

Dell EMC Storage with Milestone XProtect Corporate Reference Architecture

Safety & Security

H13496.5

Abstract

This document describes the reference architecture of a Dell EMC video storage infrastructure solution for Milestone XProtect Corporate. It defines the supported Dell EMC storage platforms, their purpose in the solution design, and supported protocols.

Dell Technologies Solutions



Notes, cautions, and warnings

 **NOTE:** A NOTE indicates important information that helps you make better use of your product.

 **CAUTION:** A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

 **WARNING:** A WARNING indicates a potential for property damage, personal injury, or death.

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Overview

Topics:

- [Document purpose](#)
- [Solution purpose](#)
- [Business challenge](#)
- [Technology solution](#)

Document purpose

This document describes the reference architecture of a Dell EMC video storage infrastructure solution for Milestone XProtect Corporate. It defines the supported Dell EMC storage platforms, their purpose in the solution design, and supported protocols.

The document is intended to be used along with the *Dell EMC Storage with Milestone XProtect Corporate Sizing guide* and *Dell EMC Storage with Milestone XProtect Corporate Best Practices guide* which provide information about system design, sizing, and configuration.

Solution purpose

The purpose of this reference architecture is to demonstrate the functionality, multitier architecture, and scalability offered by Dell EMC storage platforms with Milestone XProtect Corporate.

- Fibre Channel (FC) and iSCSI block-based storage for the XProtect Live database (Live DB) and Archive database (Archive DB), provided by Unity and SC series for small and remote offices.
- Dell EMC Isilon storage, via SMB, for the Archive DB when using direct-attached storage (DAS), FC, and iSCSI environments for the Live DB. Dell EMC Isilon scale-out storage enables dynamic scalability and ease of use for Archive DB video storage.
- Dell EMC ECS Object Storage for extending with a complete software-defined cloud storage platform that supports the storage, manipulation, and analysis of safety and security video and unstructured data on a massive scale on commodity hardware.

The reference architecture validates the performance of the solution and provides guidelines for building similar solutions. The document is not a comprehensive guide to every aspect of this solution.

Business challenge

Video storage requirements for safety and security can vary significantly, especially in highly distributed environments. Dell EMC has many offerings from small to large, including Unity and SC series. For large-scale multipetabyte requirements, Isilon scale-out storage and ECS Object Storage can offer high scalability and storage density for XProtect archiving.

For this solution, we¹ tested various storage scenarios, including iSCSI, and SMB, to determine the Dell EMC storage platforms and associated network protocols that are best suited to each XProtect video database tier.

Because safety and security video is a constant write application, we performed additional validation and testing to determine best practices and provide configuration guidelines for partners and field sales teams. This validation and testing accounts for normal application processes, planned storage maintenance, and unplanned storage array component failures.

This Reference Architecture document discusses:

- The available storage protocols and which are appropriate for each storage tier
- Dell EMC storage array positioning, with XProtect configured as a multi-tier video storage solution based on Milestone best practices

The companion documents and discuss the validation and testing in more detail, including system design, sizing, and configuration.

¹ In this guide, "we" refers to the Dell EMC Safety and Security Lab team that validated the solution.

Technology solution

This solution demonstrates how to use Dell EMC storage platforms to provide the storage resources for a multitier XProtect safety and security video implementation.

Although not Milestone best practice, a single tier solution may be implemented.

Planning and designing the storage infrastructure is a critical step due to the XProtect requirement for both Live DB and Archive DB tiers for safety and security video data. Each network-attached (NAS) storage tier must be able to accommodate large amounts of large block sequential data, even during times when storage paths are crippled (for example, during disk rebuilds, network issues, and maintenance). Otherwise, loss of video will occur.

To provide predictable performance for each tier of the XProtect video storage infrastructure, the storage must be able to handle sustained, high-bandwidth video feeds from servers without dropping video frames or introducing high response times for users reviewing the video. Designing for this workload includes deploying Live DB storage (Tier-1 storage) on Dell EMC FC or iSCSI arrays or, for smaller environments, DAS (internal server storage). The Live DB read performance is also a design consideration for moving the video data from the Live DB to the Archive DB (Tier-2 storage).

