



Video Surveillance EMC Storage with LENSEC Perspective VMS

Sizing Guide

H14768

01



Copyright © 2016 EMC Corporation. All rights reserved. Published in the USA.

Published March, 2016

EMC believes the information in this publication is accurate as of its publication date. The information is subject to change without notice.

The information in this publication is provided as is. EMC Corporation makes no representations or warranties of any kind with respect to the information in this publication, and specifically disclaims implied warranties of merchantability or fitness for a particular purpose. Use, copying, and distribution of any EMC software described in this publication requires an applicable software license.

EMC², EMC, and the EMC logo are registered trademarks or trademarks of EMC Corporation in the United States and other countries. All other trademarks used herein are the property of their respective owners.

For the most up-to-date regulatory document for your product line, go to EMC Online Support (<https://support.emc.com>).

EMC Corporation
Hopkinton, Massachusetts 01748-9103
1-508-435-1000 In North America 1-866-464-7381
www.EMC.com

CONTENTS

Chapter 1	Introduction	5
	Solution overview.....	6
	Scope.....	6
	Key objectives.....	7
Chapter 2	Configured components	9
	EMC surveillance lab virtual test environment.....	10
	Isilon clustered storage system.....	10
	Isilon protection with OneFS 7.2.....	10
	Data protection.....	10
	Cluster size.....	11
Chapter 3	Solution components	13
	EMC storage.....	14
	Storage protocols.....	14
	LENSEC Perspective VMS.....	14
Chapter 4	Sizing the solution	15
	EMC Isilon node and cluster	16
Chapter 5	Testing and validation	17
	Test objectives.....	18
	Test parameters.....	18
	Storage bandwidth and configuration test.....	18
Chapter 6	Conclusion	21
	Summary.....	22
Index		23

CONTENTS

CHAPTER 1

Introduction

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

- [Solution overview](#)6
- [Scope](#)6
- [Key objectives](#) 7

Solution overview

LENSEC provides video management software (VMS) for video surveillance that is scalable, provides sensor integration, and is standards based for open integration.

Use this guide to determine the requirements for a successful LENSEC installation. Testing was conducted to confirm functional compatibility, but does not provide specific bandwidth or configuration information at this time.

Scope

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

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

The guidelines for sizing LENSEC Perspective VMS using EMC storage systems for video storage include the following platforms:

- EMC Isilon®

It includes the following design considerations:

- Architectural overview of LENSEC Perspective VMS
- EMC storage considerations for LENSEC Perspective VMS
- Result summaries for the tests carried out by EMC engineers in a VMware ESXi virtualized infrastructure

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

- Number of LENSEC Archivers
- Mix of nodes and Archivers based on the expected bandwidth in an Isilon implementation
- Storage using Server Message Block (SMB) on Isilon
- Load factors that are related to including 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 *EMC Storage with LENSEC Perspective VMS: 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 should be similar if your environment uses similar hardware and network topology.

Key objectives

The configurations documented in this paper are based on tests that were conducted in the EMC Physical Security lab, production implementations, or a combination of the two.

The following key objectives of this paper are based on the results of these tests:

- Measure sizing needs for specific system requirements so that an implementation can be correctly sized and the right EMC products can be matched to a customer's requirements
- Determine VNX bandwidth for each logical unit number (LUN)
- Determine disk pool and LUN configurations
- Recommend Isilon SMB configuration
- Determine Isilon bandwidth for each Archiver
- Calculate array or node maximum bandwidths
- Recommend disk drive types
- Confirm the previous test results with lab controlled failures, such as disk rebuilds, node removals, network path failures, or disabled storage processors.

CHAPTER 2

Configured components

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

- [EMC surveillance lab virtual test environment](#)..... 10
- [Isilon clustered storage system](#)..... 10
- [Data protection](#)..... 10
- [Cluster size](#)..... 11

EMC surveillance lab virtual test environment

The surveillance lab is constantly being upgraded to the most recent software releases.

