size 70 Step 2: Space configuration settings for the LUN 71 Step 3: Enabling data replication and snapshot scheduling 73 Limitations 73	Ensuring the virtual machine has the correct partition alignment	
Optimizing OS performance with enlightened I/O guests .49 Installing Integration Services on Microsoft Hyper-V VMs .49 Configuring the virtual machine disks I/O timeout .50 Setting up Unity for Hyper-V .51 Enabling LACP .51 Understanding link aggregation .51 Requirements and guidelines for implementing LACP .51 Enabling LACP using the nxadmin CLI .53 Adding a storage pool .54 Before you begin .54 Adding a file system .57 Before you begin .54 Adding a file system name and storage pool .58 Step 1: Setting the file system name and storage pool .58 Step 2: Configuring space settings .59 Step 3: Configuring Data Protection .64 Step 5: Configuring Active Archive .64 Step 6: Verifying settings .67 Step 7: Viewing results .68 Creating a LUN .69 Prerequisites .69 Prerequisites .69 Step 1: Setting the LUN name and block size .70 Step 2: Space configuration settings for the LUN	Disabling File Last Access Time check	
Installing Integration Services on Microsoft Hyper-V VMs	Optimizing OS performance with enlightened I/O guests	
Configuring the virtual machine disks I/O timeout 50 Setting up Unity for Hyper-V 51 Enabling LACP 51 Understanding link aggregation 51 Requirements and guidelines for implementing LACP 51 Enabling LACP using the nxadmin CLI 53 Adding a storage pool 54 Before you begin 54 Adding a file system 57 Before you begin 57 Step 1: Setting the file system name and storage pool 58 Step 2: Configuring pace settings 59 Step 3: Configuring Data Protection 64 Step 6: Verifying settings 67 Step 7: Viewing results 68 Creating a LUN 69 Prerequisites 69 Step 1: Setting the LUN name and block size 70 Step 2: Space configuration settings for the LUN 71 Step 3: Enabling data replication and snapshot scheduling 73 Limitations 73 Limitations 76 Step 4: LUN Masking 74 Step 5: Create a new LUN Mask 75 Step 6: Verifying settings 76	Installing Integration Services on Microsoft Hyper-V VMs	49
Setting up Unity for Hyper-V 51 Enabling LACP 51 Understanding link aggregation 51 Requirements and guidelines for implementing LACP 51 Enabling LACP using the nxadmin CLI 53 Adding a storage pool 54 Before you begin 54 Adding a file system 57 Before you begin 57 Step 1: Setting the file system name and storage pool 58 Step 2: Configuring pace settings 59 Step 3: Configuring the access protocol 62 Step 4: Configuring Data Protection 64 Step 5: Configuring settings 67 Step 5: Configuring settings 67 Step 6: Verifying settings 67 Step 7: Viewing results 68 Creating a LUN 69 Prerequisites 69 Step 1: Setting the LUN name and block size 70 Step 2: Space configuration settings for the LUN 71 Step 3: Create a new LUN Mask 73 Step 4: LUN Masking 74 Step 5: Create a new LUN Mask 75 Step 6: Verifying settings 76 <	Configuring the virtual machine disks I/O timeout	
Enabling LACP 51 Understanding link aggregation 51 Requirements and guidelines for implementing LACP 51 Enabling LACP using the nxadmin CLI 53 Adding a storage pool 54 Before you begin 54 Adding a file system 57 Before you begin 57 Step 1: Setting the file system name and storage pool 58 Step 2: Configuring space settings 59 Step 3: Configuring pace settings 59 Step 4: Configuring Data Protection 64 Step 5: Configuring Active Archive 64 Step 6: Verifying results 68 Creating a LUN 69 Prerequisites 69 Step 1: Setting the LUN name and block size 70 Step 2: Space configuration settings for the LUN 71 Step 3: Enabling data replication and snapshot scheduling 73 Limitations 73 Limitations 76 Step 7: Viewing nogress 76 Step 7: Viewing nogress 78 Chapter 4: Clustering 79 Cluster configuration recommendations 80	Setting up Unity for Hyper-V	51
Understanding link aggregation 51 Requirements and guidelines for implementing LACP 51 Enabling LACP using the nxadmin CLI 53 Adding a storage pool 54 Before you begin 54 Adding a file system 57 Before you begin 54 Adding a file system name and storage pool 58 Step 1: Setting the file system name and storage pool 58 Step 2: Configuring space settings 59 Step 3: Configuring Data Protection 64 Step 5: Configuring Data Protection 64 Step 5: Configuring Active Archive 64 Step 6: Verifying settings 67 Step 7: Viewing results 68 Creating a LUN 69 Prerequisites 69 Step 1: Setting the LUN name and block size 70 Step 2: Space configuration settings for the LUN 71 Step 3: Enabling data replication and snapshot scheduling 73 Limitations 73 Step 4: LUN Masking 74 Step 5: Create a new LUN Mask 75 Step 6: Verifying settings 76 Step 7: Viewin	Enabling LACP	51
Requirements and guidelines for implementing LACP 51 Enabling LACP using the nxadmin CLI 53 Adding a storage pool 54 Before you begin 54 Adding a file system 57 Before you begin 57 Step 1: Setting the file system name and storage pool 58 Step 2: Configuring space settings 59 Step 3: Configuring the access protocol 62 Step 4: Configuring Data Protection 64 Step 5: Configuring the access protocol 62 Step 6: Verifying settings 67 Step 7: Viewing results 68 Creating a LUN 69 Prerequisites 69 Step 1: Setting the LUN name and block size 70 Step 2: Space configuration settings for the LUN 71 Step 3: Enabling data replication and snapshot scheduling 73 Limitations 73 Step 4: Clustering 74 Step 5: Create a new LUN Mask 76 Step 7: Viewing progress 78 Chapter 4: Clustering 79 Cluster configuration recommendations 80 Recommendations and re	Understanding link aggregation	51
Enabling LACP using the nxadmin CLI 53 Adding a storage pool 54 Before you begin 54 Adding a file system 57 Before you begin 57 Step 1: Setting the file system name and storage pool 58 Step 2: Configuring the access protocol 62 Step 4: Configuring Data Protection 64 Step 5: Configuring Active Archive 64 Step 5: Configuring Data Protection 64 Step 6: Verifying settings 67 Step 7: Viewing results 68 Creating a LUN 69 Prerequisites 69 Step 1: Setting the LUN name and block size 70 Step 2: Space configuration settings for the LUN 71 Step 3: Enabling data replication and snapshot scheduling 73 Limitations 73 Step 4: LUN Masking 74 Step 5: Create a new LUN Mask 75 Step 7: Viewing progress 78 Chapter 4: Clustering 79 Cluster configuration recommendations 80 Recommendations and requirements for clusters using Node and File Share Majority 80	Requirements and guidelines for implementing LACP	51
Adding a storage pool 54 Before you begin 54 Adding a file system 57 Before you begin 57 Step 2: Configuring space settings 59 Step 3: Configuring Data Protection 64 Step 6: Verifying settings 67 Step 6: Verifying settings 67 Step 7: Viewing results 68 Creating a LUN 69 Prerequisites 69 Step 1: Setting the LUN name and block size 70 Step 2: Space configuration settings for the LUN 71 Step 3: Create a new LUN name and block size 70 Step 4: LUN Masking 73 Limitations 73 Limitations 73 Step 5: Create a new LUN Mask 75 Step 6: Verifying settings 76 Step 7: Viewing progress 78 Chapter 4: Clustering 79 Cluster configuration recommendations 80 Recommendations and requirements for clusters using Node and File Share Majority 80 Recommendations for a multi-site cluster 80 Recommendations for a multi-site cluster 80	Enabling LACP using the nxadmin CLI	53
Before you begin 54 Adding a file system 57 Before you begin 57 Step 1: Setting the file system name and storage pool 58 Step 2: Configuring space settings 59 Step 3: Configuring pate recess protocol 62 Step 4: Configuring Data Protection 64 Step 5: Configuring Active Archive 64 Step 6: Verifying settings 67 Step 7: Viewing results 68 Creating a LUN 69 Prerequisites 69 Step 1: Setting the LUN name and block size 70 Step 2: Space configuration settings for the LUN 71 Step 3: Enabling data replication and snapshot scheduling 73 Limitations 73 Step 4: LUN Masking 74 Step 5: Create a new LUN Mask 75 Step 6: Verifying settings 76 Step 7: Viewing progress 78 Chapter 4: Clustering 79 Cluster configuration recommendations 80 Recommendations and requirements for clusters using Node and File Share Majority 80 Recommendations for a multi-site cluster 80	Adding a storage pool	54
Adding a file system 57 Before you begin 57 Step 1: Setting the file system name and storage pool 58 Step 2: Configuring space settings 59 Step 3: Configuring the access protocol 62 Step 4: Configuring Data Protection 64 Step 5: Configuring Active Archive 64 Step 6: Verifying settings 67 Step 7: Viewing results 68 Creating a LUN 69 Prerequisites 69 Step 1: Setting the LUN name and block size 70 Step 2: Space configuration settings for the LUN 71 Step 3: Enabling data replication and snapshot scheduling 73 Limitations 73 Step 6: Verifying settings 76 Step 7: Viewing progress 78 Chapter 4: Clustering 79 Cluster configuration recommendations 80 Recommendations and requirements for clusters using Node and File Share Majority 80 Recommendations for a multi-site cluster 80 Recommendations for a multi-site cluster 80 Recommendations for a multi-site cluster 82 Delegating control to	Before you begin	54
Before you begin 57 Step 1: Setting the file system name and storage pool 58 Step 2: Configuring space settings 59 Step 3: Configuring Data Protection 62 Step 4: Configuring Data Protection 64 Step 5: Configuring Active Archive 64 Step 6: Verifying settings 67 Step 7: Viewing results 68 Creating a LUN 69 Prerequisites 69 Step 1: Setting the LUN name and block size 70 Step 2: Space configuration settings for the LUN 71 Step 3: Enabling data replication and snapshot scheduling 73 Limitations 73 Step 5: Create a new LUN Mask 75 Step 6: Verifying settings 76 Step 7: Viewing progress 78 Chapter 4: Clustering 79 Cluster configuration recommendations 80 Recommendations and requirements for clusters using Node and File Share Majority 80 Recommendations for a multi-site cluster 80 Recommendations for a multi-site cluster 80 Recommendations for a multi-site cluster 80 Recommendations f	Adding a file system	57
Step 1: Setting the file system name and storage pool 58 Step 2: Configuring space settings 59 Step 3: Configuring the access protocol 62 Step 4: Configuring Data Protection 64 Step 5: Configuring Active Archive 64 Step 7: Viewing results 68 Creating a LUN 69 Prerequisites 69 Step 1: Setting the LUN name and block size 70 Step 2: Space configuration settings for the LUN 71 Step 3: Enabling data replication and snapshot scheduling 73 Limitations 73 Step 5: Create a new LUN Mask 75 Step 5: Create a new LUN Mask 75 Step 5: Verifying settings 76 Step 5: Create a new LUN Mask 75 Step 7: Viewing progress 78 Chapter 4: Clustering 79 Cluster configuration recommendations 80 Recommendations and requirements for clusters using Node and File Share Majority 80 Recommendations of a multi-site cluster 80 Recommendations for a multi-site cluster 80 Chapter 5: Joining a Windows Active Directory domain 81 <	Before you begin	
Step 2: Configuring space settings 59 Step 3: Configuring the access protocol 62 Step 4: Configuring Data Protection 64 Step 5: Configuring Active Archive 64 Step 6: Verifying settings 67 Step 7: Viewing results 68 Creating a LUN 69 Prerequisites 69 Step 1: Setting the LUN name and block size 70 Step 2: Space configuration settings for the LUN 71 Step 3: Enabling data replication and snapshot scheduling 73 Limitations 73 Step 5: Create a new LUN Mask 75 Step 6: Verifying settings 76 Step 7: Viewing progress 78 Chapter 4: Clustering 79 Cluster configuration recommendations 80 Recommendations and requirements for clusters using Node and File Share Majority 80 Recommendations for a multi-site cluster 80 Recommendations for a multi-site cluster 80 Chapter 5: Joining a Windows Active Directory domain 81 Microsoft Active Directory domain requirements 82 Delegating control to a non-Administrator user account 83	Step 1: Setting the file system name and storage pool	
Step 3: Configuring the access protocol 62 Step 4: Configuring Data Protection 64 Step 5: Configuring Active Archive 64 Step 6: Verifying settings 67 Step 7: Viewing results 68 Creating a LUN 69 Prerequisites 69 Step 1: Setting the LUN name and block size 70 Step 2: Space configuration settings for the LUN 71 Step 3: Enabling data replication and snapshot scheduling 73 Limitations 73 Step 5: Create a new LUN Mask 75 Step 5: Create a new LUN Mask 76 Step 7: Viewing progress 78 Chapter 4: Clustering 79 Cluster configuration recommendations 80 Recommendations and requirements for clusters using Node and File Share Majority 80 Recommendations for a multi-site cluster 80 Recommendations for a multi-site cluster 80 Chapter 5: Joining a Windows Active Directory domain 81 Microsoft Active Directory domain requirements 82 Delegating control to a non-Administrator user account 83 Creating computer objects on the Active Directory serv	Step 2: Configuring space settings	
Step 4: Configuring Data Protection 64 Step 5: Configuring Active Archive 64 Step 6: Verifying settings 67 Step 7: Viewing results 68 Creating a LUN 69 Prerequisites 69 Step 1: Setting the LUN name and block size 70 Step 2: Space configuration settings for the LUN 71 Step 3: Enabling data replication and snapshot scheduling 73 Limitations 73 Step 4: LUN Masking 74 Step 5: Create a new LUN Mask 75 Step 6: Verifying settings 76 Step 7: Viewing progress 78 Chapter 4: Clustering 79 Cluster configuration recommendations 80 Recommendations and requirements for clusters using Node and File Share Majority 80 Recommendations for a multi-site cluster 80 Chapter 5: Joining a Windows Active Directory domain 81 Microsoft Active Directory domain requirements 82 Delegating control to a non-Administrator user account 83 Creating computer objects on the Active Directory server 85 Chapter 6: Using Windows VSS 91	Step 3: Configuring the access protocol	62
Step 5: Configuring Active Archive 64 Step 6: Verifying settings 67 Step 7: Viewing results 68 Creating a LUN 69 Prerequisites 69 Step 1: Setting the LUN name and block size 70 Step 2: Space configuration settings for the LUN 71 Step 3: Enabling data replication and snapshot scheduling 73 Limitations 73 Step 5: Create a new LUN Mask 75 Step 6: Verifying settings 76 Step 7: Viewing progress 78 Chapter 4: Clustering 79 Cluster configuration recommendations 80 Recommendations for a multi-site cluster 80 Recommendations for a multi-site cluster 80 Chapter 5: Joining a Windows Active Directory domain 81 Microsoft Active Directory domain requirements 82 Delegating control to a non-Administrator user account 83 Creating computer objects on the Active Directory server 85 Chapter 6: Using Windows VSS 91 Installing the VSS Hardware Provider 91	Step 4: Configuring Data Protection	64
Step 6: Verifying settings 67 Step 7: Viewing results 68 Creating a LUN 69 Prerequisites 69 Step 1: Setting the LUN name and block size 70 Step 2: Space configuration settings for the LUN 71 Step 3: Enabling data replication and snapshot scheduling 73 Limitations 73 Step 4: LUN Masking 74 Step 5: Create a new LUN Mask 75 Step 6: Verifying settings 76 Step 7: Viewing progress 78 Chapter 4: Clustering 79 Cluster configuration recommendations 80 Recommendations and requirements for clusters using Node and File Share Majority 80 Recommendations for a multi-site cluster 80 Chapter 5: Joining a Windows Active Directory domain 81 Microsoft Active Directory domain requirements 82 Delegating control to a non-Administrator user account 82 Delegating control to a non-Administrator user account 85 Chapter 6: Using Windows VSS 91 Installing the VSS Hardware Provider 91	Step 5: Configuring Active Archive	64
Step 7: Viewing results 68 Creating a LUN 69 Prerequisites 69 Step 1: Setting the LUN name and block size 70 Step 2: Space configuration settings for the LUN 71 Step 3: Enabling data replication and snapshot scheduling 73 Limitations 73 Step 4: LUN Masking 74 Step 5: Create a new LUN Mask 75 Step 6: Verifying settings 76 Step 7: Viewing progress 78 Chapter 4: Clustering 79 Cluster configuration recommendations 80 Recommendations for a multi-site cluster 80 Recommendations for a multi-site cluster 80 Chapter 5: Joining a Windows Active Directory domain 81 Microsoft Active Directory domain requirements 82 Delegating control to a non-Administrator user account 83 Creating computer objects on the Active Directory server 85 Chapter 6: Using Windows VSS 91 Installing the VSS Hardware Provider 91	Step 6: Verifying settings	67
Creating a LUN 69 Prerequisites 69 Step 1: Setting the LUN name and block size 70 Step 2: Space configuration settings for the LUN 71 Step 3: Enabling data replication and snapshot scheduling 73 Limitations 73 Step 4: LUN Masking 74 Step 5: Create a new LUN Mask 75 Step 6: Verifying settings 76 Step 7: Viewing progress 78 Chapter 4: Clustering 79 Cluster configuration recommendations 80 Recommendations and requirements for clusters using Node and File Share Majority 80 Recommendations for a multi-site cluster 80 Chapter 5: Joining a Windows Active Directory domain 81 Microsoft Active Directory domain requirements 82 Delegating control to a non-Administrator user account 83 Creating computer objects on the Active Directory server 85 Chapter 6: Using Windows VSS 91 Installing the VSS Hardware Provider 91	Step 7: Viewing results	
Prerequisites 69 Step 1: Setting the LUN name and block size 70 Step 2: Space configuration settings for the LUN 71 Step 3: Enabling data replication and snapshot scheduling 73 Limitations 73 Step 4: LUN Masking 74 Step 5: Create a new LUN Mask 75 Step 6: Verifying settings 76 Step 7: Viewing progress 78 Chapter 4: Clustering 79 Cluster configuration recommendations 80 Recommendations and requirements for clusters using Node and File Share Majority 80 Recommendations for a multi-site cluster 80 Chapter 5: Joining a Windows Active Directory domain 81 Microsoft Active Directory domain requirements 82 Delegating control to a non-Administrator user account 83 Creating computer objects on the Active Directory server 85 Chapter 6: Using Windows VSS 91 Installing the VSS Hardware Provider 91	Creating a LUN	69
Step 1: Setting the LUN name and block size 70 Step 2: Space configuration settings for the LUN 71 Step 3: Enabling data replication and snapshot scheduling 73 Limitations 73 Step 4: LUN Masking 74 Step 5: Create a new LUN Mask 75 Step 6: Verifying settings 76 Step 7: Viewing progress 76 Chapter 4: Clustering 79 Cluster configuration recommendations 80 Recommendations and requirements for clusters using Node and File Share Majority 80 Recommendations for a multi-site cluster 80 Chapter 5: Joining a Windows Active Directory domain 81 Microsoft Active Directory domain requirements 82 Delegating control to a non-Administrator user account 83 Creating computer objects on the Active Directory server 85 Chapter 6: Using Windows VSS 91 Installing the VSS Hardware Provider 91	Prerequisites	
Step 2: Space configuration settings for the LUN 71 Step 3: Enabling data replication and snapshot scheduling 73 Limitations 73 Step 4: LUN Masking 73 Step 5: Create a new LUN Mask 75 Step 6: Verifying settings 76 Step 7: Viewing progress 78 Chapter 4: Clustering 79 Cluster configuration recommendations 80 Recommendations and requirements for clusters using Node and File Share Majority 80 Recommendations for a multi-site cluster 80 Chapter 5: Joining a Windows Active Directory domain 81 Microsoft Active Directory domain requirements 82 Delegating control to a non-Administrator user account 83 Creating computer objects on the Active Directory server 85 Chapter 6: Using Windows VSS 91 Installing the VSS Hardware Provider 91	Step 1: Setting the LUN name and block size	
Step 3: Enabling data replication and snapshot scheduling 73 Limitations 73 Step 4: LUN Masking 74 Step 5: Create a new LUN Mask 75 Step 6: Verifying settings 76 Step 7: Viewing progress 78 Chapter 4: Clustering 79 Cluster configuration recommendations 80 Recommendations and requirements for clusters using Node and File Share Majority 80 Recommendations for a multi-site cluster 80 Chapter 5: Joining a Windows Active Directory domain 81 Microsoft Active Directory domain requirements 82 Delegating control to a non-Administrator user account 83 Creating computer objects on the Active Directory server 85 Chapter 6: Using Windows VSS 91 Installing the VSS Hardware Provider 91	Step 2: Space configuration settings for the LUN	
Limitations 73 Step 4: LUN Masking 74 Step 5: Create a new LUN Mask 75 Step 6: Verifying settings 76 Step 7: Viewing progress 78 Chapter 4: Clustering 79 Cluster configuration recommendations 80 Recommendations and requirements for clusters using Node and File Share Majority 80 Recommendations for a multi-site cluster 80 Chapter 5: Joining a Windows Active Directory domain 81 Microsoft Active Directory domain requirements 82 Delegating control to a non-Administrator user account 83 Creating computer objects on the Active Directory server 85 Chapter 6: Using Windows VSS 91 Installing the VSS Hardware Provider 91	Step 3: Enabling data replication and snapshot scheduling	
Step 4. LUN Masking 74 Step 5: Create a new LUN Mask 75 Step 6: Verifying settings 76 Step 7: Viewing progress 78 Chapter 4: Clustering 79 Cluster configuration recommendations 80 Recommendations and requirements for clusters using Node and File Share Majority 80 Recommendations for a multi-site cluster 80 Chapter 5: Joining a Windows Active Directory domain 81 Microsoft Active Directory domain requirements 82 Delegating control to a non-Administrator user account 83 Creating computer objects on the Active Directory server 85 Chapter 6: Using Windows VSS 91 Installing the VSS Hardware Provider 91	Limitations	
Step 5. Create a new LON Mask 75 Step 6: Verifying settings 76 Step 7: Viewing progress 78 Chapter 4: Clustering 79 Cluster configuration recommendations 80 Recommendations and requirements for clusters using Node and File Share Majority 80 Recommendations for a multi-site cluster 80 Chapter 5: Joining a Windows Active Directory domain 81 Microsoft Active Directory domain requirements 82 Delegating control to a non-Administrator user account 83 Creating computer objects on the Active Directory server 85 Chapter 6: Using Windows VSS 91 Installing the VSS Hardware Provider 91	Step 4: LUN Masking	
Step 6: Ventying settings 70 Step 7: Viewing progress 78 Chapter 4: Clustering 79 Cluster configuration recommendations 80 Recommendations and requirements for clusters using Node and File Share Majority 80 Recommendations for a multi-site cluster 80 Chapter 5: Joining a Windows Active Directory domain 81 Microsoft Active Directory domain requirements 82 Delegating control to a non-Administrator user account 83 Creating computer objects on the Active Directory server 85 Chapter 6: Using Windows VSS 91 Installing the VSS Hardware Provider 91	Step 5. Create a new LUN Mask	
Chapter 4: Clustering 79 Cluster configuration recommendations 80 Recommendations and requirements for clusters using Node and File Share Majority 80 Recommendations for a multi-site cluster 80 Chapter 5: Joining a Windows Active Directory domain 81 Microsoft Active Directory domain requirements 82 Delegating control to a non-Administrator user account 83 Creating computer objects on the Active Directory server 85 Chapter 6: Using Windows VSS 91 Installing the VSS Hardware Provider 91	Step 6. Veniying settings	
Chapter 4: Clustering 79 Cluster configuration recommendations 80 Recommendations and requirements for clusters using Node and File Share Majority 80 Recommendations for a multi-site cluster 80 Chapter 5: Joining a Windows Active Directory domain 81 Microsoft Active Directory domain requirements 82 Delegating control to a non-Administrator user account 83 Creating computer objects on the Active Directory server 85 Chapter 6: Using Windows VSS 91 Installing the VSS Hardware Provider 91		
Cluster configuration recommendations 80 Recommendations and requirements for clusters using Node and File Share Majority 80 Recommendations for a multi-site cluster 80 Chapter 5: Joining a Windows Active Directory domain 81 Microsoft Active Directory domain requirements 82 Delegating control to a non-Administrator user account 83 Creating computer objects on the Active Directory server 85 Chapter 6: Using Windows VSS 91 Installing the VSS Hardware Provider 91	Chapter 4: Clustering	
Recommendation recommendations 80 Recommendations and requirements for clusters using Node and File Share Majority 80 Recommendations for a multi-site cluster 80 Chapter 5: Joining a Windows Active Directory domain 81 Microsoft Active Directory domain requirements 82 Delegating control to a non-Administrator user account 83 Creating computer objects on the Active Directory server 85 Chapter 6: Using Windows VSS 91 Installing the VSS Hardware Provider 91		00
Recommendations and requirements for clusters using Node and File Share Majority 60 Recommendations for a multi-site cluster 80 Chapter 5: Joining a Windows Active Directory domain 81 Microsoft Active Directory domain requirements 82 Delegating control to a non-Administrator user account 83 Creating computer objects on the Active Directory server 85 Chapter 6: Using Windows VSS 91 Installing the VSS Hardware Provider 91	Cluster configuration recommendations	80
Chapter 5: Joining a Windows Active Directory domain 81 Microsoft Active Directory domain requirements 82 Delegating control to a non-Administrator user account 83 Creating computer objects on the Active Directory server 85 Chapter 6: Using Windows VSS 91 Installing the VSS Hardware Provider 91	Recommendations and requirements for clusters using node and File Share Majority	
Chapter 5: Joining a Windows Active Directory domain 81 Microsoft Active Directory domain requirements 82 Delegating control to a non-Administrator user account 83 Creating computer objects on the Active Directory server 85 Chapter 6: Using Windows VSS 91 Installing the VSS Hardware Provider 91		
Microsoft Active Directory domain requirements	Chapter 5: Joining a Windows Active Directory domain	
Delegating control to a non-Administrator user account 83 Creating computer objects on the Active Directory server 85 Chapter 6: Using Windows VSS 91 Installing the VSS Hardware Provider 91	Microsoft Active Directory domain requirements	82
Creating computer objects on the Active Directory server	Delegating control to a non-Administrator user account	
Chapter 6: Using Windows VSS	Creating computer objects on the Active Directory server	
Chapter 6: Using Windows VSS 91 Installing the VSS Hardware Provider 91		
Installing the VSS Hardware Provider	Chapter 6: Using Windows VSS	91
	Installing the VSS Hardware Provider	

