



Milestone Certified Solution



Clouddian HyperFile

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About Cloudian

Cloudian turns information into insight with a hyperscale data fabric that lets customers store, find and protect data across the organization and around the globe. Cloudian data management solutions bring cloud technology and economics to the data center with uncompromising data durability, intuitive management tools, and the industry's most compatible S3 API. Cloudian and its ecosystem partners help Global 1000 customers simplify unstructured data management today, while preparing for the data demands of AI and machine learning tomorrow.

Cloudian products can scale from just three nodes to hundreds, allowing systems to be the right size for any application or organizational need. And Cloudian dramatically reduces enterprise storage costs with up to 95% less management overhead, 30% less power/space/cooling, and a highly robust design that ensures maximum productivity with up to 14 nines of data durability.

About Milestone Systems

Milestone Systems is a global leader in providing open platform IP video surveillance software. Milestone has provided easy-to-use, powerful video management software in more than 200,000 installations, worldwide.

Milestone XProtect® provides open architecture products that are compatible with more IP cameras, encoders, and digital video recorders than any other manufacturer. Because Milestone provides an open platform, you can integrate today's best business solutions and expand what's possible with future innovations. Visit www.milestonesys.com for more.

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Executive Summary

Data storage plays a new and vital role in video surveillance systems. With numerous cameras collecting high-res video in 1080 or 4K formats, these technologies generate massive datasets. Depending on the industry and regulations, the retention time for this data could vary from months to years, or even indefinitely. The data also needs to be readily available to facilitate analysis with machine learning/deep learning algorithms, either in real time or after-the-fact. Finally, the storage infrastructure needs to facilitate search, so users can quickly retrieve specific clips for review.

This report details the certification testing of Clouidian's storage platform running with Milestone's VMS product family. It highlights the performance results of certification tests carried out on the Clouidian storage products running on standard x86 hardware. The storage configurations tested are for the live recording server database as well as active archive storage target for Milestone's XProtect Video Management Software (VMS) for longer term retention of videos.

The Milestone Technology Partner (MTP) Certification program seeks to confirm that storage solution from Clouidian meets the performance benchmarks required to support the Milestone XProtect VMS applications.

Certified Products

- Clouidian® HyperFile® v3.3.1
- Clouidian® HyperStore® v7.0.5
- Milestone XProtect Corporate 2018 R2

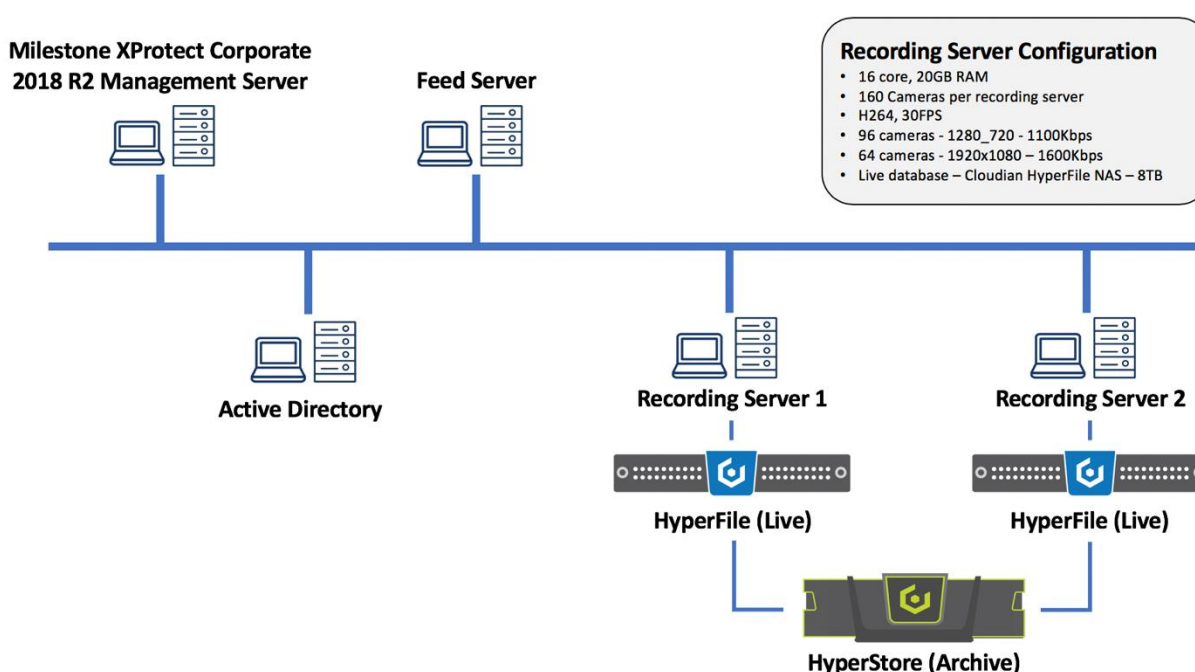
Listed Clouidian products are certified for use with the entire XProtect product line. Performance of the solution may vary if different XProtect products and/or system components not listed in the tests details are included.

