

# Video Surveillance EMC Storage with IndigoVision Control Center

## Configuration Guide

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# CHAPTER 1

## Introduction

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## Solution overview

IndigoVision video management software (VMS) for video surveillance is scalable, provides sensor integration, and is standards-based for open integration. IndigoVision VMS incorporates smart technology to automatically detect, analyze, and classify behaviors of people and vehicles. This solution is ideally coupled with Isilon Scale-out NAS storage. These options provide the customer with exceptional performance and reliability creating a successful implementation.

The purpose of this Configuration Guide is to help EMC field personnel understand how to configure EMC storage system offerings to simplify IndigoVision Control Center implementation. This document is not a replacement for the IndigoVision implementation guide nor is the document a replacement for the EMC sizing guides.

IndigoVision Control Center provides a comprehensive system for video surveillance. This system enables customer's network and security teams to collaborate effectively in a highly scalable environment that combines video and network techniques to optimize the experience. The EMC storage system provides no single point of failure while the IndigoVision Control Center design ensures resilience.

## Scope

This guide is intended for internal EMC personnel and qualified EMC and IndigoVision partners. It provides configuration instructions for installing the Control Center video management software using EMC storage platforms.

The following EMC storage systems have been tested:

- EMC Isilon<sup>®</sup>

This guide augments the standard *EMC Isilon Storage with Video Management Systems: Configuration Guide* and provides configuration specific to IndigoVision Control Center.

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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 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
- IndigoVision-certified to install IndigoVision Control Center services
- 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
- Access to the *EMC Isilon Storage with Video Management Systems: Configuration Guide*

The configurations that are documented in this guide are based on tests that were conducted in the EMC Physical Security 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 contains the following topics:

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- [EMC Isilon \(NAS\)](#)..... 10
- [Configuring IndigoVision NVR-AS servers with the AD domain controller](#)..... 15
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## Design concepts

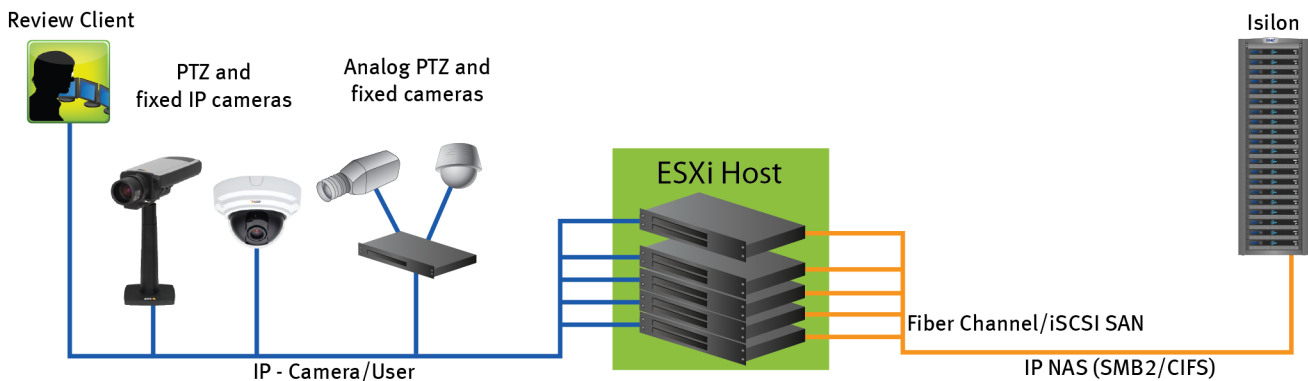
There are many design options for an IndigoVision Control Center implementation. These design details are beyond the scope of this paper.

The *IndigoVision Control Center Release 13.1* provides the information that you need to plan a IndigoVision Control Center system. The document is available from a IndigoVision partner or through [indigovision.com](http://indigovision.com). This configuration guide is not intended to replace or supersede any IndigoVision document.

This guide is intended for systems integrators and architects, network IT planners, and system administrators. The guides assume that readers know what IndigoVision Control Center does and how it works, and know how to deploy and configure Windows IP networks.

