Milestone Solution Partner IT Infrastructure Components Certification Report

Infortrend Technology Inc. EonStor DS/GSe Pro Family

5-24-2018

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About Infortrend Technology Inc.

Founded in 1993, Infortrend Technology (Public TPE: 2495) is the leading provider of high-performance networked storage solutions that focus on quality, reliability, choice, and value.

Fully dedicated in providing high quality storage solutions, Infortrend's strong foundation includes R&D people of tough technology background and passion for innovation. Our expertise covers all aspects in storage systems: hardware, firmware, software, and system integration. To ensure excellence, we design and manufacture our products in-house.

Our storage solutions are widely deployed on a variety of demanding applications by multiple clients across commercial and industrial markets. Our core brands include Eonstor DS, EonStor GS, EonStor GSe Pro, and EonServ product families.

About Milestone Systems

Milestone Systems is the world's leading power of open platform IP video surveillance software. It has provided user-friendly yet powerful video management software in more than 150,000 installations globally.
Milestone XProtect® products are designed in an open architecture and are compatible with multiple IP cameras, encoders, and digital video recorders that other manufacturers do not/cannot offer. Because of Milestone's open platform, clients can integrate their business solutions and expand the possibility of innovation that caters to their business needs. To know more of the products and services, visit their official website at www.milestonesys.com.

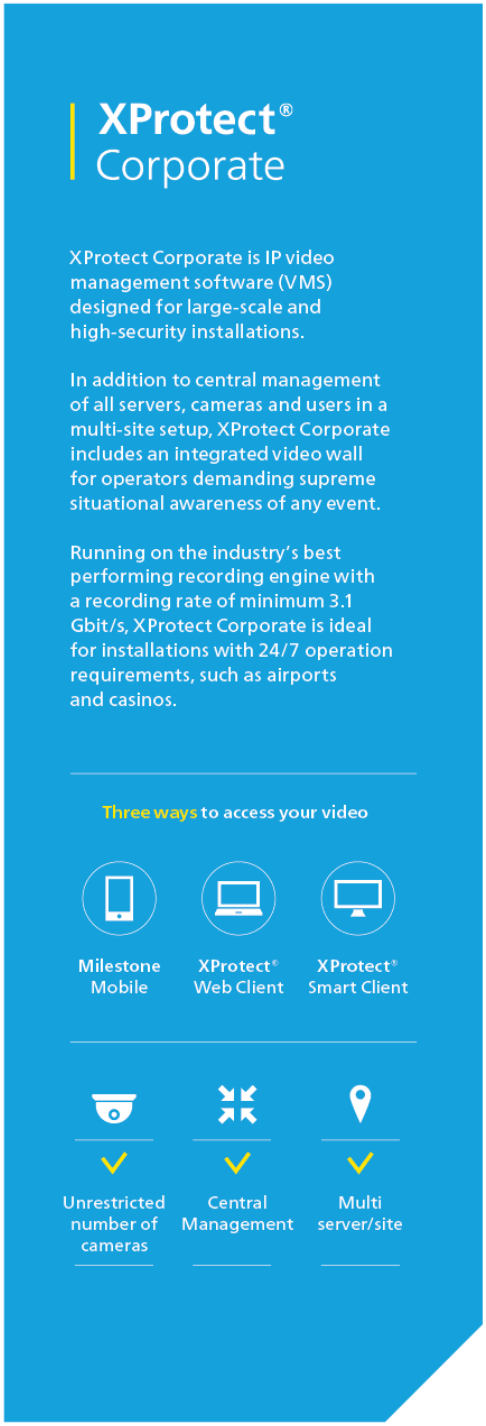
Executive Summary

Introduction

This report highlights the performance results of certification tests performed on Infortrend's EonStor DS 1000 Gen 2 and EonStor GSe Pro 3000 series. These storage solutions provide long term recording and/or database archiving with MileStone's XProtect Corporate, a VMS (video management software) surveillance system.

This certification seeks confirmation that the server, storage, and network solutions provided by qualified solution partners meet the performance benchmarks required to support the Milestone XProtect VMS applications, and to gauge the maximum performance for Milestone customers if they choose to build a solution using the certified solution partners IT infrastructure.

The MTP (Milestone Technology Partner) certification applies to building a test surveillance system using the MTP product, performance data gathering during system operation at benchmark levels, and capacity testing for performance upper limits of the certified MTP solution. The certification of EonStor DS 1000 and EonStor GSe Pro 3000 series ensures that any surveillance system build using these products with Milestone's XProtect components can record and archive a consistent number of videos with the recommendations of Milestone Sever and Storage Calculator.