Creating a VSS snapshot	
Viewing VSS client information	
Rolling back data to a VSS snapshot	
Deleting a VSS snapshot	
la dese	40-

About this document

This guide provides an overview of the best practices and troubleshooting guidelines for Microsoft use with Unity Storage Systems.

Audience

This guide has been prepared for the following audience:

- IT system administrators
- Engineers
- Technicians
- Any qualified NST/Unity administrator.

Conventions

Here is a list of text conventions used in this document:

Convention	Description
underlined blue	Cross-references, hyperlinks, URLs, and email addresses.
boldface	Text that refers to labels on the physical unit or interactive items in the graphical user interface (GUI).
monospace	Text that is displayed in the command-line interface (CLI) or text that refers to file or directory names.
monospace bold	Text strings that must be entered by the user in the command-line interface or in text fields in the graphical user interface (GUI).
italics	System messages and non-interactive items in the graphical user interface (GUI) References to Software User Guides

Notes, Tips, Cautions, and Warnings

Note Notes contain important information, present alternative procedures, or call attention to certain items. **Tip** Tips contain handy information for end-users, such as other ways to perform an action.



CAUTION: In hardware manuals, cautions alert the user to items or situations which may cause damage to the unit or result in mild injury to the user, or both. In software manuals, cautions alert the user to situations which may cause data corruption or data loss.



WARNING: Warnings alert the user to items or situations which may result in severe injury or death to the user.

Contacting Nexsan

For questions about Nexsan products, please visit the <u>Nexsan support</u> Web page, and the Nexsan Unity <u>Documents & Online Help</u> page. If you are unable to find the answer to your question there, please see our contact information below.

Service and support

Nexsan's Technical Services Group provides worldwide assistance with installation, configuration, software support, warranty, and repair for all Nexsan products. A variety of service and support programs are available to provide you with the level of coverage and availability your operation requires.

Nexsan Unity Documentation & Online Help page: <u>https://helper.nexsansupport.com/unt_</u> downloads.html

Unity Online Help page: https://helper.nexsansupport.com/unt_ onlinehelp.html Contact Nexsan Unity support: https://helper.nexsansupport.com/unt_support

Worldwide Web site: www.nexsan.com

Related documentation

The following Nexsan product manuals contain related information:

- Nexsan Unity Online Help
- Nexsan Unity Hardware Reference Guide
- Nexsan Unity Hardware Maintenance Guide, Unity Next Generation
- Nexsan Unity Software User Guide
- Nexsan Unity nxadmin Command-line Interface Reference Guide
- Nexsan Unity nxcmd Command-line Interface Reference Guide
- Nexsan Unity Snapshots and Replication Guide
- Nexsan Unity Storage Expansion Reference Guide
- Nexsan Unity VMware Best Practices Guide
- Nexsan Unity NFS Interoperability
- Nexsan Unity Networking Best Practices Guide
- Nexsan Unity Performance Best Practices Guide
- Nexsan Unity Microsoft Best Practices Guide

Chapter 1

Microsoft iSCSI

When a LUN is added to a storage pool on Unity, you can assign the LUN to an iSCSI target in the storage pool. The iSCSI target presents the LUN assigned to it to servers (initiators) on the network.

This section includes these topics:

Adding an iSCSI target	12
Connecting to an iSCSI LUN from Windows	15
Discovering your LUNs with the Windows iSCSI Initiator	16
Adding a CHAP user to the Management target	20
Configuring the LUNs in Disk Management	21
Fibre Channel recommendations	23

Adding an iSCSI target

Unity provides the **Create an iSCSI Target** wizard to guide you through the process of adding a target to a storage pool.

Note If your environment is set up as a many-to-one configuration, iSCSI targets are managed per site. You must create the iSCSI targets that will be used for failover on the Disaster Recovery site and assign them to LUN masks.

To add an iSCSI target:

1. On the **Unity navigation bar**, select **Storage > iSCSI targets**.

Figure 1-1: iSCSI targets panel

EXSAN [®] UNITY	dashboard s	system stor/	AGE DATA PROTECTION		SELECT SYS	STEM: 🖧 Masteri	NST 👻	
- iSCSI Targets [2]							ADD	ISCSI TARG
								0
							0	Enable Filters
PUBLIC ALIAS	STORAGE POOL	IQN		NUMBER OF LUNS	CHAP USER	MUTUAL CHAP	ACTIONS	Enable Filters
PUBLIC ALIAS	STORAGE POOL	וסא iqn. 001	1 1999-02.com.nexsan:es200180- 1:pool2:mgmt	NUMBER OF LUNS	chap user N/A	mutual Chap N/A	ACTIONS	Enable Filters

2. Click the Add iSCSI Target button.

The Create an iSCSI Target wizard guides you through the process of adding a target to a storage pool.

This section includes these steps:

Step 1: Setting iSCSI target properties below

Step 2: Verifying settings on the facing page

Step 3: Viewing results on page 14

Step 1: Setting iSCSI target properties

Step 1 of the Create an iSCSI target wizard prompts you to select a pool, public alias, and target IQN.

• <u>IQN</u>: an IQN (iSCSI qualified name) is the unique identifier of a device in an iSCSI network. iSCSI uses the form iqn.date.authority:uniqueid for IQNs. For example, Unity uses this IQN to identify iSCSI targets:

iqn.1999-02.com.nexsan:<site name>:<pool name>:<unique ID>

This name indicates that this is an iSCSI device from Nexsan, which was registered as a company in February of 1999. The naming authority is simply the DNS name of the company reversed; in this case, com.nexsan. Following this is the Unity Storage System (site) name, the storage pool name where the target exists, and a unique ID that you must specify to identify the target.

Note IQN is always forced to lower case by Unity, in accordance with RSF conventions.

 <u>Public alias</u>: this is a symbolic name that you can assign to a target on the Unity. The public alias is seen by some iSCSI initiators; it can help you identify the target. You can change a target's public alias at any time.

Create an iSCSI Target			Ø
	1 Properties	2 Verify Settings	
Storage Pool:			
Pool1	•		
Public Alias:	IQN:		
ISCSITargot7	ign.1999-02.com.nexsan: mast	ternst:pool1:1	

Figure 1-2: Create an iSCSI target wizard, Step 1: Specifying properties

▶ To specify the Storage Pool, IQN and public alias for the iSCSI target:

- 1. Select an available pool from the Storage Pool list.
- 2. Type a public alias for the target in the **Public alias** text box. The public alias can contain up to a maximum of 16 characters, and it must start with an (upper-case or lower-case) alphabetic character; with the exception of the underscore (_), hyphen (-), and period (.), the public alias can only contain alphanumeric characters.
- 3. Type a unique ID in the text box next to the **IQN**: field. The ID must start with an (upper-case or lower-case) alphabetic or numeric character; spaces are not allowed.
- 4. Once you specify the IQN and public alias for the target, click **Next** to continue to <u>Step 2: Verifying</u> settings below to <u>Step 3: Viewing results</u> on the next page.

Step 2: Verifying settings

Step 2 of the Create an iSCSI target wizard prompts you to verify your settings before you create the target...

Figure 1-3: Create an iSCSI target wizard: Verifying Settings

	0	2	3	
	Properties	Verify Settings		
to a specific step. Storage Pool: Public Alias:	Pool1 ISCSITarget7			
IQN:	iqn.1999-02.com.nexsan:masterns	t:pool1:1		

To verify settings for the target:

- 1. Review your settings from the wizard step 1.
- 2. Do one of the following:
 - a. Click **Previous** to make changes.
 - b. Click Create to begin the creation process. See Step 3: Viewing results below

Step 3: Viewing results

The last step of the Create an iSCSI target wizard displays progress as Unity creates the new iSCSI target.

- To view more details for an error event:
- Click the **View Error** link next to the error in the **Results** panel.

Figure 1-4: Create an iSCSI target wizard, Step 3: Viewing progress

create an iSCSI Target				G
	0 Properties	2 Verify Settings	3 Results	
pplying settings:		50% COMPLETE		
Configuration of iSCSI Target "ISCSITarget7" completed				SUCCESSFUL 🥥
Pofraching Unity				IN PROGRESS

Unity informs you when it successfully creates the target. It also asks you if you want to create another target in the storage pool:

Create an iSCSI Target			Ø
The iSCSI Target was created successfully!	Storage Pool: Pool1	ion: iqn.1999- 02.com.nexsan:masternst:pool1:1	
Do you want to create another iSCSI YES, I want to start a new wizard	Target? No, I'm finished		

Connecting to an iSCSI LUN from Windows

Use this section for instructions about connecting to an iSCSI LUN from a Windows-based initiator.

Notes:

- The procedures provided here are specific to Microsoft Windows 7; the process for connecting to an iSCSI LUN on Unity may differ depending on the version of Windows you are initiating the connection from.
- In addition, some iterations of Microsoft Windows, such as Windows XP, do not come pre-installed with Microsoft's iSCSI Initiator. You may have to download Microsoft's iSCSI Initiator, and then install and configure it before connecting to an iSCSI LUN on Unity.

Step 1: Connect the iSCSI LUN from a Microsoft Windows-based initiator

- 1. On the Windows system from where you want to connect to an iSCSI LUN on Unity, select **Start** > **Search**, and type **iSCSI**.
- 2. In Programs, click iSCSI Initiator.
- 3. If this is the first time you are launching Microsoft iSCSI Initiator, you receive a prompt that says the Microsoft iSCSI service is not running. Click **Yes** to start the service.
- 4. The Microsoft iSCSI Initiator Properties dialog box opens, and the **Targets** tab displays. Click the **Discovery** tab.
- 5. To add Unity as a target portal, click **Discover Portal**.
- 6. In the Discover Portal dialog box, type the virtual IP address of the Pool Resource Group where the LUN exists.
- 7. Select the discovered targets (LUNs) that you want to connect to and click **Connect**. The initiator adds the iSCSI LUN to Windows.
- 8. Click Done.
- 9. Click **OK** to close the Microsoft iSCSI Initiator Properties dialog box.

You must now initialize the LUN on the Windows system and add it as a disk volume to the system.

- Step 2: Initialize the LUN
- 1. Click Start > Search, type Disk Management
- 2. In Programs, click Disk Management.
- 3. *Disk Management* starts and informs you that a new disk has been found; it also instructs you to initialize the new disk before you use it. Click **OK** to initialize the new disk.
- 4. The new disk is displayed in Storage Manager as Disk 1 (although this designation may vary depending on the configuration of your system. The new disk is identified as **Online**, but **Unallocated**. To allocate the disk, right-click the disk and select **New Simple Volume**.
- 5. In the New Simple Volume wizard, you define how much disk space to allocate to the volume and you specify its drive letter.
- 6. Specify the disk space to allocate to the new simple volume, and then click Next.
- 7. Specify the drive letter to assign to the volume, and then click Next.
- 8. Format the volume using NTFS, and then click **Next**.
- 9. Disk Management prompts you to confirm the settings. Click **Finish** to continue.

10. Disk Management formats the volume and once the format process completes, it displays a new Healthy (Primary Partition) formatted with NTFS.

You can access the new volume as you would a hard disk attached locally to the system.

Discovering your LUNs with the Windows iSCSI Initiator

Before you can manage LUN snapshots using Unity's VSS Hardware Provider, you must discover the LUNs you created on Unity from the Windows Server host. These LUNs will appear as new disks in Windows *Disk Management* and *Explorer*.

The VSS Hardware Provider connects to a storage pool's Management target via iSCSI to view, create, and manage snapshots of all LUNs in the storage pool. To discover the Management target, you must first enable the VSS feature in Unity; see Enabling the Microsoft VSS client for LUNs on page 94.

You can discover Unity targets using the **Targets** tab or the **Discovery** tab of the Windows iSCSI Initiator Properties dialog box.

• To discover the LUNs using the Targets tab:

- 1. On the Windows server, select **Start > All Programs > iSCSI Initiator**.
- 2. In the **Target** field, type the Management virtual IP address of Unity.