Test Setup

The test setup topology involved five VMs running Microsoft Windows x64 based Server 2012 R2 operating system. It included two VMs for XProtect Recording servers and an additional VM hosting the XProtect Corporate Management Server, Management Client and Smart Client. Additionally, as per the Milestone's best practices, we used a VM for Microsoft Active Directory server. Having a Microsoft Active Directory server makes it easier to provide time synchronization between multiple servers and clients. Another VM was used as the Feed Server for StableFPS to serve as the source for all video data used in the certification test. To emulate network traffic to the recording server, the StableFPS device driver copies the raw video frames to a shared storage residing on a Feed server, from where the driver pulls the video streams. The copied video frames are used by all channels defined in a device. We attached 320 cameras with 160 cameras per recording server with the following video stream profile.

- 1920x1080 (1.6 Mbit/s) – 128 cameras
- 1280x720 (1.1 Mbit/s) – 192 cameras
- H.264
- 30 FPS
- Recording continuously with Video Motion Detection (VMD) disabled

The Clodian HyperFile, which is a Network Attached Storage (NAS) controller with file-based services provided the live video database in the test scenario. Two HyperFile nodes with each having an NFS share of 8 TBs were connected to the recording servers for live database. Both the NFS shares were connected to their corresponding buckets on Clodian HyperStore to automatically tier data for long-term storage. Clodian HyperStore is the industry's most S3-compatible on-premises storage platform for unstructured data consolidation, supporting use cases that include data protection, media archives, video surveillance, file sharing, artificial intelligence (AI) and more. HyperStore's cost-effective entry point and modular scalability make it easy for enterprises to start small and then grow seamlessly with expanding demand. The network and all of the NICs on the servers and the storage systems supported Gigabit Ethernet. The test topology is shown in the figure below.



