Dell EMC Storage with Milestone XProtect Corporate

Surveillance

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Configuration Guide

Abstract

This configuration guide provides the storage-specific configuration requirements and Milestone storage tiering options necessary for a successful Milestone XProtect Corporate 2018 installation.

Dell EMC Solutions

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CHAPTER 1

Introduction

This chapter presents the following topics:

Solution overview

Milestone XProtect Corporate is a tiered solution that works well with Dell EMC Unity™ or EMC VNX™ family storage arrays as well as Dell EMC Isilon™ scale-out storage. The first tier of storage, Live DB, can accommodate stored video for the retention period prior to being moved to the second tier, of storage, Archive DB or deleted. The best practice retention time is between 2 and 24 hours. The second storage tier is Archive DB, which can accommodate long video retention cycles prior to being deleted from the second tier of storage.

Live DB requires block storage, such as Dell EMC Unity or EMC VNX family arrays using iSCSI or Fibre Channel (FC), or storage local to the server. In a virtualized environment, the Unity or VNX family arrays can serve a dual purpose by providing storage for the LiveDB and VMware datastores. The Archive DB used as the secondary storage for video and surveillance data can be stored either on an Isilon scale-out storage cluster or on a unique Unity or VNX family array.

While the Milestone XProtect Corporate tiered storage solution can be deployed within a site, depending on the requirements XProtect Corporate can also provide a solution for distributed to central site architectures.

Purpose

This configuration guide aims to help Dell EMC field personnel understand how to configure Dell EMC storage system offerings to simplify the implementation of Milestone XProtect Corporate. This document is not a replacement for the Milestone implementation guide nor is it a replacement for the *Dell EMC Storage with Milestone XProtect Corporate: Sizing Guide*.

Use this guide to determine the requirements for a successful Milestone XProtect Corporate 2013, 2014, 2016 or 2017 installation, Milestone storage tiering options, and storage-specific configuration requirements.

Scope

This guide is intended for internal Dell EMC personnel and qualified Dell EMC and Milestone partners. It provides configuration instructions for installing the Milestone XProtect Corporate video management software using Dell EMC storage platforms.

The following Dell EMC storage systems have been tested:

- EMC VSS™

This guide supplements the standard and provides configuration information specific to Milestone XProtect Corporate.

Note

All performance data in this guide was obtained in a rigorously controlled environment. Performance varies depending on the specific hardware and software used.

Assumptions

This solution assumes that internal Dell EMC personnel and qualified Dell EMC partners are using this guide with an established architecture.

This guide assumes that the Dell EMC partners who intend to deploy this solution are:

- Associated with product implementation

- Milestone-certified to install Milestone XProtect Corporate services

- Proficient in installing and configuring VNX/VNXe storage solutions

- Proficient in installing and configuring Isilon storage solutions

- Familiar with installing and configuring VMware hypervisors and the appropriate operating system, such as Microsoft Windows or a Linux distribution

- Able to access the *EMC VNX Storage with Video Management Systems: Configuration Guide* and *Dell EMC Isilon Storage with Video Management Systems: Configuration Guide*

The configurations that are documented in this guide are based on tests that we conducted in the Dell EMC Surveillance Lab using worst-case scenarios to establish a performance baseline. Lab results might differ from individual production implementations.

CHAPTER 2

Configuring the solution

This chapter presents the following topics:

# Dell EMC storage considerations for Milestone XProtect Corporate

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

Video Flow

There are many Dell EMC storage platform options for each storage tier. The Live DB can be direct-attached storage (DAS), such as FC or iSCSI block storage. The Archive DB can be DAS if the storage requirement is minimal, and network-attached storage (NAS), FC, or iSCSI for virtualized server implementations and more substantial video storage requirements.

The following figure illustrates the video flow using NAS, DAS, and storage-area network (SAN).

