

Video Surveillance EMC Storage with Synectics Digital Recording System

Configuration Guide

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CONTENTS

Chapter 1	Introduction	5
	Purpose.....	6
	Scope.....	6
	Assumptions.....	6
Chapter 2	Configuring the solution	7
	Design concepts.....	8
	EMC VNX.....	8
	Disk drives.....	8
	Storage pool configuration (recommended).....	9
	LUN configuration.....	9
	VNXe RAID configuration.....	10
	iSCSI initiators.....	10
	Recommended cache configuration.....	10
	EMC Isilon (NAS).....	10
	Impact policy and priority configuration.....	11
	Volume limits.....	11
	Large file system, small view (SmartQuotas).....	11
	Configuring SmartQuotas (recommended).....	12
	Unique share naming.....	12
	Configuring SmartConnect (optional).....	12
	I/O optimization configuration.....	14
	Configuring authentication and access control.....	14
	Synectics Digital Recording System.....	14
	Releases tested.....	15
Chapter 3	Conclusion	17
	Summary.....	18

CONTENTS

CHAPTER 1

Introduction

This chapter presents the following topics:

- [Purpose](#).....6
- [Scope](#).....6
- [Assumptions](#)..... 6

Purpose

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

Scope

This guide is intended for internal EMC personnel and qualified EMC and Synectics partners. It provides configuration instructions for installing the Digital Recording System video management software using EMC storage platforms.

We tested the following EMC storage systems:

- EMC Isilon[®]
- EMC VNX[®]

This guide supplements the standard *EMC VNX Storage Best Practices with Video Management Systems: Configuration Guide* and *EMC Isilon Storage Best Practices with Video Management Systems: Configuration Guide* and provides configuration specific to Synectics Digital Recording System.

Note

All performance data in this guide was obtained in a rigorously controlled environment.

Assumptions

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

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

- Associated with product implementation
- Synectics-certified to install Synectics Digital Recording System services
- Proficient in installing and configuring VNX storage solutions
- Proficient in installing and configuring Isilon storage solutions
- Familiar with installing and configuring the appropriate operating system, such as Microsoft Windows
- Provided access to the *EMC VNX Storage with Video Management Systems: Configuration Guide* and *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 EMC Video 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:

- [Design concepts](#).....8
- [EMC VNX](#)..... 8
- [EMC Isilon \(NAS\)](#)..... 10
- [Synectics Digital Recording System](#)..... 14
- [Releases tested](#)..... 15

Design concepts

There are many design options for implementing Synectics Digital Recording System and Synergy 3. These design details are beyond the scope of this paper.

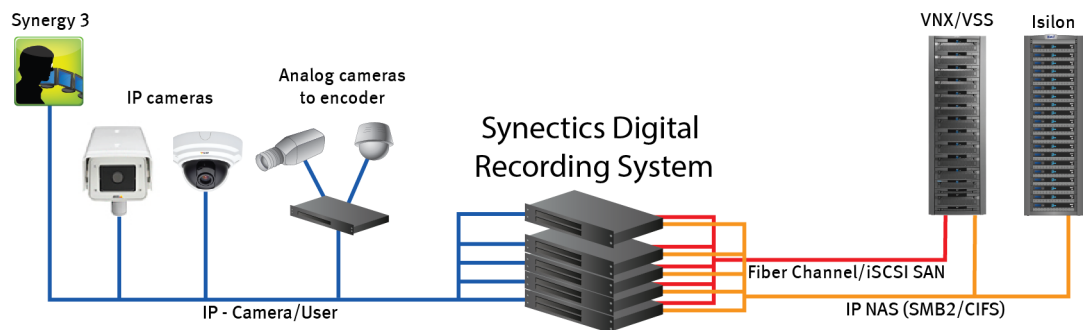
The Synectics Digital Recording System and Synergy 3 planning guides and datasheets provide the necessary information for planning a Synectics Recording system.

These guides are intended for systems integrators and architects, network IT planners, and system administrators. The guides assume that readers know what Synectics Recording System (PSN-3) and Synergy 3 system does and how it works, and know how to deploy and configure Windows IP networks. These documents are available from a Synectics partner or through the Synectics Partner network.

Synectics recommends a segregated implementation. A common segregated implementation example could consist of a user network, a camera network, and a storage network. This configuration guide is not intended to replace or supersede any Synectics document.

The following figure represents the basic configuration that was tested in our lab.