Certified Products

Listed products are certified for use with the XProtect product line.

- EonStor DS 1000 Gen2 series
  - DS 1016R Gen2 (3U16)
- EonStor GSe Pro 3000 series
  - GSe Pro 3016 (3U16)
- Milestone XProtect Corporate 2017 R3

DS 1016R Gen2

Front-View

Back-View

GSe Pro 3016

Front-View

Back-View

Key Findings

Infortrend storage systems cater as a platform to record/archive videos with Milestone XProtect VMS system. After testing, the result yields that EonStor DS 1016R Gen2 can support up to 540 / 1,080 / 1,440 cameras depending on the resolution for **recording service** via SAN whereas EonStor GSe Pro 3016 can support up to 1,000 cameras with a 1080p resolution for **archiving service** via NAS.

The system performs at a high level of data throughput with acceptable read/write latency when using the optimal logical disk configuration. Refer to the table below for EonStor systems' maximum performance and scenarios using four XProtect Recording Servers and four clients for playback.

Model	Resolution	Maximum Number of Cameras	Individual Video Stream Size (Mbps)	Processor Time (CPU %)	Read Latency (ms)	Write Latency (ms)	Maximum Disk I/O (MBps)
EonStor DS 1016R Gen2	1080p	1,440	4.4	9.12	9.25	46.37	929
	3M pixel	1,080	6.64	10.96	12.99	67.11	1,109
	5M pixel	540	10.56	9.24	27.15	74.5	1,166
EonStor GSe Pro 3016	1080p	1,000	4.16	38.01	1.74	5.73	493 (Archiving)

[Note]

Combined with archiving service, the DS 1016R Gen2 system may not support the existing maximum number of cameras due to extra CPU loading.