At the time of the most recent test, the lab was configured as follows:

- VMware ESXi 5.5
- 20-core ESXi host at 2.2 GHz or greater
- 128 GB memory per ESXi host
- Per virtualized Video Management Software (VMS) host:
 - 4 vCPUs
 - 8 GB memory
 - Network adaptor type: VMXNET3 (GbE and 10 GbE), E1000 or VMXNET2 (GbE only)
 - Isolated VLAN for storage if not FC

The EMC surveillance lab's host hardware met and exceeded the minimum system requirements for an ESXi/ESX Installation.

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

Results from previous test environments and non-current EMC arrays and clusters are not represented in this guide.

Isilon clustered storage system

Isilon network-attached storage (NAS) was designed and developed specifically to address the needs of storing, managing, and accessing digital content and other unstructured data.

An Isilon clustered storage system is composed of three or more nodes. Each node is a self-contained, rack-mountable device that contains industry-standard hardware such as disk drives, CPUs, memory, and network interfaces. These nodes are integrated with the proprietary Isilon OneFS[®] operating system, which is a distributed networked file system that unifies a cluster of nodes into a single shared resource.

Isilon protection with OneFS 7.2

On new or upgraded clusters, OneFS 7.2 provides a data protection level that meets EMC Isilon guidelines for mean time to data loss (MTTDL) for large capacity nodes. OneFS 7.2 offers a new protection option, +3d:1n1d. OneFS 7.2 also provides an option that continually evaluates the cluster and sends an alert if the cluster falls below the suggested protection level.

Data protection

OneFS does not rely on hardware-based RAID for data protection. The Isilon system uses the Reed-Solomon algorithm for N+M protection with Forward Error Correction (FEC).

Protection is applied at the file level, enabling the cluster to recover data quickly and efficiently. Nodes, directories, and other metadata are protected at the same or higher

level as the data blocks they reference. Since all data, metadata, and FEC blocks are spread across multiple nodes, dedicated parity drives are not required. For more information about data protection, see *EMC Isilon OneFS: A Technical Overview*.

Although cluster sizes as small as 3 nodes are possible, for surveillance applications we recommend a minimum of 5 nodes. Sizing calculations need to include a minimum free space calculation for proper cluster sizing. We recommend a cluster size that enables a node to be removed while retaining a minimum of 10 percent free space in the remaining capacity. This cluster size ensures that node removal and node failures have minimal or no impact on video ingestion.

The Isilon sizing tool provides an accurate calculation. You can find this tool at <https://isilon-sizing-tool.herokuapp.com>. Other sizing tools from VMS and camera vendors may also be used for sizing the bandwidth and storage capacity that is needed.

Cluster size

We recommend a minimum cluster size of five nodes, even if you are not writing to all of them. For example, if you are implementing a four-Archiver solution, implement a five-node cluster. This also meets the recommended best practices for data protection.

To estimate the ideal number of nodes in a cluster, you need to consider both cluster bandwidth as well as capacity.

Sizing by bandwidth

We recommend a cluster size with one or more additional nodes than is calculated in bandwidth sizing. This ensures that failover of a node allows for redistribution of NAS connections and avoids any frame loss.

Sizing by aggregate capacity

We recommend a cluster size with enough usable capacity to handle 110 percent of the calculated space requirement, with a minimum added capacity of one full node plus 10 percent. The values are based on camera bit rate.

Isilon sizing tool

The Isilon sizing tool can use both the sizing by bandwidth and sizing by aggregate capacity methods when calculating ideal cluster size. You can find this tool at <https://isilon-sizing-tool.herokuapp.com>.

Configured components

CHAPTER 3

Solution components

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

- [EMC storage](#)..... 14
- [Storage protocols](#)..... 14
- [LENSEC Perspective VMS](#)..... 14

EMC storage

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

This guide describes the tests for the following arrays:

- Isilon clusters

Storage protocols

This guide provides information about these network protocols.

- SMB (CIFS)

LENSEC Perspective VMS

A LENSEC Perspective VMS installation can consist of a single web server and a single video server or multiple servers in a peer structure. You can configure Perspective VMS to manage a few cameras or thousands of cameras.

The Administration, Health monitoring and External system services run on the web server, while the Archiving and Streaming services on the Archiver and Reviewer servers respectively.

following table describes the primary Perspective VMS services.

