

Surveillance

Dell EMC Storage with Digifort Enterprise

Sizing Guide

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CHAPTER 1

Introduction

This chapter provides information on the purpose and scope of this solution:

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- [Scope](#).....6
- [Key objectives](#).....7

Solution overview

The purpose of this guide is to help you understand the benefits of using a Dell EMC storage solution with Digifort Enterprise. The solution includes both hardware and software elements for video surveillance.

Use this guide to determine the requirements for a successful Digifort Enterprise installation. The storage platforms include VMware ESXi hosts that are running Digifort Enterprise.

Scope

This guide is intended for use by internal Dell EMC sales and pre-sales personnel, and qualified Dell EMC and Digifort partners.

The guidelines presented are for storage platform positioning and system sizing. The sizing recommendations are based on performance and storage protocol conclusions derived from Dell EMC testing.

The guidelines for sizing this video storage solution describe the use of the following storage platforms:

- EMC VNX™
- EMC VNXe™
- EMC VSS™

These guidelines include the following design considerations:

- Architectural overview of Digifort Enterprise
- Dell EMC storage considerations for Digifort Enterprise
- Result summaries for the tests carried out by Dell EMC engineers in a VMware ESXi virtualized infrastructure

Use this guide to determine the best configuration for the following:

- Number of Digifort Recorders
- Storage using Fibre Channel (FC) and Internet SCSI (iSCSI) on VNX systems
- Load factors related to the use of Dell EMC storage arrays in the customer's solution

Note

All performance data contained in this report was obtained in a rigorously controlled environment. Network topology and system environment variables can have significant impact on performance and stability. Follow the best practices as outlined in the *Dell EMC Storage with Digifort Enterprise: Configuration Guide* regarding network and storage array configuration. Server and network hardware can also affect performance. Performance varies depending on the specific hardware and software, and might be different from what is outlined here. Performance results will be similar if your environment uses similar hardware and network topology.

Key objectives

The configurations documented in this guide are based on tests conducted in the Dell EMC Surveillance Lab and actual production implementations.

These are the key objectives of this solution:

- Measure the sizing needs for specific system requirements so that an implementation can be correctly sized and the appropriate Dell EMC products can be matched to a customer's requirements.
- Determine the VNX, VNXe, and VSS LUN bandwidth within the storage pool.
- Calculate array maximum bandwidths.
- Recommend disk drive types.
- Confirm the previous test results with lab controlled failures, such as disabled storage processors, disk rebuilds, and network path failures.

CHAPTER 2

Solution components

This chapter provides information about storage options for video and audio data:

- [Dell EMC storage](#).....10
- [Storage protocols](#)..... 10
- [Digifort Enterprise](#)..... 10

Dell EMC storage

Dell EMC storage arrays are ideal for storing video and audio data.

This guide describes the tests for the following storage arrays:

- VNX arrays
- VNXe arrays
- VSS arrays

For our testing, we used both single and dual storage processors for the full range of VNX, VNXe, and VSS storage arrays.

Storage protocols

Dell EMC uses standard file protocols to enable users and applications to access data that is consolidated on a Dell EMC storage solution.

This guide provides information about these network protocols:

- FC
- iSCSI

Digifort Enterprise

The Digifort Enterprise system is developed around the client/server platform, using all the features and benefits this platform offers. You can configure Digifort Enterprise 7.1.0.0 to manage a few cameras or thousands of cameras.

The following table describes the primary Enterprise services.

Table 1 Enterprise primary services

Service	Description
Recorder Server	Enterprise records video through the recorder service. The recorder provides dynamic discovery and status polling of units and processes and stores (archives) all video and multimedia streams to storage. Archiving is the term used for storing video. Each recorder server maintains its own database.
Master Server	The Master server application provides the required centralized catalog for the other Enterprise services and applications on the system. All Recorder servers can be managed using Administration client on Master server or they can be individually managed.
Surveillance Client Server	Surveillance Client servers connect to the Recorder servers and provide live or recorded video playback options.

CHAPTER 3

Configured components

This chapter provides information about the components configured in this solution:

- [Dell EMC Surveillance Lab test environment](#)..... 12
- [VNX unified storage platform](#)..... 12
- [VNXe family array](#)..... 12

Dell EMC Surveillance Lab test environment

The Dell EMC Surveillance Lab is constantly being upgraded to the most recent software releases.