Milestone XProtect Corporate

Topics:

- [Overview](#)
- [Milestone XProtect Corporate architecture](#)
- [XProtect Corporate servers and services](#)
- [Releases tested](#)

Overview

Milestone XProtect Corporate uses a distributed architecture with a management server as the core server. The management server can be centrally located or distributed to multiple sites and connected using the Milestone Federated Architecture. The number of recording servers is unlimited.

Milestone XProtect Corporate architecture

You can achieve scaling by expanding the number of servers in each site in addition to combining many sites into a federated architecture.

The following figure shows a simple Milestone XProtect Corporate architecture.

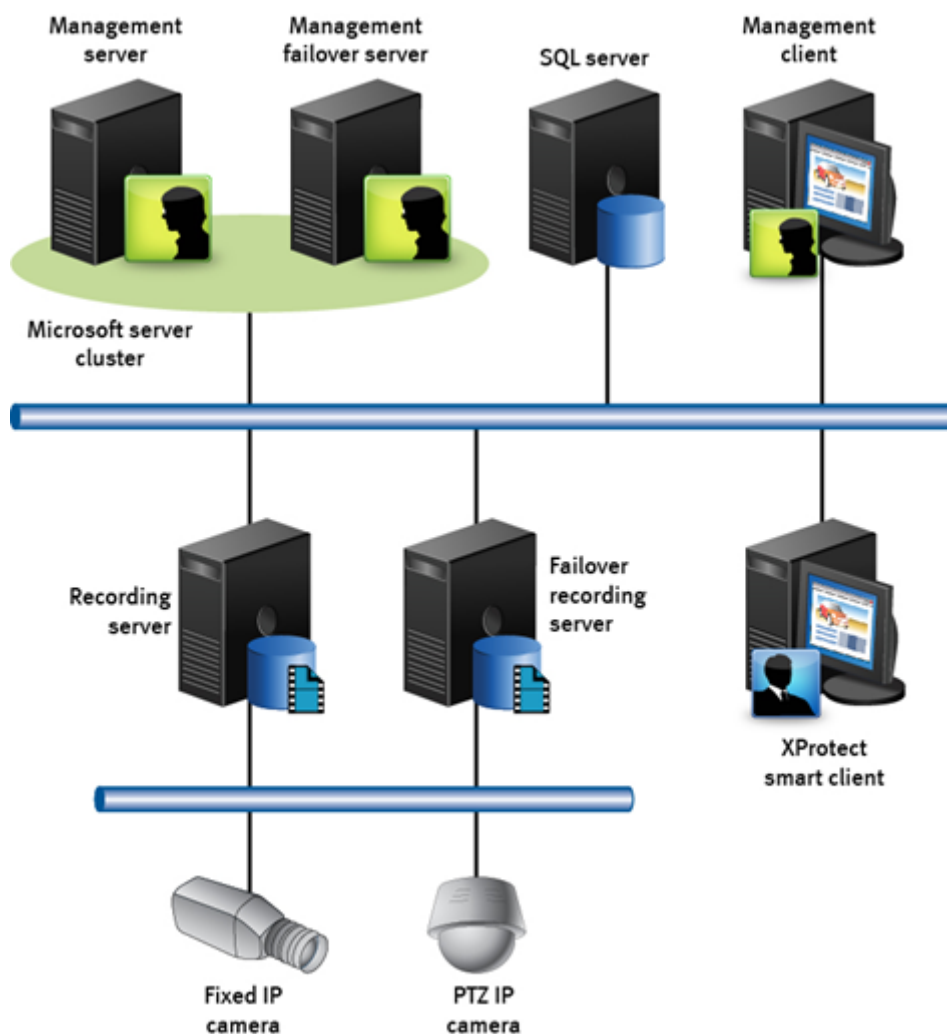


Figure 1. Milestone XProtect Corporate architecture

XProtect Corporate servers and services

The following table lists XProtect Corporate servers, services, and their functions.