Figure 1 Synectics Digital Recording System and Synergy 3 architecture



EMC VNX

VNX storage is ideal when you need to record and manage terabytes of video from distributed locations. This section describes best practices for configuring a VNX storage system for this solution.

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 block-only requirements at central locations.

Disk drives

Although any supported drive will work, video surveillance systems typically rely on the density of the array. EMC recommends NL-SAS drives of the highest available density in this solution. In general, we used one-terabyte (TB) or multi-TB NL-SAS drives when performing our tests.

Note

Because of the high percentage of sequential, large block writes, EMC does not recommend using flash drives for video storage within a surveillance application.

Storage pool configuration (recommended)

The tests we conducted show how storage pools that are defined with the maximum allowable number of disks per pool perform as well as, or better than, traditional RAID groups. Therefore, EMC recommends that you use storage pools rather than RAID groups. Storage pools also reduce the required array management tasks.

Building a storage pool is a straightforward process. You can configure either RAID 5 or RAID 6 pools depending on the VNX storage system restrictions and the level of risk that the customer is willing to accept. When configuring storage pools, use large storage pools with large logical unit number (LUN) sizes, and configure the LUNs as thick. Do not use thin LUN provisioning.

EMC recommends the following RAID configurations for VNX arrays:

- RAID 5 or RAID 10 with SAS drives
- RAID 6 with NL-SAS drives

Procedure

1. In Unisphere, select **Storage** > **Storage Pools** for block.
2. Click **Create** under **Pools** in the **Pools** section .
3. Set the following options for the storage pool:
 - Storage pool name
 - RAID type
 - Number of SAS drives
 - Number of NL SAS drives
4. Select one of the following methods for selecting disks to include in the storage pool:
 - **Automatic:** Provides a list of available disks.
 - **Manual:** Enables you to select specific disks to include in the storage pool from a list of available disks. Be sure to clear the automatic disk recommendation list before selecting new disks from the list.
5. Select **Perform a Background verify on the new storage** and set the priority to medium.
6. Click **Apply**, and then click **YES** to create the storage pool.

LUN configuration

A VNX pool LUN is similar to a classic LUN in many ways. Pool LUNs comprise a collection of slices and can be thin or thick. A slice is a unit of capacity that is allocated from the private RAID groups to the pool LUN when it needs additional storage.

Thin LUNs typically have lower performance than thick LUNs because of the indirect addressing. The mapping overhead for a thick LUN is less than for a thin LUN.

Thick LUNs have more predictable performance than thin LUNs because they assign slice allocation at creation. However, thick LUNs do not provide the flexibility of oversubscribing like a thin LUN does, so use thick LUNs for applications where performance is more important than space savings.

Thick and thin LUNs can share the same pool, enabling them to have the same ease-of-use and benefits of pool-based provisioning.

Procedure

1. In Unisphere, right-click a storage pool and click **Create LUN**.
2. Type the user capacity for the LUN.
3. Type the starting **LUN ID**, and then select the number of LUNs to create.
For example, if the selected LUN ID is 50, and the selected number of LUNs to create is 3, the names for the LUNs would be 50, 51, and 52.
4. Select **Automatically assign LUN IDs as LUN names**.
5. Click **Apply**.

VNXe RAID configuration

VNXe offers RAID 5, RAID 6, and RAID 10 configurations. Different configurations offer different types of protection against disk failures.

EMC recommends the following RAID configurations:

- RAID 5 or RAID 10 with SAS drives
- RAID 6 with NL-SAS drives

iSCSI initiators

Software initiators may be used with Synectics Digital Recording System servers.

Microsoft iSCSI initiators

For Synectics Digital Recording System servers, the EMC Surveillance Lab uses Microsoft iSCSI initiators with excellent results.

Note

The Synectics Digital Recording System we tested in the EMC Video Surveillance Lab was running a Windows Embedded Standard SP1 operating system, which is not compatible with the EMC PowerPath for Windows software. Therefore, the tests related to NIC failure or SP failure were not performed. Tests were run on the Single Storage Processor of the VNX system.

Recommended cache configuration

With the EMC VNX generation 2 systems, such as VNX5200 or VNX5400, the system manages the cache. If the array is shared with other applications, you can use a lower write cache value, but avoid excessive forced flushes.

EMC recommends that you configure the cache as 90 percent write and 10 percent read if the storage array does not automatically adapt to the write characteristics of video surveillance (for example, EMC VNX5500 or EMC VNX-VSS100).

EMC Isilon (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

Impact policy and priority configuration

The impact policy defines the number of parallel tasks or workers that can run at one time within OneFS. Leave the impact policy as it is, unless Isilon directs you to change one or more policies.