Key Consideration

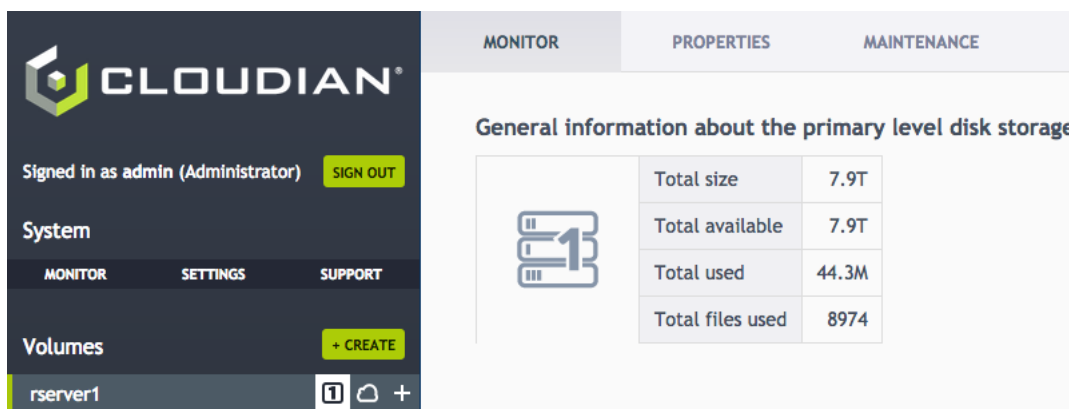
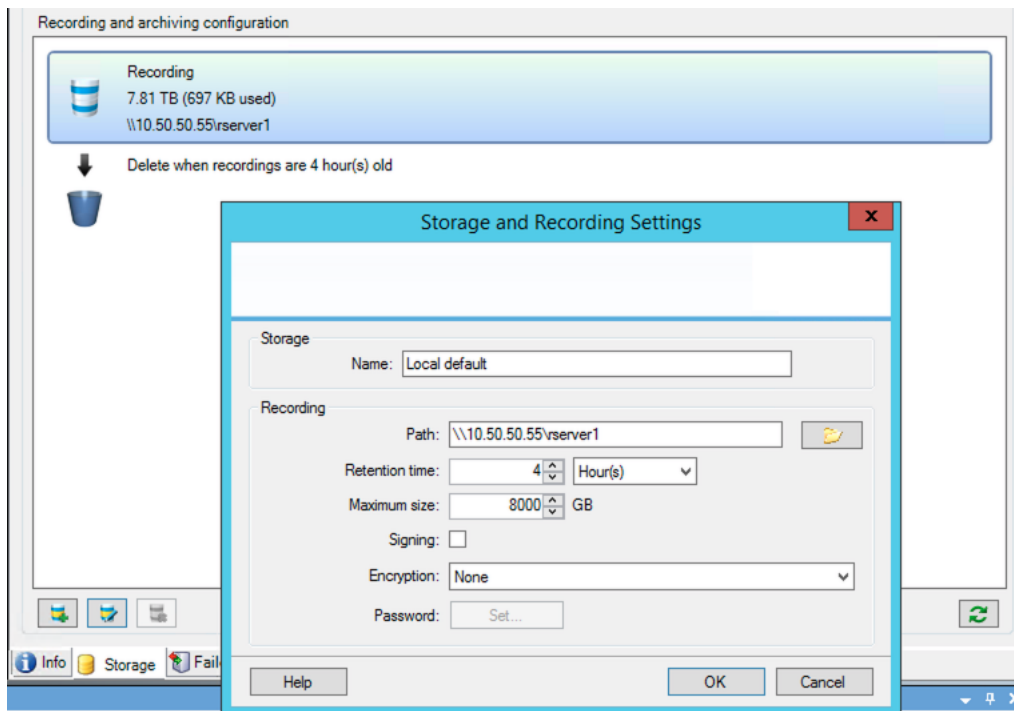
It is often recommended configuring a live and an archive database to store your video feeds. Video blocks are initially written to the live database, and later moved to the archive database based on a schedule defined in VMS. However, this process of data movement causes overhead on the application and adds more complexity to the data pipeline. Clodian storage solution simplifies this process of archiving with the integration of Clodian HyperFile and Clodian HyperStore.

Clodian HyperFile is a NAS controller that delivers SMB(CIFS) and NFS file services, employing Clodian HyperStore object storage as its underlying storage layer. Traditional NAS is built on file systems that have practical limits on capacity. As they near that capacity, their performance can degrade significantly. The usual solution is to add new NAS systems, but this leads to "NAS sprawl," and an ever-increasing level of complexity that imposes significant penalties in management, money, and manpower. Compared to a traditional NAS system, HyperFile grows in a


much more elegant way, using the HyperStore architecture to provide a unified, hyper-scalable solution.

Depending on your requirements, for long-term storage you can configure the archiving in two ways. In first scenario, you can add a HyperFile NFS share as the live database and enable tiering to HyperStore on that share. In second scenario, you can configure a HyperFile NFS share as the live database and add another HyperFile NFS share with tiering to HyperStore enabled as the archive database. Both the scenarios are described in detail below.

Scenario 1 – In this case, we created an NFS share *rserver1* of 8TBs and attached as the live database to recording server 1.