Table 1. XProtect Corporate servers and services

XProtect server/service	Functions
Smart Client	Full-featured remote client, which provides these daily functions: • Simultaneous live view and playback of 100 cameras • Intelligent Pan Tilt Zoom (PTZ) camera control • Advanced search capabilities • Export of evidence material
Remote Client	Provides live view and playback of up to 16 cameras and performs most daily operations.
Matrix	Enables up to four live video streams to be sent to an XProtect Smart Client computer.
Recording/failover server	Provides the following functions: • Storage and retrieval of video and audio from MJPEG, MPEG4, MxPEG, and H264 devices • Standby for a single or a group of recording servers, when configured as a failover server

Table 1. XProtect Corporate servers and services (continued)

XProtect server/service	Functions
	- Edge Storage capability, which enables cameras to write to an Edge Storage device if the recording server is unreachable - Processing events, alerts, and actions
Management server	The Management Application is the XProtect Corporate user interface to the management server and provides the following functions: - Managing recording servers, users, and devices - System configuration wizards, automated device discovery, smart bulk configuration, event/alarm configuration, and management of user access privileges - Multi-stage storage schemes, which enable video migrations from the Live DB to the Archive DB - Hosting and controlling access from XProtect clients - Logging

Releases tested

The following tables list the firmware builds and software releases used for our tests.

Table 2. SAN firmware builds

Model	Firmware
Unity 500	4.2.1.9535982, 4.3.1.1525703027
SC3000	7.2.30.21

Table 3. OneFS releases

Model	OneFS version
A200	8.1
A2000	8.1
HD400	7.2.1, 8.0, 8.1
NL410	7.2.1, 8.0, 8.1
X400	7.0.x

Table 4. ECS releases

Product	Version
ECS	3.2.0.0
CIFS-ECS Tool	1.2.2.1

Table 5. Milestone XProtect Corporate releases

VMS	Release
Milestone XProtect Corporate	2017, 2018 R3

Standard architectures

Topics:

- [Overview](#)
- [Network](#)
- [Virtualization](#)
- [Live DB](#)
- [Archive DB](#)

Overview

To successfully design and implement a Milestone XProtect Corporate system, you need to consider many aspects of the system, including networks, cameras, storage, and compute. This section presents storage considerations and recommendations you should take into account when deploying a Milestone XProtect Corporate system on Dell EMC storage platforms.

This reference architecture includes Dell EMC PowerEdge servers, Dell EMC Unity, Dell EMC SC series, Dell EMC Isilon, and Dell EMC ECS storage platforms. You can integrate Dell EMC storage platforms and array sizes with Milestone XProtect to provide a physical security solution to meet the requirements of applications of any size.

Network

Safety & Security is an end-to-end solution that is connected using a simplistic to complex network infrastructure. A typical solution spans multiple network layers, ranging from the access layer providing power over Ethernet (PoE) for video cameras, to the data center that provides the centralized network that is used to interconnect all of the safety and security components.

With cameras on the edge, the data center infrastructure is made of aggregation switches that are known as leaf switches, and a core switch, which is known as the spine. A small campus network has an aggregation layer, but not a data center or core. The network must be correctly sized in terms of capacity, efficiency, and resilience to effectively resolve the user's business challenges.

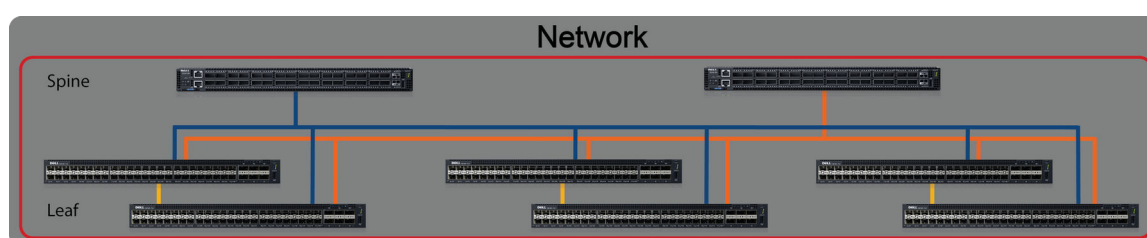


Figure 2. Network spine and leaf configuration

Virtualization

The Dell EMC Safety & Security Lab primarily uses VMware ESXi, Dell EMC storage arrays, Dell EMC servers and Dell EMC Networking. The lab therefore provides tested architectures and solutions that are optimized for various implementation tiers.

VMware ESXi is used across thousands of IT environments around the world to virtualize computer hardware resources, including CPU, RAM, hard disk, and network controller, to create a fully functional virtual machine (VM).

Virtualization with VMware consolidates the number of safety and security servers that are required at a particular site. Aggregating multiple virtualized safety and security servers onto VMware ESX/ESXi hosts enables more bandwidth per physical host than is normally available from a physical host.

