## **Bosch Video Management System**

High Availability with Hyper-V



en Configuration Manual

### Table of contents

1	Introduction	4
1.1	General Requirements	4
2	Hyper-V architectures	5
2.1	Low effort: Replication	5
2.2	Medium effort: Cluster	6
3	Preparing the operating system for replication and cluster	7
4	Configuring DSA E-Series 2600	15
4.1	Installing SANtricity on client computer	15
4.2	Assigning static IP addresses (part 1)	15
4.3	Installing the firmware on a DSA E-Series	15
4.4	Assigning static IP addresses (part 2)	17
4.5	Configuring storage for Hyper-V or VMware	18
4.6	Configuring iSCSI targets on Windows host	19
5	Performance tips	26
6	Example System Dimensions	27
6.1	Sizing	27
6.2	Network segments	27
6.3	Server configuration	27
6.3.1	Replication	27
6.3.2	Cluster	27
6.3.3	Cluster using Starwind solution	28
	Glossary	30

### 1 Introduction

### The need for high-availability systems

Software systems that provide security for lives and property need themselves to be secure from threats such as hardware failure, software failure, sabotage and natural disasters. Hence it is desirable for security management systems to be installed on some form of high-availability (HA) platform. The choice of platform depends on a number of limiting factors, including:

- Cost of downtime of the system
- Maximum tolerable downtime of the system
- Cost of the high-availability platform (usually per server)

### Scope of this document

This document describes installations that Bosch has tested in-house. It does not describe the implementation of Hyper-V systems in general, but rather helps those planning and commissioning Bosch Security Management systems on high-availability systems to avoid common misconceptions and mistakes.

As IT infrastructures differ widely, Bosch strongly recommends that those with little experience in the area of HA obtain the assistance of consultants with suitable Microsoft qualifications.

### **Required hardware**

See the datasheet of Bosch VMS or BIS for hardware requirements.



### Notice!

Prerequisite for Microsoft support

Microsoft supports a failover cluster or replica solution only if all the hardware features are marked as "Certified for Windows Server 2012 R2." In addition, the complete configuration (servers, network, and storage) must pass all tests in the **Validate a Configuration** Wizard, which is included in the Failover Cluster Manager snap-in.

## Documentation and software for Bosch Security Systems products can be found in the online product catalogue as follows:

Open any browser > enter www.boschsecurity.com > select your region and your country
 > start a search for your product > select the product in the search results to show the existing files.

### **1.1 General Requirements**

### Goals of the high availability platform:

- Near zero downtime of the security management system, e.g. BIS, Bosch VMS
- Availability as a pre-configured bundle
- Familiarity to customers and IT departments
- Cost-effectiveness
- Ease of deployment
- Upward scalability
- Ease of support

### 2 Hyper-V architectures

You can achieve two different architectures for high availability using Hyper-V from Microsoft:

- Replication
- Cluster

### 2.1 Low effort: Replication

### Advantages:

- Short downtime, low budget, low effort, widespread standard solution

### Overview

The easiest way to ensure high availability of an application using virtual machines (VMs) is to set up asynchronous replication between two Hyper-V hosts. In this scenario you replicate a virtual machine from your primary site to another site using snapshot technology. A short replication interval is around 30 seconds, and you can use Kerberos authentication or (self-signed) certificates. Information arising during the replication interval is lost. To set up VM replication you need only Windows Server 2012 R2 with Hyper-V. No domain or cluster services are necessary.



### 2.2 Medium effort: Cluster

### Advantages:

- Near zero downtime, cost-effectiveness, small central storage, easy to implement with tested standard components

### Overview

A more secure way to ensure business continuity of a virtual machine is to create a Hyper-V cluster. In this scenario a Domain Controller, at least two Hyper-V nodes and a shared storage are required. The VMs are located on the shared storage to which all Hyper-V cluster nodes have access.

To ensure high availability of an application, all cluster nodes listen to each other's "heartbeat" signal. If a cluster node's heartbeat is missing then that node is assumed to have crashed, and another cluster node will pick up the failed node's VMs with minimal downtime and information loss.

The information loss consists of the data residing in the RAM of the affected cluster node, and some events that occur during the downtime of the cluster node.

The shared storage is a single point of failure. If it fails, the VMs can no longer run. To avoid such a single point of failure, the DSA E-Series storage device provides additional redundancy. We recommend purchasing a shared storage with dual controller.



VM1 can for example host the Bosch VMS server, VM2 can host a Primary Domain Controller (PDC).

Instead of using a dedicated server for the shared storage, you can also use the Starwind solution to create a virtual shared storage on the 2 cluster nodes.

See the Cluster using Starwind solution, page 28 chapter for details.

3

# Preparing the operating system for replication and cluster

### Configuring network cards

Perform this procedure on both hosts.

- 1. Start Server Manager > Local Server.
- 2. Click the computer name to rename the server.
- 3. Click **Disabled** right by **Remote Desktop** to enable Remote Desktop.
- 4. Click **IPv4 address assigned by DHCP** to configure the ports of the network card.