Solution Architecture

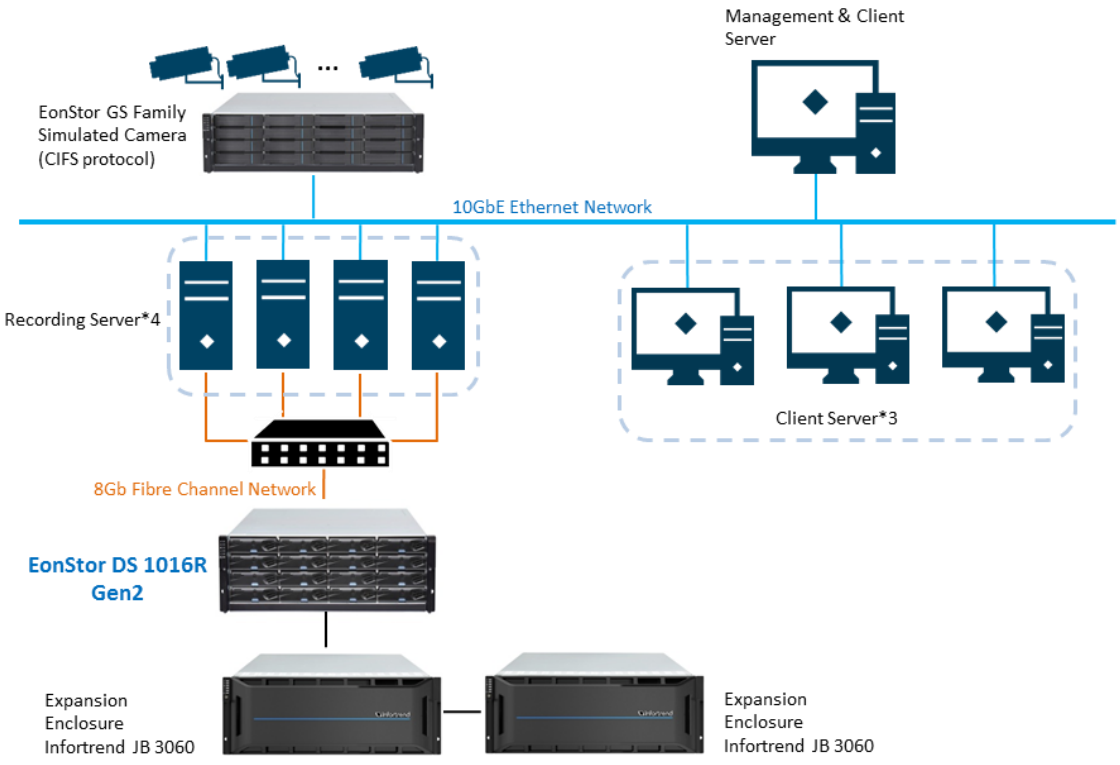
Topology

There are two test surveillance system topologies: EonStor DS 1016R Gen2 and EonStor GSe Pro 3016. The 8 servers (recording and client) are run by running in Microsoft Windows x64 based Server 2016 operating system that host the Milestone XProtect Corporate Management Server, Client Server, and Recording Sever to manage the system. One EonStor GS storage is taken as a simulated camera system via CIFS protocol. For topologies and their detailed information, see below:

Topology 1 – EonStor DS 1016R Gen2

10 Gigabit Ethernet interface is connected for simulated cameras and clients. 8 Gigabit Fibre Channel is used for recording database with EonStor DS 1016R Gen2.

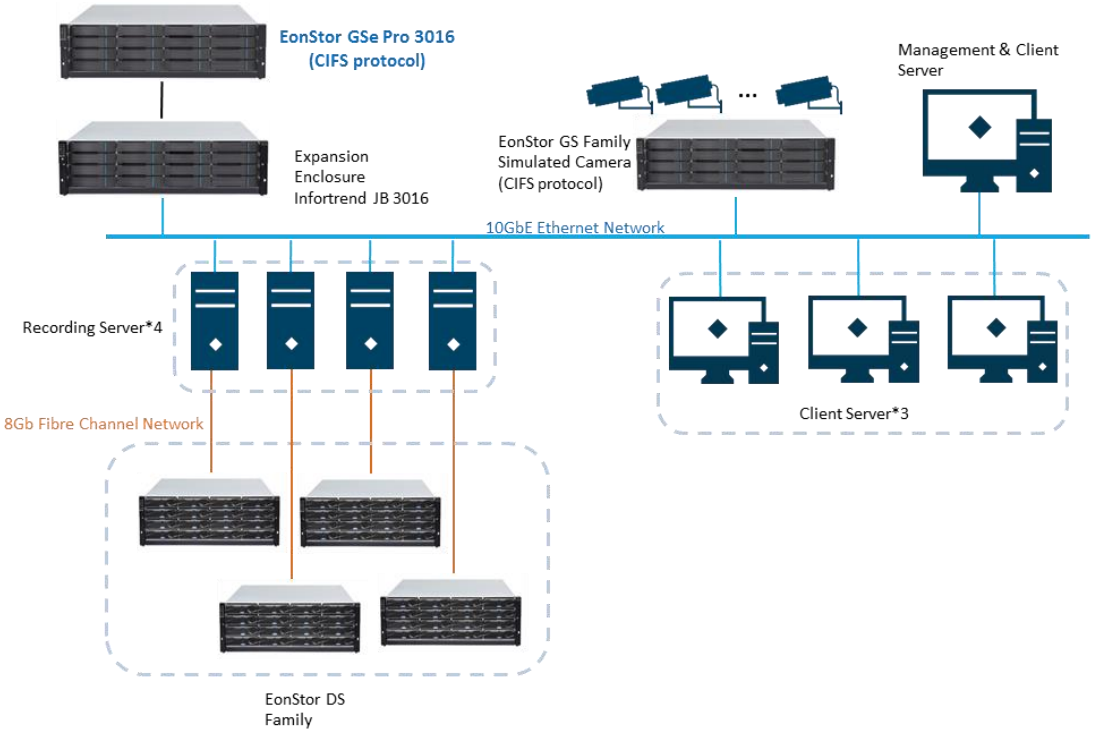
- 1 Management Server – up to 1,440 camera configuration
- 4 Recording Servers – up to 360 cameras per server with continuous recording
- 4 Client Servers – grid of 100 playback per server – 25 view streams



Topology 2 – EonStor GSe Pro 3016

10 Gigabit Ethernet interface is connected for EonStor GSe Pro 3016, simulated cameras, and clients. 8 Gigabit Fibre Channel is used for recording database with EonStor DS Family.