Larger centralized installations can benefit from the use of virtualization for consolidation purposes. For large-scale multi-petabyte requirements, Isilon scale-out storage can offer high scalability and storage density for XProtect archiving.

All of the architecture designs in this guide can be implemented as a virtualized environment.

Live DB

In a multitier implementation, the XProtect Live DB read rate is greater than 50 percent read and less than 50 percent write. The Live DB works best with the server's internal DAS or using external FC or iSCSI storage arrays, such as the Unity and SC series.

Internal DAS storage is ideal for small implementations with a few servers. As an installation grows, the need to optimize storage for reliability, scalability, manageability, and rack space increases. In larger environments, and in virtualized server environments, Unity and SC series arrays in a SAN (FC or iSCSI) configuration are more practical for the Live DB.

Live DB considerations and recommendations

- Storage options**
 - Unity
 - SC series
 - Isilon
- Considerations**
 - With the Unity and SC series the Archive DB is not required, depending on the size of the implementation. If tiered storage is required, both the Live DB and Archive DB can use either FC or iSCSI protocols. For iSCSI, you can use GbE or 10 GB NICs.

NOTE: When using smaller Unity and SC series arrays with iSCSI, we recommend that the Live DB and Archive DB reside on different arrays.
 - Dell EMC recommends that you avoid using Isilon storage for the LiveDB storage tier.
 - Although it is possible to use the NFS datastores for the Milestone boot drive in a VMware environment, this configuration with Milestone XProtect has not been tested in the Dell EMC Safety and Security Lab and field tests have been inconclusive.

PowerEdge servers

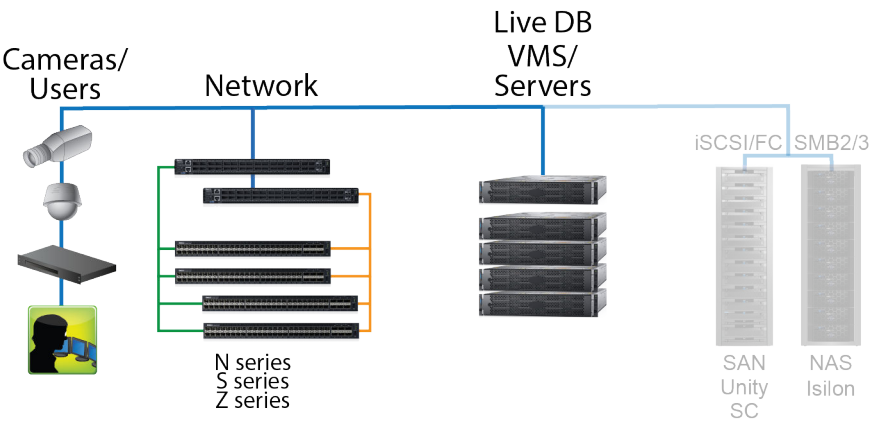


Figure 3. Architecture with PowerEdge server Live DB

- Validated PowerEdge servers**
 - R740xd
 - R740xd2

Unity and SC series

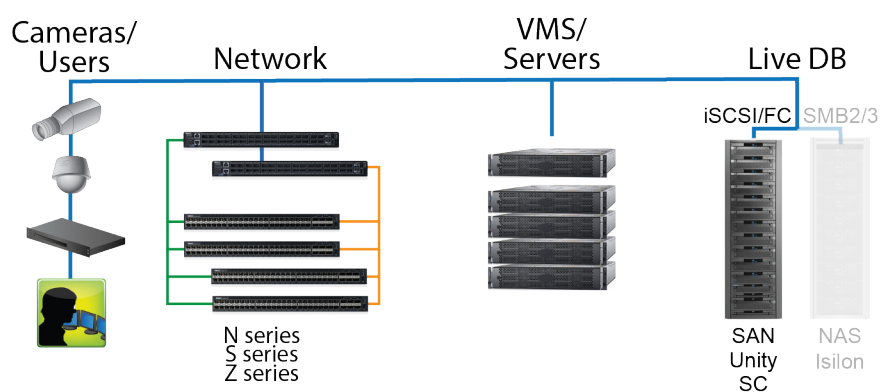


Figure 4. Architecture with Unity/SC Live DB

- Validated Unity arrays**
 - Unity 300
 - Unity 400
 - Unity 500
 - Unity 600
- Validated SC series arrays**
 - SC2030