Server N	1ar	nager • Loc	al Se	rver		· ②	۲	Manage Tools	View	Help	
Dashboard		For HVC1	5					[	TASKS	•	^
Local Server     All Servers     File and Storage Services		Computer name Workgroup		HVC1 WORK	GROUP	Last install Windows Last check	led upda Update :ed for up	tes odates	Nev Not Nev		=
		Windows Firewall Remote manageme Remote Desktop NIC Teaming E-Netz Heartbeat iSCSI MGMT	nt	Public Enable Disabl IPv4 a 172.16 192.16	: On, Private: On ed ed ddress assigned by DHCP, IPv6 enabled .0.1 i8.128.1 i8.100.1	Windows Customer IE Enhance Time zone Product IE	Error Rep Experien ed Securi e	orting ce Improvement Progra ty Configuration	Off am Not On (UTC 002	p ≡	
				M		n			)	<i>u</i> ×	
		EVENTS All events   6 total			ρ (Ξ) <b>▼</b> (用) <b>▼</b>			[	TASKS	•	
		Server Name HVC1 HVC1	ID 10149 7023 45	Severity Warning Error	Source Microsoft-Windows-Windows Remote Ma Microsoft-Windows-Service Control Mana valence	anagement ager	Log System System	Date and Time 3/9/2015 10:11:35 AN 3/9/2015 10:11:22 AN 3/9/2015 10:10:51 AN	1		
				2.101	ioning.		system	· P @ (6	ENG DE	2:47 AM 3/9/2015	1 5

Network card port #1: Management (mandatory) Network card port #2: Heartbeat (mandatory for cluster architecture) Network card port #3: Business network (optional) Network card port #4: iSCSI (mandatory for cluster architecture)

5. Restart the computer.

### Adding roles and features

 Start Server Manager and click Manage > Add Roles and Features. The Before You Begin page of the Add Roles and Features Wizard dialog box is displayed.

<b>k</b>		Server Manager	_ 0 ×
$\bigcirc$	<ul> <li>Server Mana</li> </ul>	ger 🕻 Local Server 🔹 🕫 🖉 Manage	Tools View Help
	<b>a</b>	Add Roles and Features Wizard	<u>^</u>
<ul> <li>I Local</li> <li>I Local</li></ul>	Before you beg Before You Begin Installation Type Server Selection Server Roles Features Confirmation Results	This wizard helps you install roles, role services, or features. You determine which roles, role services, or features to install based on the computing needs of your organization, such as sharing documents, or hosting a website. To remove roles, role services, or features: Start the Remove Roles and Features: Wizard Before you continue, verify that the following tasks have been completed: 1 The Administrator account has a strong password 1 Network settings, such as static IP addresses, are configured 1 The most current security updates from Windows Update are installed If you must verify that any of the preceding prerequisites have been completed, close the wizard, complete the steps, and then run the wizard again. To continue, click Next.	TASKS ▼ Neve Not c Neve Off Program Not p On (UTC- 00252
	H H H H	Skip this page by default       Install       Cancel         VC1       10149       Warning       Microsoft-Windows-Windows Remote Management       System       3/9/2015       10:         VC1       7023       Error       Microsoft-Windows-Service Control Manager       System       3/9/2015       10:         VC1       46       Error       volmgr       System       3/9/2015       10:	TASKS  TASKST TASKS TASKS TASKS TASKS TASKS TASKST TASKS TASKS TASKS TASKS TAS
		* [P	ENG 2:48 AM DE 3/9/2015

2. Click Next.

The **Select installation type** page is displayed.



		Server Manager	_ 0
•)),	Server M	nager 🔸 Local Server 🛛 🗸 🔊 🖌 🚩 Manage	Tools View Helg
2	)	Add Roles and Features Wizard	
Dashb Local : All Ser File an	Select instal Before You Begin Installation Type Server Selection Server Roles Features Confirmation Results	DESTINATION SERVER         HVC1         Select the installation type. You can install roles and features on a running physical computer or virtual machine, or on an offline virtual hard disk (VHD).            • Role-based of feature-based installation         Configure a single server by adding roles, role services, and features.         • Remote Desktop Services installation         Install required role services for Virtual Desktop Infrastructure (VDI) to create a virtual machine-based         or session-based desktop deployment.	TASKS     ▼       Neve     ∧       Not c     ∧       Off     ∩       Program     Not p       On     (UTC-       00252
		< <u>Previous</u> Install Cancel	
		HVC1 10149 Warning Microsoft-Windows-Windows Remote Management System 3/9/2015 1	10:11:35 AM

4. Click Next.

The **Select destination server** page is displayed.

5. Click Select a server from the server pool.

Your server is displayed in the <b>S</b>	erver Pool list.
<b>a</b>	Add Roles and Features Wizard
Select destination server	ver or a virtual bard dick on which to install roler and

stallation Type	<ul> <li>Select a server</li> </ul>	from the server pool		
erver Selection	<ul> <li>Select a virtual</li> </ul>	hard disk		
erver Roles	Server Pool			
eatures onfirmation	Filter:			
Results	Name	IP Address	Operating System	
	HVR1	192.168.2.59	Microsoft Windows Server 2012 R2	Standard
	1 Computer(s) fou	nd	dows Server 2012 and that have been	added by using

6. Select your server and click **Next**.

The **Select server roles** page is displayed.

- 🗆 🗙

DESTINATION SERVER HVR1 b - x Add Roles and Features Wizard DESTINATION SERVER Select server roles HVR1 Select one or more roles to install on the selected server. Before You Begin Installation Type Roles Description Server Selection Hyper-V provides the services that Active Directory Certificate Services you can use to create and manage Server Roles Active Directory Domain Services virtual machines and their resources. Features Active Directory Federation Services Each virtual machine is a virtualized computer system that operates in an Active Directory Lightweight Directory Services isolated execution environment. This Active Directory Rights Management Services allows you to run multiple operating Application Server systems simultaneously. = DHCP Server DNS Server Fax Server File and Storage Services (1 of 12 installed) Hyper-V Network Policy and Access Services Print and Document Services Remote Access Remote Desktop Services < Previous Next > Install Cancel

### 7. Click to enable Hyper-V.

#### 8. Click Next.

The Add features that are required for Hyper-V page is displayed.