Figure 1 Milestone XProtect Corporate architecture
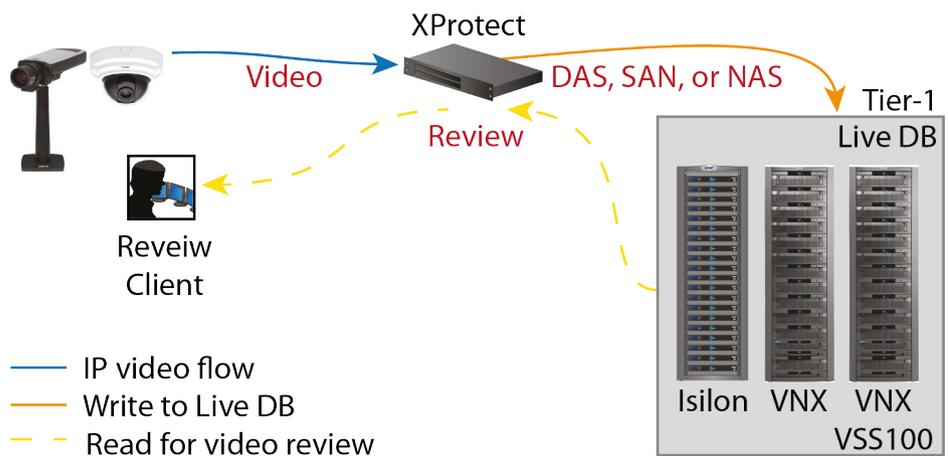
Video is initiated at the camera and XProtect initially places that video in the Live DB. Milestone recommends a retention period of from 2 to 24 hours for video in the Live DB, as outlined in Retention periods.

XProtect moves video files at rest from the Live DB storage tier to the Archive DB storage tier at regular intervals. The Archive DB stores each video file until that file's full retention time has expired.

Live DB

XProtect's Live DB write algorithm is optimized for block storage. Therefore, the Live DB works best with the server's internal DAS, or with external FC or iSCSI storage arrays such as the VNX, VSS, and VNXe 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, VNX, VSS, and VNXe arrays in a SAN (FC or iSCSI) configuration are more practical for the Live DB.

Archive DB

The Archive DB is the long-term storage for XProtect and typically constitutes the majority of 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.

Starting with XProtect Corporate 2013, support for NAS was added and shared storage provided by an Isilon scale out storage cluster or block storage provided by a VNX family storage array can be used.

Storage considerations for Live DB and Archive DB

The Live DB can be a VNX, VSS, or VNXe storage array in a SAN configuration. The Archive DB can be an Isilon scale-out cluster in a NAS configuration or a VNX storage array in a SAN configuration.

- With the VNX, VSS, or VNXe, both the Live DB and Archive DB can use either FC or iSCSI protocols. For iSCSI, you can use GigE or 10 GbE NICs.

- When using smaller VNX, VSS, or VNXe arrays with iSCSI, we recommend that the Live DB and Archive DB reside on different arrays.

- When using FC, Live DB and an FC Archive DB can co-exist on the same VNX array.

- Arrays such as the VNX5800 can be used with iSCSI for both the Live DB and Archive DB.

- VNX, VSS, or VNXe storage can be used for:

  - LiveDB only

  - LiveDB as the first tier in a tiered implementation

  - Archive DB as the second tier in a tiered implementation

- For Isilon scale-out storage, NAS can be used with Isilon OneFS™ 7.0 or higher. Use the default Isilon protection scheme unless the customer needs additional protection.

- You can use GigE or 10 GbE network interface cards (NICs). Test results for this solution are based on both GigE and 10 GbE interfaces on the Isilon cluster. By default, XProtect moves video from the Live DB to the Archive DB using a single thread. With NAS, you can increase the Archive DB thread count to allow parallel video file moves within the archive process.

- We recommend 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 Surveillance Lab.

Retention periods

A Live DB retention period longer than 24 hours may result in prolonged recording server restart, as the restart process includes verifying the index files for the retained video recordings.

For this reason, Milestone recommends that the Live DB retention period be limited to no more than 24 hours, with a higher frequency preferred. Milestone recommends a minimum retention period of two hours for the Live DB, although a one hour retention

period is the minimum supported. The default Live DB retention period of four hours has been satisfactory for our tests.

