

Surveillance

Dell EMC Storage with Aimetis Symphony

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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Introduction

This white paper will help Dell EMC field personnel and partners to understand the requirements for a successful Aimetis Symphony installation. The document provides guidelines for storage platform positioning and system design, based on performance testing.

Dell EMC storage hardware and software solutions are ideal for storing, consolidating, protecting, and backing up video and audio data. This document outlines how Aimetis Symphony video management installations can benefit from using Dell EMC storage solution, and provides configuration and sizing guidelines for virtualized Aimetis Symphony installations on Dell EMC storage.

This solution uses Dell EMC Isilon™ scale-out clusters and EMC VNX™ storage arrays as storage platforms for a virtualized Aimetis Symphony video management solution. VMware vSphere provides the virtualization platform, with VMware ESXi hosts implementing the Symphony servers.

This document provides guidelines for storage platform positioning and sizing for system design, and:

- Presents bandwidth information for Aimetis Symphony releases 6.12 (and later) when the servers are attached to various Dell EMC storage system
- Describes the optimum Isilon and EMC VNX5400™ configurations for Aimetis Symphony
- Summarizes the results of the tests carried out by Dell EMC

The solution testing focused on determining:

- The maximum bandwidth to Isilon or VNX storage based on multiple Aimetis Symphony servers writing to storage
- The recommended configuration and sizing for Dell EMC storage

Terminology

This section defines the terms "block-level storage system" and "file-level storage system".

Block-level storage

A block-level storage system writes and reads blocks of data by using logical block addresses (LBAs), which are translated into disk sector addresses on the drives. Storage area network (SAN) environments use block-level storage to provide a higher level of performance as compared with file-level storage. Block-level storage allows the host to control the assigned storage allocations (LUNs or volumes) as if they were independent disks.

File-level storage

File-level storage, such as network-attached storage (NAS) implements a client/server model. NAS is a shared storage device that provides file-based storage services to clients on the network. The NAS device handles data storage, read/write requests, file management, and data protection. NAS is accessed using network protocols such as Server Message Block (SMB) or Network File System (NFS).

CHAPTER 2

Solution components

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

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- [Aimetis Symphony](#)..... 9

Dell EMC storage

Dell EMC storage arrays are ideal for storing video and audio data. We carried out the solution testing with VNX arrays and Isilon clusters.

EMC VNX

The EMC VNX series is optimized for virtual applications and delivers innovation and enterprise capabilities for file, block, and object storage in a scalable, easy-to-use solution.

VNX combines powerful and flexible hardware with advanced efficiency, management, and protection software to meet the demanding needs of today's enterprises. VNX is powered by Intel Xeon processors for intelligent storage that automatically and efficiently scales in performance while ensuring data integrity and security.

The VNX series is designed to meet the high-performance, high-scalability requirements of midsize and large enterprises.

Dell EMC Isilon

Dell EMC Isilon video surveillance solutions, together with leading video management software such as Aimetis Symphony, provide video surveillance, security, and data storage.

Dell EMC Isilon scale-out NAS can manage surveillance data from a range of sources for scalable, efficient storage solutions that address large amounts of video data.

Isilon video surveillance solutions are simple to install and manage, and scale to virtually any size, regardless of how your surveillance needs change in the future.

Isilon scale-out NAS provides unparalleled scalability for your video surveillance data storage needs. With the ability to scale to over 15 petabytes (PB) of capacity per cluster in a single file system, it can accommodate large-scale increases in the video quality per camera, or bringing more cameras online, by dynamically expanding video surveillance storage.

Cluster size

We tested this solution using a five-node cluster.

A five-node cluster is the minimum cluster size that Dell EMC recommends. Three or four node clusters can be implemented, but these will not achieve the level of performance outlined in this document, and cannot sustain failures correctly.

The Isilon team recommends a +2:1 protection level for five-node clusters. Larger clusters have an increased possibility of disk failures. For these clusters, use N+2, N+3, or N+4, according to the Isilon team's recommendations.

The best way to size a cluster is to use the [Isilon Cluster Sizing Tool](#).

Other tools to make capacity calculations are also available from the camera vendors, or the video surveillance manager vendor, when estimates of the bandwidth and storage capacity are needed.

If tools other than the [Isilon Cluster Sizing Tool](#) are being used for sizing aggregate capacity, Dell EMC recommends that, in steady state, the capacity does not exceed 85% of the total usable space capacity, and during a worst case scenario the capacity does not exceed 90%. The optimal protection scheme for the implementation affects

these calculations. Contact your Dell EMC representative for assistance to determine the right protection scheme for your environment

Aimetis Symphony

Aimetis Symphony is a video management solution that provides a single, innovative, and open IP video platform for video analytics, system integration, and alarm management.

