

Milestone Solution Partner IT Infrastructure Components Certification Report

Surveon Technologies NVR7800 Series NVR

12-15-2015



The Open Platform Company

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About Surveon Technology Inc.:

Surveon Technology offers end-to-end network video surveillance solutions that showcase our expertise in professional camera design, RAID NVR, high-availability video storage, embedded firmware and video management software. All Surveon products are designed in-house and manufactured on our ISO 9001 and ISO 14001 certified production site to ensure the highest quality for our partners. For more information about Surveon, please visit our website at www.surveon.com.

About Milestone Systems:

Milestone Systems is the world's leading provider of open platform IP video surveillance software. Milestone has provided easy-to-use, powerful video management software in more than 100,000 installations worldwide.

Milestone XProtect[®] products are designed with open architecture and 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:

Introduction

This report highlights the performance results of certification tests performed on the Surveon NVR7800 Series NVR solutions. Specifically the NVR7812 and NVR7816 NVR platforms with major three different Intel new generation processors which hosted XProtect Recording Servers and provided hard disk space for both the long term archive and live video database storage within a Milestone XProtect® video management software (VMS) surveillance system. The certification process seeks to confirm that server, storage and network solutions provided by qualified Solution Partners meet the performance benchmarks required to support the Milestone XProtect VMS applications, and to measure the maximum performance available to Milestone customers if they choose to build a solution using certified Solution Partners IT Infrastructure components.

Milestone Technology Partner (MTP) certification efforts include building a test surveillance system using the subject MTP product and gathering performance data while the system is in operation at the benchmark levels, and capacity testing to determine the upper limits of performance for the certified MTP solution. Certification of the NVR7800 Series will ensure that any surveillance system built using this product in combination with the Milestone XProtect components will be able to record and archive an amount of video consistent with the recommendations of the Milestone Server and Storage Calculator.

Certified Products

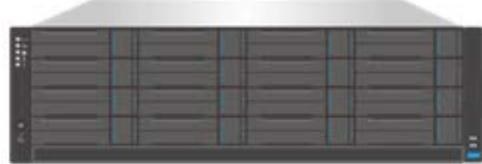
- NVR7800 Series
 - NVR7812(2U12)
 - NVR7816(3U16)
- Milestone XProtect Corporate 2016 10.0a

NVR7812



(Front-View)

NVR7816



(Back-View)



Highly integrated controller with cableless design that is easy to deploy

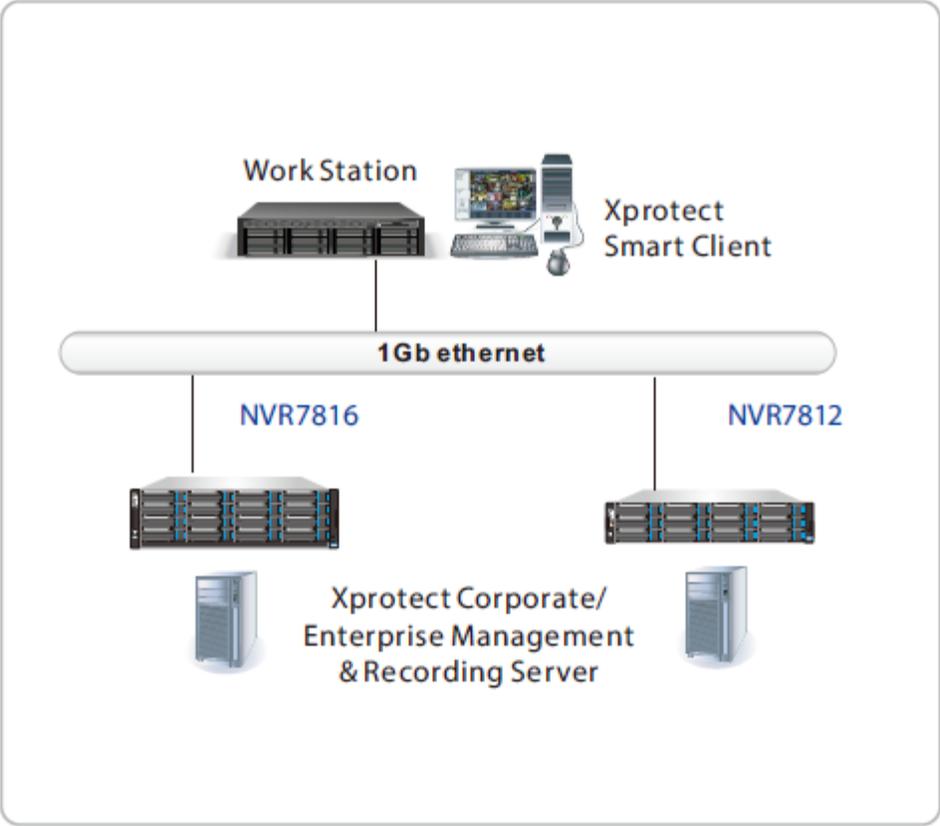


Hot-swappable redundant 80+ PSU

Solution Architecture:

Topology

The test surveillance system topology included one Surveon NVR7800 Series (NVR7812 or NVR7816) storage server running a Microsoft Windows x64 based Server 2012 R2 operating system hosting the Milestone XProtect Corporate Management Server, Management Client and Recording Server to administrate the system. One workstation was running a Microsoft Windows 7 professional operating system hosting the Milestone XProtect Smart Client 2014 to display a 5x5 view of recorded video. The network and all of the NICs on the NVR servers and workstation systems supported Gigabit Ethernet. The test topology is shown below:



One instance of the video feed simulator and video content files were placed on the NVR7800 Series NVR Server. In this configuration video streams are sent across the IP network to be recorded on the Product storage. Placing the video stream sources within each recording server removes any potential network bottlenecks between cameras, encoders, or other video sources and the recording servers themselves. The specific configurations detailed above were chosen in order to conform to the recommended Milestone storage configuration; providing a live database and an archive database for each recording server.