Figure 1-5: iSCSI Initiator—Targets tab

uick Connect To discover and log on to a target using a basic connection,	type th	e IP address or
)NS name of the target and then click Quick Connect.		
arget:		Quick Connect
iscovered targets		
		<u>R</u> efresh
Name	Statu	IS
o connect using advanced options, select a target and the	n	Connect
o connect using advanced options, select a target and the lick Connect.	n .	Connect
o connect using advanced options, select a target and ther lick Connect. o completely disconnect a target, select the target and hen click Disconnect.	n	Co <u>n</u> nect Disconnect
o connect using advanced options, select a target and the lick Connect. o completely disconnect a target, select the target and hen click Disconnect. or target properties, including configuration of sessions,	n	Connect Disconnect
o connect using advanced options, select a target and the lick Connect. o completely disconnect a target, select the target and hen click Disconnect. or target properties, including configuration of sessions, elect the target and click Properties.	n	Cognect Disconnect Properties
To connect using advanced options, select a target and the dick Connect. To completely disconnect a target, select the target and hen click Disconnect. For target properties, including configuration of sessions, delect the target and click Properties.	n .	Co <u>n</u> nect Disconnect Properties
To connect using advanced options, select a target and the lick Connect. To completely disconnect a target, select the target and hen click Disconnect. For target properties, including configuration of sessions, select the target and click Properties. For configuration of devices associated with a target, select he target and then click Devices.	n .	Cognect Disconnect Properties Deyjces
To connect using advanced options, select a target and the dick Connect. To completely disconnect a target, select the target and hen click Disconnect. For target properties, including configuration of sessions, select the target and click Properties. For configuration of devices associated with a target, select he target and then click Devices.	n	Connect Disconnect Properties Devices
To connect using advanced options, select a target and ther lick Connect. To completely disconnect a target, select the target and hen click Disconnect. For target properties, including configuration of sessions, select the target and click Properties. For configuration of devices associated with a target, select he target and then click Devices.	n .	Cognect Disconnect Properties Devices
To connect using advanced options, select a target and the dick Connect. To completely disconnect a target, select the target and hen click Disconnect. For target properties, including configuration of sessions, select the target and click Properties. For configuration of devices associated with a target, select he target and then click Devices.	n .	Connect Disconnect Properties Devices

3. Click **Quick Connect**. The discovered targets appear in the list.

Figure 1-6: iSCSI Initiator—Targets tab: Discovering targets

Connect	
argets that are available for connection at the IP addre rovided are listed below. If multiple targets are availab o each target individually.	ess or DNS name that you le, you need to connect
onnections made here will be added to the list of Favor o restore them will be made every time this computer re	ite Targets and an attemp estarts.
Discovered targets	
Name	Status
ign.1999-02.com.nexsan:es200070-001:p1:mgmt	Connected
Progress report	

- 4. Click **Done** to close the Quick Connect dialog box.
- 5. The discovered target appears in the list. Click **OK** to exit the iSCSI Initiator.
- **•** To discover the LUNs using the Discovery tab:
- 1. On the Windows server, select **Start > All Programs > iSCSI Initiator**.
- 2. Select the **Discovery** tab.

3. Click Discover Portal.

Address	JUNTUR Targets	on following portals:	Refresh
Address	Port	Adapter	IP address
<ip address=""></ip>	3260	Default	Default
<ip address=""></ip>	3260	Default	Default
To add a target (oortal, click Disc	over Portal.	Discover <u>P</u> ortal
To remove a targ then click Remov	get portal, selec e.	t the address above and	<u>R</u> emove
Name			
To add an iSNS s	erver, click Add	Server.	A <u>d</u> d Server
To add an iSNS s To remove an iSf then click Remov	erver, click Add VS server, selec e.	Server. t the server above and	A <u>d</u> d Server Re <u>m</u> ove

Figure 1-7: iSCSI Initiator—Discovery tab

4. In the IP Address or DNS Name field, type the Management virtual IP address of Unity and click OK.

Figure 1-8: iSCSI Initiator—Discovery tab: Discovering targets

Discover Target Portal	×
Enter the IP address or DNS name and p want to add.	ort number of the portal you
To change the default settings of the dis the Advanced button.	covery of the target portal, click
IP address or DNS name:	Port: (Default is 3260.)
<u>A</u> dvanced	QK <u>C</u> ancel

5. The discovered targets appears in the list. Click **OK** to exit the iSCSI Initiator.

Related topics:

Configuring the LUNs in Disk Management on page 29

1

Adding a CHAP user to the Management target

When you add a storage pool to Unity, the system assigns the storage pool a Management (mgmt) target, by default.

Unity's VSS Hardware Provider connects to a storage pool's Management target via iSCSI to view, create, and manage snapshots of all LUNs in the storage pool. Unlike a non-management target, the properties for the Management target are read-only; you cannot change any of the system-assigned properties for this target. You can, however, set a CHAP user for the Management target, in order to restrict access to LUN snapshots in a storage pool to specific VSS hosts.

See Creating CHAP users in the Unity Software User Guide or Unity Online Help.

Configuring the LUNs in Disk Management

After discovering your LUNs with the Windows iSCSI Initiator, the LUNs appear as new disks, which you need to initialize and configure before you can use them.

b To initialize and configure disks in *Disk Management*:

1. Open Disk Management. The discovered targets appear as Offline and Unallocated.

This example shows two new disks, *Disk 4* and *Disk 5*, that correspond to two LUNs using the same iSCSI target on Unity.

Figure 1-9: Discovered targets in Disk Management

Disk Management	: Volume	e List +	Graphical Viev	v				
Volume	Layout	Туре	File System	Status	Capacity	Free Space	% Free	F.
📾 (C:)	Simple	Basic	NTFS	Healthy (Boot, Page File, Crash Dump, Primary Partition)	418.90 GB	348.24 GB	83 %	N
Boy (E:)	Simple	Basic	NTFS	Healthy (Primary Partition)	1862.90 GB	28.71 GB	2%	N
📾 data (F:)	Simple	Basic	NTFS	Healthy (Primary Partition)	419.00 GB	118.88 GB	28 %	N
System Reserved	Simple	Basic	NTFS	Healthy (System, Active, Primary Partition)	100 MB	72 MB	72 %	N
•								Þ
Disk 1 Basic 419.00 GB Online	data (F 419.00 G Healthy (:) B NTFS Primary	Partition)					
Disk 2 Basic 1862.90 GB Online	Boy (E:) 1862.90 Healthy () GB NTF: Primary	5 · Partition)					
Disk 3 Basic 2048.00 GB Online	2048.00 Unallocat	GB ed						
GDisk 4 Unknown 1.00 GB Offline i Help	2048.00 Unallocat	GB ed						
GDisk 5 Unknown 1.00 GB Offline (i Help	2048.00 Unallocat	GB ed						
CD-ROM 0	Primary	partit	ion					⊡

- 2. Right-click a disk on the left-hand side and select **Online**. The status changes to *Not Initialized* and *Online*.
- 3. Right-click the same disk on the left-hand side and select **Initialize Disk**.
 - For disks bigger than 2 TB, select GPT (GUID Partition Table).
 - For disks smaller than 2 TB, leave the default option set to MBR (Master Boot Record).

The status changes to *Basic*.

- 4. Right-click the initialized disk on the right-hand side. The context menu offers new options; select **New Simple Volume**.
- 5. Follow these steps in the New Simple Volume wizard:
 - a. Assign a volume size.
 - b. Assign a drive letter or mount the volume in an empty NTFS folder.
 - c. Format the volume as NTFS.
 - d. Give it a meaningful name.
 - e. Perform a quick format.
- 6. The volume appears as *Healthy* and displays your configuration settings.

Figure 1-10: Configured volume in Disk Management



7. Repeat steps 2 to 5 for each discovered target disk.

8. Right-click a volume. The Properties dialog box displays a new tab called **Nexsan Unity** with the disk details, such as the pool name, Controller ID, and GUID.

Note The Properties panel will also display the Nexsan Unity tab when opened from Explorer.

🦻 FinanceQC (I	K:) Properties		2
General T Previous Vers	ools Hardware sions Quota	Sharing Sec Nexsan NST app	urity Shadow Copies oliance Customize
Volume Inform Pool Name:	mation FinancePool1	Volume Name:	FinanceQC
Site Name:	resetSite	Site Model:	NST5000
Controller:	ES260786-176-02	Site Serial #:	ES260786-176
GUID:	6000402E50000007	7AFB8ACA87CD478	82
Click on Displa	y Snapshots to retriev	e the list of snapsho	its.
Snapshot Nar	ne	Creation Time	Mount Point
Manage Snaj	pshot v Crea	ate Snapshot	Display Snapshots
Group Config	juration		About
		nk l r	Cancel Applu

Figure 1-11: Disk Properties-Nexsan Unity tab

Fibre Channel recommendations

When using Fibre Channel LUNs with Unity you must set the MPIO settings.

Registry entry	Definition
PDORemovePeriod	This setting controls the amount of time (in seconds) that the multipath pseudo-LUN will continue to remain in system memory, even after losing all paths to the device.
	When this timer value is exceeded, pending I/O operations are failed. The failure is then exposed to the application, rather than attempting to continue to recover active paths.
PathRecoveryInterval	The PathRecoveryInterval setting specifies the amount of time (in seconds) the MPIO component waits before retrying a lost path.
UseCustomPathRecoveryInterval	The UseCustomPathRecoveryInterval setting allows the use of the PathRecoveryInterval if it is available and set to 1.

- **•** To configure the following Microsoft MPIO settings on the Hyper-V host server:
- 1. Navigate to the following registry key:
 - HKEY LOCAL MACHINE\SYSTEM\CurrentControlSet\Services\mpio\Parameters
- 2. Set these values to the following entries:
 - PDORemovePeriod to 90
 - PathRecoveryInterval to 40
 - UseCustomPathRecoveryInterval to 1
- 3. Reboot the server.

Note These are the recommended MPIO hotfixes for Windows Server 2012 (not R2 version) KB2867201, KB2889784, KB2869606, KB2779768.

Chapter 2

Configuring Multipathing

This section provides specific recommendations and instructions for configuring multipathing for a Windows host.

Multipath connectivity's main purpose is to provide redundant access to the storage devices, that is, to have access to the storage device when one or more of the components in a path fails. Another advantage of multipathing is the increased throughput by way of load balancing. This provides redundancy and maximum performance.

To allow multipathing for Unity LUNs on Windows hosts, you must first configure Unity in the MPIO Device Manager, and then discover your LUNs with the MPIO feature enabled.

Notes: Multipathing on Unity can only be done using MPIO. MSIO is not supported.

This section includes these topics:

Configuring MPIO Device manager	. 26
Configuring the LUNs in Disk Management	. 29
Configuring Windows iSCSI Initiator settings	32
iSCSI LUNs	32
Fibre Channel LUNs	33

Configuring MPIO Device manager

Note When connecting your LUNs to Windows hosts using the Multipathing I/O (MPIO) feature, you must enter the Unity Vendor and Product names for the LUN to be assigned as a multipath disk exactly as described in the procedure to configure MPIO.

To configure MPIO:

- 1. From the Windows Server host, select **Start > MPIO Configuration**.
- 2. By default, the MPIO Devices tab is open. Click Add.

Figure 2-1: Starting the MPIO Device Manager

MPIO Properties
MPIO Devices Discover Multi-Paths DSM Install Configuration Snapshot
To add support for a new device, click Add and enter the Vendor and Product Ids as a string of 8 characters followed by 16 characters. Multiple Devices can be specified using semi-colon as the delimiter. To remove support for currently MPIO'd devices, select the devices and then click Remove.
Devices:
Device Hardware Id
NEXSAN NESTOS
Add Remove
OK Cancel

- 3. In the Device Hardware ID box:
 - a. Enter the Unity Vendor and Product names for the LUN to be assigned as a multipath disk in this format:
 - The Vendor format is "Nexsan"
 - "Nexsan" followed by 2 spaces, for a total of 8 characters.
 - The Product format for the [[[Undefined variable Unity.NST4000 short]]] is "NestOS
 - "NestOS" followed by 10 spaces, for a total of 16 characters.
 - The Product format for the NST5000 is "NST5000
 - "NST5000" followed by 9 spaces, for a total of 16 characters.
 - The Product format for the [[[Undefined variable Unity.NST6000 short]]] is "NestOS
 - "NestOS" followed by 10 spaces, for a total of 16 characters.

Note The Vendor and Product names are case-sensitive.

b. Click OK.

Figure 2-2: Adding a device to MPIO support

Add MPIO Support	×
Enter the Vendor and Product Ids (as 16 characters) of the devices you wa	a string of 8 characters followed by nt to add MPIO support for.
Device Hardware ID:	
	OK Cancel

- 4. Reboot the windows machine.
- To discover LUNs with MPIO enabled:
- 1. On the Windows server, select Start > All Programs > iSCSI Initiator.
- 2. In the Target field, type the IP address of Unity.
- 3. Click Connect.

- 4. When the Connect To Target dialog box opens, select the **Enable multi-path** option and click **OK**.
 - 1. Figure 2-3: Enabling multipathing when discovering LUNs

iSCSI Initiato	or Properties	<
Targets Di Quick Coni To discove DNS name	iscovery Favorite Targets Volumes and Devices RADIUS Configuration	
Target:	172.21.156.192 Quick Connect	
Discover	Connect To Target	Ì
Name	Target name: iqn.1999-02.com.nexsan:es156190-001;test1;mgmt	
iqn.199 iqn.199 iqn.199	 Add this connection to the list of Favorite Targets. This will make the system automatically attempt to restore the connection every time this computer restarts. Enable multi-path 	
	Advanced OK Cancel	
To connec click Conn To comple then click	et using advanced options, select a target and then Connect ect. etely disconnect a target, select the target and Disconnect	
For target select the	t properties, including configuration of sessions, Properties	
For config the target	uration of devices associated with a target, select	
More about	t basic iSCSI connections and targets	
	OK Cancel Apply	

- 5. Click **OK** to exit the iSCSI Initiator.
- 6. Verify that both LUNs appear as disks on the Windows host; to configure the disks in *Disk Management*, see Configuring the LUNs in Disk Management on the facing page.

Configuring the LUNs in Disk Management

After discovering your LUNs with the Windows iSCSI Initiator, the LUNs appear as new disks, which you need to initialize and configure before you can use them.

b To initialize and configure disks in *Disk Management*:

1. Open Disk Management. The discovered targets appear as Offline and Unallocated.

This example shows two new disks, *Disk 4* and *Disk 5*, that correspond to two LUNs using the same iSCSI target on Unity.

Figure 2-4: Discovered targets in Disk Management

Disk Management	: Volume	e List +	Graphical Viev	Ŷ				
Volume	Layout	Туре	File System	Status	Capacity	Free Space	% Free	F.
💼 (C:)	Simple	Basic	NTFS	Healthy (Boot, Page File, Crash Dump, Primary Partition)	418.90 GB	348.24 GB	83 %	N
Boy (E:)	Simple	Basic	NTFS	Healthy (Primary Partition)	1862.90 GB	28.71 GB	2 %	N
📾 data (F:)	Simple	Basic	NTFS	Healthy (Primary Partition)	419.00 GB	118.88 GB	28 %	N
📼 System Reserved	Simple	Basic	NTFS	Healthy (System, Active, Primary Partition)	100 MB	72 MB	72 %	N
•]		Þ
Disk 1 Basic 419.00 GB Online	data (F 419.00 G Healthy (:) B NTFS Primary	Partition)					
Basic 1862.90 GB Online	Boy (E:) 1862.90 Healthy () GB NTF: Primary	5 Partition)					
Basic 2048.00 GB	2048.00	GB						
Online -	Unallocat	ed		-1				
Disk 4 Unknown 1.00 GB Offline D	2048.00 Unallocat	GB ed						
GDisk 5 Unknown 1.00 GB Offline 1 Help	2048.00 Unallocat	GB ed						
CD-ROM 0	Primary	partit	ion					⊡

- 2. Right-click a disk on the left-hand side and select **Online**. The status changes to *Not Initialized* and *Online*.
- 3. Right-click the same disk on the left-hand side and select **Initialize Disk**.
 - For disks bigger than 2 TB, select GPT (GUID Partition Table).
 - For disks smaller than 2 TB, leave the default option set to MBR (Master Boot Record).

The status changes to *Basic*.

- 4. Right-click the initialized disk on the right-hand side. The context menu offers new options; select **New Simple Volume**.
- 5. Follow these steps in the New Simple Volume wizard:
 - a. Assign a volume size.
 - b. Assign a drive letter or mount the volume in an empty NTFS folder.
 - c. Format the volume as NTFS.
 - d. Give it a meaningful name.
 - e. Perform a quick format.
- 6. The volume appears as *Healthy* and displays your configuration settings.

Figure 2-5: Configured volume in Disk Management



7. Repeat steps 2 to 5 for each discovered target disk.

8. Right-click a volume. The Properties dialog box displays a new tab called **Nexsan Unity** with the disk details, such as the pool name, Controller ID, and GUID.

Note The Properties panel will also display the Nexsan Unity tab when opened from Explorer.

🛷 FinanceQC (I	K:) Properties		×				
General T Previous Vers	ools Hardware ions Quota	Sharing Sec Nexsan NST app	urity Shadow Copies bliance Customize				
Pool Name:	mation FinancePool1	Volume Name:	FinanceQC				
Site Name:	resetSite	Site Model:	NST5000				
Controller:	ES260786-176-02	Site Serial #:	ES260786-176				
GUID:	6000402E50000007	AFB8ACA87CD478	32				
Click on Displa	y Snapshots to retrieve	the list of snapsho	ts.				
Snapshot Nar	ne	Creation Time	Mount Point				
Manage Spanshot V Create Spanshot Display Spanshots							
Group Config	juration	te Shapshot	About				
		ок (с	Cancel Apply				

Figure 2-6: Disk Properties—Nexsan Unity tab

Configuring Windows iSCSI Initiator settings

In firmware releases prior to 2.2, with multiple iSCSI LUNs connected to a single Microsoft Cluster host, deleting a large VHD (Virtual Hard Disk) from the host system may cause it to lose connection to iSCSI LUNs on the corresponding Unity.

This issue is due to small time-out values for two Windows iSCSI Initiator registry parameters on the Microsoft Cluster host. We strongly recommend that you increase the time-out values for these parameters.

iSCSI LUNs

On the Microsoft Cluster host, modify Windows iSCSI Initiator settings in the system registry as described below.

► To configure Windows iSCSI Initiator for iSCSI LUNs:

- 1. Click Start and select Run.
- 2. In the Run dialog box, type regedit, and click OK.
- 3. Navigate to the following registry key:

HKEY LOCAL MACHINE\SYSTEM\CurrentControlSet

- 4. With the CurrentControlSet key selected, open the Edit menu and select Find.
- 5. Type MaxRequestHoldTime, and click Find.
- 6. Set the MaxRequestHoldTime parameter to 300 seconds (5 minutes).

This is the maximum time (in seconds) for which requests will be queued if connection to the target is lost and the connection is being retried. After this hold period, requests fail with an error and device (disk) will be removed from the system.



7. Set the LinkDownTime parameter to **35**. This value determines how long requests will be held in the device queue and retried if the connection to the target is lost.

Fibre Channel LUNs

For Windows hosts using MPIO (mostly for Fibre Channel LUNs), it is recommended to set these registry settings to the values mentioned below.

- <u>PDORemovePeriod</u>: This setting controls the amount of time (in seconds) that the multipath LUN will continue to remain in system memory, even after losing all paths to the device. When this timer value is exceeded, pending I/O operations will fail, and the failure is exposed to the application rather than attempting to continue to recover active paths.
- <u>PathRecoveryInterval</u>: This setting specifies how long (in seconds) the MPIO component waits before retrying a lost path.
- <u>UseCustomPathRecoveryInterval</u>: If this key exists and is set to 1, it allows the use of PathRecoveryInterval.
- Recommended MPIO hot fixes for Windows Server:
- Windows Server 2008 R2 SP1: KB2871163, KB2851144, KB2754704, KB2684681, KB2406705, KB2522766, KB2670762, KB2718576
- Windows Server 2012 R1: KB2867201, KB2889784, KB2869606, KB2779768
- **b** To configure Windows iSCSI Initiator for Fibre Channel LUNs:
- 1. Start the registry editor by selecting Start > Run and typing regedit.
- 2. Navigate to the following registry key:

HKEY LOCAL MACHINE\SYSTEM\CurrentControlSet\Services\mpio\Parameters

- 3. Set new values to these entries:
 - a. Set the PDORemovePeriod parameter to 90.
 - b. Set the PathRecoveryInterval parameter to 30.
 - c. Set the UseCustomPathRecoveryInterval parameter to 1.

2

Chapter 3

Setting up Hyper-V

This section provides specific recommendations and requirements to help you prepare for integrating Unity in a Microsoft Hyper-V 2012 R2 environment.