Three versions are available.

Aimetis Symphony Standard

For customers who require a video management solution only

Aimetis Symphony Professional

For customers who want to integrate their video system with third-party systems for interoperability and centralized alarm management

Aimetis Symphony Enterprise

Expands Symphony Professional to include a wealth of information derived from video analytics and other features

Aimetis Symphony Professional and Enterprise are infinitely scalable from single camera installations to installations with thousands of cameras. Symphony supports high camera-to-server density and server farms.

For information on hardware benchmarks, server recommendations, and expected system bandwidths, refer to the Aimetis website for [Supported video devices](#) and [Hardware calculator](#).

Server and client software

An Aimetis Symphony installation has two components: server software and client software.

The server software handles all video recording, analytics, dynamic discovery, and status polling and reporting. It is an intelligent management system that is responsible for processing all video and multimedia streams and then transferring to storage. The server software supports both analog and IP cameras.

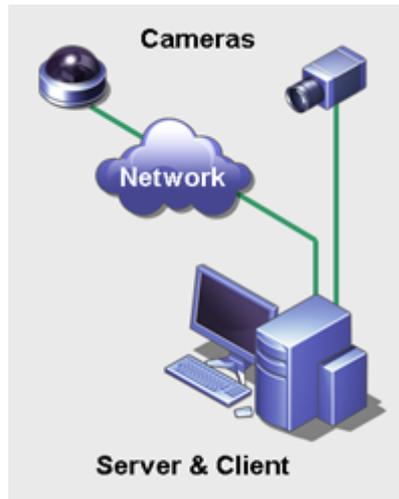
The client software provides the user interface for all tasks including monitoring, searching, reporting, and configuration.

Server and client deployments

An Aimetis Symphony installation can consist of a single server or multiple peer servers.

The Server and Client installer sets up both the server and client software on a single computer, as shown in the following figure. One computer and one camera is all you need to get started.

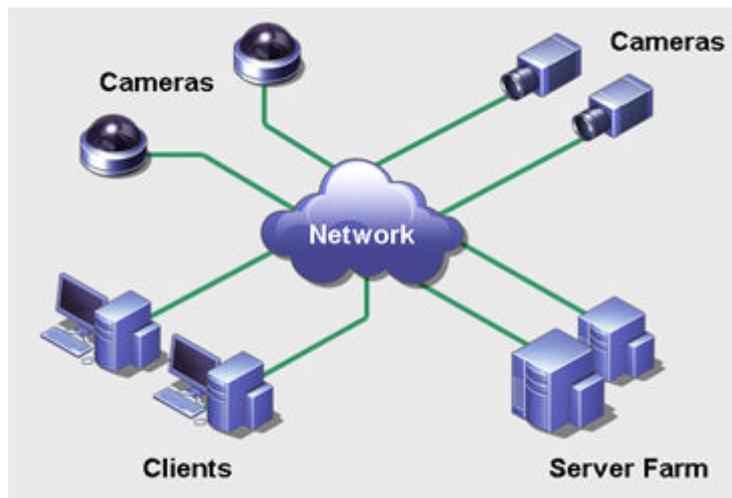
Figure 1 Server and client on one computer



At a more typical site, the client software is installed on multiple desktop computers that are connected to a dedicated server computer running the server software.

At larger sites, the server software runs on multiple computers linked together to form a server farm, as shown in the following figure.

Figure 2 Server farm with many clients



Minimum hardware and software requirements

The *Aimetis Symphony Installation Guide* provides the minimum hardware requirements and the operating system and software requirements for a Symphony installation.

At the time we tested this solution, the minimum hardware requirements were as follows.

Server:

- Any Intel CPU or any AMD CPU that supports Streaming SIMD Extensions 2 (SSE2)-for example, Opteron
- 500 MB free disk space

- At least 1 GB RAM

Client:

- 200 MB free disk space
- 2 GHz or faster processor
- At least 1 GB RAM

CHAPTER 3

Sizing the solution

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

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- [EMC VNX test results](#).....14
- [Isilon node test results](#)..... 15
- [Best practices for Isilon cluster sizing](#)..... 15

Sizing the solution

Use the results presented in this white paper to determine how to size a customer's environment.

The results are based on tests carried out in the Dell EMC Surveillance Lab.

EMC VNX test results

We conducted the tests to determine the maximum bandwidths on a VNX5400 array.

We tested a 30-disk storage pool configuration, which is a useful compromise between a lower performing pool with less disks and a higher performing pool with more disks. In general, pools with less than 30 disks have a steeper performance drop-off and may not achieve the same results; pools with more than 30 disks have a more gradual performance increment.