- 1 Management Server – up to 1,000 camera configuration
- 4 Recording Servers – up to 250 cameras per server with 25% motion detection
- 4 Client Servers – grid of 25 playback per server – 100 view streams



One instance of the video feed simulator and video content files was placed on each Recording Server. In these configurations, the video streams are sent across the IP network to be recorded the following order:

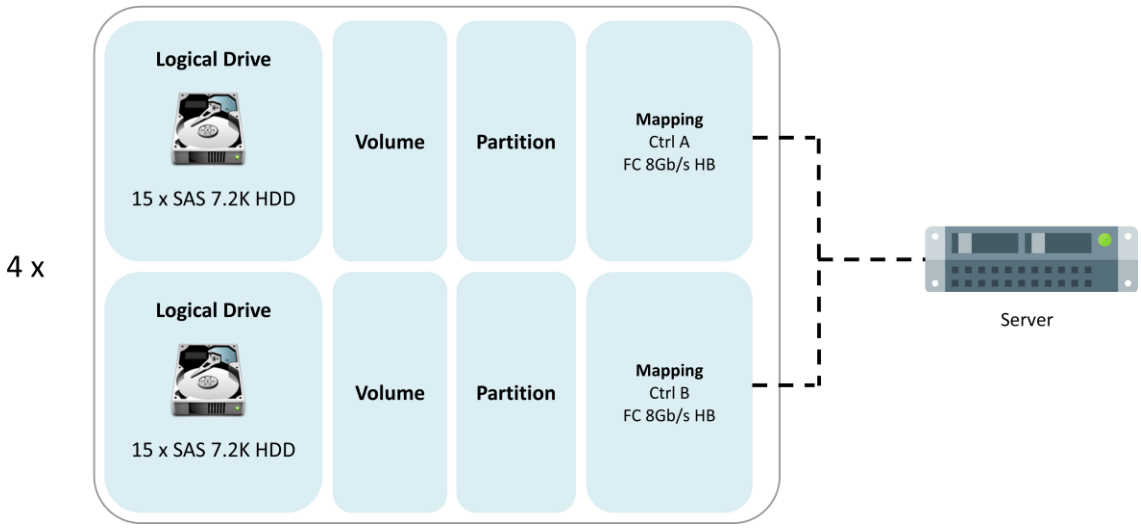
- Locally saved to each Recording Server
- Archived to EonStor DS 1016R Gen2/EonStor GSe PRo 3016 for longer term storage

Placing the video stream sources in each recording server removes any potential network bottlenecks between cameras, encoders, other video sources, and within recording servers too. The specific configurations detailed above are selected to conform to the recommended Milestone storage configuration, which provides a live and archive databases for each recording server.

Storage Platform

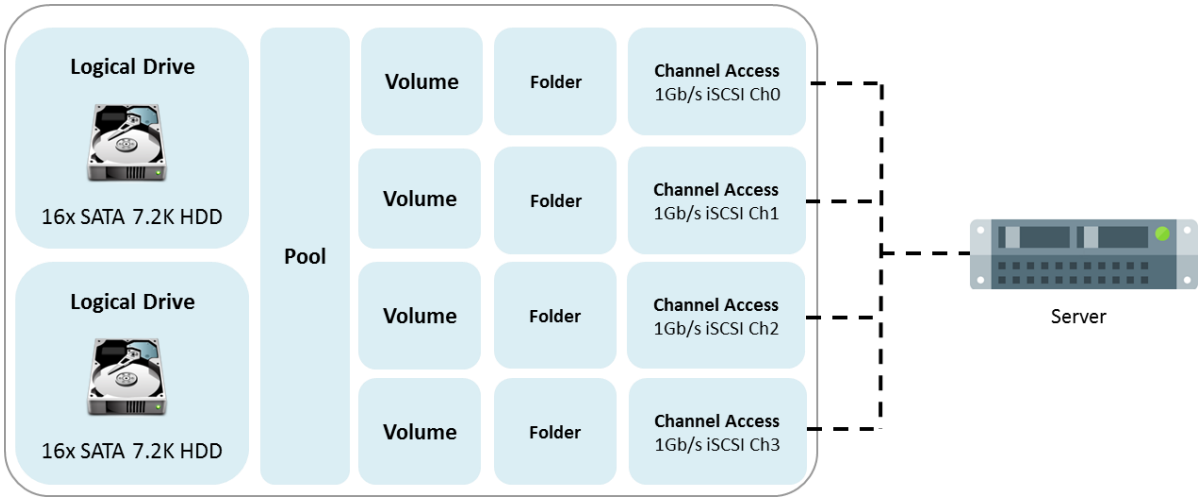
Platform 1 – EonStor DS 1016R Gen2

EonStor DS 1016R Gen2 is a 3U16 storage platform. The maximum raw capacity is up to 4 PB. For testing configuration, we incorporated JB 3060R, an expansion enclosure with 120 x 6 TB NL-SAS drives installed. 8 logical volumes are configured with SANWatch which is central management tool for EonStor DS Family. Each logical volume has 1 logical drives with RAID 5 and each logical drive has 15 drives.