This section includes these topics:

Network recommendations	36
IP network infrastructure	36
Storage configuration recommendations	37
Block/record size requirements	37
When to disable Thin Provisioning	37
When to use Thin Provisioning	37
Using Unity snapshots	37
Enabling jumbo frames using the nxadmin CLI	38
Microsoft Hyper-V 2012 R2 recommendations	39
Setting up Unity for Hyper-V	51

Network recommendations

To ensure that the network configuration where the iSCSI traffic will run has been designed to achieve high availability and no single point of failure:

- Isolate the storage traffic from other networking traffic. You can configure this utilizing VLAN, network segmentation, or dedicated switches for iSCSI traffic only.
- On Unity, configure at least two physical 10GbE (dual-port) NICs per head, bundled into a single channel using the IEEE 802.3ad Link Aggregation Control Protocol (LACP) with a large maximum transmission unit (MTU) and jumbo frames (9000 bytes). If you are working with a cluster configuration, configure at least two 10GbE (dual-port) NICs per head, and also use an IP network multipathing (IPMP) configuration in combination with LACP.
- With IPMP configuration you will achieve network high availability, and with link aggregation you will obtain a better network performance. These two technologies complement each other and can be deployed together to provide benefits for network performance and availability for virtual environments.
- For picking an outbound port based on source and IP addresses, use LACP L3.
- For switch communication mode, use the LACP active mode, which will send and receive LACP messages to negotiate connections and monitor the link status.

IP network infrastructure

It is recommended to use 10GbE IP switches with all interfaces working in 10GbE speed in full duplex mode, with MTU (jumbo frame) and Link Aggregation Control Protocol (LACP).

Note Some Ethernet switches support a newer technology called virtual port-channel. This technology is a supported solution and also provides more redundancy of network paths as well as better performance and bandwidth for your virtualized environment.

IP network recommendations:

- On the Microsoft Hyper-V hosts, ensure that there is at least one dual 10GbE NIC working with 9000 MTU jumbo frame.
- Use at least two physical IP network switches.
- Ensure that there is, at minimum, a link aggregation of two or more 10GbE NICs attached with a physical IP network switch, configured and working with port-channel group or virtual port-channel technologies.
- Ensure that the 10GbE IP network is properly configured and working with high availability and load balancing (without point of failure).
- Ensure that the physical IP switches or routers are not congested or saturated.
- Ensure that the storage network provides adequate throughout as well as low latency between initiators and targets.
- Isolate the traffic through different VLANs or even network segmentation.
Storage configuration recommendations

For the storage configuration, typically any virtualization application is sensitive to available IOPS from the storage system. Be sure to plan and configure Unity accordingly. Please refer to the *Unity Performance Best Practices Guide* for more detailed information about how to optimize Unity.

Block/record size requirements

LUNs have a default block size of 8 KB. This is the default choice for transactional workloads. Large-block streaming workloads require a higher block size, such as 128 KB, to obtain better streaming read performance. It is typically recommended to set the Unity LUN block size to match what your application uses.

Note LUN block size cannot be modified once a LUN is created.

File Systems have a default record size of 128 KB. However, this record size is somewhat dynamic and Unity will write in smaller blocks if the application would seem to benefit from it. It is not recommended to change the default record size of file systems except in very specific circumstances where the application is database-driven and the database record size is precisely known.

Note File system record size can be modified at any time.

When to disable Thin Provisioning

It is recommended to use fixed size VHDX disks type in a production environment to increase disk throughput. Differencing and Dynamic disks are not recommended for production, due to increased disk read/write latency times (differencing/dynamic disks).

It is recommended to set up Thick Provisioned LUNs on Unity to increase performance and limit increased fragmentation of the Hyper-V NTFS file system.

When to use Thin Provisioning

Using Thin Provisioning is recommended if your data is replicated on LUNs. Thin provisioning and dynamically expanding VHDX disks can offer significant disk capacity savings and can be used when performance is not critical. If you need to convert Thick Provisioned LUNs to use Thin Provisioning, contact Nexsan Technical Support for assistance.

Using Unity snapshots

For LUNs or file systems hosted on Hyper-V, you must perform specific steps when creating snapshots and rolling back data to these snapshots. Please refer to the *Unity User Guide* and *Unity Performance Best Practices Guide* for detailed information on snapshot procedures. If the procedures are not followed correctly, data loss may occur.

Enabling jumbo frames using the nxadmin CLI

Enabling jumbo frames on the Unity Storage System can significantly increase network throughput while consuming fewer CPU cycles on the system.

Before you begin:

- You must make sure to enable jumbo frames on the switch(es) that the Unity Storage System is connected to, as well as on all client systems that access it.
- You must make sure that the 10 GigE interface is set as the primary interface (nx0) on the Unity Storage System (for example: ixgbe1, ixgbe2, etc.).
- Enabling jumbo frames over the network will cause disconnection. Perform these steps through a KVM or IPMI console. Client systems and applications on the network will temporarily lose connection to the Unity Storage System during the reboot and switchover operations. Make sure that client systems with an active connection to any file systems on the Unity Storage System are disconnected; also make sure to quiesce any applications with an active connection to the Unity Storage System.
- We recommend that IPMI settings be configured for the Unity Storage System if you are connected to the Unity Storage System with a system on a separate management network.

b To enable jumbo frames on the Unity Storage System:

- 1. Access the nxadmin CLI.
- 2. Type this command to set the MTU for the nx0 interface to 9000 bytes (jumbo frames) and press Enter: nic set-linkprop -p mtu=9000 nx0
- 3. Repeat these steps for any other network interfaces on the Unity Storage System (such as, nx1); for example:

```
nic set-linkprop -p mtu=9000 nx1
```

- 4. Restart the system or the controller node:
 - a. Type menu and press Enter.
 - b. When the NestOS Admin Menu displays, type **2** (Shutdown and Reboot Menu), and press Enter.
 - c. Type **1**, and press Enter. The system or controller node reboots; this process may take some time to complete.
- 5. Once the system or controller node reboots, test and confirm network connectivity to the Unity Storage System.
- 6. Repeat these steps on the second controller node after you transition cluster resources back to the node you finished configuring.

Troubleshooting LACP

b To detect that LACP is enabled on the switches and not on the Unity Storage System:

- Verify that LACP is enabled on the switches as passive or active; see <u>Enabling LACP using the nxadmin</u> <u>CLI on page 53</u>.
- Verify the Unity Storage System network interface LACP status.

▶ To verify the network interface LACP status:

1. At the command: prompt, type:

nic show-aggr -L

2. Press Enter.

You will see similar results as displayed below when the protocol is up.

ES200100-001	1-02:P:/> nic	show-aggr -L					
LINK	PORT	AGGREGATABLE	SYNC	COLL	DIST	DEFAULTED	EXPIRED
nx0	ixgbe2	yes	yes	yes	Yes	no	no
	ixgbe3	yes	yes	yes	yes	no	no
private0	ixgbe0	yes	yes	yes	yes	no	no
	ixgbe1	yes	yes	yes	yes	no	no
nx99	igb0	yes	no	no	no	no	no

Microsoft Hyper-V 2012 R2 recommendations

The following requirements are specifically for use with Unity.

Network configurations

- ▶ To set network protocols on the dedicated iSCSI storage network card:
- 1. Open the Networking tab in the iSCSI properties dialog box. Uncheck all Networking protocols with the exception of:
 - Manufacturers protocol (if applicable)
 - Internet Protocol Version 4
- 2. Unbind other protocols.



iSCSI-1 Properties
Networking Sharing
Connect using:
Intel(R) 82575EB Gigabit Network Connection
Configure
This connection uses the following items:
QoS Packet Scheduler
Hyper-V Extensible Virtual Switch
Microsoft Network Adapter Multiplexor Protocol
Link-Layer Topology Discovery Mapper I/O Driver
Link-Layer Topology Discovery Responder
Internet Protocol Version 6 (TCP/IPv6)
Internet Protocol Version 4 (ICP/IPv4) ✓
Install Uninstall Properties
Description
Allows your computer to access resources on a Microsoft network.
OK Cancel

- To disable DNS Registration on the dedicated iSCSI storage network card:
- 1. Open the Advanced TCP/IP Settings dialog box.
- 2. Uncheck the option Register this connection's addresses in DNS.

Figure 3-2: Disabling DNS registration

	iSCSI-1 Properties
Network	ing Sharing
q	
	Advanced TCP/IP Settings
	IP Settings DNS WINS
	DNS server addresses, in order of use:
	t
	3
	Add Edit Remove
	The following three settings are applied to all connections with TCP/IP
	enabled. For resolution of unqualified names:
	Append primary and connection specific DNS suffixes
	Append parent suffixes of the primary DNS suffix
	Append these DNS suffixes (in order):
	t
	3
	Add Edit Remove
-11	DNS suffix for this connection:
L L	Register this connection's addresses in DNS
	Use this connection's DNS suffix in DNS registration
	OK Cancel

b To set jumbo frames on the dedicated iSCSI storage network card:

Note As network cards may vary, please refer to the network card manufacturer for details on setting up jumbo frames.

Below is an example of setting up jumbo frames in the Gigabit Network Connection Properties dialog box.

Intel(R) 82575EB Gigabit Net	twork Connection Propert
General Advanced Driver Deta	Is Events Power Management
The following properties are availabl the property you want to change on on the right.	e for this network adapter. Click the left, and then select its value
Property:	Value:
Row Control Gigabit Master Slave Mode Interrupt Moderation Interrupt Moderation Rate IPv4 Checksum Offload Jumbo Packet Large Send Offload V2 (IPv4) Large Send Offload V2 (IPv6) Locally Administered Address Log Link State Event Maximum number of RSS Processo Maximum Number of RSS Queues Maximum RSS Processor Number Packet Priority & VLAN	> 9014 Bytes ✓
	OK Cancel

Figure 3-3: Setting jumbo frames on the dedicated iSCSI storage network card

b To set power management on the dedicated iSCSI storage network card:

Note As network cards may vary, please refer to the network card manufacturer for details on configuring the Power Management settings.

1. In the Gigabit Network Connection Properties dialog box, uncheck the option Allow the computer to turn off this device to save power.



Figure 3-4: Setting power management

Modifying the Microsoft iSCSI Initiator settings:

This section provides information related to the following registry entries.

Registry entry	Definition
MaxRequestHoldTime	Maximum time (in seconds) for which requests will be queued if connection to the target is lost and the connection is being retried. After this hold period, request will be failed with "error no device" and device (disk) will be removed form the system.
LinkDownTime	This value determines how long requests will be held in the device queue and retried if the connection to the target is lost.

To configure the following settings on the Hyper-V host server:

- Navigate to the following registry key: HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet
- 2. With CurrentControlSet selected, click on the Edit menu and select Find.
- 3. Type in "MaxRequestHoldTime" and select Find.
- 4. Set MaxRequestHoldTime to 300 seconds (5 mins) (decimal).
- 5. Set LinkDownTime to 45 (decimal).

Tuning the TCPAckFrequency:

Modify the TCP/IP settings for the network interfaces carrying iSCSI traffic to immediately acknowledge income TCP segments.

Note These TCP/IP settings should not be modified for network interfaces not carrying iSCSI traffic as the increased acknowledgment traffic may negatively affect other applications.

- **b** To configure the following settings on the Hyper-V host server:
- 1. Navigate to the following registry key:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Tcpip\Parameters
\Interfaces\<InterfaceGUID>
```

- 2. Select the key of the dedicated iSCSI network interfaces(s).
- 3. Set TcpAckFrequency to 1 (decimal).
 - Default value: 200 (milliseconds)
 - Recommended value: 1 (millisecond)
- 4. Reboot the server.

Using VHDX for virtual disks

New disks should use the VHDX format. Disks created in earlier Hyper-V iterations should be converted to VHDX, unless there is a need to move the VHD back to a 2008 Hyper-V host.

The VHDX format offers:

- Virtual hard disk storage capacity of up to 64 TB.
- Improved protection against data corruption during power failures (by logging updates to the VHDX metadata structures).
- Improved alignment of the virtual hard disk format to work well on large sector disks.

Note Use of the VHDX format for virtual disks is the default for Microsoft 2012 R2.

• To choose the VHDX disk format and type:

- 1. Open the New Virtual Hard Disk wizard dialog box.
- 2. Continue to the Choose Disk Format page. Select the VHDX option.

Figure 3-5: VHDX format for virtual disks

2	New Virtual Hard Disk Wizard
Choose Disk	Format
Before You Begin Choose Disk Format Choose Disk Type Specify Name and Location Configure Disk Summary	 What format do you want to use for the virtual hard disk? VHD Supports virtual hard disks up to 2,040 GB in size. VHDX This format supports virtual disks up to 64 TB and is resilient to consistency issues that might occur from power failures. This format is not supported in operating systems earlier than Windows Server 2012.
	< Previous Next > Finish Cancel

3. Continue to the Choose Disk Type page. Select the Fixed size option.

Note Disks type should be fixed size in a production environment to increase disk throughput. Differencing and Dynamic disks are not recommended for production due to increased disk read/write latency times (differencing/dynamic disks).

2	New Virtual Hard Disk Wizard	x
Choose Disk	Туре	
Before You Begin Choose Disk Type Specify Name and Location Configure Disk Summary	 What type of virtual hard disk do you want to create? Fixed size This type of disk provides better performance and is recommended for servers running applical with high levels of disk activity. The virtual hard disk file that is created initially uses the size of virtual hard disk and does not change when data is deleted or added. Dynamically expanding This type of disk provides better use of physical storage space and is recommended for server running applications that are not disk intensive. The virtual hard disk file that is created is small initially and changes as data is added. Differencing This type of disk is associated in a parent-child relationship with another disk that you want to leave intact. You can make changes to the data or operating system without affecting the parent disk, so that you can revert the changes easily. All children must have the same virtual hard disk format as the parent (VHD or VHDX).	ions the s ent sk
	< Previous Next > Finish Cance	!

Using virtual disks for CSV

Disks used for CSV (Cluster Shared Volumes) must be partitioned with NTFS. Do not use a disk for a CSV that is formatted with FAT, FAT32, or Resilient File System (ReFS).

The recommended minimum free space on CSV volumes containing Hyper-V virtual machine VHD and/or VHDX files is:

- 15% free space, if the partition size is less than 1TB.
- 10% free space, if the partition size is between 1TB and 5TB.
- 5% free space, if the partition size is greater than 5TB.

Do not use a shared VHDX file for the operating system disk. Servers should have a unique VHDX (for the OS) that only they can access. Shared Virtual Hard Disks are better used as data disks and for the disk witness.

Note OFFLOADED DATA TRANSFER (ODX) is not currently supported on Unity.

Virtual Machine recommendations In this section:

Specifying the generation of the virtual machine	
Ensuring the virtual machine has the correct partition alignment	48
Disabling File Last Access Time check	
Optimizing OS performance with enlightened I/O guests	
Installing Integration Services on Microsoft Hyper-V VMs	
Configuring the virtual machine disks I/O timeout	

Specifying the generation of the virtual machine

Guest virtual machines (VMs) should be configured to use UEFI firmware at startup (Gen-2 guests), which offers better virtual driver support and performance than BIOS (Gen-1 guests) at startup.

- To specify the VM generation:
- 1. Open the New Virtual Machine wizard.
- 2. Continue to the Specify Generation page. Select the generation 2 option.

Figure 3-7	Specifying	generation
------------	------------	------------

b	New Virtual Machine Wizard	X
Specify Gene	eration	
Before You Begin Specify Name and Location Specify Generation Assign Memory Configure Networking Connect Virtual Hard Disk Installation Options Summary	 Choose the generation of this virtual machine. Generation 1 This virtual machine generation provides the same virtual hardware to the virtual machine as in previous versions of Hyper-V. Generation 2 This virtual machine generation provides support for features such as Secure Boot, SCSI boot, PXE boot using a standard network adapter. Guest operating systems must be running at least Windows Server 2012 or 64-bit versions of Windows 8. Once a virtual machine has been created, you cannot change its generation.	and
	< Previous Next > Finish Cancel	

Ensuring the virtual machine has the correct partition alignment

- If the guest operating system is Windows Vista, Windows 7, Windows Server 2008 or Windows Server 2008 R2 and the partitions were created using one of these operating systems, they will be aligned.
- Partitions created with Windows Server 2003 and Windows XP will have the default starting offset 32,256 bytes (31.5 KB) and will be misaligned. Refer to Microsoft KB929491 to create aligned partitions.

Disabling File Last Access Time check

- On newer Windows clients (Vista and newer) and servers (2008 and newer) the "last-access" time updates is disabled by default.
- If running Windows 2003 or earlier guest operating systems on Hyper-V, it is recommended that file "lastaccessed" be disabled to help optimize disk performance.

To disable file "last-access" time:

1. Navigate to the following registry key:

HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\FileSystem

- 2. Create a new DWORD value in the right-hand pane named NtfsDisableLastAccessUpdate and give it a value of 1.
 - Default value: 0
 - Recommended value: 1
- 3. Reboot the virtual machine.

Optimizing OS performance with enlightened I/O guests

The operating system kernel in Windows clients (Vista SP1 and newer) and Windows Server (2008 and newer) includes feature "enlightenments" that optimize OS performance when the OS is installed as a Hyper-V guest. An enlightened guest means that the OS is virtualization-aware to some degree. The enlightenments work by decreasing the amount of CPU overhead required when an OS is running as a Hyper-V guest VM. For optimal guest VM OS performance, Windows Server 2008 or newer is recommended.

Installing Integration Services on Microsoft Hyper-V VMs

The installation of Integration Services should be performed after the guest operating system loads for the first time.

- 1. Launch the Virtual Machine Connection application from within the Hyper-V Manager console to connect to the guest operating system. Log in with an account that has administrative privileges.
- 2. You can then select the Insert Integration Services Setup Disk option from the Action menu.



Figure 3-8: Installing Integration Services

Configuring the virtual machine disks I/O timeout

Configuring the VM disks I/O timeout helps the guest operating system survive high latency, or temporary outage conditions such as path failover or network failure.

To configure I/O timeout with Microsoft OS:

1. Navigate to the following registry key:

HKEY LOCAL MACHINE\System\CurrentControlSet\Services\Disk

- Create or modify the DWORD value in the right-hand pane named TimeOutValue and give it a value of 180.
 - Default value: 60 (seconds)
 - Recommended value: 180 (seconds)
- 3. Reboot the virtual machine.

► To configure I/O timeout with Linux OS:

- 1. cat /sys/block/<disk>/device/timeout
- 2. Set to 180
 - Default value: 60 (seconds)
 - Recommended value: 180 (seconds)

Setting up Unity for Hyper-V

Perform the following tasks to use Unity in a Hyper-V 2012 R2 environment. Be sure to review all Hyper-V recommendations and requirements prior to starting. See <u>Microsoft Hyper-V 2012 R2 recommendations on page 39</u>.

This section includes the following topics:

Enabling LACP below

Enabling jumbo frames using the nxadmin CLI on page 38

Adding a storage pool on page 54

Creating a LUN on page 69

Adding a file system on page 57

Enabling LACP

LACP (Link Aggregation Control Protocol) allows multiple individual Ethernet links to be aggregated together to form a single logical channel. LACP allows a network device to negotiate an automatic bundling of links by sending LACP packets to the peer (directly connected device that also implements LACP).

LACP is typically used for two purposes:

- 1. <u>Load balancing</u>: bundling two or more links together provides increased throughput and a level of load balancing for when the speed of individual Ethernet lines is limited.
- 2. <u>Redundancy</u>: links in a LACP aggregation provide an automatic fallback should one of the links fail, providing enhanced resilience. All traffic is routed from the failed link to the remaining links.

The Unity Storage System supports both active and passive LACP modes:

- <u>Active mode</u>: places a port into an active negotiating state in which the port initiates negotiations with other ports by sending LACP packets.
- <u>Passive mode</u>: places a port into a passive negotiating state in which the port responds to LACP packets that it receives but does not initiate LACP packet negotiation.

This section explains how to enable and configure LACP on the Unity Storage System.

Understanding link aggregation

Link aggregation does NOT work by passing packets across all the links in an aggregate group in a roundrobin fashion. When a packet arrives, LACP calculates the source and destination address hash (which can be L2, L3, or L4 policies, with L4 being the default), and automatically assigns any given source-destination pair to one of the links in the aggregate. As a result, a single TCP connection can never achieve speeds surpassing the throughput of a single link.

For example, while you might aggregate 4x 1Gbps links into a single aggregate, you'll never get more than 1Gbps in any single data transfer. Even in the case of multiple sessions at the same time from multiple clients, 50/50 load balancing is almost never achieved in real-life implementations; around 70/30 is more common.

For more information about LACP, see:

http://en.wikipedia.org/wiki/Link_aggregation

Requirements and guidelines for implementing LACP

This section lists network and infrastructure requirements for implementing LACP, as well as guidelines/best practices for configuring the Ethernet switches for LACP.

3

- LACP only operates point-to-point between two partner devices connected together: for example, the Unity Storage System and the Ethernet switches.
- LACP must be enabled at both ends of the link to be operational. Refer to the Ethernet switch manufacturer's documentation for information on setting up LACP on the Ethernet switches.
- The link between the Unity Storage System and the Ethernet switch(es) must be Full-Duplex.
- Both the Unity Storage System and the Ethernet switches must be running at the same speed (1Gbps or 10Gbps).
- The Ethernet switches must support the IEEE 802.3ad Link Aggregation Standard.
- To prevent a single point-of failure in your configuration, make sure to connect each controller node to a different Ethernet switch, as explained in "Understanding network aggregation" in the *Network Configuration Guide*.

Enabling LACP using the nxadmin CLI

The Unity Storage System provides the nic command in the Unity Storage System's menu-based nxadmin CLI for enabling and monitoring LACP on the Unity Storage System.

Before you begin:

- Enabling LACP over the network will cause disconnection. Perform these steps through KVM console, or through IPMI console.
- You must not enable LACP on nx99 otherwise you will lock yourself out of the system.



CAUTION: On a clustered system, you must enable LACP on each controller node individually. Before you enable LACP on a controller node, however, you must transition any Pool Resource Groups and/or the System Management component to the second controller in the system. You must then repeat this process to enable LACP on the second controller.

• To enable and configure LACP on the Unity Storage System:

- 1. Access the nxadmin CLI.
- 2. When the NestOS Admin Menu displays, type 5 (Run a Command), and then press Enter.
- 3. At the command: prompt, type one of these command to enable LACP on the Unity Storage System, in either active or passive mode:
 - Active mode:

nic modify-aggr -L active nx0

Where $n \ge 0$ represents the primary interface on the Unity Storage System. You can also enable LACP on the secondary interface, if available: to enable LACP on the secondary interface, replace $n \ge 0$ with $n \ge 1$.

Passive mode:

