

# Dell EMC Storage with Milestone XProtect Corporate

## Surveillance

May 2019

H14501.6

## 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

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## 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 2018 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:

- Dell EMC Isilon™
- Dell EMC Unity™
- Dell EMC SC series™

This guide supplements the standard [Dell EMC Isilon Storage Best Practices with Video Management Systems: Configuration Guide](#) and provides configuration information specific to Milestone XProtect Corporate.

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### Note

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

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# 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 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](#)..... 10
- [Releases tested](#)..... 12

# Dell EMC storage considerations for Milestone XProtect Corporate

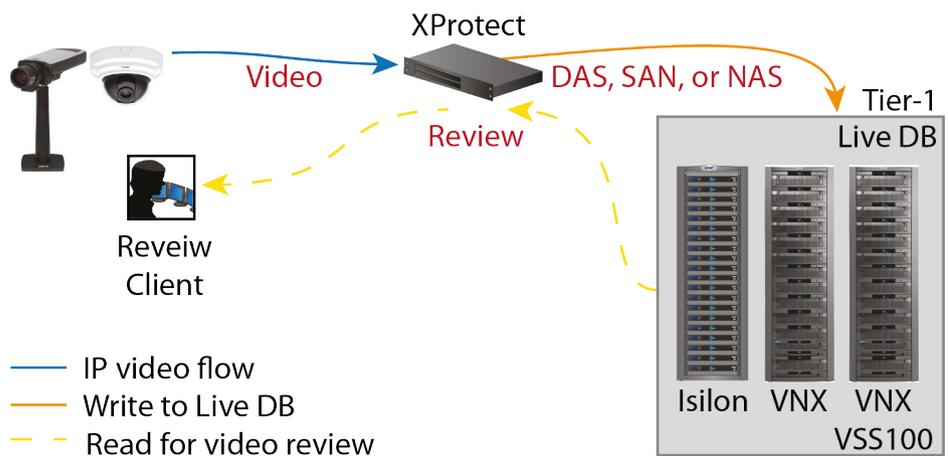
To successfully design and implement a Milestone XProtect Corporate system, you need to consider many aspects of the system, including networks, cameras, storage, and more. This section presents storage considerations and recommendations you should take into account when deploying a Milestone XProtect 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 such as Unity or SC series arrays. Milestone enables video to be kept in the Live DB storage indefinitely.

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 or SC series arrays in a SAN (FC or iSCSI) configuration are more practical for the Live DB.

## Archive DB

The Archive DB is a long-term storage option 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.

## Storage considerations for Live DB and Archive DB

The Live DB can be a storage array in a SAN configuration. The Archive DB can be a Unity or SC series storage array in a SAN configuration, or an Isilon scale-out cluster in a NAS configuration.

- With the Unity or SC series, 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 Unity or SC series arrays with iSCSI, we recommend that the Live DB and Archive DB reside on different volumes.
- When using FC, Live DB and an FC Archive DB can co-exist on the same Unity array.
- Arrays such as the Unity 600 can be used with iSCSI for both the Live DB and Archive DB.
- Unity or SC series 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.
- When using Isilon storage, we recommend using it as the Archive DB 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

Milestone recommends a minimum retention period of two hours for the Live DB, although one hour is the minimum supported. There is no limitation on the maximum retention time for Live DB.

The Archive DB retention period depends on business requirements and can range from a few weeks to many months.

## 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 SC series arrays with both FC and iSCSI storage protocols.
- For the Archive DB we tested an Isilon scale-out cluster, Unity arrays, and SC series arrays with 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)
Unity series	Live DB	FC	Yes (functional test)
Unity series	Live DB	iSCSI	Yes
SC series	Live DB	iSCSI	Yes (functional)
DAS	Archive DB	DAS	Yes (by Milestone)
Isilon clusters <sup>a</sup>	Archive DB	SMB2, SMB3	Yes
Unity series	Archive DB	iSCSI	Yes
SC series	Archive DB	iSCSI	Yes
ECS	Archive DB	S3	Yes

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

## 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

**Table 3** OneFS releases (continued)

<b>Model</b>	<b>OneFS version</b>
HD400	7.2.1, 8.0, 8.1
NL410	7.2.1, 8.0, 8.1
X400	7.0.x

**Table 4** ECS releases

<b>Product</b>	<b>Version</b>
ECS	3.2.0.0
CIFS-ECS Tool	1.2.2.1

**Table 5** Milestone XProtect Corporate releases

<b>Release</b>	<b>Subrelease</b>
Milestone XProtect Corporate	2016, 2017, 2018



# CHAPTER 3

## Dell EMC storage configuration

This chapter describes best practices for Dell EMC storage configurations.

- [Block storage \(SAN, local\)](#) .....16
- [File storage \(NAS\)](#) ..... 16
- [Dell EMC ECS](#) ..... 16

## Block storage (SAN, local)

Block storage is ideal for recording and managing terabytes of video from distributed locations. The Unity and SC series arrays are 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 block storage, see [Dell EMC Block Storage with Video Management Systems Configuration Best Practices](#).

## 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](#).

## Dell EMC ECS

Dell EMC ECS is a complete software-defined cloud storage platform that supports the storage, manipulation, and analysis of video surveillance and unstructured data on a massive scale on commodity hardware. ECS is specifically designed to support the mobile, cloud, and Big Data workloads that are similar to large-scale surveillance workloads.