Platform 2 – EonStor GSe Pro 3016

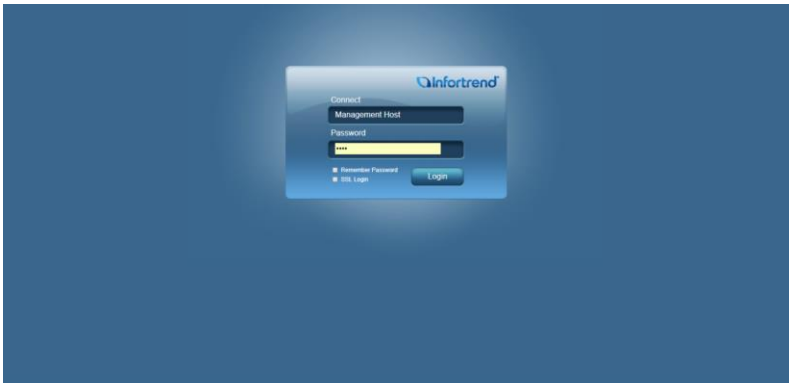
EonStor GSe Pro 3016 is a 3U16 storage platform. The maximum raw capacity is up to 4 PB. For testing configuration, we incorporated JB 3016S, an expansion enclosure with 32 x 3 TB SATA drives installed. 1 logical volume is configured with EonOne which is central management tool for EonStor GSe Pro Family. It has 2 logical drives with RAID 5 and each logical drive has 16 drives.



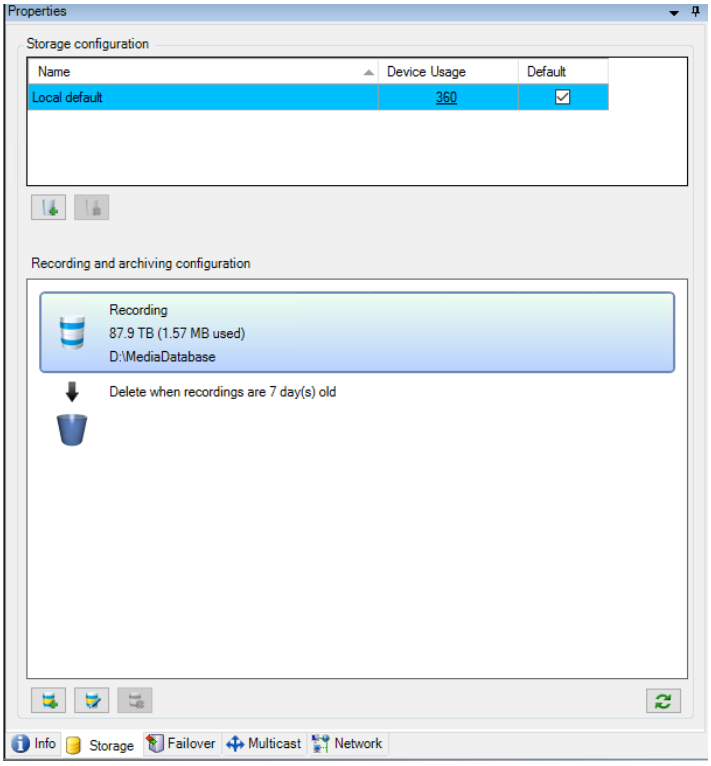
Storage System Configuration

Configuration 1 – EonStor DS 1016R Gen2

SANWatch is an intuitive RAID graphic user interface designed for novice users who have none to minimum RAID-related knowledge. With this system, you can easily set up RAID and monitor your system's status. For more details about SANWatch, refer to SANWatch User Manual in the bundled CD-ROM.



We configure a live database with EonStor DS 1016R Gen2. According to the test scenario, the XProtect Recording Server was configured to use 90 TB*4 as a live volume. Videos are written to the live database.