```
nic modify-aggr -L passive nx0
```

Where $n \ge 0$ represents the primary interface on the Unity Storage System. You can also enable LACP on the secondary interface, if available: to enable LACP on the secondary interface, replace $n \ge 0$ with $n \ge 1$.

- 4. Press Enter. The Unity Storage System disconnects from the network.
- 5. Configure the Ethernet switch to set the ports that you want to combine into a logical channel. The Unity Storage System comes back online once LACP negotiation is complete.
- 6. Test and confirm network connectivity to the Unity Storage System.

Adding a storage pool

Unity provides the Create a Storage Pool wizard to guide you through the process of creating a storage pool.

Before you begin

If your Unity deployment is set up to use Unity authentication, consider adding user accounts to the system that you can then assign as Pool Administrators to the storage pool. You may also want to add user accounts for file system-level access; you can then configure the relevant access permissions when you create file systems.

How to allocate storage with Unity

- Take into account the number of file systems and/or LUNs that you need per storage pool, and divide the disk space in the storage pool accordingly. When allocating disk space, keep in mind that metadata and snapshots also consume storage.
- Consider future capacity requirements, particularly when allocating space usage to file systems and LUNs.
- You are not required to allocate all available volumes to the storage pool when you initially create the pool. However, keep in mind that any unallocated volumes remain unused on the system until you allocate them to the storage pool.
- Consider how you intend to expose file systems on the system: using (to Windows-based systems), (to UNIX/Linux-based systems), or using both sharing.
- Consider the users and groups that will access the file systems, as well as the file systems-level access permissions that you need to give each user and/or group.
- If your deployment includes the Unity Data Replication package, make sure the remote Unity that you
 intend to use as your replication site has adequate storage capacity to match the capacity on the primary
 site.
- If your deployment includes the Data Replication and/or Snapshots features, make sure there is enough storage capacity for both replicated data and scheduled snapshots of your data.
- If your deployment includes Nexsan storage enclosures attached externally to your Unity, make sure the system(s) is properly connected to Unity and that it is powered on.
- If your environment is set up as a many-to-one configuration, you cannot create a storage pool if the Disaster Recovery site is down or unreachable. This is to ensure uniqueness of storage pool names across all sites.

- To create a storage pool:
- 1. On the **Unity navigation bar**, click **Storage > Storage Pools**.
- 2. In the Storage Pools panel, click Add Storage Pool. The Create a Storage Pool wizard opens.
- 3. In the Available listing, select a storage system or volume and click Allocate.

Figure 3-9: Create a Storage Pool: Properties

	1 Properties	Verify Settings Results	
rage Pool Name:	Resource Group:		
312	Pool Resource Group	■ 1 (<ip address="">)</ip>	
cate and remove storage systems	or individual volumes to the new pool by clicking the a		PENALE
cate and remove storage systems i	or individual volumes to the new pool by clicking the a	Assigned to Pool2	REMOVE
cate and remove storage systems i	or individual volumes to the new pool by clicking the a	ASSIGNED TO POOL2	REMOVE
cate and remove storage systems a	or individual volumes to the new pool by clicking the a	ASSIGNED TO POOL2	REMOVE &- REMOVE C REMOVE C REMOVE
pcate and remove storage systems (or individual volumes to the new pool by clicking the a	ASSIGNED TO POOL2 	REMOVE

- 4. Optionally, change either of the following:
 - a. the Storage Pool name.
 - b. the **Resource Group** that you want to assign the storage pool to.

Click the Next button.

- If the new pool has FASTier drives, specify whether they should be used for READ or WRITE (see "Assigning FASTier devices," below). Click the Next button.
- 6. Verify your settings and click the **Create** button.

Next steps

After the pool is created, these are typical follow-on tasks:

- Creating another storage pool
- Adding a file system on page 57
- Creating a LUN on page 69

Assigning FASTier cache devices:

- You assign a read/write cache device as either read cache OR write cache.
- Unity only uses read cache devices once the RAM cache on the system is full. Read cache devices are filled only as files are read. This means that Unity uses read caching only on the second file access.

• Write-only cache devices aggregate smaller writes in one large write. They are particularly useful for many small, synchronous writes. Asynchronous writes will see no improvement.

For more information about FASTier cache devices, please contact your Nexsan reseller or Nexsan Support Representative.

Adding a file system

Unity provides the Create a File System wizard to guide you through the process of file system setup.

Before you begin

Planning the content, size, and distribution of file systems on Unity can improve performance, manageability, and overall ease-of-use of the system.

You should carefully choose the contents of a file system to avoid two common pitfalls: having too many file systems of a very specific nature, or having very few file systems of a general nature. For example, file systems for general use are easier to set up in the beginning, but can cause problems later. A better approach is to create separate file systems with a specific purpose or group of users in mind.

However, creating too many file systems also has its drawbacks. For example, it is much more efficient to create a *home* file system rather than creating separate file systems for each user's home directory. See Home Directories.

In general, by keeping the number of file systems and other resources low, the performance of Unity is optimized.

Before you add file systems to a storage pool on Unity, review these guidelines:

- Take into account the number of file systems that you need per storage pool, and divide the disk space in the storage pool accordingly. When allocating disk space, keep in mind that file system metadata and snapshots also consume storage.
- Consider future capacity requirements, particularly when allocating space usage to file system.
- Consider how you intend to expose file systems: either CIFS sharing, NFS sharing, FTP sharing (Nexsan Unity authentication only), or CIFS and/or NFS and/or FTP sharing.
- Consider the users and groups that will access the file systems as well as the share-level access permissions that you need to give each user and group.
- If your environment is set up as a many-to-one configuration, you cannot create a file system if the Disaster Recovery site is down or unreachable. This is to ensure uniqueness of file system names across all sites.

Step 1: Setting the file system name and storage pool

- To assign a file system name and storage pool:
- 1. On the **Unity navigation bar**, select **Storage > File Systems**.
- 2. Click Add File System. The Create a File System wizard opens.

Figure 3-10: Step 1: Naming the File System and choosing the pool

Create a File System				
Properties	2 Space Configuration	3 Access Protocol	4 Data Protection	5 Configure the Archive
File System Name:	Storage Pool:			
FiloSystem5	Pool1			

3. You can accept or change the:

a. File System Name

b. **Storage Pool** assignment, if more than one storage pool exists. Select which pool you want to assign to the file system to.

Click the Next button.

Step 2: Configuring space settings

In this step, configure reserved space, quota, and record size.

<u> </u>	0 4 4	01	~ /	~	
⊦ıgure	3-11	: Step	2:3	Space	settings

Properties	Space Configuration	Access Protocol	Data Protection	Co	onfigure the	Archive
Reserved Space:				0	MB 👻	/ 587.59 M
luota:						
Quota: Unlimited <i>(Space Usa</i>	ge is unlimited, and Space Usage Alerts	will be disabled.)			MR -	/ 502 00 M
Quota: Unlimited <i>(Space Usa</i> ou can reserve all available of eplication.	ge is unlimited, and Space Usage Alerts disk space for the file system as needed	will be disabled.) except for the last 6.31 MB. This s	pace may be required for syst	593.90 em-related o	MB 💌	/ 593.90 M uch as data
Quota: Unlimited <i>(Space Usa</i> You can reserve all available of eplication. <i>Vote: This space automatical</i> You CANNOT set a quota sma	ge is unlimited, and Space Usage Alerts disk space for the file system as needed ly becomes available in the event that th ller than the reserved space on the file s	will be disabled.) except for the last 6.31 MB. This s here is no more disk space reservat system.	pace may be required for syste on available in the storage po	593.90 em-related o vol.	MB 💌	/ 593.90 M uch as data
Quota: Unlimited <i>(Space Usa</i> You can reserve all available of eplication. <i>Note: This space automatical</i> You CANNOT set a quota sma Record Size:	ge is unlimited, and Space Usage Alerts disk space for the file system as needed ly becomes available in the event that th Iller than the reserved space on the file s	will be disabled.) except for the last 6.31 MB. This s here is no more disk space reservat system. Data Compre	pace may be required for syst ion available in the storage po ession:	593.90 em-related o ool.	MB -	/ 593.90 M uch as data
2uota: Unlimited <i>(Space Usa</i> /ou can reserve all available of eplication. <i>Vote: This space automatical</i> /ou CANNOT set a quota sma /ecord Size:	ge is unlimited, and Space Usage Alerts disk space for the file system as needed ly becomes available in the event that th iller than the reserved space on the file :	will be disabled.) except for the last 6.31 MB. This s ere is no more disk space reservat system. Data Compre	pace may be required for syst on available in the storage po ession: e data compression	593.90 em-related o	MB –	/ 593.90 N uch as data

► To configure space settings:

1. In the wizard step 2 **Space Configuration** panel, you can specify:

Setting	Description
Reserved Space	You can reserve a set amount of disk space in the storage pool for the exclusive use of the file system. (Read more)
	If you add another file system to the storage pool, the space available to the new file system is the difference of the total disk space in the storage pool minus any reservations set aside for other Unity file systems. For example, in a storage pool with two file systems and 10 TB of available disk space, if a reservation of 6 TB is allocated to one file system, then the second file system has 4 TB of available disk space. To reserve space for the file system in the storage pool:

Setting	Description
	 Move the slider left or right to set the desired amount of reserved space,
	Or
	 Enter a value in the box to the right of the slider.
	Note To increase reserved space when you are using a limited quota, you must first
	increase the quota.
Quota	A usage quota allows Unity to dynamically expand a file system's storage capacity. (Read more)
	You can reserve all available disk space for the file system, if needed, except for the last 6.31 MB, which space may be required for system-related operations, such as data replication. Note: This space automatically becomes available in the event that there is no more disk space reservation available in the storage pool.)
	To specify the file system quota:
	1. Click the Quota C button.
	2. Do one of the following:
	 Move the Quota slider left or right to decrease or increase the quota limit.
	 Enter a value in the box to the right of the slider.
Record Size	Use this setting if you want to optimize for database applications that have specific file sizes. It defines the suggested size of each data block used by the File System. (Read more)
	File system record size is dynamic and Unity can write in smaller blocks for applications requiring a different record size. It is not recommended to change the default file systems record size except where the application is database-driven and the database record size is precisely known.
	File systems have a default record size of 128 KB, which is the maximum size.
Data Compression	CAUTION: If you turn on data compression for a file system, and then you turn it off before you set up replication for the file system, part of the data is compressed and the other part is not. Since the file system has not been replicated yet, the compression settings are not inherited and data compression is off at the remote site.
	If you set a space quota on the file system and that quota is almost full, the file system on the remote site will not have enough space to accommodate data coming from the primary file system.
	As a result, replication will fail.
	Perform one of these actions before replication:
	 Increase the quota to match the actual space used by data on the file system.
	• Set the quota to <i>Unlimited</i> .
	 Enable data compression on both sites.

Setting	Description
	You can enable/disable compression at the file system level.
	Compression allows for better performance of the File Systems or LUNs, since the files to read/write are much smaller. However, it will also increase CPU usage. Compression can be enabled or disabled at any time.
	This setting takes precedence over the settings defined at the storage pool level. If you enabled data compression at the pool level before creating this file system, the file system already has data compression enabled. If you choose to disable data compression on the file system, only that file system will be affected.
	Compression allows for better performance of the file system since the files to read/write are much smaller. However, it will also increase CPU usage. Compression can be enabled/disabled at any time.
	Notes:
	 When you set up replication for file systems that have the compression setting enabled, file systems on the remote site inherit the compression settings.
	• Enabling or disabling data compression does not affect existing data. It will only affect data that will be written to the file system after the change.

2. Click the Next button.

Note <u>Step 3: Configuring the access protocol on the next page</u> is only displayed if your Unity deployment includes Unity's Data Protection feature. For more information about Snapshots and Data Replication, please contact your Nexsan reseller or Nexsan Support Representative.

Step 3: Configuring the access protocol

Now select the Access Protocol for the file system.

- A file system that you expose using the CIFS sharing method can also be accessed by UNIX/Linux-based systems using a CIFS client implementation for UNIX (such as, *Samba*).
- A file system that you expose using the NFS sharing method can also be accessed by Windows-based systems using an NFS client implementation for Windows (available in *Microsoft Services for UNIX*)
- You cannot expose a file system to Windows-based systems over the CIFS protocol if Unity is connected to an LDAP Directory service; the CIFS sharing option is not available in LDAP Directory service implementations.
- If you configured LDAP Directory service as the user authentication mode for Unity: exposing a file system over the CIFS protocol in an LDAP environment is only supported with anonymous read and/or anonymous read/write access enabled for the share.
- A file system that you expose using the FTP sharing method can be accessed by UNIX/Linux-based and Windows-based systems using the FTP protocol. FTP sharing is only supported for Nexsan Unity authentication. It must be enabled at the site level beforehand.
- If the file system will be accessed over IIS, do not enable case-sensitivity for the share.

Figure 3-12: Step 3: Configuring the access method

•				
Properties	Space Configuration	Access Protocol	Data Protection	Configure the Archi
Set the file sharing protocol that	the Unity Storage System will use to	expose this File System on the ne	twork.	
CIFS Access: 👔				
Share permissions are set to an	onymous access for all users.			
Enable CIFS				
_				
NFS Access: 🥡				
Access is controlled by file syste	em permissions.			
Enable NFS				
Access is controlled by file syste	m normissions			
Enable FTP	яп реплазіона.			

To configure the access protocol:

• Choose any of the following:

Now select the Access Protocol for the file system.

- A file system that you expose using the CIFS sharing method can also be accessed by UNIX/Linux-based systems using a CIFS client implementation for UNIX (such as, *Samba*).
- A file system that you expose using the NFS sharing method can also be accessed by Windows-based systems using an NFS client implementation for Windows (available in *Microsoft Services for UNIX*)
- You cannot expose a file system to Windows-based systems over the CIFS protocol if Unity is connected to an LDAP Directory service; the CIFS sharing option is not available in LDAP Directory service implementations.
- If you configured LDAP Directory service as the user authentication mode for Unity: exposing a file system over the CIFS protocol in an LDAP environment is only supported with anonymous read and/or anonymous read/write access enabled for the share.
- A file system that you expose using the FTP sharing method can be accessed by UNIX/Linux-based and Windows-based systems using the FTP protocol. FTP sharing is only supported for Nexsan Unity authentication. It must be enabled at the site level beforehand.
- If the file system will be accessed over IIS, do not enable case-sensitivity for the share.

Step 4: Configuring Data Protection

Now you need to enable:

- Replication
- Snapshots scheduling

To enable replication for a file system, you need a second Unity Storage System that you can connect the current system to.

Figure 3-13: Step 4: Setting Replication and Snapshots scheduling

eate a File System				
1 Properties	2 Space Configuration	3 Access Protocol	4 Data Protection	5 Configure the Archive
eplication				
Enable Replication				
napshots				
Enable snapshot schedu	ling			
Recur every: 1	Day(s) - At: 12:00 AM			
Keep a limited r	umber of auto-snapshots			
Keep 7	auto-snapshots			
Enable auto-del	etion of snapshots			
The Unity Stora Advanced Settir	ge System will automatically start dele ngs panel.)	ting snapshots when the storage	pool is 80% full. (This threshold i	s configured on the Storage Pool

To configure data protection for the file system:

- 1. If your Unity System is connected to a remote Unity System and has replication set up, select **Enable Replication**.
- 2. Optionally, select **Enable snapshot scheduling**. By default, automatic snapshots are enabled every day at midnight and a limit of seven snapshots are maintained.
- 3. Adjust the schedule for auto-snapshots to be taken, according to your requirements. You can change the number, frequency and time of day.
- 4. Specify the maximum number of auto-snapshots to be retained.
- 5. Enable auto deletion of snapshots if you want Unity to delete snapshots when the storage pool is 80% full. The threshold is configured on the **Storage Pool Advanced Settings** page.
- 6. Click the Next button.

Step 5: Configuring Active Archive

If you have **Unity Active Archive** configured, this step of the **Add File System** wizard prompts you to select the **Archive Settings** for the file system.

This step only appears if you have Unity Active Archive on this Unity Storage System. Unity Active Archive enables you to set data retention policies to automatically offload stale data and release primary storage. This in turn enables increase the performance of your primary storage without increasing its size.

Archiving allows you to retain data, using Nexsan's Assureon archiving capabilities.

• To configure Active Archive settings:

1. Select the Enable Active Archive button

Figure 3-14: Step 5: Enable Active Archive

Create a File System						
1 Properties	Space	2 Configuration	3 Access Protocol	4 Data Protection	5 Configure the Archive	
Enable Active Archive						
Assureon Server Settings		Archive File Original				
Archive organization:	.	-Default-	-			
Retention Rule:	•	Access Classification		Action After Archiving:	•	
T8U0avs						

2. The following Active Archive settings are the settings on Assureon Server by which data from your file system will be archived. The options that appear here are defined on the Assureon Server.

Table 3-1:	Assureon	Server	Settings
------------	----------	--------	----------

Setting	Description
Archive Organization	Select the Assureon organization to be used for archiving. An organization is a group of one or more file systems which share retention rules, access classifications, and reports.
Archive File System	Select the file system in the Archive Organization to be used for archiving. A file system consists of a database, storage location (the stores), manifest and audit files as well as replication options. Think of it as a self-contained archive that shares properties with the other file systems within an organization.