Þ		Add Roles and Features Wizard	x
	_		_
	Ad	Id features that are required for Hyper-V?	
	The hav	following tools are required to manage this feature, but do not e to be installed on the same server.	
	⊿	Remote Server Administration Tools	
		▲ Role Administration Tools	
		<ul> <li>Hyper-V Management Tools</li> </ul>	
		[Tools] Hyper-V Module for Windows PowerShell	
		[Tools] Hyper-V GUI Management Tools	
	~	Include management tools (if applicable)	
		Add Features Cancel	

9. Click Add Features.

The **Select features** page is displayed.



#### 10. Only on Hyper-V Cluster installations: Click to enable Failover Clustering.

### 11. Click Next.

The **Hyper-V** page is displayed.

Think		Server Manager	
€∋∙	Server Manage	er 🕻 Local Server 🔹 🕫 🖡 Manage Toc	ols View Help
2	2	Add Roles and Features Wizard	^
Dashb Local  All Ser	Hyper-V	DESTINATION SERVER HVC1	TASKS  Nevel Not c
📭 File an	Before You Begin Installation Type	Hyper-V allows you to virtualize your server workloads by running those workloads on virtual machines. You can use virtual machines to consolidate multiple workloads on one physical server, to improve server availability, and to increase efficiency in developing and testing software.	Nevei
	Server Selection Server Roles Features Hyper-V Virtual Switches	<ul> <li>Things to note:</li> <li>Before you install this role, you should identify which network connections on this server you want to use for setting up virtual switches.</li> <li>After you install Hyper-V, you can use Hyper-V Manager to create and configure your virtual machines.</li> </ul>	Program Not p On (UTC- 00252
	Migration Default Stores Confirmation Results		
		More information about Hyper-V	
		< Previous Next > Install Cancel	
	HVC1 HVC1 HVC1	10149 Warning Microsoft-Windows-Windows Remote Management System 3/9/2015 10:11:3 7023 Error Microsoft-Windows-Service Control Manager System 3/9/2015 10:11:2 46 Error volmgr System 3/9/2015 10:10:5	85 AM 22 AM 51 AM
		- で 留	ENG 2:50 AM DE 3/9/2015

### 12. Click Next.

The **Create Virtual Switches** page is displayed.

\_ 🗇 X

13.	Click to enable <b>MGMT</b>		
	<b>a</b>	Add Roles and Features Wizard	_ <b>D</b> X
	Create Virtual Sw	itches □ES	TINATION SERVER HVC1
	Before You Begin Installation Type Server Selection Server Roles Features	Virtual machines require virtual switches to communicate with other computers. After y role, you can create virtual machines and attach them to a virtual switch. One virtual switch will be created for each network adapter you select. We recommend at least one virtual switch now to provide virtual machines with connectivity to a physic can add, remove, and modify your virtual switches later by using the Virtual Switch Mar Network adapters:	ou install this that you create al network. You nager.
	Hyper-V	Name Description	^
	Virtual Switches	MGMT HP Ethernet 1Gb 4-port 331FLR Adapter	=
	Migration	Heartbeat HP Ethernet 1Gb 4-port 331FLR Adapter	~
	Default Stores	< III	>
	Results	Previous Next > Install	Cancel
14.	Click Next. The Virtual Machine N	<b>ligration</b> page is displayed.	
	<b>a</b>	Add Roles and Features Wizard	_ <b>D</b> X
	Virtual Machine N	Migration	TINATION SERVER HVC1
	Before You Begin Installation Type Server Selection	Hyper-V can be configured to send and receive live migrations of virtual machines on t Configuring Hyper-V now enables any available network on this server to be used for li you want to dedicate specific networks for live migration, use Hyper-V settings after yo Allow this server to send and receive live migrations of virtual machines	his server. ive migrations. If u install the role.

### 14

<b>a</b>	Add Roles and Features Wizard
Virtual Machine	Migration Destination Server HVC1
Before You Begin Installation Type Server Selection Server Roles Features Hyper-V Virtual Switches <u>Migration</u> Default Stores Confirmation Results	Hyper-V can be configured to send and receive live migrations of virtual machines on this server.         Configuring Hyper-V now enables any available network on this server to be used for live migrations. If you want to dedicate specific networks for live migration, use Hyper-V settings after you install the role.         Image: Image: Allow this server to send and receive live migrations of virtual machines         Authentication protocol         Select the protocol you want to use to authenticate live migrations.         Image: Use Credential Security Support Provider (CredSSP)         This protocol is less secure than Kerberos, but does not require you to set up constrained delegation. To perform a live migration, you must be logged on to the source server.         Use Kerberos         This protocol is more secure but requires you to set up constrained delegation in your environment to perform tasks such as live migration when managing this server remotely.         Image: A full the server will be part of a cluster, do not enable migration now. Instead, you will configure the server for live migration, including specifying networks, when you create the cluster.
	< Previous Next > Install Cancel

### 15. Click Next.

The **Default Stores** page is displayed.