In order to test this solution, the Dell EMC Surveillance Lab was configured as follows:

- 8 vCPUs
- 12 GB memory
- Network adapter type: VMXNET3 - 10 GbE
- Isolated VLAN for storage (if not FC)

For all the tests, the virtual CPU (vCPU), memory, and network were configured according to Digifort best practices. The VMware vSphere configuration was in accordance with the VMware Compatibility Guide (www.vmware.com/resources/compatibility/search.php). In addition, Dell EMC PowerPath™ was used for block storage (FC and iSCSI) and is recommended for block storage implementations.

The Dell EMC Surveillance Lab's host hardware met and exceeded the minimum system requirements for an ESXi/ESX installation. The Digifort Recorder VM was running on an ESXi 6.0 host using Cisco UCS B230 Blade Servers with a 20-core ESXi host at 2.2 GHz and 128 GB memory. The Digifort Recorder virtual machine was running on an ESXi 6.0 host using Cisco UCS B230 Blade servers with 256 GB memory. For more information about VM configuration, see the General recommendations for storage and sizing section of the *Using EMC VNX storage with VMWare VSphere* guide.

VNX unified storage platform

The VNX series is designed for a wide range of environments that include midtier through enterprise systems. VNX provides offerings that include file only, block only, and unified (block and file) implementations. The VNX series is managed through a simple and intuitive user interface called Unisphere, which completes the unified experience.

The VNX series is Dell EMC's next generation of midrange-to-enterprise products. The VNX unifies Dell EMC's file-based and block-based offerings into a single product that you can manage with one easy to use GUI. This VNX software environment offers significant advancements in efficiency, simplicity, and performance.

VNXe family array

With the Digifort Enterprise solution, a VNXe family array is used for the primary storage array. An iSCSI-connected VNXe array, implemented with storage pools, provides a cost-effective implementation while maintaining expected performance levels. Many mid-sized deployments can use VNXe.

CHAPTER 4

Sizing the solution

This chapter provides information to enable you to quickly determine the correct storage array based on your customer's bandwidth requirements:

- [EMC VNX and EMC VNXe](#)..... 14

EMC VNX and EMC VNXe

We conducted validation tests to determine how Digifort works with VNX and VNXe storage arrays.

Our testing found the best bandwidth for a single camera server to be 42 MB/s. The tests included an overall read bandwidth of 20 percent. Maximum per recorder bandwidth may vary based on the configuration of the Recorder server used. All testing was conducted using the iSCSI protocol.

Test results are based on a conservative model to ensure that the constant-bandwidth video traffic is unaffected during a single storage pool (SP) maintenance cycle, disk rebuild, or similar performance-intensive event.

Table 2 EMC VNX/VNXe storage array results

Array	Storage Pools				Maximum (RAW)
	RAID	Disks	iSCSI Bandwidth (MB/s)	FC Bandwidth (MB/s) **	
VNXe1600	6	96	202	222	400 TB
VNXe3200 *	6	120	210	231	500 TB
VNX-VSS100 *	5, 6	90	381	419	360 TB
VSS1600	6	96	202	103	400 TB
VNX5200 *	5, 6	55	360	396	500 TB
VNX5400 *	5, 6	120	476	524	1 PB
		250	476	524	
VNX5600 *	5, 6	120	500	550	2 PB
		240	800	880	
		500	800	880	
VNX5800 *	5, 6	120	530	583	3 PB
		240	847	932	
		360	1271	1398	
		750	1271	1398	
VNX7600 *	5, 6	120	547	602	4 PB
		240	876	963	
		360	1314	1445	
		480	1752	1927	
		1000	1752	1927	
VNX8000 *	5, 6	120	655	720	6 PB
		240	1047	1152	
		360	1571	1728	

Table 2 EMC VNX/VNXe storage array results (continued)

Array	Storage Pools				Maximum (RAW)
	RAID	Disks	iSCSI Bandwidth (MB/s)	FC Bandwidth (MB/s) **	
		480	2094	2304	
		600	2618	2880	
		1000	2618	2880	

* These values are extrapolated from Dell EMC Surveillance Lab test results.