Retention Rule	Select the retention rule to be used for data archived from this file system. Retention rules specify how long a file is kept under management. The default is 180 days, but the range is from 90 days to 99 years.
Access Classification	Select the access classification to be used for data archived from this file system. When a file is placed under Assureon management, it is stored using classification and sub classification information. Classifications enable you to control access to files. They also provide an intuitive way to search, audit, and dispose of files.
Action After Archiving	Define what is to happen to files once they have been archived: Shortcut , Leave , or Remove . Note Files will not be converted to shortcuts, or removed if asynchronous replication is enabled.
Sync	 Archive Files Performs a complete archive of the file system, either manually or on a schedule. This feature does not affect Real Time Archiving. Archive Folder Security Performs a complete archive of the file system's folder security, either manually or following a schedule. This does not affect Real-Time archiving.
Real-Time	 Archive Files Performs a persistent and ongoing archive of files, as changes are detected. Files are checked and archived if necessary every minute. Archive Folder Security Performs a persistent and ongoing archive of folder security, as changes are detected. Files are checked and archived if necessary every minute.

3. Click the **Next** button.

Step 6: Verifying settings

Now you review the summary of your settings carefully before applying the configuration settings.

To review your settings:

- 1. Review the summary of the settings shown on screen.
- 2. To revise any of your settings, you can click **Previous** to go back.

OR

3. Click any of the step numbers at the top of the panel to jump to that section of the wizard. For example, if you want to change **Properties**, click:

1 Properties

4. When you are ready to proceed, click **Create**.

The wizard displays file system creation progress as it applies your settings.

Now you can Add another file system or click No, I'm finished.

Step 7: Viewing results

In this step, the wizard displays results as Unity creates the new File System.

Figure 3-15: File System wizard: Viewing configuration results

Access Protocol	Data Protection	Configure the Archive	Verify Settings	Results
lying settings:				
		71% COMPLETE		
onfiguration of File System FileSy	stem5 completed			SUCCESSFUL
onfiguration of CIFS sharing comp	bleted			SUCCESSFUL
onfiguration of NFS sharing comp	leted			SUCCESSFUL
onfiguration of snapshot schedule	e completed			SUCCESSFUL
onfiguration of file system replica	ition completed			SUCCESSFUL
onfiguring file system archiving				IN PROGRESS .
efresh Unity				

The wizard displays error events that the system encounters during the creation process. You can view more details about an error event by expanding the corresponding entry.

- To view more details for an error event:
- Click the **View Error** link corresponding to the error event.

Unity informs you when it successfully creates the File System. It also asks you if you want to create another File System in the storage pool.

Creating a LUN

This section describes the process for adding a LUN to a storage pool on Unity, including guidelines for LUN management, and steps for setting up CHAP (Challenge Handshake Authentication Protocol) authentication. You add a LUN to a storage pool using the Create a LUN wizard; before starting the Create a LUN wizard, review the guidelines provided in the subsequent sections.

Note If you select the option to create a new iSCSI target during the LUN creation process (*step 1*), the Create a LUN wizard includes 7 steps. This section only describes the process for adding a LUN using the default, or an existing target. Unity provides the Target Setup wizard to guide you through the process for adding a target to a storage pool; for more information, see <u>Adding an iSCSI target on page 12</u>.

Before you begin:

- If you intend to use CHAP (Challenge Handshake Authentication Protocol) authentication, you must add CHAP users to the Unity System.
- You can add one or more iSCSI targets to storage pools where you intend to add LUNs. You can create a separate target for each LUN or assign multiple LUNs to a single target; see <u>Adding an iSCSI target on page 12</u>.
- If your environment is set up as a many-to-one configuration, you cannot create a LUN if the Disaster Recovery site is down or unreachable. This is to ensure uniqueness of LUN names across all sites.

The Create a LUN wizard guides you through the process of adding a LUN to a storage pool.

Prerequisites

To add a LUN, you must first define a storage pool.

- ▶ To start the Create a LUN wizard:
- 1. On the **Unity navigation bar**, select **LUNs**.
- 2. Click Add LUN.

This section includes these steps:

Step 1: Setting the LUN name and block size on the next page

Step 2: Space configuration settings for the LUN on page 71

Step 3: Enabling data replication and snapshot scheduling on page 73

Step 4: LUN Masking on page 74

Step 6: Verifying settings on page 76

Step 7: Viewing progress on page 78

Step 1: Setting the LUN name and block size

This step of the Create a LUN wizard prompts you to specify a name for the new LUN, set block size, as well as define client-specific (initiators) settings.

Create a LUN							8
	1 Properties	2 Space Configuration	3 Data Protection	G Lun Masking	S Verify Settings	6 Results	
LUN Name: LUNFourthFloor		Storage Pool1	Pool:				
LUN Block Size Adjust the block-size for the LUN, if ne Block size: 32 KB • Note: The LUN's block size cannot be r	eeded. To ensure optimal modified once the LUN ha	I/O performance, set the LUN's blocks is been created.	ize to the same value as the typic	al I/O blocksize of the host applica	ation.		
LUN Read Caching: If this LUN will be integrated as part o Exchange Logs, Oracle OLTP Logs, or S	of an online transaction pr IQL Logs.	ocessing (OLTP) workload, we recomm	nend that you disable read cachin) for the LUN. Disabling read cach	ing will ensure optimal performance i	n these situations. Examples of OLTP ap	plications include

Figure 3-16: Create a LUN wizard, Step 1: Setting the LUN name and block size

To define the LUN:

1. Type a name for the LUN in the LUN Name field.

The name must start with an (upper-case or lower-case) alphabetic; and, with the exception of the underscore (_), hyphen (-), and period (.), the name can only contain alphanumeric characters, without spaces.

These characters are NOT allowed:

 $'' / \setminus [] : ; | = , + * ? < >$

Note If your environment is set up as a many-to-one configuration, LUN names must be unique across all sites.

2. In the LUN Blocksize section, adjust the block size for the LUN, if needed.

To ensure optimal I/O performance, set the LUN's block size to the same value as the typical I/O block size of the host application. Aligning the volume block size to the typical I/O block size from the application can significantly improve application performance.

Table 3-2: Recommended block size for the application used

Application / Data type	Recommended block size
Windows / Linux Boot	64 KB
Microsoft Exchange 2010 DB	32 KB
Microsoft Exchange 2010 Log	128 KB
Oracle OLTP	8 KB
SQL Server	64 KB
Video Streaming	128 KB

Notes:

- You CANNOT modify the LUN's block size once the LUN is created.
- The maximum block size for Unity is 128 KB.
- 3. (Optionally) Disable read caching for the LUN. For database OLTP LUNs, we recommend to disable read caching to increase performance.
- 4. Click Next to continue.

Step 2: Space configuration settings for the LUN

This step of the Create a LUN wizard prompts you to specify space usage settings for the LUN.

Note If you are using data replication, Nexsan recommends using thin-provisioned LUNs.

This table illustrates how Unity distributes disk space to LUNs for a storage pool of 10 TB.

Table 3-3: Distribution of disk space to LUNs

Space usage softings	Total available space in storage pool: 10 TB			
Space usage settings	LUN 0 (Thin-provisioned)	LUN 1 (Thick-provisioned)		
Reservation	4 TB	6 TB		
Virtual volume size	20 TB	N/A		
Physical capacity	4 TB	6 TB		
Virtual volume size as seen by initiators	20 TB	6 TB		

Properties	2 Space Configuration	3 Data Protection	4 Lun Masking	5 Verify Settings	B Results
Create a Thin-provision LUN		Create a Thick-provision LUN			
UN Size: I GB - / 65,536 0	βB	LUN Size:			
eservation: 28 MB / 28.78 M 	В				

Figure 3-17: Create a LUN wizard, Step 2: Space configuration

► To configure space usage for the LUN:

1. To use the **Thin Provisioning** feature (enabled by default): Accept or update the **LUN Size** value. This determines the disk space that clients see when they connect to the LUN.

Notes:

- Once you set the virtual volume size for a LUN, you cannot decrease it; however, you can increase it at any time.
- The virtual volume size cannot be less than the reserved space.
- You cannot switch to Thick Provisioning after the LUN is created.
- 2. Specify the **Reservation** space for the LUN in the storage pool. This space will be reserved for the exclusive use of the LUN.

When you reserve space for a LUN, Unity allocates the specified amount of disk space in the storage pool to the LUN. If you add another LUN to the storage pool, the space available to the new LUN is the difference of the total disk space in the storage pool minus any reservations that you set for other LUNs on the system.

For example, in a storage pool with 2 LUNs and 10 TB of available disk space, if a reservation of 6 TB is allocated to one LUN, then the second LUN has 4 TB of disk space available to it.
3. Optionally, select Create a Thick-provisioned LUN.

Accept the default **LUN size**, or enter a value to change it. Thick Provisioning will use the specified amount of physical disk space.

Notes:

- The Unity graphical user interfaces do not support switching from thick to thin LUN provisioning after a LUN is created. Contact Nexsan Support if you need to perform a conversion.
- Once you set the minimum volume size for a LUN, you cannot decrease it; however, you can increase it as needed.
- If you intend to use snapshots with a Thick-provisioned LUN, keep in mind that each snapshot consumes disk space equivalent to the total size of the snapshot, so please make sure to plan your space consumption requirements accordingly.

For LUNs hosted in a VMware environment, we recommend using Thick-provisioned LUNs.

4. Click the **Next** button to continue.

Step 3: Enabling data replication and snapshot scheduling

This step of the Create a LUN wizard prompts you to enable data replication for the LUN, if data replication with one or more remote sites is configured for the storage pool, and also to configure the snapshots schedule and auto-deletion settings for snapshots.

Limitations

- We do not recommend enabling snapshots scheduling when using LUNs in a Hyper-V environment. You can take manual snapshots and roll back data to a snapshot.
- We do not recommend enabling snapshot scheduling when using LUNs in a VMware environment. To take manual snapshots and roll back data to a snapshot for VMware, see the VMware Best Practices Guide on the Nexsan Unity Documentation & Online Help page.

Properties	2 Snace Configuration	3 Data Protection	4 Lun Masking	5 Vorify Settings	
Topentes	opace configuration	Data Hotection		Verity Settings	
ication					
Enable Replication					
oshots					
) Enable snapshot scheduli	ng				
Recur Every: 1	Day(s) - At: 12:00 AM				
🚺 Keep a limited nu	mber of auto-snapshots				
Keep 7	auto-snapshots				

Figure 3-18: Create a LUN wizard: Replication and snapshots

To enable data replication for the LUN:

- 1. Select **Enable Replication**. This option is disabled if you have not yet configured data replication for the storage pool. If you enable this option, Unity replicates the LUN to the remote site during the next scheduled data replication.
- 2. If you don't need to enable snapshot scheduling, click **Next** on the wizard panel to continue.

► To configure snapshot scheduling for the LUN:

Note There can only be one snapshot schedule per LUN.

- 1. Configure the snapshot schedule for the LUN:
 - a. Select **Enable snapshot scheduling**. This option is selected by default. Clearing the check box disables snapshot scheduling.
 - b. Specify a recurrence pattern for the schedule by typing a value in the **Recur every** field; then, select the recurrence period from the drop-down list: **Minutes(s)**, **Hour(s)**, **Day(s)**, **Week(s)**, or **Month(s)**.
 - For example, if you want Unity to take a snapshot every two hours, type 2 in the **Recur every** field and select **Hour(s)** from the recurrence type drop-down list.
 - If you select **Week(s)** from the recurrence type drop-down list, then select the day or days of the week that you want Unity to take automatic snapshots on.
 - If you select **Month(s)**, then select the month or months of the year, as well as the calendar dates that you want Unity to take automatic snapshots on.
- 2. Select **Enable the auto-deletion of snapshots** if you want Unity to automatically delete scheduled snapshots for the LUN when the storage pool is 80% full. Unity deletes snapshots—starting with the oldest automatic snapshot on the system—until used disk space capacity in the storage pool falls below the 80% threshold. Unity does not delete manual snapshots when you enable this option; only scheduled automatic snapshots are processed.
- 3. Click Next to continue.

Step 4: LUN Masking

This step of the Create a LUN wizard prompts you to select a LUN Mask. A LUN Mask enables you to make a LUN accessible to hosts through the selected Target(s). You can use an existing LUN Mask or create a new one. Unity has two types of LUN Masks, one for Fibre Channel and the other one for iSCSI for each storage pool.

Note If the system is replicated, you must also create a LUN Mask on the replicated site for the LUN to be accessible when a failover occurs.

To select a Mask:

- 1. Select one of these options:
 - Use pre-defined Fibre Channel LUN Mask: This mask includes the common, unique Fibre Channel target.
 - Use pre-defined iSCSI LUN Mask: This mask contains all iSCSI targets and is accessible to all hosts.
 - Use an existing LUN Mask: If you previously created one or more LUN Masks, they will display in the drop-down list.

- Create a new LUN Mask: This step adds a step to the wizard for defining a LUN Mask. See the next step.
- None: If you select this option, you will need to select or create a LUN Mask later to make the LUN accessible to hosts; .

Figure 3-19: Create a LUN wizard, Step 4: Selecting a Mask

0		3	4		6
Properties	Space Configuration	Data Protection	Lun Masking	Verify Settings	
LUN Mask allows you to make a system is replicated, you mu lect a Mask:	a LUN accessible to hosts through th st also create a LUN Mask on the repl	e selected larget(s). The Unity app icated site for the LUN to be acces	Irance has a pre-defined LUN Mas sible when a failover occurs.	K TOF FIDRE Channel and another one	tor ISUSI, tor each storage poo
LUN Mask allows you to make e system is replicated, you mu elect a Mask:	a LUN accessible to hosts through th st also create a LUN Mask on the repl nel LUN Mask	e selected larget(s). The Unity app icated site for the LUN to be acces	liance has a pre-defined LUN Mas sible when a failover occurs.	k for Fibre Channel and another one	Tor ISCSI, Tor each storage poo
UN Mask allows you to make a system is replicated, you mu lect a Mask:) Use pre-defined Fibre Chann) Use pre-defined iSCSI LUN	a LUN accessible to hosts through th st also create a LUN Mask on the repl nel LUN Mask Mask (Pool1-15732) 1	e selected larget(s). The Unity applicated site for the LUN to be acces	ilance has a pre-defined LUN Mas sible when a failover occurs.	k for Fibre Channel and another one	tor ISUSI, tor each storage poo
UN Mask allows you to make a system is replicated, you mu lect a Mask:) Use pre-defined Fibre Chann) Use pre-defined iSCSI LUN) Use an existing LUN Mask	a LUN accessible to hosts through th st also create a LUN Mask on the repl nel LUN Mask Mask (Pool1-15732) 🚯	e selected larget(s). The Unity app icated site for the LUN to be acces	liance has a pre-defined LUN Mas sible when a failover occurs.	k for Fibre Channel and another one	tor ISUSI, tor each storage poo
UN Mask allows you to make a system is replicated, you mu elect a Mask:) Use pre-defined Fibre Chann) Use pre-defined iSCSI LUN) Use an existing LUN Mask) Create a new LUN Mask	a LUN accessible to hosts through th st also create a LUN Mask on the repl nel LUN Mask Mask (Pool1-15732) 👔	e selected larget(s). The Unity applicated site for the LUN to be acces	liance has a pre-defined LUN Mas	k for Fibre Channel and another one	tor ISUSI, tor each storage poo

 Click Next to continue. If you selected to create a new LUN Mask, the wizard will continue to <u>Step 5</u>: Create a new LUN Mask below.

If you selected an existing LUN Mask, the wizard will continue to <u>Step 6: Verifying settings on the next</u> page.

Step 5: Create a new LUN Mask

This step of the **Create a LUN** wizard prompts you to create a new LUN Mask if you selected that option in the previous step. The LUN mask is used to make the LUN visible to a host using the target you associate with the LUN.

When creating an iSCSI LUN, you specify the initiators you want and assign one or more of the available iSCSI targets to the LUN. If you have not created iSCSI targets yet, you must skip this step because the wizard will not let you continue. After creating the LUN, you have the possibility to associate it to a target by following the steps in . For steps to create an iSCSI target, see <u>Adding an iSCSI target on page 12</u>.

When creating a Fibre Channel LUN, you specify the initiators you want and then assign the unique common Fibre Channel target to the LUN.

To add a new LUN mask:

1. Select the Add to a new LUN Mask option.

Figure 3-20: Create a LUN wizard, Step 5: Create LUN Mask

	•	•	•		
Properties	2 Space Configuration	3 Data Protection	4 Lun Masking	5 Create Lun Mask	6 Verify Settings
Mask Name:		Transport Type:			
FinanceMask		iSCSI	-		
 All Hosts Select Hosts (1) 					
Select Hosts () There are no Initiator Groups in t	he system				
araote		LUN ID:			
argets					

- 2. Enter a meaningful name in the Name field.
- 3. From the **Transport Type** drop-down list, select **iSCSI** or **Fibre Channel**. The **Target** selection is automatically updated with the existing target associated with the storage pool.
- 4. Select an Initiator Group. An initiator group must contain either Fibre Channel or iSCSI initiators. An initiator cannot be selected in multiple groups.
- 5. Enter a LUN ID or let Unity assign the next available number. The LUN ID is a number used to identify a LUN—from 0 to 254. Each LUN associated to the same target and the same initiators must have a unique LUN ID. However, if you associate each LUN to a different target or to different initiators (even if they are part of the same target), there is no need for the LUN IDs to be different. For LUN masking, the LUN ID has to be unique within the same mask.
- 6. Click Next to continue.

Step 6: Verifying settings

This step of the Create a LUN wizard summarizes the settings you selected for your LUN. Review the summary carefully before applying the configuration settings.

To change a LUN configuration setting:

- Click **Previous** to go back to the corresponding configuration step. Or
 - Or
- Click the corresponding step identifier at the top of the Create a LUN wizard panel. For example, if you
 want to rename the LUN, click **Properties**.

Properties	Space Configuration	Data Protection	Lun Masking	Create Lun Mask	Verify Settings
					, ,
e verify your configuration setti a specific step.	ngs. If you want to change a settin	g, click the "Previous" button to r	avigate to the relevant configurat	ion step. Or, click the step identifier	at the top of the wizard pan
Properties					
.UN Name:	Lun2				
Storage Pool:	Pool1-15732				
UN Block Size	32 KB				
LUN Read Caching:	Enabled				
Space Configuration					
	1.00				
LUN SIZE. Reserved Snace:	28 MR				
Data Compression:	Enabled				
Data Drataation					
	Photo I				
Replication:	Disabled				
Snapshot Scheudie.	Enabled				
Auto-Snapshot to keep:	7				
Lun Masking					
Mask Name:	FinanceMask				
Transport Turner	iscsi				

Figure 3-21: Create a LUN wizard: Verify Settings

When you are satisfied with the configuration settings, click **Create** at the bottom of the panel.

Step 7: Viewing progress

In this step, the Create a LUN wizard displays progress as Unity creates the new LUN.

Figure 3-22: Create a LUN wizard: Viewing configuration results

eate a LUN					
1 Properties	2 Space Configuration	3 Data Protection	4 Lun Masking	5 Create Lun Mask	6 Verify Settings