È	Add Roles and Features Wizard	- 🗆 X			
Default Stores	DESTINA	ATION SERVER HVC1			
Before You Begin Installation Type Server Selection Server Roles	Hyper-V uses default locations to store virtual hard disk files and virtual machine configura unless you specify different locations when you create the files. You can change these defa now, or you can change them later by modifying Hyper-V settings. Default location for virtual hard disk files:	tion files, ult locations			
Features	C:\Users\Public\Documents\Hyper-V\Virtual Hard Disks	Browse			
Hyper-V	Default location for virtual machine configuration files:				
Virtual Switches	C:\ProgramData\Microsoft\Windows\Hyper-V	Browse			
Migration					
Default Stores					
Confirmation					
Results					
	< Previous Next > Install	Cancel			

16. Change the default locations.

### 17. Click Next.

The **Confirm installation selections** page is displayed.

18. Click to enable Restart the destination server automatically if required.

<b>b</b>	Add Roles and Features Wizard				
Confirm installat	ion selections destination ser	VER VC1			
Before You Begin	To install the following roles, role services, or features on selected server, click Install.				
Installation Type	Restart the destination server automatically if required				
Server Selection	Optional features (such as administration tools) might be displayed on this page because they have				
Server Roles	been selected automatically. If you do not want to install these optional features, click Previous to cl their check boxes.	ear			
Features		_			
Hyper-V	Failover Clustering	<u>^</u>			
Virtual Switches	Hyper-V				
Migration	Remote Server Administration Tools				
Default Stores	Feature Administration Tools				
Confirmation	Failover Cluster Management Tools	=			
Results	Add Roles and Features Wizard				
	If a restart is required, this server restarts automatically, without additional notifications. Do you want to allow automatic restarts?	~			
	Yes No				
	< Previous Next > Install Cance	2			

- 19. Click Yes.
- 20. Click Install.

The server is restarted.

### **Fixing MAC addresses**

To avoid that the MAC address of the network adapter of the Bosch VMS virtual machine is automatically changed, perform this procedure.

You need the MAC address of the affected network adapter.

- 1. Start Hyper-V Manager.
- 2. Right-click a virtual machine entry and click **Settings...** The Settings dialog box is displayed.
- 3. In the Hardware list, click **Advanced Features**.

12 12	Se	ettings for the formation
HVTest-BVMS-1	¥	♦ ►   Q.
* Hardware	^	Advanced Features
Memory		MAC address O Dynamic O Static
4096 MB Processor 2 Virtual processors IDE Controller 0 G Hard Drive HVTest-BVMS-1.vhdx		00 - 15 - 5D - 01 - 88 - 88 MAC address spoofing allows virtual machines to change the source MAC address in outgoing packets to one that is not assigned to them.
	=	DHCP guard DHCP guard drops DHCP server messages from unauthorized virtual machines pretending to be DHCP servers. ☐ Enable D <u>H</u> CP guard
Hardware Acceleration Advanced Fectures COM 1 None COM 2		Router guard Router guard drops router advertisement and redirection messages from unauthorized virtual machines pretending to be routers. Enable <u>r</u> outer advertisement guard
None Diskette Drive None Management Name HVTest-BVMS-1		Protected network Move this virtual machine to another cluster node if a network disconnection is detected. Protected network
Integration Services     Some services offered     Checkpoint File Location     C: \ClusterStorage \Volume 1\HV		Port mirroring Port mirroring allows the network traffic of a virtual machine to be monitored by copying incoming and outgoing packets and forwarding the copies to another virtual machine configured for monitoring.
C:\ClusterStorage\Volume1\HV	~	Mirroring mode:     None     V       QK     Cancel     Apply

- 4. In the MAC address field, click **Static**.
- 5. Type in the valid MAC address.
- 6. Click OK.

### **Configuring DSA E-Series 2600**

For installing the firmware and assigning static IP addresses, install SANtricity ES Storage Manager software.

You need the default NetAppp firmware to install it on your DSA E-Series device. This firmware is available on the Bosch VMS product catalog page.

Contact Bosch Technical Support for these software packages.



4

### Notice!

For more detailed and up-to-date information refer to the SANtricity installation manual available on http://mysupport.netapp.com/documentation/productlibrary/index.html? productID=61197.

### See also

- Installing SANtricity on client computer, page 15
- Assigning static IP addresses (part 1), page 15
- Installing the firmware on a DSA E-Series, page 15
- Assigning static IP addresses (part 2), page 17
- Configuring storage for Hyper-V or VMware, page 18

### 4.1 Installing SANtricity on client computer

• Start Setup.exe and follow the instructions on the screen.

### 4.2 Assigning static IP addresses (part 1)

Refer to the SANtricity manual for performing the following tasks.

Switch on the DSA E-Series device. The device waits several minutes for a DHCP server assigning IP addresses. If no DHCP server is available or the DHCP does not assign IP addresses, default IP addresses are automatically assigned for both the iSCSI Controller and the Management Controller. SANtricity can only detect devices in the same subnet. If DHCP server is available, this is not a problem. Otherwise you must configure an alternative IP address for your network adapter so that you can reach iSCSI storage devices in other subnets.

Assign the static IP addresses for the iSCSI controller after you installed the NetApp firmware on your DSA E-Series device.

### Assign IP addresses:

- 1. After this automatic assignment, start SANtricity to configure static IP addresses.
- 2. For the Management Controller configure port 1.

For better network redundancy, you can also configure port 2.

- 3. Exit SANtricity and restart it.
- 4. Remove the old array entry and rescan.