Table 1 Perspective VMS primary services

Service	Description
Administration Service	Responsible for monitoring disk utilization and moving old archives to a different offsite location. It also ensures user synchronization between Active Directory and Perspective VMS.
Streaming Service	An intermediate agent between Perspective VMS and system cameras. It is responsible for handling video streams and passing them to the Perspective VMS system.
Archiving Service	Responsible for archiving image and video streams from cameras. It handles image and live recording requests from Perspective VMS users to capture video streams.
Health Monitor Service	Checks if system cameras defined in Perspective VMS are up and running. If not, the service notifies the user about the offline status of the camera in question. Generates a health report for cameras, servers, and other system components.
External System Service	Acts as an intermediary communication agent between Perspective VMS and third party software and hardware. This service is installed using a stand-alone, package independent of the main Perspective VMS setup.

CHAPTER 4

Sizing the solution

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

- [EMC Isilon node and cluster](#) 16

EMC Isilon node and cluster

The test results are based on a model in which the constant-bandwidth surveillance video traffic remained unaffected during a single node maintenance cycle, disk rebuild, SP failure, or non-disruptive upgrade.

We performed all tests with node or drive failures in place in the cluster (for example, with Isilon FlexProtect™ running) to ensure a worst-case scenario for all sizing parameters. The test included an overall read bandwidth of 10%.

The following table provides bandwidth-sizing guidelines based on our test results:

Table 2 EMC Isilon node and cluster (SMB) test results

Array	OneFS version	Archivers per node	Bandwidth (MB/s)		Drive Size	Maximum Cluster Raw
			Per node	Per host		
X410	7.2.x	1	78	78	1 TB	20.7 PB
		2	110	55	1 TB	
		3	132	44	1 TB	
		4	136	34	1 TB	
NL410	7.2.x	1	78	78	1 TB	30.2 PB
		2	106	53	1 TB	
		3	120	40	1 TB	
HD400	7.2.x	1	78	78	2 TB	50.9 PB
		2	106	53	2 TB	
		3	120	40	2 TB	

Note

All disk drives are NL-SAS 7200 RPM unless otherwise noted.

CHAPTER 5

Testing and validation

This chapter describes the testing used to validate this solution.

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

Test objectives

Many factors should be taken into account when designing your solution.

The EMC lab tests focus on storage-related factors with the following objectives:

- Determine the bandwidth for various EMC storage arrays and clusters using SMB.
- Determine the configuration parameters for Isilon storage options.
- Determine optimal video storage performance requirements for use with Isilon scale-out storage clusters.
- Determine the maximum bandwidth with multiple Archivers.
- Determine the previous test results with a lab controlled failure, such as rebuilding disks, removing a node, network path failures, or disabling a storage processor.

Test parameters

All test parameters and scenarios reflect standard production behavior for LENSEC Perspective VMS 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 LENSEC Archiver.

Storage bandwidth and configuration test

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

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

Procedure

1. Configured video storage for an EMC storage system.
2. Set up camera simulators (traffic generators) to produce a traffic load to each LENSEC Archiver 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 Isilon nodes
 - Initiation of Isilon node failures and recoveries
 - Initiation of Isilon node removals (downsizing a cluster)
 - Initiation of Isilon node additions (scaling up)

- NIC failures with active/active and active/passive configurations
6. Captured the storage system and host statistics.
 7. Based on the test results:
 - If no issues were detected, we incremented the bandwidth.
 - If issues were detected, we decremented the bandwidth.
- This was repeated until the maximum, error-free, bandwidth was reached.

CHAPTER 6

Conclusion

This chapter summarizes the testing for this solution:

- [Summary](#).....22

Summary

We performed comprehensive testing with LENSEC Perspective VMS on a number of EMC Isilon clusters. Depending on the implementation needs, you can use EMC storage for LENSEC Perspective VMS. The LENSEC Perspective VMS architecture and product suite enables extreme scaling from a few cameras to tens of thousands of cameras using EMC storage.

EMC Isilon scale-out storage

Isilon scale-out storage is ideal for midtier and enterprise customers. An Isilon cluster is based on independent nodes working seamlessly together to present a single file system to all users.

Licensed SmartQuotas options can be configured so that each Archiver view of the storage is based on the assigned quota and not the entire file system. We recommend using SmartQuotas with LENSEC Perspective VMS as a best practice.