plying settings:					
		57% CO	MPLETE		
Configuration of LUN "Lun2"	completed				SUCCESSFUL
Configuration of space compl	eted				SUCCESSFUL
Configuration of data compre	ssion completed				SUCCESSFUL
	amploted				SUCCESSFUL
Configuration of replication c	ompieteu				
Configuration of replication c Creating snapshots schedulir	ig				IN PROGRESS
Configuration of replication c Creating snapshots schedulir Create new LUN Mask	Ig				IN PROGRESS

The Create a LUN wizard displays error events that the system encounters during the LUN creation process. You can view more details about an error event by expanding the corresponding entry.

b To view more details for an error event:

• Click the **View Error** link corresponding to the error event.

Unity informs you when it successfully creates the LUN. It also asks you if you want to create another LUN in the storage pool.

Chapter 4

Clustering

The Nexsan Unity has built in Active/Active Clustering capability, whereby both controller nodes on Unity operate in active mode—that is, both controllers can actively serve data in parallel—in addition to providing full redundancy in the event that one of the controller nodes fails.

For detailed information on Clustering, see Chapter 8: Clustering in the Unity Software User Guide.

This section includes these topics:
Cluster configuration recommendations
Recommendations and requirements for clusters using Node and File Share Majority
Recommendations for a multi-site cluster

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Cluster configuration recommendations

To use Unity in a Microsoft Hyper-V 2012 R2 cluster environment, perform the following tasks after completing the configuration procedures detailed in <u>Microsoft Hyper-V 2012 R2 recommendations on page 39</u>.

Note The following recommendations are based on the assumption that Microsoft Hyper-V 2012 R2 cluster has already been installed. For further information on installation, please refer to the Microsoft documentation.

Use Node & File Share Witness (FSW) Quorum for cluster configuration, especially for even numbers of Cluster Nodes. Please refer to the following Microsoft documentation for more information: *How to Configure the Node and File Share Majority Quorum*.

Recommendations and requirements for clusters using Node and File Share Majority

- Use a Server Message Block (SMB) file system on a Windows Server 2003 or Windows Server 2008-2012 file server.
- Ensure that the file system has a minimum of 5 MB of free space.
- Ensure that the file system is dedicated to the cluster and is not used in other ways (including storage of user or application data).
- Do not place the file system on a node that is a member of this cluster or that will become a member of this cluster in the future.
- You can place the file system on a file server that has multiple file systems serving different purposes. This may include multiple file system witnesses, each one a dedicated file system. You may also place the file system on a clustered file server (in a different cluster), typically a clustered file server containing multiple file systems that serve different purposes.
- Place the file system on a server that is a member of a domain, in the same forest as the cluster nodes.
- For the folder that the file system uses, make sure that the administrator has Full Control file system and NTFS permissions.
- Do not use a file system that is part of a Distributed File System (DFS) Namespace.

Recommendations for a multi-site cluster

• You can co-locate the external file system on one of the sites where a node/nodes are located.

Note It is recommended to configure the external file system in a separate third site or third failure domain. The file system must be isolated from any kind of failure (network, hardware or environmental) of the Hyper-V nodes.

Chapter 5

Joining a Windows Active Directory domain

This section describes how to join an Active Directory domain using the System Configuration wizard. The wizard prompts you for connection details to the Microsoft Windows Active Directory server on your network, including the Active Directory domain name, as well as the domain administrator's user name and password to connect to the server.

Note SMBv1 must be enabled on Domain Controllers when using Active Directory Authentication on Unity.

This section includes these topics:

Microsoft Active Directory domain requirements	82
Delegating control to a non-Administrator user account	83
Creating computer objects on the Active Directory server	85

Microsoft Active Directory domain requirements

This section describes the Microsoft Active Directory support requirements for Unity. Carefully review this table before joining Unity to a Microsoft Active Directory domain.

Requirement	Description
Operating Systems	 Windows Server 2016 Windows Server 2012 Windows Server 2008 R2 Windows Server 2008 x86 or x64, including: Windows Server 2008 with Service Pack 1 Windows Server 2008 with Service Pack 2 Window Server 2003 R2 x86 or x64
Reverse DNS	The Microsoft Active Directory implementation must be configured with a reverse DNS lookup zone.
Global catalog and LDAP catalog ports	The primary domain controller that Unity connects to must have both the global catalog port (3268) and the LDAP catalog port (389) open. In a Microsoft Active Directory forest implementation, all domain controllers must have these ports open.
Time server	The primary domain controller that Unity connects to must be configured as a reliable time source (time server capability) for the domain. In a Microsoft Active Directory forest implementation, all domain controllers must have this capability. If the Microsoft Active Directory implementation does not provide, or is not configured for, time server capability, you must specify a valid Network Time Protocol (NTP) source for Unity to synchronize its date and time with.
Domain administrator privileges	You will need to provide domain credentials for a domain administrator, or of a user who has full domain administrative privileges. If the user account does not have domain administrator privileges, you must create computer objects for Unity in the Active directory domain, and give the corresponding user account management access to the objects before joining the domain.
DNS alias for non- standard domain names	Use a DNS alias if the domain controller name starts with a digit, or contains nonstandard characters. If the name of the primary domain controller that you configure Unity to connect to starts with a digit, or contains nonstandard characters, you must set up an alias—made up of only standard characters—for the domain controller on the DNS server; standard characters include: (A-Z, a- z), digits (0-9), and hyphens (-). You must also add a resource record for the alias in the reverse DNS lookup zone. Later, when you configure the Unity Storage System to join the Microsoft Active Directory domain, you must specify the domain controller's alias, including its fully qualified domain name (FQDN), in the Domain Controller

Requirement	Description
	(optional) field.
	As an example, if the domain controller uses this name: 1MYDC_ 001.mydomain.lan ,
	1. Create this alias for the domain controller on the DNS server: MYDC-001
	2. Add a resource record for the alias in the reverse DNS lookup zone.
	3. During the Site Setup process, when configuring Unity to join the Microsoft Active Directory domain, specify the domain controller's alias, including its fully qualified domain name (FQDN), in the Domain Controller (optional) field: MYDC-001.mydomain.lan
LM Manager authentication level	By default, Unity uses NTML level 2 authentication. If your Active Directory Domain Controller uses a different authentication level, you must change this setting by selecting another LM Compatibility Level.
Creation of machine accounts	The Microsoft Active Directory implementation must support the creation of machine accounts in the default Organizational Unit (OU).

Delegating control to a non-Administrator user account

After <u>creating a computer object</u> in the Active Directory server, you must give full control to the non-Administrator user account for the selected Organization Unit (OU), so that this user can operate Unity in your Active Directory environment.

To delegate control:

- 1. To open Active Directory Users and Computers:
 - a. Click Start then select Control Panel.
 - b. Double-click Administrative Tools.
 - c. Double-click Active Directory Users and Computers.

To open Active Directory Users and Computers in Windows Server 2012, click Start , and type dsa.msc.

- 2. In the console tree, right-click the organizational unit (OU) for which you want to delegate control, under Active Directory Users and Computers\ domain node.
- 3. Click **Delegate Control** to start the Delegation of Control wizard.

4. Click **Add** and select the non-Administrator user account used in the previous section. Click the **Next** button.

Figure 5-1: Active Director	v - Delegation of	f Control wizard:	select a user
J	, - J		

Delegation of Control Wizard	x
Users or Groups Select one or more users or groups to whom you want to delegate control.	D.
Selected users and groups:	
User 1 (user1@wojo local) Add	
<pre></pre>	

5. Select **Create a custom task to delegate** and click the **Next** button.

Figure 5-2: Active Directory - Delegation of Control wizard: select tasks to delegate

Delegation of Control Wizard	x
Tasks to Delegate You can select common tasks or customize your own.	6
 Delegate the following common tasks: 	
□ Create, delete, and manage user accounts ^ □ Reset user passwords and force password change at next logon □ □ Read all user information □ □ Create, delete and manage groups □ □ Modify the membership of a group □ □ Manage Group Policy links ✓ □ Generate Resultant Set of Policy (Planning) ✓	
Create a custom task to delegate < Back	

6. Select This folder... and click the Next button.

Figure 5-3: Active Directory - Delegation of Control wizard: select the task scope

Delegation of Control Wizard
Active Directory Object Type Indicate the scope of the task you want to delegate.
Delegate control of: This folder, existing objects in this folder, and creation of new objects in this folder Only the following objects in the folder:
account objects ^ aCSResourceLimits objects
< Back Next > Cancel Help

7. Give Full Control access to the non-Administrator user account and click Next.

Figure 5-4: Active Directory - Delegation of Control wizard: select permissions

Delegation of Control Wizard	x
Permissions Select the permissions you want to delegate.	P
Show these permissions: General Property-specific Creation/deletion of specific child objects Permissions:	
 Full Control Read Write Create All Child Objects Delete All Child Objects Read All Properties 	×
< <u>B</u> ack <u>N</u> ext > Cancel	Help

8. Click Finish.

Creating computer objects on the Active Directory server

In a typical deployment, Unity requires Domain Administrator privileges to join a Microsoft Active Directory domain. This process allows Unity to automatically create and configure computer objects for Unity on the Microsoft Active Directory server, without any manual intervention from a network administrator.

In some environments, specifying Domain Administrator credentials to integrate Unity with the Microsoft Active Directory Domain is not desirable, or possible. For these deployments, a network administrator can join Unity to a Microsoft Active Directory Domain using a user account with limited domain administrative privileges.

To allow this, you must manually perform configuration steps for creating and configuring computer objects for Unity on the Microsoft Active Directory server:

- Determine or create the non-Administrator domain user account that you want to use to join Unity to the Microsoft Active Directory Domain. <u>Delegate full control</u> to this user before joining the Active Directory domain.
- Create a computer object(s) for Unity on the corresponding Active Directory Server for each controller node, as described in this procedure.
- Configure the attributes for the computer object(s) according to the settings described in this procedure.
- Use the **Advanced** button to join Unity join Unity to the Microsoft Active Directory Domain using the credentials for the non-Administrator domain user account.



CAUTION: RISK OF OUTAGE

Do not join Unity with Active Directory to Domain Controllers hosted on VMware. Domain Controllers used with Unity and Active Directory must either be a physical device or hosted externally to Unity.

To create a computer object for a non-Administrator user account:

1. On the relevant Active Directory Server, add a new computer object for Unity, using each controller node's host name.



CAUTION: When creating the computer object, make sure to enter the host name exactly as it is configured on Unity, or on each of its controller nodes.

To obtain the host name for Unity controller nodes:

a. Access the nxadmin CLI on Unity via SSH or remote console. Download and install an SSH client of your choice on a client machine that has network connectivity to Unity. You can use Putty, which is a (free) open source telnet and SSH client, available for download at this URL:

http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html

- b. Once you download and install an SSH client, launch it, and enter the IP address of a controller node.
- c. When the login prompt displays, type nxadmin, and press Enter.
- d. When you are prompted for the password, type the nxadmin (Nexsan Unity Administrator) password configured on Unity, and then press Enter. If you are connecting to a system that has not yet been configured using the Nexsan Unity System Configuration wizard—that is, an uninitialized Unity—you must type the default password for the nxadmin (Nexsan Unity Administrator) account: PASSWORD (all upper-case).
- e. On each controller node, run the <code>hostname</code> command.
- f. Take note of Unity host name; for example, ES253957-001-01.

2. Give the non-Administrator domain user account the ability to perform the operation for integrating Unity with the Active Directory Domain. You must give the non-Administrator domain user account the ability to join each controller node to the Active Directory Domain.

It is important that you perform this step, since, by default, the privileges for joining a new computer object to the Active Directory Domain are automatically assigned to the Domain Administrator user/group account.

Here is an example:

New Object - Computer	x		
Create in: wojo.local/nst			
Computer name:			
ES253957-001-01		Select User or Group	? X
Computer name (pre-Windows 2000): ES253957-001-01 The following user or group can join this computer to a domain. User or group: wojo.local/Users/User 1 Assign this computer account as a pre-Windows 2000 computer		Select this object type: User, Group, or Built-in security principal From this location: wojo.local Enter the object name to select (<u>examples</u>): <u>User 1 (user1@wojo.local)</u>	Object Types Locations Check Names
OK Cancel Help		Advanced OK	Cancel

3. Set the following attributes for the computer object that you added for Unity to the Active Directory Server. You must set these attributes separately for each controller node.



CAUTION: Use the Active Directory Service Interfaces Editor (ADSI Edit) to set the attributes for the computer object(s). For each attribute, make sure to specify the value using the exact letter case, as shown.

Table 5-1: Computer object attributes

Attribute	Value to set
dNSHostName	<nesthostname>.<domain name=""> For example: ES777666-001-01.qadomain.net</domain></nesthostname>
msDS- SupportedEncryptionTypes	31
servicePrincipalName	 cifs/<nesthostname>.<domain name=""></domain></nesthostname> For example: cifs/ES777666-001-01.qadomain.net host/<nesthostname>.<domain name=""></domain></nesthostname> For example: host/ES777666-001-01.qadomain.net HTTP/<nesthostname>.<domain name=""></domain></nesthostname> For example: HTTP/ES777666-001-01.qadomain.net nfs/<nesthostname>.<domain name=""></domain></nesthostname> For example: nfs/ES777666-001-01.qadomain.net root/<nesthostname>.<domain name=""></domain></nesthostname> For example: nfs/ES777666-001-01.qadomain.net root/<nesthostname>.<domain name=""></domain></nesthostname> For example: not/ES777666-001-01.qadomain.net host/<nesthostname>.<domain name=""></domain></nesthostname> For example: not/ES777666-001-01.qadomain.net host/<nesthostname></nesthostname> For example: not/ES777666-001-01.qadomain.net
userPrincipalName	host/ <nesthostname>.<domain name="">@<domainname> For example: host/ES777666-001-01.qadomain.net@QADOMAIN.NET</domainname></domain></nesthostname>
userAccountControl	4130

Note If the domain you are joining is department.company.com, make sure to use that whole name in *Step 7*.

4. In the **distinguishedName** attribute of the computer object, take note of the Organizational Unit names, in this format: *OU=name1,OU=name2*, etc. You will need this for *Step 7*.

Note You can create a new OU at the root of the domain tree or use an existing user-defined OU. In the example below, you would use *OU=Finance*, *OU=OU2*.

Properties	?
Published Certificates M Security Remote control General Address / Personal Virtual Desktop	tember Of Password Replication Dial-in Object Environment Sessions Remote Desktop Services Profile Account Profile Telephones Organization COM+ UNIX Attributes Attribute Editor
Attributes:	
Attribute	Value
department	<not set=""></not>
departmentNumber	<not set=""></not>
description	<not set=""></not>
desktopProfile	<not set=""></not>
destinationIndicator	<not set=""></not>
displayName	ul
displayNamePrintable	<not set=""></not>
distinguishedName	CN=u1,0U=Finance,0U=0U2,DC=qadoma
division	<not set=""></not>
dSASignature	<not set=""></not>
dSCorePropagationD	0x0 = ()
dynamicLDAPServer	<not set=""></not>
employeeID	<not set=""></not>
employeeNumber	<not set=""></not>
• [[*] −	
View	Filter
OK	Cancel Apply Help

- 5. Repeat **step 3** above for the computer object that you added for the 2nd controller node.
- 6. Configure Unity using the Nexsan Unity System Configuration wizard (if not already configured).
- 7. Join Unity to the Microsoft Active Directory Domain in Nexsan Unity.

Make sure you specify the user name and password for the non-Administrator domain user account that you granted the ability to perform the operation for integrating Unity with the Active Directory Domain.

Make sure to use the same (whole) domain name as in Step 3.

- a. At the Configure User Authentication Mode step, click the **Advanced** button.
- b. Enter the Organizational Unit (OU) names obtained in Step 4.
- c. Select the Use pre-defined computer objects option.
- d. Click the Apply button.
- 8. After configuring Unity and successfully joining the system to the Microsoft Active Directory Domain, reset the **userAccountControl** attribute to **69632**—for each Unity computer object that you added to the Active Directory Server: DONT_EXPIRE_PASSWORD | WORKSTATION_TRUST_ACCOUNT.

Chapter 6

Using Windows VSS

Unity's VSS Hardware Provider serves as the interface between Windows Volume Shadow Copy Service running on a host system and Unity. Upon receiving instructions from a VSS host to create, mount, and restore snapshots, the VSS Hardware Provider sends the appropriate commands to Unity and returns the result of these commands to the host.

Note The VSS Hardware Provider supports both iSCSI and Fibre Channel LUNs.

Prerequisites:

You must install the VSS Hardware Provider on a Windows Server host; it can be installed on any of the following operating systems:

- Windows Server 2016
- Windows Server 2012
- Windows Server 2008 R2
- Windows Server 2008
- Windows Server 2003 R2

Installing the VSS Hardware Provider

The installation of the VSS Hardware Provider is available on the Unity Discovery CD.

Before you begin:

Make sure to review the list of supported operating systems in Using Windows VSS above.

If you install the VSS Hardware Provider on Windows Server 2003 R2, you will see several warning messages:

- For the **Run As** pop-up message, select **Current user** and uncheck the **Run this program with restricted access** option. This pop-up will appear multiple times. Perform the same steps as mentioned above each time.
- For any file replace warning, click **Yes**.
- For Windows logo verification warning, click **Continue**.

To install the VSS hardware provider:

- 1. On the Unity Discovery CD, open the VSS folder and double-click NSTVSS.exe.
- 2. On the Welcome page, click Next.

- 3. On the Choose Destination Location page:
 - To select the default installation folder, click **Next**.
 - To select another folder, click **Browse** and navigate to the desired folder. Click **Next**.

Figure 6-1: Installing VSS Hardware Provider

T VSS - InstallShield Wizard			
Choose Destination Location Select folder where setup will install files.			24