### 4.3 Installing the firmware on a DSA E-Series

### To install:

- 1. Start SANtricity ES Storage Manager.
- 2. Click the **Support** tab.
- 3. Click **View Event Log**.

The Event Log dialog box is displayed.

4. Click Clear All....

5. In the next dialog box, type in yes and click **OK**.

Old event logs are removed. This is a prerequisite for installing the firmware.

 Click Download Firmware. The following dialog box is displayed.

📸 e-SeriesENetz01 - Select Down
NetApp <sup>.</sup>
Select a download task:
Ownload controller firmware
Download controller NVSRAM
O Download drive firmware
Oownload ESM firmware
Obwnload Tray configuration settings
OK Cancel

7. Select **Download controller firmware** and click **OK**. The following dialog box is displayed.

🔛 VMware - Download Controller Firmware
NetApp <sup>.</sup>
Select a firmware file to transfer new controller firmware from this management station to Storage Array VMware.
Controller Firmware
Current controller firmware version: PkgInfo 07.81.09.20
Selected controller firmware file:
esktop\vmware\E26xx_07844600\RC_07844600_e10_784_26x0.dlp
File information:
Firmware=07.84.46.00
NVSRAM
✓ Transfer NVSRAM file with controller firmware
Current NVSRAM version: N26X0-781830-301
Selected NVSRAM file:
nistrator\Desktop\vmware\E26xx_07844600\N26X0-784834-DB2.dlp Select File
File information:
No displayable attributes associated with this file.
Transfer files but don't activate them (activate later)
Transfer Cancel Help

- 8. Select check box **Transfer NVSRAM file with controller firmware**.
- 9. In both selection fields, enter the appropriate path and filenames.
- Click Transfer...
   The firmware is transferred and installed on your device.

This process can last 10 minutes or longer.

### 4.4 Assigning static IP addresses (part 2)

Refer to the SANtricity manual for performing the following task. Assign static IP addresses for the iSCSI controllers.

### Assign IP addresses:

• For each iSCSI controller configure 2 iSCSI ports with static IP addresses. Configure the correct port speed used in your network.

### 4.5 Configuring storage for Hyper-V or VMware

### Create volume group with volume:

- 1. Click the Storage & Copy Services tab.
- 2. Create a volume group.
- 3. For this group configure **Automatic** and **RAID 6**.
- 4. In the Map to host: list, select Map Now to Default Group.

🔀 Unnamed - Create V	Volume: Specify Parameters	×
	1	NetApp <sup>.</sup>
	Tips on storage provisioning	
	Volume Parameters	
	Volume group name: Vol_VMware Volume group RAID level: 6 Free capacity: 4.587,549 GB	
9	N <u>e</u> w volume capacity: <u>U</u> nits:	
	0,000 🐳 GB 🔻	
	Volume name: 2	
	Map to host: 2	
	Map Later	
	Map Now to Default Group	
	Enable data assurance (DA) protection on the new volume 👔	QoS
	Volume I/O <u>c</u> haracteristics type:	
	Finable dynamic cache read prefetch	
	Segment size:	
	128 KB 👻	
	Einish Cancel	Help
In this group, croa	to a 1 TR volume for VMware	

In this group, create a 1 TB volume for VMware.
 For Hyper-V, create 3 volumes:
 1x 100GB Quorum
 2x 1TB as Cluster Shared Volumes

### For VMware: Change the default host operating system type:

- 1. Click the **Host Mappings** tab.
- 2. Right-click Default Group and click Change Default Host Operating System.
- 3. As the new host type configure VMWare.

### For Hyper-V: Change the default host operating system type:

- 1. Click the **Host Mappings** tab.
- 2. Right-click Default Group and click Change Default Host Operating System.
- 3. As the new host type configure **Windows Server 2003/Server 2008 Clustered (Supports DMP)** for a dual controller device.

For a single controller device select the **Windows Server 2003/Server 2008 Non-Clustered (Supports DMP)** option.

### 4.6 Configuring iSCSI targets on Windows host

For preparing the storage you must perform the following tasks:

- Adding the iSCSI target
- Initializing the disks of the iSCSI target

### Adding the iSCSI target

1. Start the iSCSI service.

<b>*</b>		Comp	outer Management		_ 🗆 X	
File Action View Help						
🗢 🔿 🙍 🖬 👔 😰	X 📽 🖻 🔍 😼					x
🜆 Computer Management (Local	Volume	Layout Type File Syste	m Status	0	Actions	
⊿ System Tools Tools A B B B B B B B B B B B B B B B B B B B	(C:)	Simple Basic NTFS	Healthy (Boot, Page File, Crash Dump, Prin	nary Partition) 1	Disk Management	
I ask Scheduler	System Reserved	d Simple Basic NTFS	Healthy (System, Active, Primary Partition)	5	More Actions	
Shared Folders						
Local Users and Groups						
▷ No Performance						
Device Manager						
Windows Server Backup						
Disk Management						
Services and Applications						- ( <i>I</i> )
	<			>		
	Disk 0					
	Basic 136.70 GB	System Reserved	(C:) 136 36 GB NTES			
	Online	Healthy (System, Active, Pr	i Healthy (Boot, Page File, Crash Dump, Prim		Microsoft iSC	ISI 🛛 🔍
	CD-ROM 0			The Microsof	ft iSCSI service is not running. The ser	vice is required to be started for
	DVD (D:)			iSCSI to funct	tion correctly. To start the service nov	v and have the service start
	No Media			adcomatically	y caen ante the compater restarts, en	ik the residution.
						Yes <u>N</u> o
				l		
						SI ISINE-01-00 Multi-P
		Primary partition				
		r may paration				