For the archival purposes, you can enable tiering to Cloudfian HyperStore on your NFS share as shown in the picture below. In Flush Settings, *Age to copy* indicates when the file is copied from HyperFile to HyperStore.



Signed in as admin (Administrator) SIGN OUT


System

MONITOR SETTINGS SUPPORT

Volumes + CREATE

- rserver1 ⓘ ☰ +
- test_dont_remove ⓘ ☰ +

MONITOR	PROPERTIES	MAINTENANCE
Flush Settings		
Age to copy	20s	
Number of threads	10	
Object Storage Configuration		
Object storage type	Cloudian® HyperStore®	
Host	http://10.50.200.231	
Port	80	
HTTPS	DISABLED	
Bucket	archive1	
Certificate validation	Enabled	
Max # of version per file	1000	
Access key ID	4e4bca64418b1e0c541e	
Shared secret	Hidden, click to show	
S3 Signature version	Version 2	
Multi gateway	Disabled	





Signed in as admin (Administrator) SIGN OUT

System

MONITOR SETTINGS SUPPORT

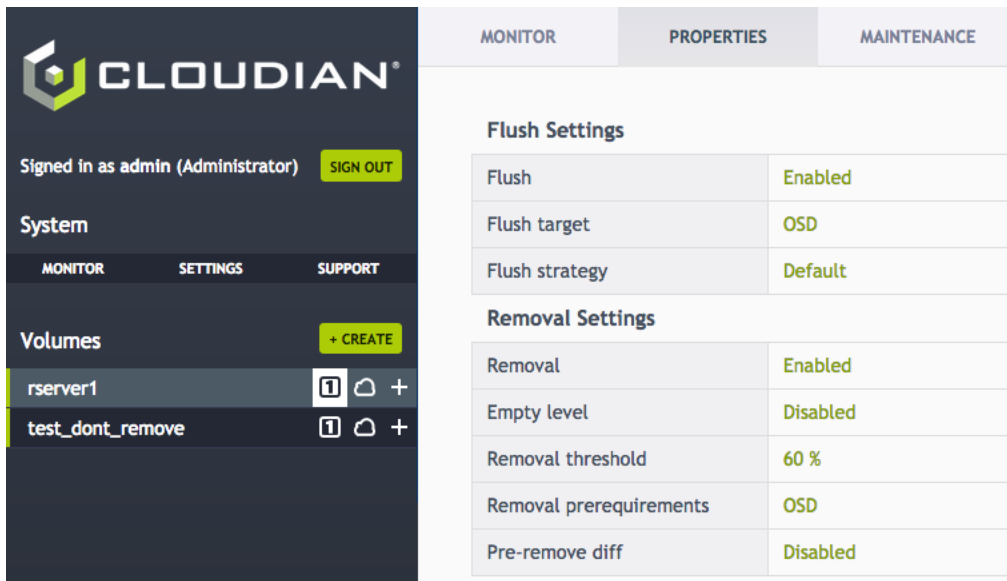
Volumes + CREATE

- rserver1 ⓘ ☰ +
- test_dont_remove ⓘ ☰ +

MONITOR	PROPERTIES	MAINTENANCE
General information about the object storage		
	Host	10.50.200.231:80
	Library version	1.0
	Status	ONLINE
	Versioning	ENABLED
Stored files and pending activities		
	Estimated used	9 MB
	Files archived	7044
	Files pending	0
	Files not archived	0
Last operations on this level		
Oct 11 20:37:58 operation="archive" path="/rserver1/8b12c703-ee4e-4123-9df4-fca18e67973b/f89b60fa-3914-472e-97d9-b9a44975c8aa/a127be95-b3ed-4f0b-999b-07efe8d16f9f/pindex.idx" status="success"		
Oct 11 20:37:58 operation="archive" path="/rserver1/8b12c703-ee4e-4123-9df4-fca18e67973b/f89b60fa-3914-472e-97d9-b9a44975c8aa/908d3e34-3510-4372-9e3f-20c53b92490a/pindex.idx" status="success"		
Oct 11 20:37:58 operation="archive" path="/rserver1/8b12c703-ee4e-4123-9df4-fca18e67973b/f89b60fa-3914-472e-97d9-b9a44975c8aa/908d3e34-3510-4372-9e3f-20c53b92490a/cindex.idx" status="success"		