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

**Figure 1** IndigoVision Control Center architecture



## 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<sup>®</sup> 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

## Data protection

In the Isilon N+M data protection model, N represents the number of nodes, and M represents the number of simultaneous node, drive, or a combination of node and drive

failures that the cluster can withstand without incurring data loss. N must be larger than M.

Isilon OneFS supports N+1, N+2, N+3, and N+4 data protection schemes, and up to 8x mirroring. OneFS also supports several hybrid protection schemes. These include N+2:1 and N+3:1, which protect against two drive failures or one node failure, and three drive failures or one node failure, respectively.

The following best practices are based on a five-node minimum cluster size. You can use cluster sizes as small as a three-node cluster, but EMC does not recommend this.

- Our five-node cluster lab tests were based on the Isilon recommended +2:1 protection level for this node count range. Larger node-count clusters have more disks, which cause an increase in the possibility of multiple disk failures. For larger clusters, consult the Isilon team or your Isilon representative for appropriate protection schemes: N+2:1, N+2, N+3, or N+4.
- Include a minimum free space calculation for proper cluster sizing. EMC recommends a cluster size that enables a node to be removed, while retaining a minimum of 10 percent free space in the remaining capacity. This free space ensures that node removal and node failures have minimal or no impact on video ingestion.

An Isilon sizing tool provides a more accurate calculation. You can find this tool at <https://isilon-lawndart.herokuapp.com/pools/search>. Other sizing tools are available for sizing bandwidth and storage capacity needed.

## 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 is, unless Isilon directs a change to 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**. You can set the impact policy by selecting **Operations > Jobs and Impact Policies**.

### Priority configuration

Even if the impact policy is modified, for example by modifying 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. 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 IndigoVision NVR-AS, the EMC best practice is to use SmartQuotas™ to segment the single Isilon file system so that each NVR-AS 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 IndigoVision NVR-AS and presents a view of available storage that is based on the assigned quota to the NVR-AS. SmartQuotas enables each NVR-AS to calculate its available disk space and react appropriately.

Without SmartQuotas, the Control Center administrator must anticipate the total write rate to the cluster and adjust the **Min Free Space** on each NVR-AS 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 NVR-AS is writing to the Isilon cluster, or when other users share the cluster. Enable SmartQuotas and define a quota for each share or directory.

The SmartQuotas setup requires the following configuration settings:

- Configure a hard share limit threshold to the NVR-AS 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 NVR-AS uses the time and date as part of its directory and file-naming conventions.

To avoid corruption that is caused by overwriting or grooming (deleting) files prematurely, you must create a unique share for each NVR-AS.

## 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 either voluntarily or involuntarily surrendered its authority status. 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 IndigoVision NVR-AS servers 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 IndigoVision NVR-AS servers to specified nodes in the Isilon cluster. Use a unique IP address pool for video recording and NVR-AS read/write access.

### Network throughput

Based on NIC utilization. Use of throughput requires that each NVR-AS 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 NVR-AS IP address pool. Define additional pools for management (such as Isilon InsightIQ<sup>®</sup> 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 IndigoVision.

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### Note

This setting does not require a SmartPool license.

## Configuring authentication and access control

Authentication and access control tests were conducted to determine the best method for shared access.

The following three tests were conducted:

### Full Active Directory (recommended)

Where the Control Center server and the Isilon cluster are part of the same Windows domain.

### Partial Active Directory

Where the Control Center servers are part of the Windows domain, but the Isilon cluster is administered locally.

**Fully locally administered control**

Where the Control Center servers and the Isilon cluster are administered locally.

Alternatives to the previous methods might exist, but the EMC Physical Security Lab team does not plan to derive or support other methods.

**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 using one of the following options:
  - When the Isilon cluster and IndigoVision are not part of the same domain, set the shares to **Run as Root**. This setting is not ideal from a security perspective.
  - When the Isilon cluster and Control Center server are part of the same domain, configure the `DVM Camera` service to use the Domain account with read/write permissions to the Isilon cluster share. During the initial installation of the camera server, use the Control Center administrator account specification wizard to configure the camera service. Specify the recording location for the camera server using the full UNC path of the Isilon share.

## Configuring IndigoVision NVR-AS servers with the AD 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 and acting as the domain controller on your network. Consult your network administrator regarding use of AD with your IndigoVision Control Center environment.