2. Find and start the iSCSI initiator using the Windows search function.



- 3. The **iSCSI Initiator Properties** dialog box is displayed.
- 4. Type in the IP address of your iSCSI target and click **Quick Connect...**

現在	Failover Cluster Manager	<b>– D</b> X
File Action View Help		
iSCSI Initiator Properties		
Targets       Discovery       Favorite Targets       Volumes and Devices       RADIUS       Configuration         Quick Connect       To discover and log on to a target using a basic connection, type the IP address or DNS name of the target and then click Quick Connect.       Target:       192.168.128.34       Quick Connect.         Target:       192.168.128.34       Quick Connect.       Status         Discovered targets       Refresh	P Queries ▼ L ▼ ♥ Status Cluster Use Information Up Cluster and Client Up None Up Cluster Only	Actions Networks  View Migration Settings View View Kefresh Help ISCSI Show Critical Events Properties Help
To connect using advanced options, select a target and then       Connect         dick Connect.       Disconnect         To completely disconnect a target, select the target and then dick Disconnect.       Disconnect         For target properties, including configuration of sessions, select the target and dick Properties.       Properties         For configuration of devices associated with a target, select the target and then dick Devices.       Devices         OK       Cancel       Apply	III > 2.158.128.0/24	

5. The **Quick Connect** dialog box is displayed.

The successfully connected iSCSI target is displayed in the **Discovered targets** field.

iSCSI Initiator Properties						
Quick Connect	×	r				
Targets that are available for connection at the IP addres provided are listed below. If multiple targets are available to each target individually. Connections made here will be added to the list of Favori to restore them will be made every time this computer res	ss or DNS name that you e, you need to connect te Targets and an attempt tarts.					
Discovered targets						
Name	Status					
Progress report						
Login Succeeded.						
Connect	one					

6. Click Done.

The **iSCSI Initiator Properties** dialog box with the connected iSCSI target is displayed.



7. Click Devices...

The **Devices** dialog box with all disks assigned to your target are displayed.

		iSCSI Initiator Properties					
		Devices	x				
Name	Address						
Disk 1	Port 3: Bus (	Port 3: Bus 0: Target 0: LUN 0					
Disk 2	Port 3: Bus (	0: Target 0: LUN 1					
Disk 3	Port 3: Bus (	0: Target 0: LUN 2					
Disk 4	Port 3: Bus (	0: Target 0: LUN 3					
Disk 5	Port 3: Bus (	0: Target 0: LUN 4					
Volume path	n names:	11 IDhunicelDrive 1					
Legacy devi	ce nome.	(). Physical Drive I					
		\\?\scsi#disk&ven_lsi∏_inf-01-00#1&1c1213448	MC .				
Device inter	face name:						
		<	>				
Configure M	lultipath IO (MF	PIO)					
To configur selected de	e the MPIO po vice, dick MPIC	o.					
		OK	J.				

8. Click **OK**. The iSCSI target is successfully added.

### Initializing the disks of the iSCSI target

1. Start **Disk Management**.

<u>*</u>				Computer Mana	igement			_ □	x
File Action View Help									
🗢 🔿 🙇 📰 🛛 🖬 🎝	K 📽 🖻 🍳 😼								
<ul> <li>Computer Management (Local</li> <li>▲          <sup>1</sup> <sup></sup></li></ul>	Volume  (C:)  System Reserved	Layout Type Simple Basic Simple Basic	File System NTFS NTFS	Status Healthy (Boot, Page Healthy (System, Ac	File, Crash Dump, Primary Partition) ctive, Primary Partition)	Capacity 136,36 GB 350 MB	Free Space 114,09 GB 89 MB	Actions Disk Management More Actions	<b>^</b>
<ul> <li>Event Viewer</li> <li>Shared Folders</li> <li>Coal Users and Groups</li> <li>Performance</li> <li>Device Manager</li> <li>Storage</li> <li>Windows Server Backur,</li> <li>Disk Management</li> <li>Services and Applications</li> </ul>	CD-ROM 0       Winallocated	System Reserver 350 MB NTFS Healthy (System, J 500 MB Unallocated 999,87 GB 999,87 GB 1000,00 GB Unallocated 1000,00 GB Unallocated	d Active, Prim	III	e File, Crash Dump, Primary Partition			More Actions	•

### 2. Right-click **Disk1** and click **Online**



3. Right-click **Disk 1** and click **Initialize Disk**.

*			Computer Management	
File Action View Help				
🗢 🔿 🙍 📰 🛿 🖬 🗳 😭	1 😼			
🜆 Computer Management (Local 🚺	Volume	Layout Type File System	Status	Capacity Free Space
⊿ 👫 System Tools	画 (C:)	Simple Basic NTFS	Healthy (Boot, Page File, Crash Dump, Primary Partition)	136,36 GB 114,09 GB
Task Scheduler	System Reserved	l Simple Basic NTFS	Healthy (System, Active, Primary Partition)	350 MB 89 MB
▷ La Event Viewer				
B Shared Folders	<			>
Deformance				
Device Manager	Basic	System Reserved	(C;)	
⊿ 🔄 Storage	136,70 GB	350 MB NTFS	136,36 GB NTFS	
Windows Server Backup	Online	Healthy (System, Active, Prin	Healthy (Boot, Page File, Crash Dump, Primary Partition)	
📄 Disk Management				
Services and Applications	Disk 1			
	Unknown			
	500 MB In	itialize Disk		
	Not initial	ffline		
	-			
	Disk 2	operties		
	Basic H	elp		
	999,88 GB	999,87 GB		
	Online U			
		1		

4. The **Initialize Disk** dialog box is displayed.

Initialize Disk 🛛 🗙
You must initialize a disk before Logical Disk Manager can access it.
Select disks:
✓ Disk 1
Use the following partition style for the selected disks:
MBR (Master Boot Record)     GPT (GUID Partition Table)
Note: The GPT partition style is not recognized by all previous versions of Windows.
OK Cancel
5. Click <b>OK</b>

Disk 1 is online and unallocated.