Oct 11 20:37:58 operation="archive" path="/rserver1/8b12c703-ee4e-4123-9df4-fca18e67973b/f89b60fa-3914-472e-97d9-b9a44975c8aa/a127be95-b3ed-4f0b-999b-07efe8d16f9f" status="success"		
Oct 11 20:37:58 operation="archive" path="/rserver1/8b12c703-ee4e-4123-9df4-fca18e67973b/f89b60fa-3914-472e-97d9-b9a44975c8aa/a127be95-b3ed-4f0b-999b-07efe8d16f9f/desktop.ini" status="success"		
Oct 11 20:37:58 operation="archive" path="/rserver1/8b12c703-ee4e-4123-9df4-fca18e67973b/f89b60fa-3914-472e-97d9-b9a44975c8aa/f3f39289-0372-410d-8936-802b1e627567/pindex.idx" status="success"		
Oct 11 20:37:58 operation="archive" path="/rserver1/8b12c703-ee4e-4123-9df4-fca18e67973b/f89b60fa-3914-472e-97d9-b9a44975c8aa/f3f39289-0372-410d-8936-802b1e627567/cindex.idx" status="success"		
Oct 11 20:37:58 operation="archive" path="/rserver1/8b12c703-ee4e-4123-9df4-fca18e67973b/f89b60fa-3914-472e-97d9-b9a44975c8aa/f3f39289-0372-410d-8936-802b1e627567" status="success"		
Oct 11 20:37:58 operation="archive" path="/rserver1/8b12c703-ee4e-4123-9df4-fca18e67973b/f89b60fa-3914-472e-97d9-b9a44975c8aa/f3f39289-0372-410d-8936-802b1e627567/desktop.ini" status="success"		
Oct 11 20:37:58 operation="archive" path="/rserver1/8b12c703-ee4e-4123-9df4-fca18e67973b/f89b60fa-3914-472e-97d9-b9a44975c8aa/f3f39289-0372-410d-8936-802b1e627567/config.xml" status="success"		

In Removal Settings, *Removal threshold* indicates for how long the file is maintained in the HyperFile cache. In this case, the threshold is set to 60%, which translates to roughly 4.8TBs. For the configured video profile with 160 cameras per recording server, this can store upto 4 hours' worth of video data. Beyond that time period, the files will be pulled from underlying HyperStore bucket and served to the application. When Milestone VMS deletes or overwrites the data after

the retention period is over, it gets deleted/overwritten automatically from both HyperFile and HyperStore.