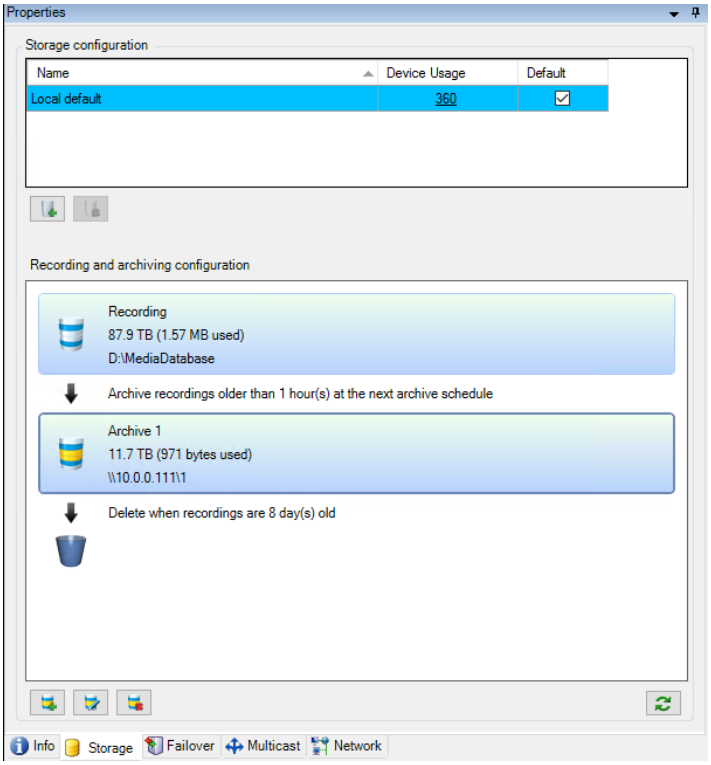


The optimal configuration for performance with the storage solution is to place the live database on EonStor DS 1016R Gen2. This configuration provides the highest performance. The certification has verified that this is the optimal configuration for video recording performance.

Configuration 2 – EonStor GSe Pro 3016

EonOne is an intuitive and user-friendly interface that allows you to manage all storage-related setups and configurations. With its smart setup wizard and a streamlined workflow, it helps you configure the storage requirements based on your needs. To help your system run on top condition, EonOne also provides a wide range of features for a centralized management of multiple systems including SRM (storage resource management), system monitoring, access authorization, and event notifications. For more information, refer to the EonOne User Manual from the bundled CD-ROM.

During the test, XProtect Recording Server is configured to use 4 x 10 TB as the archive database in EonStor GSe Pro 3016. The video is initially written to the live database. The data that are kept for more than an hour are transferred to the archive database by the system. With this test, it concludes that if the archive is full, the oldest data will be deleted and the incoming data will be stored. This process causes overhead, and is required to simulate a system in long term operations.



The configuration with the storage solution is to place archive database on the EonStor GSe Pro 3016 due to large-scale IP cameras deployment. It provides great performance with scalable ability. The certification has verified that this is the optimal configuration for video archiving.

[Note]

1. For large installations, long rebuild times might be expected if video databases need to be rebuilt. The rebuild process will scan all video databases within the same directory, including sub directories.
2. One storage is running one archive process (started at one time, but multi-threaded) by creating more storage configurations. It is recommended to spread the archive processes to start on different time slots, reducing the peak load of the live and archive storages.

Test Plan Summary

Test Process

The process of parameter increase involves adding additional simulated cameras to each recording server. For EonStor DS 1016R Gen2, this process uses 1080p/3M pixel/5M pixel resolution streams with 30 fps. For EonStor GSe Pro 3016, the process uses 1080p streams with 30 fps. As for the codec options, H.264 is selected as the main codec for all tests due to its popularity in some new IP video surveillance installations.

During testing by specification, the performance of EonStor DS 1016R Gen2/EonStor GSe Pro 3016 is closely monitored; and as the number of cameras increased, it results the following: **video frame loss**, **CPU consumption**, **archive event duration**, **unacceptable level of read/write latency**. These results reduce the data load and the performance has to be monitored again. If the system operates at a reduced level of data load within the acceptable parameters, a full data capture takes place and the maximum storage live and archive process is defined to the recommended levels of data and video stream parameters. Acceptable levels of operation are defined according to the following:

- Less than 0.1% video frame loss
- CPU values under 70% average
- Archive event duration equal to live database retention (1 hour)
- Read/Write latency values under 200 milliseconds

In these test scenarios, XProtect Recording Server records the videos to the active databases located on each Recording Server, which are configured to record continuously of up to 360 cameras at 30 fps per server for EonStor DS 1016 Gen2. For EonStor GSe Pro 3016, 250 cameras per server are running and reached 30 fps for data archiving.