The Archive DB retention period depends on business requirements and can range from a few weeks to many months. The archived video index files are not verified upon recording server restart, so server restart is not a consideration for the Archive DB.

Summary of Dell EMC storage and network protocols

Live DB and Archive DB are two distinct repositories with different write characteristics.

They were evaluated on individual storage platforms and on a single platform in the following configurations:

- For the Live DB we tested various Unity and VNX family arrays with both FC and iSCSI storage protocols.
- For the Archive DB we tested an Isilon scale-out cluster, Unity arrays, and VNX family arrays with iSCSI.
- For a single storage platform including both the Live DB and Archive DB, we tested a VNX5800™ with FC and iSCSI.

The following table lists the Dell EMC storage platforms and network protocols determined to be suitable for each XProtect video database storage tier.

Table 1 Storage and protocols for XProtect database tiers

Array/cluster	Database	Protocol	Verified
DAS	Live DB	DAS	Yes (by Milestone)
VNX series	Live DB	FC	Yes (functional test)
VNX series	Live DB	iSCSI	Yes
Unity series	Live DB	iSCSI	Yes
VNXe series	Live DB	iSCSI	Yes
VSS series	Live DB	iSCSI	Yes
DAS	Archive DB	DAS	Yes (by Milestone)
Isilon clusters*	Archive DB	SMB2	Yes
VNX series	Archive DB	FC	Yes (extrapolated)
VNX series	Archive DB	iSCSI	Yes
VNXe series	Archive DB	iSCSI	Yes
VSS series	Archive DB	iSCSI	Yes
Unity series	Archive DB	iSCSI	Yes

∗ Isilon OneFS releases prior to OneFS 7.0 are not recommended.

Releases tested

The Dell EMC Surveillance Lab continually tests Milestone XProtect Corporate with the latest Dell EMC storage offerings.

For a complete list of XProtect releases and Dell EMC Storage offerings that have been tested, see the Dell EMC Surveillance Validiation Matrix

CHAPTER 3

Dell EMC storage configuration

This chapter describes best practices for Dell EMC storage configurations.

Block storage (SAN, local)

VNX storage is ideal for recording and managing terabytes of video from distributed locations. The VNX family includes the VNX and VNX-VSS series arrays. The VNX series is designed for midtier to enterprise storage environments, is ideal for distributed environments, and can scale to handle large petabyte (PB) environments with blockonly requirements at central locations.

For information about best practices for configuring VNX storage, see EMC VNX Storage Best Practices with Video Management Systems: Configuration Guide.

File storage (NAS)

The Isilon scale-out network-attached storage (NAS) platform combines modular hardware with unified software to harness unstructured data. Powered by the distributed Isilon OneFS® operating system, an Isilon cluster delivers a scalable pool of storage with a global namespace.

The platform's unified software provides centralized web-based and command-line administration to manage the following features:

- A symmetrical cluster that runs a distributed file system

- Scale-out nodes that add capacity and performance

- Storage options that manage files and tiering

- Flexible data protection and high availability

- Software modules that control costs and optimize resources

For information about best practices for configuring Isilon storage, see Dell EMC Isilon Storage Best Practices with Video Management Systems: Configuration Guide.

CHAPTER 4

XProtect-specific configuration

This chapter describes best practices for system and XProtect Corporate configuration.

Note

Internal server storage was not tested. If using server-based storage, refer to the Milestone recommendations and best practices.

Configuring Active Directory and domain controller

Although local user account authentication is available, we configured Active Directory (AD) user account authentication in the lab to simplify user management.

AD is a distributed directory service included with several Windows Server operating systems. It identifies resources on a network in order for users or applications to access them. If you wish to add users through the AD service, you must have a server with AD installed that acts as the domain controller on your network. Consult your network administrator regarding the use of AD with your XProtect deployment.