This guide provides details on the total load that was tested in the Dell EMC Surveillance Lab. However, the independent software vendor (ISV) should provide the actual server specification. The test results in this guide set a server bandwidth specification that is based on our lab environment, which can be used in the event the ISV does not provide these specifications.

The VNX family array architecture is optimized for storage pools. A storage pool is a construct that is built over one, or more commonly multiple, RAID groups. LUNs are built on top of the storage pool. The read/write activity is a random distribution across all disks defined to the storage pool. This distribution results in increased and balanced per disk utilization and improved performance when compared to traditional RAID implementations.

The RAID groups underlying storage pools can be either RAID 5 or RAID 6. The default and recommended RAID configuration for a VNXe or VSS1600 array using NL-SAS drives is RAID 6. Either RAID 5 or RAID 6 can be used with VNX arrays. RAID 5 is used for optimizing the array to achieve the maximum amount of storage and RAID 6 is used for enhancing data protection. Our tests using an isolated surveillance infrastructure did not reveal any notable performance variances when using RAID 5 as compared to RAID 6.

CHAPTER 5

Testing and validation

This chapter describes the testing used to validate this solution.

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- [Test parameters](#)..... 18
- [Storage bandwidth and configuration test](#)..... 18

Test objectives

Many factors must be considered when designing your solution.

The Dell EMC Surveillance Lab tests focus on storage-related factors with the following objectives:

- Determine the bandwidth for various Dell EMC storage arrays using FC and iSCSI.
- Determine the best configuration parameters for VNX storage options.
- Determine best video storage performance requirements for use with VNX storage arrays.
- Determine the maximum bandwidth with multiple Recorders.
- Determine all factors with a lab-controlled failure, such as disabling a storage processor, rebuilding disks, or network path failures.

Test parameters

All test parameters and scenarios reflect standard production behavior for Digifort Enterprise under storage-intensive conditions, including typical storage functions and failures. We followed best practices for recovery and break-fix issues for normal situations that might arise in a standard production environment.

We used the following parameters to perform the tests:

- The IP network (Layer 2) is a flat, high-availability network with plenty of capacity, which enabled us to focus on the products we were testing.
- All tests assumed uniform distribution of bandwidth from the Digifort Recorder.

Storage bandwidth and configuration test

The storage bandwidth test evaluated video storage and applications with a number of different Dell EMC storage systems. Additional tests evaluated ESXi host hardware in relationship to vCPU settings and the resulting bandwidths.

These tests assumed that Digifort Enterprise was configured as described by Digifort's best practices and operated within the recommended bandwidth, camera count, and other Digifort maximum requirements.

Procedure

1. Configured video storage for a Dell EMC storage system.
2. Set up camera simulators (traffic generators) to produce a traffic load to each Digifort Recorder at the recommended bandwidth.
3. Verified that motion detection was in the **On** state for all cameras.
4. Evaluated the network and video storage to ensure an error-free environment at the induced bandwidth.
5. Introduced storage device errors including:
 - Disk failures and rebuilds on VNX and VNXe arrays
 - Use of only one VNX or VNXe storage processor
6. Captured the storage system and host statistics.

7. Based on the test results:

- If no issues were detected, incremented the bandwidth.
- If issues were detected, decreased the bandwidth.

This procedure was repeated until the maximum error-free bandwidth was determined.

CHAPTER 6

Conclusion

This chapter summarizes the testing for this solution:

- [Summary](#)22

Summary

We performed comprehensive testing with Digifort Enterprise on a large number of EMC VNX, VSS and VNXe arrays.

Depending on a customer's requirements, you can use EMC VNX storage systems with Digifort Enterprise for this solution. The Digifort architecture and product suite enables scaling from a few cameras up to tens of thousands of cameras with this solution.

EMC VNX

Compared to traditional block-level storage, the use of storage pools to create LUNs within the VNX arrays greatly simplifies the configuration and increases the performance. Either iSCSI or FC can be implemented. FC performs better than iSCSI.

EMC VSS

The VNX Video Surveillance Storage (VSS) is a storage solution that is purpose-built to meet the unique demands of the video surveillance environment. We found that this high-availability, low-cost array performs comparably to other arrays in the VNX family.

EMC VNXe

An iSCSI-connected VNXe array, implemented with storage pools, provides a cost-effective implementation while maintaining the expected performance. Many mid-sized deployments can use VNXe.