## Retention periods and policies

ECS provides the ability to prevent data from being modified or deleted within a specified retention period. Bucket based retention is not supported and should not be used with any VMS when using the CIFS-ECS service. VMS time based retention is the only supported retention policy when using CIFS-ECS.

## Cluster Capacity

Dell EMC only supports the use of time based retention settings with the VMS. To determine the capacity requirement for each recorder, calculate the number of

cameras per recorder, the target bit rate per camera, and the retention time in days. Always consult with the VMS ISV to determine an accurate capacity estimate.

All writes to the ECS cluster stop when the cluster capacity reaches 90% full. It is always recommended to plan for additional capacity as soon as you reach 75% of the cluster capacity.

## Quotas

When using CIFS-ECS, Dell EMC requires the use of soft quotas. Quotas are the storage space limit that is specified for the ECS buckets. You can specify a storage limit for the bucket and define notification and access behavior when the quota is reached. The quota setting for a bucket cannot be less than 1 GB and can be specified in increments of 1 GB.

The quota behavior options are as follows:

**Notification Only at <quota\_limit\_in\_GB>**

Soft quota setting at which you are notified.

**Block Access Only at <quota\_limit\_in\_GB>**

Hard quota setting which, when reached, prevents write/update access to the bucket.

**Block Access at <quota\_limit\_in\_GB> and**

Hard quota setting which, when reached, prevents write/update access to the bucket.

**Send Notification at <quota\_limit\_in\_GB>**

Quota setting at which you are notified that the write/update access is blocked.

Dell EMC only supports Soft quotas. It is recommended to have 15% overhead beyond the capacity requirement.

## Garbage collection

Garbage collection in ECS is designed such that it runs with lower priority than input/output activity. When an object is deleted, ECS waits for garbage collection to reclaim the space allocated to that object. However, the object is marked as deleted and the deletion is reflected in the user's view of system utilization through metering and chargeback reports.

An object maps to a set of chunks as all data is stripped and spread across the chunks during data ingest. Therefore, a single object and its metadata could span multiple data chunks and metadata chunks. Each chunk has a logical volume of 128 MB. Processing a delete requires updates to the object index as well as the chunk index. Garbage collection verification is performed to ensure that all object references to a chunk have been removed before it is marked for reclamation. Chunks that pass the verification are then reclaimed through the garbage collection process.

There two types of garbage collection, Repo GC and Btree GC. Each has two types of GC Full GC and partial GC. Full GC is when chunk has no references of objects - it is eligible for full GC. When more than 2/3 of the chunk is garbage, garbage collection does not wait until the remaining 1/3 becomes garbage before processing. Partial GC frees up the chunk by merging valid data of such chunks.

To protect users from data loss in the event of accidental deletion, the steps in the deletion and space reclamation process are not performed in quick succession.

The Dell EMC Surveillance Lab recommends tuning the garbage collection process for video surveillance workloads to achieve faster space reclamation. The parameters to tune are:

- Decrease the time interval for the frequency of verification scanner
- Increase the scanner throttle for number of objects
- Increase the scan tasks expiration times
- Increase the maximum number of pending partial GC tasks

Please contact Dell EMC ECS technical support for more information about tuning these parameters.

## **CIFS-ECS tool**

Refer to the [Dell EMC CIFS-ECS Tool User Guide](#) for information about installation and configuration of CIFS-ECS tool on the recorder.

# CHAPTER 4

## XProtect-specific configuration

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

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### Note

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

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## 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.

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### Note

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

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Dell EMC recommends the following `allocation unit size` settings:

#### Multi-tier implementation-Live DB

Change the `allocation unit size` setting 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 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 recording server must be modified to use either three or four archive processes. By default, XProtect uses a single thread.

To minimize the risk of errors, the `RecorderConfig.xml` file can be edited with the [Recorder Configuration Manager](#) tool available from Milestone.

### 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 4 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>4</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 through 2017, the 2018 version has these values included. 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>

<precreate_block_files>>false</precreate_block_files>

<maxframesinqueue>500</maxframesinqueue>
```

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
```

To reduce path failover times for volumes that are mapped through ESXi hosts using raw device mapping (RDM) LUN's or Datastores, use the following timeouts. Modify these settings on the iSCSI software adapter for each SAN attached host. These settings are located on the **Advanced** tab in the properties section of the individual ESXi servers Software iSCSI adapter.

```
iSCSI Login Timeout 5
NoopInterval 2
NoopTimeout 10
Recovery Timeout 4
Delayed ACK Disabled
```

## iSCSI initiator queue depth on ESXi hosts

Define the iSCSI initiator queue depth for each SAN attached ESXi host.

Run the following command to iSCSI initiator queue depth:

```
esxcli system module parameters set -m iscsi_vmk -p
iscsivmk_LunQDepth=255
```

# CHAPTER 5

## Conclusion

This chapter presents the following topics:

- [Summary](#).....26

## 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.

## ECS storage

Dell EMC ECS is a software-defined, cloud-scale, object storage platform that combines the cost advantages of commodity infrastructure with the reliability, availability and serviceability of traditional arrays. With ECS, any organization can deliver scalable and simple public cloud services with the reliability and control of a private-cloud infrastructure.

## Dell EMC Unity and SC series arrays

The use of storage pools to create LUNs within the Dell EMC Unity or SC series 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.

## 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.