Dell EMC recommends a storage pool configuration instead of traditional RAID groups. Testing in the lab shows that storage pools perform as well as, or better than, RAID groups. Storage pools are also simpler to manage.

The results in the table below are based on tests that produce conservative results to ensure that the video traffic, which has a constant bandwidth, is unaffected during a single storage processor (SP) maintenance cycle, disk rebuild, or other event that can seriously degrade the array's performance.

Table 1 EMC VNX storage array results

Model (iSCSI)	Maximum single storage processor bandwidth ^a	No. of Pools	Disks per pool	Per server bandwidth (MB/s)	No. of servers	Aimetis Symphony version
VSS100	54	1	9	27	2	6.12.3.0
VSS100	162	1	72	27	6	6.12.3.0
VNX5400	192	1	30	32	6	6.12.3.0
VNX5400	450+ ^b	1	180	32	n/a	6.12.3.0

a. Tested using a single storage processor with an active disk rebuild providing the maximum design-to-number.

b. Extrapolated data based on the 30-disk pool results.

Note

All disks tested are NL-SAS with 3 TB and run at 72000 RPM unless otherwise noted.

Isilon node test results

These results are from conservative tests to ensure that the video traffic, which has a constant bandwidth, is unaffected during a single-node maintenance cycle, disk rebuild, or other event that can seriously degrade the cluster's performance.

We tested Aimetis Symphony with Isilon NL400 nodes only. However, Dell EMC Isilon X200 and Dell EMC Isilon X400 models will provide the same, or better, bandwidth per node.

The Test results shown in the table below illustrate how the Isilon scales nonlinearly. The 10 GE bandwidth does not scale as expected because the node processor utilization exceeds safe limits due to all testing cases being based on a node remove (failure/recovery) process.

Table 2 Dell EMC Isilon node and cluster (SMB2) test results

Array	Isilon NIC	Ratio of servers to nodes	Per node bandwidth (MB/s)	Maximum server bandwidth (MB/s)	Isilon OneFS version	Aimetis Symphony Version
NL400	1 GbE	1:1	34	34	7.1.0.0	6.12.3.0
NL400	1 GbE	2:1	68	34	7.1.0.0	6.12.3.0
NL400	1 GbE	3:1	84	28	7.1.0.0	6.12.3.0
NL400	10 GbE	1:1	50	50	7.1.0.0	6.12.3.0
NL400	10 GbE	2:1	96	48	7.1.0.0	6.12.3.0
X410	10 GbE	1:1	50	50	8.0.01	6.14.5.1
X410	10 GbE	3:1	150	50	8.0.01	6.14.5.1

Note

Dell EMC recommends that you schedule permanent node removals during a scheduled maintenance window. When we permanently removed a node from the five-node cluster using the OneFS SmartFail process, the system experienced five minutes of recording errors while SmartFail started.

Best practices for Isilon cluster sizing

We tested this solution with a five-node cluster, which is the minimum cluster size Dell EMC recommends. You can implement three- or four-node clusters. However, these may not achieve the performance outlined in this document and cannot sustain failures correctly.

The following best practices are based on a minimum cluster size of five nodes:

- Isilon recommends a +2:1 protection level for five-node clusters. Larger clusters have more disks and, therefore, an increased possibility of multiple disk failures. For clusters of more than five nodes, use N+2, N+3, or N+4, according to the Dell EMC Isilon account team's recommendations.

- The bandwidth and storage requirement varies greatly depending on the installation. Various calculators are available for determining the storage requirement, including the [Isilon Cluster Sizing Tool](#).
- When estimating the correct cluster size for an installation, you must add a minimum amount of free space to the calculated space requirement.
- Dell EMC recommends a cluster size such that, if a node is removed, the remaining capacity retains a minimum of 10% free space. This ensures that a node removal or failure has minimal or no impact on video ingestion. If using a protection scheme that provides for multiple node failures, add additional nodes as required. Always provide sufficient capacity so that a minimum 10% free space remains after nodes are removed.

CHAPTER 4

Testing and validation

This chapter describes the testing used to validate this solution.

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- [Testing disclaimer](#) 18
- [Testing storage bandwidth and configuration](#) 18

Test objectives

These tests were conducted to provide information about the maximum expected bandwidth per array or node, the disk configuration, and recommendations for various configuration parameters.

The objectives of the solutions tests were as follows:

- Determine the bandwidth for a VNX storage array using iSCSI and an Isilon storage cluster using NAS (SMB2).
- Determine the configuration parameters for VNX and Isilon storage.
- Determine the optimal video storage performance requirements for use of Isilon scale-out storage clusters based on various failure scenarios.
- Determine the optimal performance requirements for use of a VNX storage array based on various failure scenarios.
- Determine the maximum bandwidth with multiple Symphony servers.