Releases with OneFS 7.0 or greater

EMC recommends using OneFS 7.0 or later to maximize bandwidth and minimize video review response times. You can use the default impact policy with Isilon X400, Isilon X410, Isilon NL410, and greater. For less powerful nodes, such as the Isilon X200 and earlier running OneFS 7.0 or greater, modify all jobs to use an impact policy of **Low**.

Releases prior to OneFS 7.0

For releases prior to OneFS 7.0, the best I/O performance is obtained by configuring all background jobs with the impact policy set to **Low**. To set the impact policy select **Operations > Jobs and Impact Policies**.

Priority configuration

Even if the impact policy is modified, for example, by changing the settings of all the jobs to **Low**, the priority of the jobs remains at their default settings.

Volume limits

Implementations greater than 8 TB are common when video is stored on high-end storage, such as Isilon scale-out NAS storage and VNX block storage. The clustered file system OneFS uses enables Isilon to handle these large volumes.

Large file system, small view (SmartQuotas)

Although it is possible to assign the full Isilon cluster file system to a single Synectics Recorder, the EMC best practice is to use SmartQuotas™ to segment the single Isilon file system so that each Recorder has a logical subset view of storage.

There are three directory-level quota systems:

Advisory limit

Lets you define a usage limit and configure notifications without subjecting users to strict enforcement.

Soft limit

Lets you define a usage limit, configure notifications, and specify a grace period before subjecting users to strict enforcement.

Hard limit (recommended)

Lets you define a usage limit for strict enforcement and configure notifications. For directory quotas, you can configure storage users' view of space availability as reported through the operating system.

Use the **Hard limit** quota system to set the video storage as a defined value.

Configuring SmartQuotas (recommended)

The SmartQuotas feature enables you to limit the storage that is used for each Synectics Recorder. It presents a view of available storage that is based on the assigned quota to the Recorder. SmartQuotas enables each Recorder to calculate its available disk space and react appropriately.

Without SmartQuotas, the Digital Recording System administrator must anticipate the total write rate to the cluster and adjust the **Min Free Space** on each Recorder accordingly. A miscalculation can result in lost video. SmartQuotas resolves the issues that can be caused by manual calculations.

Configure SmartQuotas when more than one Recorder is writing to the Isilon cluster, or when other users share the cluster. Enable SmartQuotas and define a quota for each share or directory.

Configure the SmartQuotas setup with the following settings:

- Configure a hard share limit threshold to the Recorder video files.
- Define OneFS to show and report the available space as the size of the hard threshold.
- Set the usage calculation method to show the user data only.

Procedure

1. From the OneFS GUI, select **File System Management > SmartQuotas**.
2. For each listed share, select **View details**.
3. Under **Usage Limits**, select **Edit usage limits**.
4. Define the SmartQuotas limit and set the threshold:
 - a. Select **Specify Usage Limits**.
 - b. Select **Set a hard limit**.
 - c. Type the hard limit value.
 - d. Select the size qualifier, typically **TB**.
 - e. Select the size of the hard threshold.
5. Click **Save**.
6. Repeat the process for the remaining shares.

Unique share naming

When working with a single file system, each Recorder uses the time and date as part of its directory and file-naming conventions.

To avoid corruption caused by overwriting or grooming (deleting) files prematurely, create a unique share for each Recorder.

Configuring SmartConnect (optional)

SmartConnect™ uses the existing Domain Name Service (DNS) Server and provides a layer of intelligence within the OneFS software application.

The resident DNS server forwards the lookup request for the delegated zone to the delegated zone's server of authority, which is the SmartConnect Service IP (SIP) address

on the cluster. If the node providing the SmartConnect service becomes unavailable, the SIP address automatically moves to a different node in the pool.

Connections are balanced across the cluster, which ensures optimal resource utilization and performance. If a node goes down, SmartConnect automatically removes the node's IP address from the available list of nodes, ensuring that a connection is not tried with the unavailable node. When the node returns to service, its IP address is added to the list of available nodes.

The delegated server authority is always the node with the lowest ID, unless it has surrendered its authority status, either voluntarily or involuntarily. This node should always be available, but if the status of the node changes and becomes unavailable, it voluntarily surrenders its role as server of authority.

You must add a delegation Name Server (NS) entry to the resident DNS server for the SmartConnect name, which points to the SIP address as the Name Server. In your DNS Manager, create a **New Delegation** using your SmartConnect zone name. In the Microsoft DNS wizard, a New Delegation record is added in the forward lookup zone for the parent domain.