Isilon

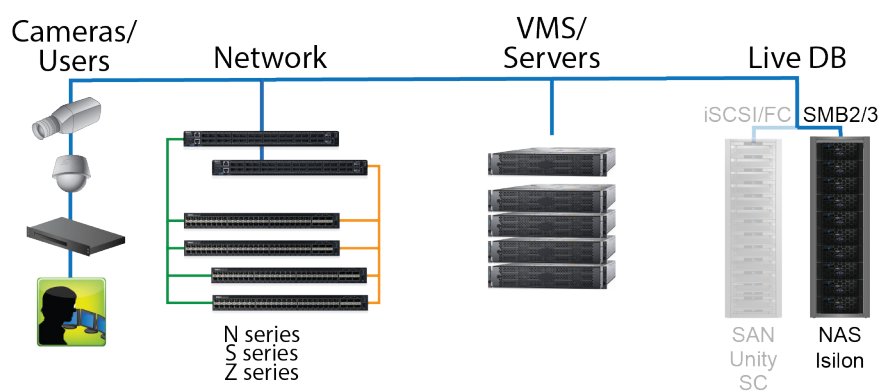


Figure 5. Architecture with Isilon Live DB

- Validated Isilon Clusters**
 - A200
 - A2000
 - H400

Archive DB

The Archive DB is the long-term storage for XProtect and typically constitutes most the storage capacity requirement. Moving video from the Live DB to the Archive DB involves many activities, including optimizing index files for the larger video repository, and moving the files.

Archive DB considerations and recommendations

Storage options

- Unity
- SC series
- Isilon
- ECS Object Storage

Considerations

- When using FC, Live DB and an Archive DB can co-exist on the same Unity array.
- Arrays such as the Unity500 can be used with iSCSI for both the Live DB and Archive DB.
- Dell EMC recommends using 1 GbE or 10 GbE network interface cards (NICs). Test results for this solution are based on both GigE and 10 GB interfaces on the Isilon cluster. XProtect by default moves video from the Live DB to the Archive DB using a single thread. With NAS (SMB2 protocol), the Archive DB thread count can be increased to enable parallel video file moves within the archive process.
- For Isilon scale-out storage, the OneFS protection scheme should be +2:1 (or greater) for installations up to 10 nodes, N+2 for up to 20 nodes, and N+3 for more than 20 nodes. We tested +2:1 on our five-node clusters.

Unity and SC series

Live DB options

- PowerEdge R740xd
- PowerEdge 740xd2
- Unity 300
- Unity 400
- Unity 500
- Unity 600
- SC 2030