Setup will install NST VSS in the following fo	lder.		
To install to this folder, click Next. To install t another folder.	o a different folde	r, click Browse a	ind select
Destination Folder			
C:\Program Files\Nexsan Technologies\V	SSN	[B <u>r</u> owse
C:\Program Files\Nexsan Technologies\V	SS\	[Browse
C:\Program Files\Nexsan Technologies\V:	SS\	[Browse

- 4. On the Ready to Install page, click **Install**.
- 5. On the Installation Complete page, click **Finish** to exit the wizard.

- 6. Verify the VSS Hardware Provider installation:
 - a. Open a command prompt.
 - b. Type this command: vssadmin list providers
 - c. If the installation was successful, the list should display an entry for Nexsan VSS Hardware provider.

Figure 6-2: Verifying the VSS Hardware Provider installation

📾 Administrator: Command Prompt	
Microsoft Windows [Version 6.1.7601] Copyright (c) 2009 Microsoft Corporation. All rights reserved.	-
C:\Users\clusteruser>vssadmin list providers vssadmin 1.1 - Volume Shadow Copy Service administrative command-line tool (C) Copyright 2001-2005 Microsoft Corp.	
Provider name: 'Nexsan E5000 USS HW Provider' Provider type: Hardware Provider Id: {a21f8dd4-4d63-4030-882a-47cfa267cb1f} Version: 1.0.0	
Provider name: 'Microsoft Software Shadow Copy provider 1.0' Provider type: System Provider Id: {b5946137-7b9f-4925-af80-51abd60b20d5} Version: 1.0.0.7	
C:\Users\clusteruser>_	
	•

- 7. Start the VSS Hardware Provider service:
 - a. Open the Services application.
 - b. Locate and right-click the NSTVSSProvider service.

Figure 6-3: Starting the VSS Hardware Provider service

🖏 Services							_ 🗆 ×
<u>File Action View</u>	Help						
	à 😖 🛛 🖬 🕨 🖿 🕕 🕨						
Services (Local)	🔅 Services (Local)	·					
	NSTVSSProvider	Name 🔶	Description	Status	Startup Type	Log On As	▲ _
		🏩 Net. Msmq Listener Adapter	Receives activation requests over t		Disabled	Network Service	
	Start the service	🎑 Net.Pipe Listener Adapter	Receives activation requests over t		Disabled	Local Service	
		🎑 Net. Tcp Listener Adapter	Receives activation requests over t		Disabled	Local Service	
	Description:	🏟 Net. Tcp Port Sharing Service	Provides ability to share TCP ports		Disabled	Local Service	
	NST VSS Provider	🍳 Netlogon	Maintains a secure channel betwee	Started	Automatic	Local System	
		🌼 Network Access Protection Agent	The Network Access Protection (NA		Manual	Network Service	
		Network Connections	Manages objects in the Network an	Started	Manual	Local System	_
		🌼 Network List Service	Identifies the networks to which th	Started	Manual	Local Service	
		🏟 Network Location Awareness	Collects and stores configuration inf	Started	Automatic	Network Service	
		🌼 Network Store Interface Service	This service delivers network notific	Started	Automatic	Local Service	
			NST VSS Provider		Manual	Local System	
		NSTVSSRequestor	NST VSS Requestor	Started	Automatic	Local System	
		🏟 ONC/RPC Portmapper		Started	Automatic	Local System	
		🌼 Performance Counter DLL Host	Enables remote users and 64-bit pr		Manual	Local Service	
		🌼 Performance Logs & Alerts	Performance Logs and Alerts Collec		Manual	Local Service	
		🌼 Plug and Play	Enables a computer to recognize an	Started	Automatic	Local System	
		🌼 PnP-X IP Bus Enumerator	The PnP-X bus enumerator service		Disabled	Local System	-
	Extended Standard		<u> </u>		•		
I							

- c. Select Start from the context menu.
- d. Make sure the NSTVSSProvider service status indicates Started.
- e. Verify that the NSTVSSRequestor service status is Started.

What's next:

Enabling the Microsoft VSS client for LUNs below

Enabling the Microsoft VSS client for LUNs

You can enable the VSS client on the pool hosting the LUNs that will be managed by VSS before or after installing the VSS Hardware Provider.

- To enable the VSS Hardware Provider on a LUN:
- 1. On the **Unity navigation bar**, select **Storage > Storage Pools**.
- 2. Select the storage pool that you need to enable Microsoft VSS for. The **Pool Summary** panel opens.
- 3. Select Summary > Advanced Settings.
- 4. Click the Enable VSS client button to permit Unity's VSS Client to manage snapshots for LUNs hosted on this pool.

6

Figure 6-4:	Storage	Pool	panel.	Advanced	Settinas

Storage Pools [1]	
Pool1 Advanced Settings -	0
Auto-deletion setting for snapshots	
Allow Unity to automatically start deleting snapshots when the storage pool is 80% full.	
0	
Enable default access time for all new file systems.	
Data Compression	
Enable data compression by default for all new file systems and LUNs.	
VSS Client 👔	
Enable the Unity Storage System's VSS Client to create and manage shadow copies (point-in-time snapshots) of the LUNs in this storage pool.	
	(APPLY) CANCEL

2. Click the **Apply** button.

Related topics:

Installing the VSS Hardware Provider on page 91

Discovering your LUNs with the Windows iSCSI Initiator on page 16

Creating a VSS snapshot

Unity's VSS Hardware Provider enables you to take snapshots of one or more LUNs. As opposed to Unity, the VSS Hardware Provider enables you to create groups of multiple LUNs and to take snapshots of these groups.

For applications running on multiple LUNs, such as an SQL Server database, you can create a snapshot of all the LUNs that are being used for the database. This enables you to restore the data residing on multiple LUNs at the same time, and not lose data integrity, such as database links.

b To create a snapshot using the VSS Hardware Provider:

- 1. On the Windows host, open Explorer.
- 2. Right-click a VSS-managed volume and select **Properties**.
- 3. Click the Nexsan Unity tab.
- 4. Click Create Snapshot.

Figure 6-5: Creating VSS snapshots on the Windows host

🛷 FinanceQC (I	K:) Properties		×
General T Previous Vers	ools Hardware sions Quota	Sharing Sec Nexsan NST app	urity Shadow Copies bliance Customize
Volume Infor Pool Name:	mation FinancePool1	Volume Name:	FinanceQC
Site Name:	resetSite	Site Model:	NST5000
Controller:	ES260786-176-02	Site Serial #:	ES260786-176
GUID:	6000402E50000007	AFB8ACA87CD478	82
Click on Displa	ay Snapshots to retrieve	e the list of snapsho	its.
Snapshot Na	me	Creation Time	Mount Point
Manage Sna	pshot v Crea	te Snapshot	Display Snapshots
Group Config	guration		About
		ок с	Cancel Apply

- 5. By default, the volume from which you opened the Properties dialog box is selected. Optionally, enter a name for the snapshot. Do one of the following:
 - To take a snapshot of the current volume, click **OK**.
 - To take a snapshot of a group, select multiple LUNs from the list and click **OK**.

In this example, we create a group snapshot.

Figure 6-6: Creating a VSS group snapshot

Create Volume Snapshot	×				
To create a snapshot of the selected volume(s), please specify a name for the snapshot. If you do not specify a name, the Nexsan NST appliance VSS client will assign a default name to the snapshot.					
Snapshot name (optional):					
FinanceGroup					
Select the volume(s) to include in the snapshot:					
Note: If the current volume is part of a group, you cannot remove its group members from the snapshot.					
Volume Name					
OK Cancel					

6. After successful creation of the snapshot, you will see a confirmation message. Click OK.

Back on the Properties page, you can see the new snapshot appearing in the list. Group snapshots include _ grp in their name. This image provides an example of a group snapshot.

FinanceMTL	(L:) Propertie:	5				
General T Previous Vers	ools Hardw ions Quot	vare ta	Sharing Se Nexsan NST ap	curity pliance	Shadov Cu	w Copies Istomize
⊂Volume Inforr Pool Name:	nation FinancePool1		Volume Name	: Financ	eMTL	
Site Name:	resetSite		Site Model:	NST5	000	
Controller:	ES260786-176	-02	Site Serial #:	ES260	0786-176	6
GUID:	6000402E5000	0000063	3994A85ACA044	4A		
Click on Displa	u Snapshots to r	ratriava	the list of snapsh	ote		
CIICK ON Displa	y shapshots to r	ICUICVC	une list or shapsh	0(3.		
Snapshot Nar	ne	Cre	ation Time	Moun	t Point	
Snapshot Nar	ne t_FinanceGroup	Cre 12/	ation Time /06/13 16:19:00	Moun	t Point	
Snapshot Nar vss_grp_clien	ne t_FinanceGroup	Cre 12/	ation Time /06/13 16:19:00	Moun	t Point	
Snapshot Nar vss_grp_clien	ne t_FinanceGroup	Cre 12/	ation Time /06/13 16:19:00	Moun	t Point	
Snapshot Nar vss_grp_clien	ne L_FinanceGroup	Cre 12/	ation Time /06/1316:19:00	Moun	t Point	
Snapshot Nan vss_grp_clien	ne t_FinanceGroup	Cre 12/	ation Time /06/13 16:19:00	Moun	t Point	
Snapshot Nan vss_grp_clieni	ne L_FinanceGroup	Cre 12/	ation Time /06/13 16:19:00	Moun	t Point	
Snapshot Nan vss_grp_clien	ne L_FinanceGroup	Cre 12/	ation Time '06/13 16:19:00	Moun	t Point	
Snapshot Nan vss_grp_clien	ne L_FinanceGroup	Cre 12/	ation Time '06/13 16:19:00	Moun	t Point	
Snapshot Nan vss_grp_clien	ne L_FinanceGroup	Cre 12/	ation Time '06/13 16:19:00	Mouni	t Point	
Snapshot Nan vss_grp_clien	ne L_FinanceGroup	Cre 12/	ation Time '06/13 16:19:00	Mouni	t Point	
Snapshot Nan vss_grp_clien	ne t_FinanceGroup ashot v	Creater Creater	ation Time 106/13 16:19:00 e Snapshot	Dis	t Point	pshots
Snapshot Nan vss_grp_clien	ne t_FinanceGroup pshot_v	Create	ation Time 106/13 16:19:00 e Snapshot	Dist	blay Sna	pshots
Snapshot Nan vss_grp_clien Manage Snap Group Config	ne t_FinanceGroup oshot_v uration	Creat	ation Time '06/13 16:19:00 e Snapshot	Dis	blay Sna	pshots

Figure 6-7: Viewing a VSS snapshot on the Properties page

You can also view the VSS snapshot from Unity. See

What's next:

You can mount—also referred to as browse in Unity—unmount, rollback, and delete the snapshot as required.

Related topics:

Browsing a VSS snapshot on the facing page Rolling back data to a VSS snapshot on page 102 Deleting a VSS snapshot on page 104

Browsing a VSS snapshot

You can use the VSS Hardware Provider's snapshot browsing <u>snapshot browsing</u> mechanism to recover individual files from a snapshot in case the files are accidentally deleted or overwritten, or corrupted in the snapshot's parent LUN.

Notes:

- The Management (mgmt) target must be connected for the **Manage Snapshot** button to be available and thus perform browsing.
- The VSS feature must be enabled for the storage pool in Unity.
- When you browse, or mount, a LUN snapshot using the VSS Hardware Provider on the Windows host, that same snapshot appears as *Browsing Enabled* in Unity.
- If the snapshot is already mounted in Unity, you will not be able to mount it with the VSS Hardware Provider.

Note When browsing or mounting a LUN snapshot using the VSS Hardware Provider on Windows hosts, the disk is read-only. This applies to both iSCSI and Fibre Channel LUNs.

To mount a VSS snapshot:

- 1. On the Windows Server host, open Explorer.
- 2. Right-click the volume where the snapshot to browse is hosted and select **Properties**.
- 3. Select the Nexsan Unity tab.
- 4. Click Display Snapshots.
- 5. Select the snapshot to mount.

6

6. From the Manage Snapshot drop-down list, select Mount.

Figure 6-8: Browsing a VSS snapshot

*	1T (G:) Propertie	5		×
	General Tools Previous Versions	Hardware Quota	e Sharing Sect Nexsan NST app	urity Shadow Copies liance Customize
	Volume Information Pool Name: p1	n	Volume Name:	FLLO
	Site Name: site1	Lin	Site Model:	NestOS
	Controller: ES2	00070-001-01	Site Serial #:	ES200070-001
	GUID: 6000	0402E500000	0077FAFF4CC9C4486	в
	Click on Display Sna	apshots to retri	eve the list of snapsho	ts.
	Snapshot Name		Creation Time	Mount Point
	snapFLL11		12/11/13 14:48:00	H:V
	vss_manual_2013-	12-11-1458	12/11/13 14:58:00	
	vss_snap2		12/11/13 15:47:00	
	vss_auto_2013-12-	12-010516	12/12/13 01:05:00	
	Manage Snapshot	V C	ireate Snapshot	Display Snapshots
	Delete	n		About
_	Details			
	Mount		ок (с	ancel Apply
	Bollback			
	Kollbackiri			

7. A new window opens where you assign drive letter/mount path from the drop-down list. Click OK.

Original Vol/Drive Letter	Select Drive Letter/Mount Pa
6: \	

Figure 6-9: Assigning a drive letter to the VSS snapshot

- 8. Yo will see a confirmation message after successful mounting. Once refreshed, the list shows the Mount Point against the snapshot name.
 - a. Check if a new volume appears under Hard Disk Drives with the drive letter you provided in the previous step.
 - b. Verify that all files present in the original volume when the snapshot was taken are in the new volume.
- To unmount a VSS snapshot:
- 1. From the Nexsan Unity tab, select the snapshot you mounted.
- 2. From the Manage Snapshot drop-down list, select Unmount.
- 3. A confirmation message appears: Snapshot successfully unmounted. The volume that appeared with the assigned drive letter name under Hard Disk Drives is no longer present.
- Related topics:

Creating a VSS snapshot on page 96 Rolling back data to a VSS snapshot on the next page Deleting a VSS snapshot on page 104

Viewing VSS client information

This section describes how to view the space currently used by LUN snapshots managed by the VSS Hardware Provider.

You can view the space consumption from Unity, along with the name of the Windows Server host, and the LUN mount point.

- To view VSS client information for a LUN:
- 1. On the Unity navigation bar, select Storage > LUNs.
- 2. Click the link to the LUN you want to view VSS Information for.
- 3. Select **Summary > VSS**.

Figure	6-10:	LUNs	VSS	panel
--------	-------	------	-----	-------

LUNs [1]			
Pool1 Lun VSS -			•
NAME	VALUE		
NAME Used Space	value 389 MB		
NAME Used Space Computer Name	VALUE 389 MB QA2018CLUSTER1		

Rolling back data to a VSS snapshot

The rollback function reverts a LUN's contents to what they were at the time the snapshot was taken, including all file- and folder-level permission settings and access-level attributes. This function also automatically deletes all snapshots that are newer than the snapshot that you roll back to, including all manual snapshots of the LUN and snapshots that have browsing enabled. The VSS Hardware Provider also enables you to roll back data for groups of LUNs, using the group snapshot.

Unity provides the rollback function for extreme circumstances: for example, if all the data in a LUN is corrupted and can no longer be recovered. The rollback function overwrites all the existing data in the LUN with the contents of the snapshot that you roll back to; any new data that was added after the snapshot is recorded, including updates to existing data, is lost during the rollback process and cannot be undone.

Notes:

- The Management (mgmt) target must be connected for the Manage Snapshot button to be available and thus perform the rollback.
- The VSS feature must be enabled for the storage pool in Unity.
- To roll back data to a VSS snapshot:
- 1. On the Windows Server host, open Explorer.
- 2. Right-click the volume where the snapshot to roll back to is hosted and select **Properties**.
- 3. Select the Nexsan Unity tab.

- 4. Click Display Snapshots.
- 5. Select the snapshot that you wish to use for data restore.
- 6. From the Manage Snapshot drop-down list, select Rollback.

Figure 6-11: Rolling back data to a VSS snapshot

⊳ 1T (G:) Prope	rties		×
General To Previous Versi	ools Hardware ons Quota	Sharing Sec Nexsan NST app	urity Shadow Copies pliance Customize
Volume Inform Pool Name:	nation p1	Volume Name:	FLLO
Site Name:	site1Lin	Site Model:	NestOS
Controller:	ES200070-001-01	Site Serial #:	ES200070-001
GUID:	6000402E5000000	077FAFF4CC9C4486	В
Click on Display	Snapshots to retrie	ve the list of snapsho Creation Time	ts. Mount Point
snapFLL11		12/11/13 14:48:00	H:\
vss_manual_2	013-12-11-1458	12/11/13 14:58:00	
vss_snap2		12/11/13 15:47:00	
vss_auto_201;	3-12-12-010516	12/12/13 01:05:00	
Manage Snap	shot v Cr	eate Snapshot	Display Snapshots
Delete Details	n		About
Mount Unmount,		ок с	Cancel Apply
Rollback			

7. You will be prompted to confirm the restore operation. Type **Yes** in the field and click **OK**.

Figure 6-12: Confirming the VSS snapshot rollback



- 8. Restart these services:
 - Volume Shadow Copy
 - NSTVSSProvider
 - NSTVSSRequestor
- 9. Verify that the data present in the volume correspond to the data in the snapshot.

Deleting a VSS snapshot

This section describes how to delete a LUN snapshot using Unity's VSS Hardware Provider.

Notes:

- The Management (mgmt) target must be connected for the Manage Snapshot button to be available and thus perform a deletion.
- The snapshot must be unmounted before it can be deleted; for steps to unmount a snapshot, see <u>Browsing</u> <u>a VSS snapshot on page 99</u>.
- The VSS feature must be enabled for the storage pool in Unity.
- You can also delete a LUN snapshot created by the VSS Hardware Provider from Unity.
- To delete a VSS snapshot:
- 1. On the Windows Server host, open Explorer.
- 2. Right-click the volume where the snapshot to delete is hosted and select Properties.
- 3. Select the Nexsan Unity tab.
- 4. Click Display Snapshots.
- 5. Select the snapshot to delete.

6. From the **Manage Snapshot** drop-down list, select **Delete**.

🛷 1T (<u>G:</u>)	Properties	5							X
General Previou	Tools Versions	Hardwa Quota	are a	Sharing Nexsan NST	Secu app	urity liance	Shadov Cu:	v Copies stomize	l
Pool Na	Information me: p1			Volume Na	me:	FLLO			
Site Na	me: site1	Lin		Site Model:		NestOS	6		
Controll	er: ES20	0070-001-0	01	Site Serial \$	#:	ES200	070-001		
GUID:	6000	402E50000	00007	7FAFF4CC9C4	4868	}			
Click on	Display Sna	pshots to re	etrieve	the list of snap	oshot	s.			
Snapsh	ot Name		Cre	ation Time		Mount	Point		
snapFLl	.11		12	/11/13 14:48:0	00	H:V			
vss_mar	nual_2013-1	2-11-1458.	12/	/11/13 14:58:0	00				
vss_sna	р2		12	/11/13 15:47:0	00				
vss_aut	o_2013-12-1	12-010516.	12	/12/13 01:05:0	00				
Manage	e Snapshot	V	Creat	te Snapshot		Displ	lay Snap	oshots	
Delet Detai	в s	n					About		
Moun	t			οκ	C	ancel	1	Applu	1
Unma	unt		_			ancor		-AAA-	
Rollba	ack								

Figure 6-13: Deleting a VSS snapshot

 A warning message will appear. Click **Yes** to confirm the deletion and refresh. The snapshot is no longer listed under the **Nexsan Unity** tab.

Related topics:

Enabling the Microsoft VSS client for LUNs on page 94

Index

A

Active Directory creating computer objects 85 domain requirements 82 Active mode 51 Adding a file system 57 Adding a LUN 69 Adding a storage pool 54 Adding an iSCSI target 12 Applications 71 Auto-deletion 74

В

Before adding LUNs 69 Before creating pools 54 Browsing snapshots 99

С

CHAP authentication Configuring CHAP for iSCSI targets 13 CIFS sharing 57, 62 Computer objects 85 Configuring LACP 53 Configuring UNs in Disk Management 21, 29 Configuring Windows iSCSI Initiator settings 32 Connecting to an iSCSI LUN from a Windows-based initiator 15 Creating a storage pool 54 CurrentControlSet 32

D

Data replication LUN 73 Data Replication 54, 61 Data type 71 Discovering LUNs with MPIO enabled 27 Disk Management 21, 29 Disk properties 23, 31 DNS alias 82 dNSHostName 88

Ε

Enable snapshot scheduling 74 Enabling jumbo frames 38 Enabling LACP 53 Enabling LACP on Unity 51 Ethernet switches for LACP 52-53

F

Fibre Channel LUNs on Windows 33 File system adding 57 considerations 57 Full-Duplex 52

G

Global catalog 82 GUID Partition Table 22, 30

Initializing a LUN 15 Initializing LUNs in Disk Management 21, 29 IPMI console 38, 53 IQN 12 iSCCI target Adding 12 Configuring CHAP authentication 13 Specifying IQN and public alias 12 iSCSI LUNs on Windows 32

J

Jumbo frames 38

K

KVM console 53

L

LACP 51 configuring 53 monitoring 38 Requirements and guidelines 51 Understanding link aggregation 51 LDAP 62,82 LDAP catalog 82 Link aggregation 51 LinkDownTime 32 Linux 71 Load balancing 51 Logical Unit Number (LUN) 70 LUN Adding a target 12 Connecting to an iSCSI LUN from a Windows-based initiator 15 Initializing a LUN 15 mgmt target 20 LUN name 70

Μ

Master Boot Record 22, 30 MaxRequestHoldTime 32 mgmt target 20 Microsoft Active Directory 82, 85 Microsoft Cluster host 32 Microsoft Exchange 71 Monitoring LACP 38 MPIO Device Manager 26 msDS-SupportedEncryptionTypes 88

Ν

NESTHOSTNAME 88 NestOS Admin Menu Shutdown and Reboot menu 38 Network Time Protocol (NTP) 82 New Simple Volume 15, 22, 30 NFS sharing x, 57, 62 nic modify-aggr 53 set-linkprop 38 show-aggr 39 Non-Administrator user account 85 nx0 53 nx1 53

)

Offline disks 21, 29 Oracle OLTP 71

Ρ

Parameters for iSCSI Initiator 32 Passive mode 51 PathRecoveryInterval 33 PDORemovePeriod 33 Pools creating a storage pool 54 Public alias 12

R

Recommended MPIO hot fixes 33 Redundancy 51 Registry Editor 32 Requirements and guidelines for implementing LACP 51 Resource Group 55

S

servicePrincipalName 88 Setting quota 60 reservation 71
Share considerations 57 Size of block 71 Snapshots scheduling 73 Space usage for a LUN 71 SQL Server 71 Storage pool creating a storage pool 54

Т

Time server support 82 Troubleshooting LACP issues 38

U

Unallocated disk 15 Unallocated disks 21, 29 Understanding link aggregation 51 UseCustomPathRecoveryInterval 33 userAccountControl 88 userPrincipalName 88

V

Verifying settings 13, 67, 76 Video Streaming 71 Virtual Hard Disk 32 Virtual volume size 71

W

Windows 71 Windows-based initiator 15 Windows iSCSI Initiator settings 32



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