SmartConnect balances connection loads to the Isilon cluster and handles connection failover. With SmartConnect, all Synectics Recorders use a single fully qualified domain name (FQDN) or universal naming convention (UNC) path for video storage access. Using this network name provides load balancing when the connection to the cluster is made and simplifies installations.

SmartConnect Basic can use a round-robin-type connection allocation, which is based on DNS load balancing.

SmartConnect Advanced can include multiple pools for each subnet, Dynamic IP addresses for NFS, and the following load-balancing options (Connection policy and Rebalance policy):

Round-robin (recommended)

Sequentially directs a connection to the next Isilon IP address in the cycle. Based on field reports, this option works well with 20 servers or more.

Connection count

Provides uniform distribution of the Synectics Recorder servers to specified nodes in the Isilon cluster. Use a unique IP address pool for video recording and Recorder read/write access.

Network throughput

Based on NIC utilization. Use of throughput requires that each Recorder is activated, configured, and recording video after it connects to Isilon.

CPU usage

Uses the node CPU utilization to determine which Isilon IP address to assign to the next connection request.

Ensure that no other service uses the Recorder IP address pool. Define additional pools for management (such as Isilon InsightIQ[®] or administrative access), evidence repository, post process, or other use.

Procedure

1. Select **Networking Configuration**.
2. Under **Subnet > Settings**, define the SmartConnect service IP (SSIP) address. The SSIP address is the IP address that the DNS uses for the Isilon Authoritative name service.
3. Under **Pool settings**:

- a. Define the SmartConnect zone name, which is the name to which clients connect.
 - b. Define the SmartConnect service subnet (the subnet that has the SSIP configured on the DNS server).
 - c. Define the connection balancing policy to **Connection Count** or **Network Throughput**.
 - d. Set the IP allocation strategy to **Static**.
4. Verify this configuration on the SmartConnect dashboard.

I/O optimization configuration

As of OneFS 7.0.x, no changes are necessary to the I/O profiles for the directories that are used for Synectics.

Note

This setting does not require a SmartPool license.

Configuring authentication and access control

We conducted authentication and access control tests to determine the best method for shared access.

We tested Partial Active Directory, where the Synectics Digital Recording System PSN 3 servers are administered locally but the Isilon cluster is joined to the Windows domain.

Procedure

1. Select **Cluster Management** > **Access Management**.
2. Select **Access zone** and ensure that the **System access zone** has the provider status **Active Directory**, **Local**, and **File** marked with a green dot.
3. Under **Active Directory**, select **Join a domain** and add the Windows domain and appropriate users.
 - When the Isilon cluster and Synectics are not part of the same domain, set the shares to **Run as Root**. This setting is not ideal from a security perspective.

Synectics Digital Recording System

We made configurational changes on the Synectics Digital Recording system to achieve maximum performance results with EMC storage devices.

- We installed the latest network adapter drivers for the Intel[®] Ethernet Server Adapter I350 drivers present on the Synectics recorder.
- The Synectics team installed a fix to resolve the grooming issue on the Synectics servers.
- The Synectics team implemented a configuration change that significantly reduced the high IOPS write from the Synectics Servers to the EMC storage systems. This change resolved the high utilization on the Isilon platform and the VNX system.

Contact the Synectics team to incorporate these changes on the Synectics Digital Recording Systems.

Releases tested

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

Table 1 Firmware builds

Model	Firmware
VNX5200	VNX OE 5.33.008.5.119

Table 2 OneFS releases

Model	Firmware
NL410	8.0.0

Table 3 Synectics Digital Recording System releases

Release	Subrelease
Digital Recording System	V 1.17.0.16
Synergy	3

CHAPTER 3

Conclusion

This chapter presents the following topics:

- [Summary](#).....18

Summary

EMC performed comprehensive testing with Synectics Digital Recording System against many EMC VNX arrays and EMC Isilon clusters.

Depending on the implementation needs, you can use EMC storage for Synectics Digital Recording System. The Synectics architecture and product suite allows extreme scaling, from a few cameras to up to tens of thousands of cameras, by using EMC storage.

EMC VNX

Compared to traditional block-level storage, the use of storage pools to create LUNs within the VNX arrays greatly simplifies the configuration and increases the performance .

EMC VSS

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 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 Recorder view of the storage is based on the assigned quota and not the entire file system. EMC recommends using SmartQuotas with Synectics Digital Recording System as a best practice.