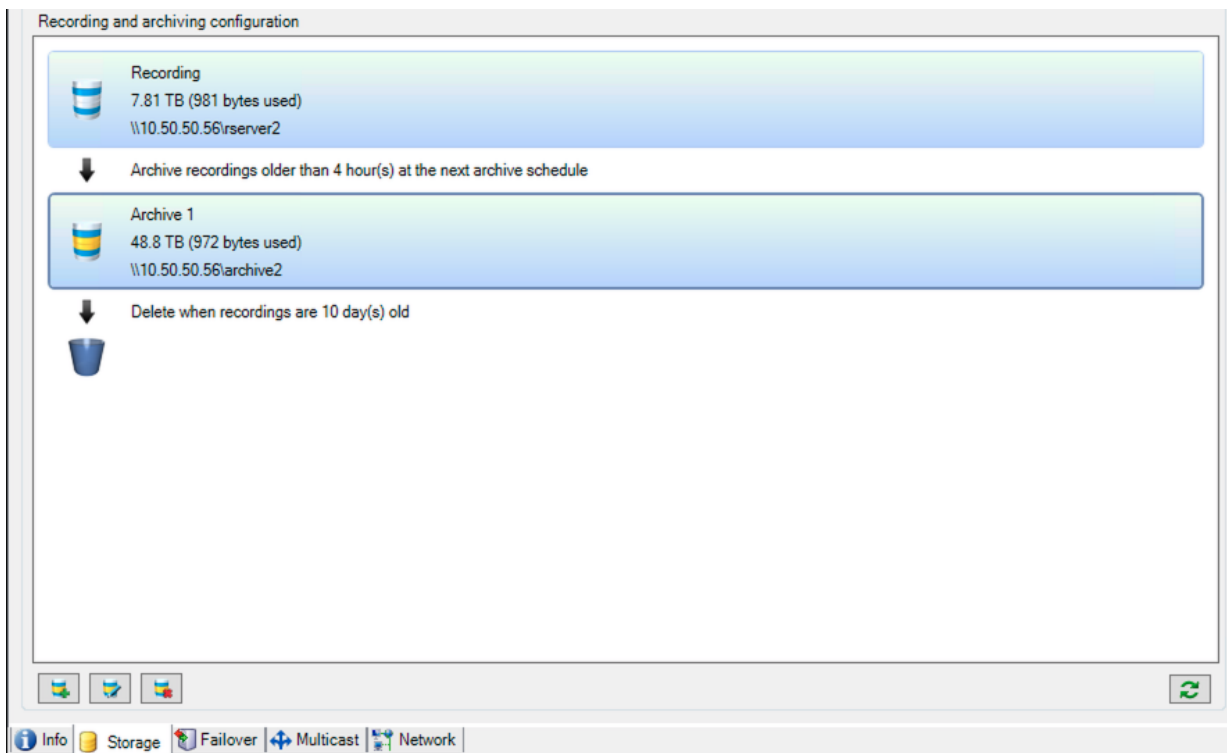
The screenshot shows the Cloudbian web interface. On the left is a dark sidebar with the Cloudbian logo, user information (Signed in as admin), and navigation tabs for System (MONITOR, SETTINGS, SUPPORT) and Volumes (+ CREATE). Two volumes are listed: 'rserver1' and 'test_dont_remove'. The main content area is titled 'PROPERTIES' and contains two sections: 'Flush Settings' and 'Removal Settings', each with a table of configuration options.

Flush Settings	
Flush	Enabled
Flush target	OSD
Flush strategy	Default

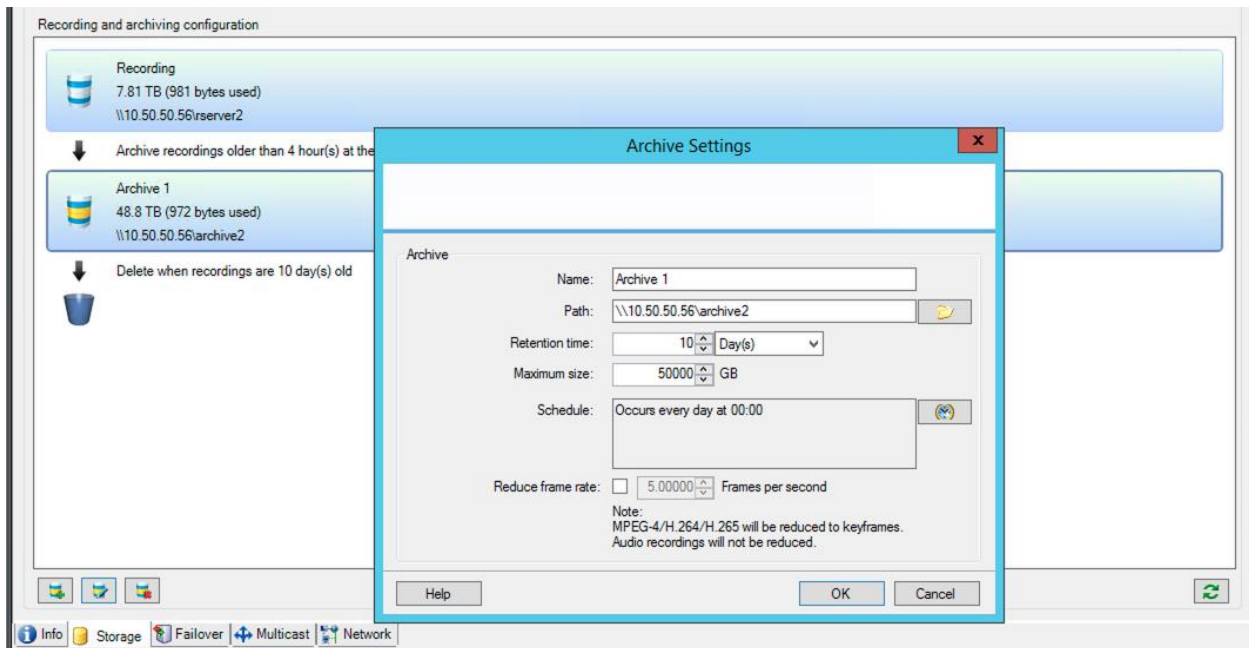
Removal Settings	
Removal	Enabled
Empty level	Disabled
Removal threshold	60 %
Removal prerequisites	OSD
Pre-remove diff	Disabled