<u>.</u>			Computer Management		
File Action View Help					
🔶 🔿 🔁 📰 😰 🛛	ê 😼				
<ul> <li>Computer Management (Local</li> <li>System Tools</li> <li>Task Scheduler</li> <li>Event Viewer</li> <li>Shared Folders</li> <li>Local Users and Groups</li> <li>Performance</li> <li>Device Manager</li> <li>Storage</li> <li>Windows Server Backup</li> <li>Disk Management</li> <li>Services and Applications</li> </ul>	Volume (C:) System Reserved Volume System Reserved System Reserved System Reserved System Reserved System Syste	Layout Type File System Simple Basic NTFS Simple Basic NTFS System Reserved 350 MB NTFS Healthy (System, Active, Prinr	Status Healthy (Boot, Page File, Crash Dump, Primary Partition) Healthy (System, Active, Primary Partition) III (C:) 136,36 GB NTFS Healthy (Boot, Page File, Crash Dump, Primary Partition)	Capacity 136,36 GB 350 MB	Free Space 114,09 GB 89 MB >
	Continue Contin	499 MB Unallocated 999,87 GB			
	Disk 3 Basic 999,88 GB Offline	999,87 GB			
	Unknown 1000,00 GB Offline ( Disk 5 Unknown 1000,00 GB Offline (	1000,00 GB Unallocated 1000,00 GB Unallocated			

6. Right-click **Disk 1** and click **New Simple Volume**.

The New Simple Volume Wizard is displayed.

New Simple Volume Wizard		
Welcome to the New Simple Volume Wizard		
This wizard helps you create a simple volume on a disk.		
A simple volume can only be on a single disk.		
To continue, click Next.		
k		
< Back Next > Cancel		
	New Simple Volume Wizard Welcome to the New Simple Volume Wizard This wizard helps you create a simple volume on a disk. A simple volume can only be on a single disk. To continue, click Next.	

- 7. Click Next.
- 8. Type in the desired disk size and click **Next**.
- 9. Click to select **Do not assign a drive letter or drive path**.

New Simple Volume Wizard		
Assign Drive Letter or Path For easier access, you can assign a drive letter or drive path to your partition.		
<ul> <li>Assign the following drive letter:</li> <li>Mount in the following empty NTFS folder:</li> <li>Browse</li> <li>         ● Do not assign a drive letter or drive path     </li> </ul>		
< Back Next > Cancel		

- 10. Click Next.
- 11. Click to select Format this volume with the following settings.

New Simple Volume Wizard				
Format Partition To store data on this partition, you m	Format Partition To store data on this partition, you must format it first.			
Choose whether you want to format t	his volume, and if so, what	settings you want to use	4	
O Do not format this volume				
<ul> <li>Format this volume with the following the second sec</li></ul>	lowing settings:			
File system:	NTFS	×		
Allocation unit size:	Default	¥		
Volume label:	Quorum			
Perform a quick format			N	
Enable file and folder co	mpression		6	
	< Back	Next > Canc	el	

12. Click Next.

New Simple Volume Wizard	x
Completing the New Simple Volume Wizard	
You have successfully completed the New Simple Volume Wizard. You selected the following settings: Volume type: Simple Volume Disk selected: Disk 1 Volume size: 497 MB Drive letter or path: None File system: NTFS Allocation unit size: Default Volume label: Quorum Cuick format: Yes To close this wizard, click Finish.	
< Back Finis Cancel	

- 13. Click Finish.
- 14. Repeat the above steps for all disk drives that are not yet included.

## 5 Performance tips

### The following practices help optimize Hyper-V performance

- 1. Since MS Server 2012 the default **Power Options** for the virtual machines and hosts is **Balanced**. Reset this to **High Performance**.
- 2. Ensure that the number of virtual CPUs assigned is not higher than the number of physical CPUs available.
- 3. Install the latest versions of Guest Tools appropriate to your version of the Hypervisor.
- 4. The virtual hard disks (VHDs) of the virtual machines (VMs) should be deployed on logical unit numbers (LUNs) that suit the demands of the application. For example:
  - Put the operating system (OS) and the application on separate VHDs.
  - Format the VHD for the OS with an allocation unit (cluster size) of 4096
  - (Profitable for BIS, not Bosch VMS) format the VHD where an MS SQL database resides with a cluster size of 64K
  - Format the VHD where the error log resides with a cluster size of 1024
- 5. If possible, do not run the Hyper-V Manager on the Hyper-V host. Run it from a client instead.
- 6. Use **Checkpoints** (Snapshots) of virtual machines only temporarily for updates, not for backups, because Checkpoints lead to increased I/O.
- 7. Always prefer synthetic over emulated hardware (for background information see https:// support.microsoft.com/en-us/kb/2844106). Do not activate hardware compatibilities in the devices of the virtual machine, even though this is allowed, for example for the CPU.