We also test multiple XProtect Smart Client application that displays recorded videos. 25 streams are played back simultaneously in one view client, totally up to 100 playback streams in 4 separate view clients for EonStor DS 1016R Gen2 and EonStor GSe Pro 3016.

Stop Criteria: CPU, Archiving Time, and Frame-loss

The goal of each performance test is to determine the maximum amount of data that can be recorded to the storage array in a given current configuration without creating a negative impact on the long term health of the surveillance system. The system performance is at its maximum level based on the factors used in each rest scenario.

Four primary stop criteria are used to determine if the maximum load test has reached the limit, or if the system did not pass the benchmark test:

- CPU utilization average measures over 70% on any of the Milestone Recording servers or storage systems
- Read/Write latency from the live video database which is higher than 200 milliseconds
- Archiving event duration measures to be longer than the retention period of the live database
- Frame loss of over 0.1%, which will be indicated by “media lost” events received by the XProtect VMS system log

Performance Results

Test Scenarios

Scenario 1 – EonStor DS 1016R Gen2

The data load used in the benchmark test scenario includes the following parameters:

- H.264 video codec
- 30 frames per second
- 100% recording
- Live Database: 120 x 7,200 RPM 6 TB NL-SAS drives using RAID 5

Product Benchmark test results:

Model	Resolution	Maximum Number of Cameras	Individual Video Stream Size (MBps)	Processor Time (CPU %)	Read Latency (ms)	Write Latency (ms)	Maximum Disk I/O (MBps)
EonStor DS 1016R Gen2	1080p	1,440	4.4	9.12	9.25	46.37	929
	3M pixel	1,080	6.64	10.96	12.99	67.11	1,109
	5M pixel	540	10.56	9.24	27.15	74.5	1,166

[Note]

Combined with archiving service, the DS 1016R Gen2 system may not support the existing maximum number of cameras due to extra CPU loading.

Scenario 2 – EonStor GSe Pro 3016

The data load used in the benchmark test scenario includes the following parameters:

- H.264 video codec
- 30 frames per second
- 100% recording with 25% motion detection
- Live Database: 144 x 7,200 RPM 6 TB NL-SAS drives using RAID 5
- Archive Database: 32 x 7,200 3 TB SATA drives using RAID 5

Product Benchmark test results:

Model	Resolution	Maximum Number of Cameras	Individual Video Stream Size (MBps)	Processor Time (CPU %)	Read Latency (ms)	Write Latency (ms)	Maximum Disk I/O (MBps)
EonStor GSe Pro 3016	1080p	1,000	4.16	38.01	1.74	5.73	493 (Archiving)

Conclusion

EonStor DS 1016R Gen2 and EonStor GSe Pro 3016 with Milestone XProtect VMS are NVR bundle solutions that provide superb high performance with the selected hard drive configurations. As the test result, EonStor DS 1016 Gen2 supports a large number of cameras depending on the resolution set: 1,440 with 1080p / 1,080 with 3M pixel / 540 with 5M pixel. On the other hand, EonStor GSe Pro 3016 supports a maximum 1,000 camera database archiving with 1080p and 25% video motion detection.

Installers, designers, and operators of surveillance systems who use these proposed solutions can say that they can totally rely on their system when it comes to speed, performance, and quality of recording and archiving videos. Clients who want reliable value and performance for their surveillance system can check out our best practices outlined in this document to help design their own system that exceeds the benchmark limitations, which also followed by Milestone Server and Storage Calculator.

Appendix

Configuration Tuning for Recording Server

Milestone Recording Server Configuration Tuning

For tuning Archive Bandwidth with FS8600 and Milestone Xprotect Corporate

Active Database record to local server drives (R10) or Block SAS/SAN

#

In each Recording Server – adjust the following:

File found at - ProgramData/Milestone/XProtect Recording Server/ RecorderConfig.XML file

Search and find and modify the following tuning adjustments:

Must restart the Milestone Recording Server service after modify/save of file

#

<!--

Specifies the maximum number of frames in the queue, both key- and nonkey-frames

(H264 and MPEG limit primarily).

Type : System.Int32

Range : 20 - 200

(recommended limits)

Default : 50

-->

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