Procedure

1. Ensure that there is a server with AD installed and acting as the domain controller on the network.
2. Add all recording servers and management hosts to the available domain controller.
3. Add the Isilon cluster to the available domain controller.
4. Log in as the Domain user on the host.
5. In Windows Services, select **Milestone XProtect Corporate Recording Server**. Click the **Log On** tab and update the credentials for the Active Directory user.
6. Restart the service.

Hard disk formatting

One factor that can impact a disk's performance in a video surveillance system is the cluster size of the formatted hard disk.

Note

Update the `allocation unit size` when formatting the hard drive to significantly improve the performance of the archive process.

Multi-tier implementation-Live DB

Change the `allocation unit size` setting from 4 to 8 KB when formatting the hard disk for the Live DB in a two-tier structure. This block size is better suited for the balanced reads and writes rate caused by the archive process.

Multi-tier implementation-Archive DB

Change the `allocation unit size` setting from 4 to 64 KB when formatting the hard disk for the Archive DB. A 64 KB block size significantly improves the performance of the archive process.

Single-tier implementation

Change the `allocation unit size` setting to 64 KB when formatting the hard disk for the Live DB only.

See the Microsoft Support article Default cluster size for NTFS, FAT, and exFAT for more information about single and multi-tier allocation unit sizes.

Enabling motion detection

If motion detection is not working, you must enable a new rule for motion detection.

Procedure

1. Disable the **Default Record on Motion Rule** on the management server.

2. Add a new rule named **Record Always** using the following definition:

   ```
   Perform an action in a time interval
   always
   start recording immediately on All Cameras

   Perform an action when time interval ends
   stop recording immediately
   ```

Modifying the number of archive process threads

When using archive storage, such as NAS attached Isilon scale-out cluster, each XProtect Corporate recording server must be modified to use either three or four archive processes. By default, XProtect uses a single thread.

Procedure

1. Stop the Milestone XProtect Corporate Recording Server Service.

2. Go to: `C:\ProgramData\Milestone\XProtect Recording Server`.

3. Open the `RecorderConfig` file.

4. Edit the file as follows to change the low priority archive thread pool size to 3 and the high priority archive thread pool size to 4:

   ```
   <thread_pools>
   <delete_thread_pool_size>2</delete_thread_pool_size
   <low_priority_archive_thread_pool_size>3</
   low_priority_archive_thread_pool_size>
   <high_priority_archive_thread_pool_size>4</
   high_priority_archive_thread_pool_size>
   </thread_pools>
   ```

5. Save the file.

6. Start the Milestone XProtect Corporate Recording Server Service.

   Note

   These steps apply to XProtect starting with version 2014.

Modifying the Archive DB write block size

When using archive storage, such as NAS attached Isilon scale-out cluster, the Archive DB write block must be modified.

Procedure

1. Stop your Recording Server Services.

2. Rename the file `%ProgramFiles%\Milestone\XProtect Corporate Recording Server\VideoOS.Platform.Database.dll` to, for example, `VideoOS.Platform.Database.dll,orig`.

3. Open the file `%ProgramData%\Milestone\XProtect Recording Server\RecorderConfig.xml` in an editor.

4. Update the disk utilization section. Use one of the following methods:

   - For Milestone version 2013 5.0, add the following xml code highlighted in bold:

```
<disk_utilization>
  <max_bytes_in_block_files>16777216</
max_bytes_in_block_files>
  <max_records_in_block_files>2000</
max_records_in_block_files>
  <truncate_block_files>true</truncate_block_files>
  <precreate_block_files>true</precreate_block_files>
  <precreate_sizes>
    <regular>16777216</regular>
    <sequence>65536</sequence>
    <signature>4194304</signature>
  </precreate_sizes>
  <media_block_files use_os_cache="true">
    <read_buffer_size>4096</read_buffer_size>
    <write_buffer_size>4096</write_buffer_size>
  </media_block_files>
  <sequence_block_files use_os_cache="true">
    <read_buffer_size>4096</read_buffer_size>
    <write_buffer_size>4096</write_buffer_size>
  </sequence_block_files>
  <signature_block_files use_os_cache="true">
    <read_buffer_size>4096</read_buffer_size>
    <write_buffer_size>4096</write_buffer_size>
  </signature_block_files>
  <index_files use_os_cache="true">
    <read_buffer_size>4096</read_buffer_size>
    <write_buffer_size>4096</write_buffer_size>
  </index_files>
  <chunk_files use_os_cache="true">
    <read_buffer_size>65536</read_buffer_size>
    <write_buffer_size>65536</write_buffer_size> <!--
default 4096 -->
  </chunk_files>
</disk_utilization>
```