To configure IndigoVision NVR-AS servers with AD Domain Controller:

**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, management hosts, and the Isilon cluster to the available domain controller.
3. Log in as the Domain user on the host.
4. In Windows Services, select IndigoVision NVR-AS service.
  - Click the Log On tab and update the credentials for the Active Directory user.
5. Restart the service.

## Configuring the IndigoVision NVR-AS service to automatically restart

The NVR-AS application carries out a periodic check to see that the storage is still available for writes. If the storage is not available to write the camera recordings due to

network failure or some problem in the storage, the NVR-AS service shuts down completely. NVR-AS server does this to force a failover operation.

During the NIC failure, node power-off and node smartfail tests were run with smartconnect configured in the EMC Physical Security lab. If the NIC connection or the node is down, NVR-AS service shut down completely and didn't restart automatically even after the connection and storage are restored on the NVR-AS server.

If the NIC connection or the node is down, the NVR-AS service shut down completely and did not automatically restart even after the connection and storage were restored on the NVR-AS server.

The work around for this behavior is to reconfigure the 'IndigoVision NVR-AS' service to automatically restart.

**Procedure**

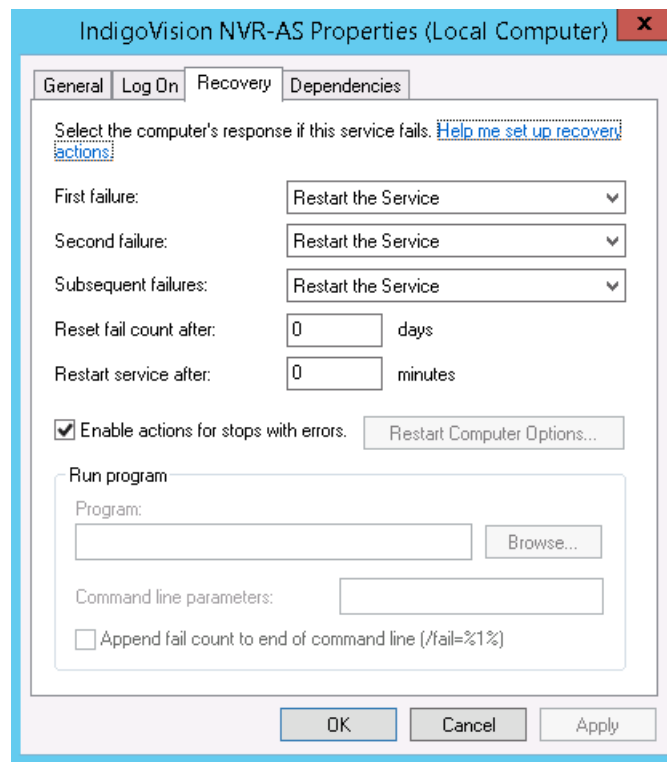
1. Open the IndigoVision NVR-AS service properties window and select the **Recovery** tab.
2. Select **Enable actions for stops with errors**.

**Results**

Enables the the 'IndigoVision NVR-AS' service to run continuously and continue writing to the storage when the connection is restored and storage is available for writing.

The following figure shows the setting on the NVR-AS service **Recovery** tab to restart the service that was stopped due to errors.

**Figure 2** NVR-AS service workaround for restart





## Releases tested

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

**Table 1** OneFS releases

Model	Firmware
NL410	8.0.0
HD400	8.0.0

**Table 2** IndigoVision Control Center releases

Release	Subrelease
IndigoVision Control Center	13.1 Version



# CHAPTER 3

## Conclusion

This chapter contains the following topics:

- [Summary](#).....20

## Summary

EMC performed comprehensive testing with IndigoVision Control Center against EMC Isilon clusters. Depending on the implementation needs, you can use EMC storage for IndigoVision Control Center. The IndigoVision Control Center architecture and product suite enables extreme scaling from a few cameras to tens of thousands of cameras using EMC storage.

### **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 NVR-AS view of the storage is based on the assigned quota and not the entire file system. EMC recommends using SmartQuotas with IndigoVision Control Center as a best practice.