Validated Unity arrays as Archive DB

- Unity 500
- Unity 600

Validated SC arrays as Archive DB

- ME4

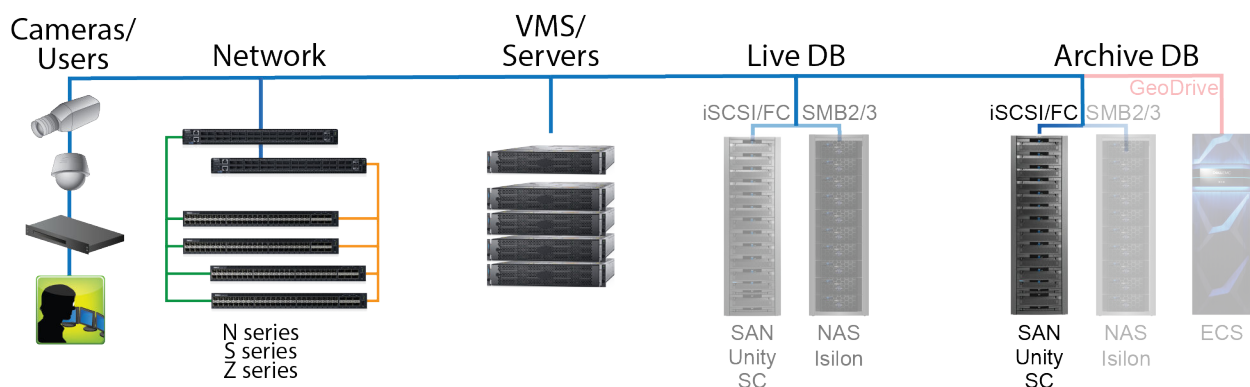


Figure 6. Architecture with PowerEdge server Live DB and Unity/SC Archive DB

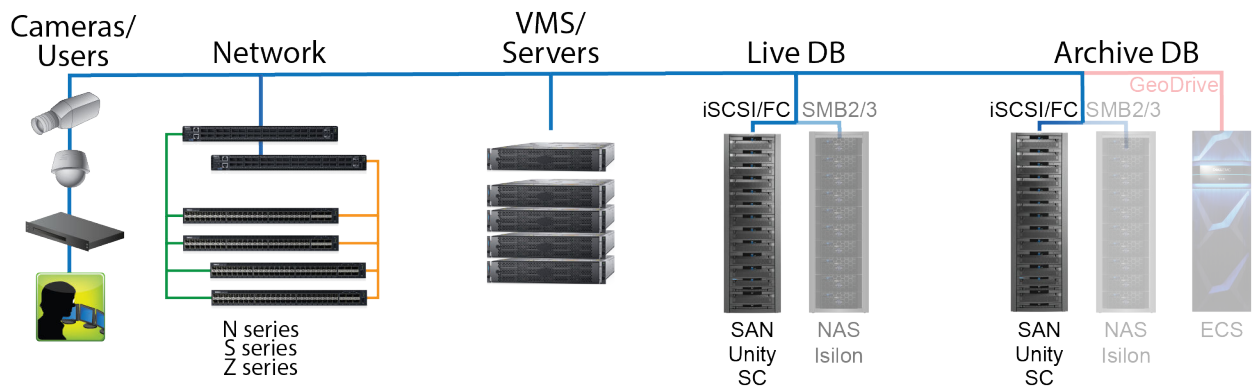


Figure 7. Architecture with Unity/SC Live DB and Unity/SC Archive DB

Isilon

Live DB options

- PowerEdge R740xd
- PowerEdge 740xd2
- Unity 300
- Unity 400
- Unity 500
- Unity 600
- SC 2030