**Example System Dimensions** 6

### 6.1

Sizing

SCx

6.1	Sizing		
Sizing			
SCx	HDD Size	Memory Size	Network
HVC1	146 GB	16 GB	4x 1 Gbit/s

HVC2	146 GB	16 GB	4x 1 Gbit/s
HVR1	146 GB	16 GB	4x 1 Gbit/s
HVR2	146 GB	16 GB	4x 1 Gbit/s

#### **Network segments** 6.2

Network configuration						
Name	Named in OS	Network	IP-Address	DNS	DHCP	Gateway
		mask	range			
Management	MGMT	/24	192.168.100	192.168.0.10	Yes	192.168.0.254
Heartbeat	Heartbeat	/16	172.16	NA	No	NA
Production	E-Netz	DHCP	DHCP	DHCP	Yes	DHCP
Storage	iSCSI	/24	192.168.128	NA	No	NA

#### 6.3 Server configuration

#### Replication 6.3.1

Server configuration: Physical server (Replication)			
Server name	HVR1	HVR2	
Usage	MS Windows Hyper-V	MS Windows Hyper-V	
Server type	HP Proliant DL380	HP Proliant DL380	
Network configuration	1		
NIC1 (MGMT) 192.168.100.101 192.168.100.102		192.168.100.102	
HDD			
C Partition         136 GB         136 GB		136 GB	
Туре			
Cluster	No	No	
Physical / Virtual	Physical	Physical	
OS	Windows Server 2012 R2	Windows Server 2012 R2	

#### 6.3.2 Cluster

Server configuration: Physical server (Failover Cluster)			
Server name HVC1 HVC2		HVPDC	
Usage	MS Windows Hyper-V	MS Windows Hyper-V	Domain Controller

Server configuration: Physical server (Failover Cluster)			
Server name	e HVC1 HVC2		HVPDC
Server type	HP Proliant DL380	HP Proliant DL380	Hyper-V Virtual Machine
Network configura	ation		
NIC1 Port1 (MGMT)	192.168.100.1	192.168.100.2	192.168.100.10
NIC1 Port2 (Heartbeat)	172.16.0.1	172.16.0.2	
NIC1 Port3 (E- Netz)	Over DHCP	Over DHCP	
NIC1 Port4 (iSCSI)	192.168.128.1	192.168.128.2	
HDD			
C Partition	136 GB	136 GB	50 GB
Storage			
Volume 1 (Quorum)	/olume 1 500 MB (Quorum)		
Volume 2 (CSV1)	1 TB		
Volume 3 (CSV2)	1 TB		
Туре			
Cluster	Management Cluster	Management Cluster	NA
Physical / Virtual	Physical	Physical	Virtual
os	Windows Server 2012 R2	Windows Server 2012 R2	Windows Server 2012 R2

### 6.3.3 Cluste

Cluster using Starwind solution

Tested with:

- StarWind Virtual SAN V8 Build 8198

- Microsoft Server 2012 R2 as Host System
- Microsoft Server 2008 R2 as Client System
- Bosch VMS 5.5.5.258

Server Name	HVC 1		HVC 2
Usage	Windows Hyper-V		Windows Hyper-V
Server Type	HP Proliant DL 380		HP Proliant DL 380
Network Configuration	letwork Configuration		
Nic 1 Port 1 Mgmt	192.168.*.* 192.168		68.*.*
Nic 1 Port 2 Heartbeat / Sync 1	172.16.110.* / 172.16.210.*	172.1	6.110.* / 172.16.210.*
Nic 2 Port 1 Heartbeat / Sync 2	172.16.111.* / 172.16.211.*	172.1	6.111.* / 172.16.211.*

Server Name	HVC 1	HVC 2
HDD		
HDD 1 (136GB)	Raid Group 1 C Partition	Raid Group 1 C Partition
HDD 2 (136GB)		
HDD 3 (136GB)	Raid Group 2 StarWind Partition	Raid Group 2 StarWind
HDD 4 (136GB)		Partition
Storage		
Volume 1 (Quorum)	500 MB	500 MB
Volume 2 (CSV1)	100GB	100GB
Туре		
Cluster	Management Cluster	Management Cluster
Physical/Virtual	Physical	Physical
OS	Windows Server 2012 R2	Windows Server 2012 R2

### Glossary

### **Emulated device**

[Context: Microsoft Hyper-V] Software that emulates a legacy device within a virtual machine. Advantage: availabilitiy of drivers. Disadvantage: sub-optimal performance.

### High availability (HA)

Technology to keep a system available for use despite threats such as HW or SW failures, sabotage or natural disasters.

### Host

In the context of high availability a host is the physical computer on which hypervisor software creates and runs virtual machines.

#### Hyper-V

Hyper-V is Microsoft's standard native hypervisor. A hypervisor or virtual machine monitor creates and runs virtual machines.

### Logical unit number

a unique identifier to designate an individual or collection of physical or virtual storage devices to a SCSI system

### Synthetic device

[Context: Microsoft Hyper-V] A new kind of highperformance virtual device available with Hyper-V. Advantage: better performance than emulated devices.

### Virtual hard disk

A software file that emlates a hard disk in high availability technology

### Virtual machine

The emulation of a physical computer in software. The VM has its own operating system and uses the physical resources of the physical computer that hosts it. See Host.

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