You can adjust these settings and size the environment appropriately based on the retention time for live and archive database.

Scenario 2 – In this case, you can configure a HyperFile NFS share as the live database and add another HyperFile NFS share with tiering to HyperStore enabled as the archive database on the VMS. Here, we created an NFS share *rserver1* of 8TBs and attached as the live database and attached another NFS share *archive2* as the archive database to recording server 2 as shown in the picture below.



The screenshot shows a 'Recording and archiving configuration' window. It contains two main sections: 'Recording' and 'Archive 1'. The 'Recording' section shows a recording of 7.81 TB (981 bytes used) on the path \\10.50.50.56\rserver2, with a note to archive recordings older than 4 hours. The 'Archive 1' section shows an archive of 48.8 TB (972 bytes used) on the path \\10.50.50.56\archive2, with a note to delete recordings when they are 10 days old. At the bottom, there are icons for Info, Storage, Failover, Multicast, and Network, along with a refresh button.



During the next archive schedule after 4 hours, the recordings are moved from *rserver2* to *archive2* where tiering to HyperStore is enabled as described in the scenario 1.

These configurations provide the optimal rate of read/write performance. The certification has verified that this is the optimal configuration for video recording and storage performance.

Performance Results / Features Tested Described

The performance workload is determined by the available hardware, the number of cameras attached, and the configured video profiles. After installation and configuration of all required system components, the perfmon data collector was configured and the stop condition was set to 6 hours. We started with the 32 cameras per recording server and gradually increased the number of cameras to 160 per recording server. The test results for the Cloudian HyperFile as the live database are described in the table below.

Test Scenario	Recording Server	Cameras	Frames Lost	Average CPU%	Average GOP Write Time	Average Disk Write
Live	1	<ul style="list-style-type: none"> 96 @ 1280 X 720, H.264, 30 FPS 64 @ 1920 X 1080, H.264, 30 FPS 	.0005%	49.2%	7.2 ms	199.8 MB/s
Live	2	<ul style="list-style-type: none"> 96 @ 1280 X 720, H.264, 30 FPS 64 @ 1920 X 1080, H.264, 30 FPS 	0%	54.5%	4.5 ms	199.4 MB/s
Total	2	320	0%	51.8%	5.8 ms	199.6 MB/s

Conclusion

The Cloudian storage solution provides both performance and scalability. In addition to the optimum solution for surveillance system, HyperFile includes all the data security features present in enterprise NAS solutions. These include WORM (write once, read many) capability, snapshots, and disk quotas. The solution provides client access control through LDAP and Active Directory user authentication. AES 256-bit encryption provides security for data at rest.

Customers who wish to gain the maximum value and performance out of their surveillance system can also refer to the best practices and performance limitations outlined in this document to help design a system that exceeds the benchmark limitations for video recording which are followed by the Milestone Server and Storage Calculator. The Cloudian HyperFile and HyperStore storage solution is certified live and archive storage for use with Milestone's XProtect VMS systems. This solution was able to reliably archive large amounts of video data without impacting the performance of the Milestone system.

Resources

- [Cloudian Products Datasheet](#)