Surveillance

Dell EMC Storage with LENSEC Perspective VMS

Sizing Guide

Dell EMC
Surveillance Lab
Tested

LENSEC
The Power of Perspective

DELLEMC

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CHAPTER 1

Introduction

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

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 Dell EMC sales and pre-sales personnel, and qualified Dell EMC and LENSEC 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:

- Dell EMC Isilon™

These guidelines include the following design considerations:

- Architectural overview of LENSEC Perspective VMS

- Dell EMC storage considerations for LENSEC Perspective VMS

- 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 LENSEC Archivers

- Mix of nodes and LENSEC Archivers based on the expected bandwidth in an Isilon implementation

- Storage using Server Message Block (SMB) on Isilon systems

- Load factors related to the use of Dell EMC storage arrays in the customer's solution

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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 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 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.

- Recommend an Isilon SMB configuration.

- Calculate node maximum bandwidths.

- Recommend disk drive types.

- Determine Isilon bandwidth for each Archiver.

- Confirm the previous test results with lab controlled failures, such as disk rebuilds, node removals, and network path failures.

CHAPTER 2

Configured components

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

Dell EMC Surveillance Lab virtual test environment

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

The virtualized LENSEC Perspective VMS host 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:
  - vCPUs
  - 8 GB memory
  - Network adapter type:
  - Isolated VLAN for storage (if not FC)

The Dell 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 Compatatility 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.

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

Isilon clustered storage system

Isilon NAS was designed and developed specifically for 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

New or upgraded clusters, starting with OneFS 7.2, provide a data protection level that meets Dell EMC Isilon guidelines for mean time to data loss (MTTDL) for large capacity nodes. Current releases of OneFS offer a new protection option, +3d:1n1d, which means the cluster can survive three simultaneous disk failures or one entire node failure plus one disk. OneFS 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 a 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 Isilon data protection, see *Dell EMC Isilon OneFS: A Technical Overview*.

Although cluster sizes as small as three nodes are possible, for surveillance applications we recommend a minimum of five 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 video management software (VMS) and camera vendors may also be used for sizing the necessary bandwidth and storage capacity.

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-node 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 cluster bandwidth and capacity.

Sizing by bandwidth

We recommend a cluster size with one or more additional nodes than 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.

The Isilon sizing tool can use both the sizing by bandwidth and sizing by aggregate capacity methods when calculating ideal cluster size.

Configured components

CHAPTER 3

Solution components

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

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:

* Isilon clusters

For our testing, we used single- and multi-node performance testing on the Isilon storage array.

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:

* 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.

The following table describes the primary Perspective VMS services.

Table 1 Perspective VMS primary services

LENSEC PVMS 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 3rd 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 enable you to quickly determine the correct storage array based on your customer's bandwidth requirements:

Dell 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 Dell 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

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 clusters using SMB.

- Determine the best configuration parameters for Isilon storage options.

- Determine best video storage performance requirements for use with Isilon scale-out storage clusters.

- Determine the maximum bandwidth with multiple Archivers.

- Determine all factors with a lab-controlled failure, such as rebuilding disks, removing a node, or network path failures.

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 Dell EMC storage systems. 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 a Dell 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, 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

We performed comprehensive testing with LENSEC Perspective VMS on a number of Dell EMC Isilon clusters. Depending on the implementation needs, you can use Dell 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 Dell EMC storage.

Dell 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. Dell EMC recommends using SmartQuotas with LENSEC Perspective VMS as a best practice.