Testing disclaimer

All performance data contained in this white paper was obtained in a rigorously controlled environment. The Dell EMC Surveillance Lab is an isolated environment and does not mimic the network or storage traffic in a production environment.

Although all our findings are based on worst-case server and storage scenarios, the findings are also based on the use of high-end physical servers and a 10 GbE isolated network capable of supporting a large-scale data center. Results obtained in other operating environments may vary significantly.

Testing storage bandwidth and configuration

The purpose of the storage bandwidth tests was to evaluate video storage and its application to Isilon storage nodes and VNX storage arrays. Additional tests evaluated ESXi host hardware in relation to virtual CPU settings and the resulting bandwidths.

For all the tests, we assumed that Aimetis Symphony was configured according to Aimetis best practices, and was operating within the recommended bandwidth, camera count, and other Aimetis maximums.

Procedure

1. Configured video storage for a Dell EMC storage array or cluster.
2. Configured Symphony servers for the storage protocol to be tested-SMB2 (CIFS) or iSCSI.
3. Set up camera simulators (traffic generators) to produce a traffic load to each Symphony server at the desired bandwidth.
4. Verified that motion detection was enabled for all cameras.
5. Evaluated the network and the video storage to ensure an error-free environment at the induced bandwidth.
6. Introduced storage device errors and bottlenecks, including:
 - Disk failures and rebuilds on the Isilon nodes or VNX array
 - Using a single VNX storage processor

- Isilon node failures and recoveries
 - Isilon node removals (downsizing a cluster)
7. Captured the storage system and host statistics.
 8. Based on the results:
 - If no issues were detected, we incremented the bandwidth.
 - If issues were detected, we decremented the bandwidth.

We repeated the tests until the maximum, error-free, bandwidth was reached.

CHAPTER 5

Conclusion

This chapter summarizes the testing for this solution:

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- [Dell EMC Isilon scale-out storage findings](#)22
- [VNX storage arrays findings](#)22

Summary

Dell EMC carried out comprehensive testing with Aimetis Symphony and Dell EMC Isilon clusters or an EMC VNX5400 storage array. The results show that Aimetis Symphony is ideally suited for either Isilon scale-out storage or VNX storage arrays.

The Aimetis architecture and product suite enables extreme scaling from a few cameras to tens of thousands of cameras with Dell EMC storage.

Dell EMC Isilon scale-out storage findings

Dell EMC Isilon scale-out storage is ideal for both mid tier and enterprise customers.

An Isilon cluster is based on independent nodes working seamlessly together to present a single file system to all users. You can configure licensed SmartQuotas options so that each server view of the storage is based on an assigned quota and not the entire file system. In our tests, we found this feature to be required for a successful disk rebuild and for various node removal tests. Dell EMC recommends using SmartQuotas.

VNX storage arrays findings

Aimetis Symphony performance to the VNX5400 array was exceptional, with high write bandwidths and video review causing low overhead to the array.

We tested a 30-disk pool configuration as this provides a good compromise between a lower performing pool with less disks and a higher performing pool with more disks. In general, pools with less than 30 disks have a steeper performance drop-off, while pools with more than 30 disks have a more gradual performance increment.

Based on our test results, the VNX5400 with a full complement of disk drives should be able to exceed 450 MB/s.

CHAPTER 6

References

This chapter contains references to other sources of information.

- [Dell EMC references](#)..... 24
- [Aimetis references](#)..... 24
- [VMware references](#).....24

Dell EMC references

The following documents are available from Dell EMC websites.

The following documents, available from the EMC Online Support or EMC.com websites, provide additional and relevant information.

- *Introduction to the New EMC VNX Series-VNX5200, VNX5400, VNX5600, VNX5800, VNX7600, & VNX8000*
- *Dell EMC VNX Unified Best Practices for Performance*
- *Isilon OneFS 7.0 User Guide*

Aimetis references

These documents are available from the Aimetis website.

The following documents are available from the Aimetis.com website:

- *Symphony Release Notes*
- *Symphony Installation Guide*
- *Symphony Administration Guide*
- *Symphony Analytics Guide*
- *Symphony Client User Guide*
- Knowledge Base Articles
- Case Studies
- White Papers
- Application Video Samples

VMware references

These documents are available from the VMware website.

The following documents are available from the VMware.com website:

- *VMware ESXi 5.5 Operations Guide*
- *vSphere Installation and Setup: vSphere 5.5*