   - For Milestone version 2013 R2 and later. Update the `chunk_files use_os_cache` section. Modify the `read_buffer_size` and `write_buffer_size` values to `65536`.

```
<chunk_files use_os_cache="true">
  <read_buffer_size>65536</read_buffer_size>
  <write_buffer_size>65536</write_buffer_size> <!-- default
```

```
4096 -->
  </chunk_files>
```

5. Save the `RecorderConfig.xml` file.

6. Restart your recording server.

Isilon OneFS for the Archive DB

Configure XProtect to use an Isilon cluster for the Archive DB.

Refer to the *Dell EMC Isilon Storage with Video Management Systems: Configuration Guide* to configure the following with Isilon OneFS:

- Configure SmartConnect and Domain Name System (DNS)
- Configure SmartQuotas

OneFS 8.1 job workers (required)

OneFS can be tuned to provide optimal bandwidth, performance, or operating characteristics. Starting with OneFS 8.1 the Dell EMC Surveillance Lab achieved optimum resilience when the number of job workers slowly increased their number per job phase.

From the CLI to modify the job works to 0 per core:

```
isi_gconfig -t job-config impact.profiles.medium.workers_per_core=0
```

Multipathing and NIC failures

Configure the Unity and SC block storage arrays with multiple paths to recorders using Microsoft MPIO. For redundancy, configure multiple NICs with the recorders and controllers. Recorders that are configured with multipathing reconnect to the volume across another available path after a NIC failure.

The TCP Max transmissions value determines how many times the Transmission Control Protocol (TCP) retransmits an unacknowledged data segment on an existing connection. The TCP retransmits data segments until they are acknowledged or until this value expires.

TCP/IP adjusts the frequency of retransmissions over time. The TCP establishes an initial retransmission interval by measuring the round trip time on the connection. This interval doubles with each successive retransmission on a connection, and it is reset to the initial value when responses resume.

To reduce the reconnection time and eliminate video loss, adjust the following TCP retransmission timers:

Note

It is recommended that you perform a backup before editing registry settings.

```
HKEY_LOCAL_MACHINE\System\CurrentControlSet\Services\Tcpip
\Parameters
Value Name:  TcpMaxDataRetransmissions
Data Type:   REG_DWORD - Number
```

```
Valid Range: 0 - 0xFFFFFFFF
Value:      3
```

```
HKEY_LOCAL_MACHINE\System\CurrentControlSet\Services\Tcpip
\Parameters
Value Name:  TCPInitialRtt
Data Type:   REG_DWORD - Number
Valid Range: 0 - 0xFFFFFFFF
Value:       2
```

CHAPTER 5

Conclusion

This chapter presents the following topics:

Summary

Dell EMC performed comprehensive testing with Milestone XProtect Corporate against many EMC VNX and VNXe arrays and Dell EMC Isilon clusters. The VNX family arrays performed very well as either Live DB storage, Archive DB storage, or both when used in larger VNX arrays.

Testing focused on the Archive DB enhancements of XProtect Corporate that allow the use of Isilon clusters running a minimum release of OneFS 7.0. 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.

EMC VNX arrays

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

EMC VNX-VSS arrays

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 arrays

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.

Low-bandwidth implementations can use a NAS-connected VNXe, but ideally NAS implementations should be based on Dell EMC Isilon scale-out storage.

Dell EMC Isilon scale-out storage

Dell EMC 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 Recorder view of the storage is based on the assigned quota and not the entire file system. We recommend using SmartQuotas with Milestone XProtect Corporate as a best practice.