Validated Isilon clusters Archive DB

- A200
- A2000
- H400

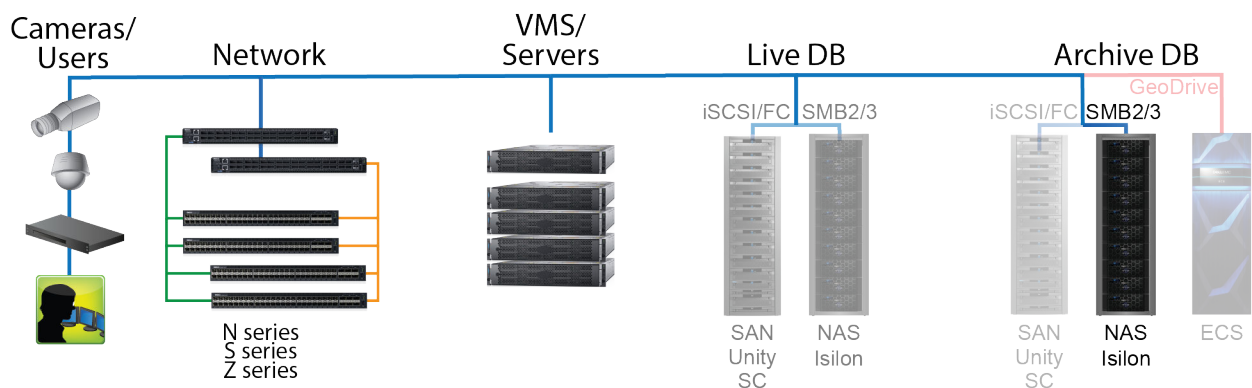


Figure 8. Architecture with PowerEdge server Live DB and Isilon Archive DB

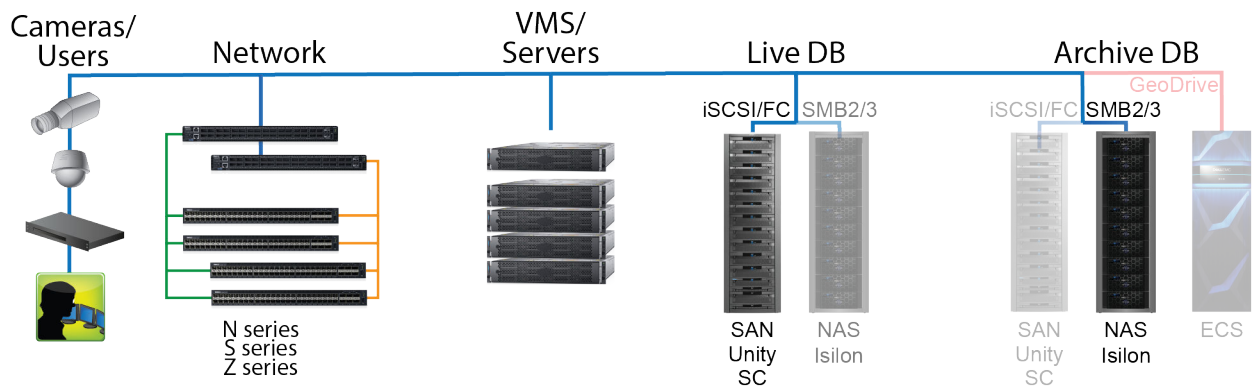


Figure 9. Architecture with Unity/SC Live DB and Isilon Archive DB

ECS

Live DB options

- PowerEdge R740xd
- PowerEdge 740xd2
- Unity 300
- Unity 400
- Unity 500
- Unity 600
- SC 2030

Validated Unity arrays as Archive DB

- Unity 500
- Unity 600

Validated SC arrays as Archive DB

- ME4

Validated Isilon clusters Archive DB

- A200
- A2000
- H400

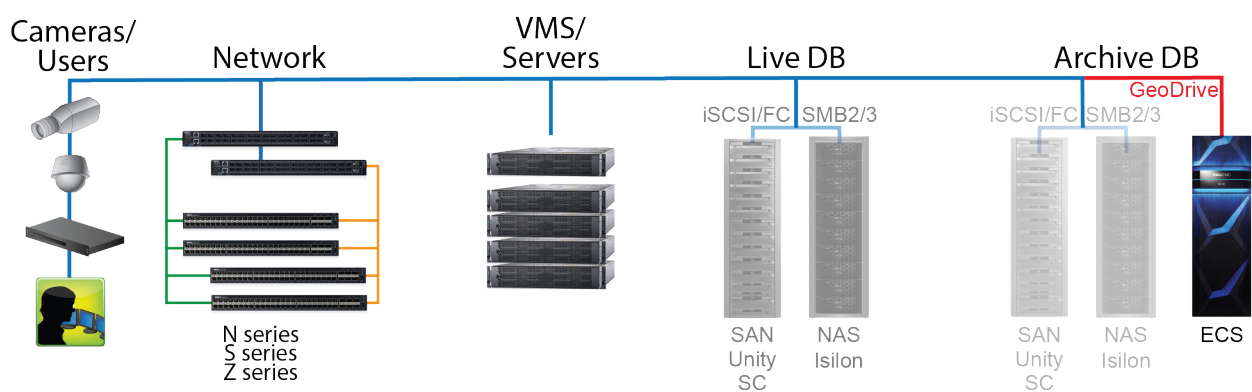


Figure 10. Architecture with PowerEdge server Live DB and GeoDrive Archive DB

Conclusion

Topics:

- [Summary](#)
- [References](#)

Summary

We performed comprehensive testing with Milestone XProtect Corporate to benchmark the application performance in a Milestone tiered storage environment.

The archive process, when writing to an Isilon cluster, easily handled all video accumulated between archive process executions. In addition, various forced Isilon failures did not affect the Live DB to Archive DB process.

When using an Isilon cluster for the Archive DB, only two modifications to the XProtect Corporate configuration are necessary: increase the number of archive process threads; and increase the write block size to the Archive DB.

For both FC- and iSCSI-attached storage, formatting with 8,192 KB blocks for Live DB and 64 KB blocks for Archive DB is required.

Dell EMC Networking solutions provide flexible and highly scalable infrastructures that meet a broad range of demanding physical security requirements.

References

Dell EMC documentation

For additional information, see the following Dell EMC documents:

- *Dell EMC Storage for Milestone XProtect Corporate-EMC VNX and Dell EMC Isilon Reference Architecture*
- *Introduction to the EMC VNX Series-A Detailed Review White Paper*

Other documentation

For additional information on related topics, see the following Milestone documents:

- *XProtect Corporate Administrator's Getting Started Guide*
- *XProtect Corporate Administrator's Manual*
- *XProtect Smart Client User's Manual*