RAID Configuration on the NVR7800 Series

Using the built in RAID configuration tool available through the browser based interface: EonOne Lite, a single RAID 10 array was configured for the first test scenario to provide the best balance of throughput and redundancy. The NVR7812 NVR storage server was also connected with a 2U 12-bay form factor JB212 JBOD. This additional storage array was configured as a single RAID 5 disk array.

In the second scenario, the NVR7816 NVR storage server; a 3U 16-bay form factor, used a single RAID 10 array for the live database, and the JB216 JBOD with a single RAID 5 disk array served as the archive database.

RAID Configuration Tool on the NVR7800 Series

EonOne Lite is an intuitive RAID graphic user interface designed for novice users that may have non to minimum RAID related knowledge. It has a 3-step setup wizard for fast and easy RAID storage setup and can begin monitoring system statuses. Please refer to the EonOne Lite user manual on the CD-ROM for more information.

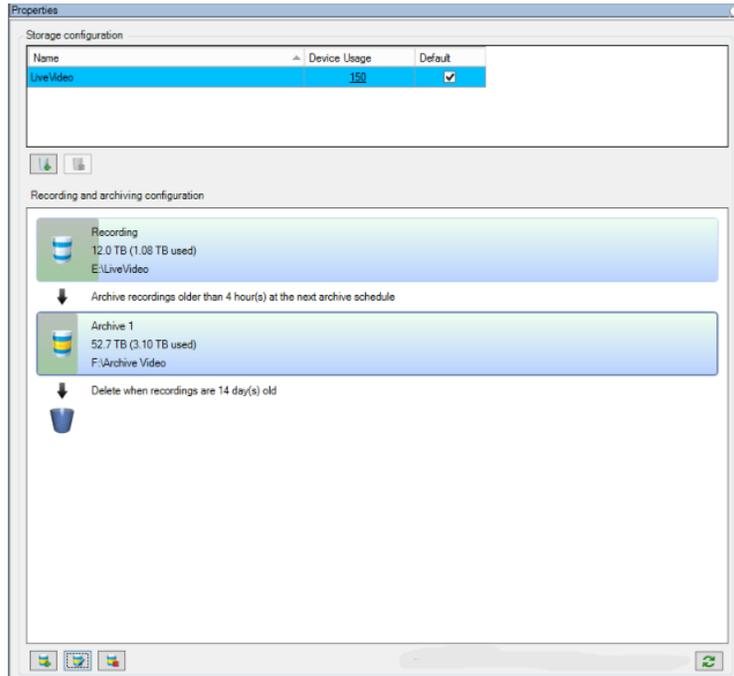


(In the login page, type user name "admin" and password "admin")



(3-step setup wizard for fast and easy RAID storage setup and can begin monitoring system statuses)

Milestone recommends always configuring a live and an archive database. In the second test scenario, the XProtect Recording Server was configured to use a 12 Terabyte volume as the live volume on the NVR7800 Series, and a 52.7 Terabyte volume as the archive database on the Infortrend JB216 JBOD. Video is initially written to the live database, and later moved to the archive database. Once the archive is full, the oldest data will be deleted and incoming data will be stored. This process causes overhead, and is required to simulate a system in long term operations.



Live and archive video database sizes of 12 terabyte and 52.7 terabyte, respectively, were used to support an efficient testing process. Increasing these sizes in operational video surveillance deployments will not negatively affect performance results.

The optimal configuration for performance with the NVR7800 Series storage solution is to place the live database on the NVR and archive database on the expandable JBOD when used in a large-scale IP camera deployment. These configurations provide the highest rate of IOPS, or read/write performance. The certification has verified that this is the optimal configuration for video recording and storage performance.

Test Plan Summary:

Test Process:

The load tests which are included in the basic scope of the certification test include one benchmark test, and one or more maximum performance load tests. Each certification test includes two test scenarios, each scenario contains both of these test types.

- **Benchmark test**
 - The disk array specifications of partner solutions which are servers, NVRs, or storage solutions will be entered into the Milestone server and storage calculator and a benchmark number of cameras will be output. This tool will be used to determine the benchmark level of performance.
 - Network and display solutions which have video streaming and video display limitations suggested by their manufacturer will be tested using those limitations as the benchmark levels of performance.
 - If a solution does not pass the benchmark test it will not be certified.

- **Maximum performance load test(s)**
 - Load testing will seek to determine the maximum amount of video streams that a partner solution can support as a component in an operational XProtect VMS system.
 - The number of video streams, video recording servers, and the video stream profile used in the certification test may all be increased to add stress to the Infortrend EonServ 5000 series solution.
 - Once the system meets a stop criteria, the video stream load will be scaled back to the last known safe level of performance and this level will be judged to be the maximum performance.
 - Servers and NVRs may include additional maximum performance load tests which include a comparison between continuous recording and video motion detection based recording.
 - There is no maximum level of performance required to pass the certification.

Stop Criteria:

There are 4 primary stop criteria used to determine if the maximum load test has reached a limit, or if the system has not passed the benchmark test.

- CPU utilization average measured over 80% on any of the Milestone Recording servers or storage systems.
- Read latency from the live video database which is higher than 200 milliseconds.
- Archiving event duration measured to be longer than the retention period of the live database.
- Frame loss of over 1%, which will be indicated by “media overflow” events received by the XProtect VMS system log.

Test Scenarios:

Scenario 1: XProtect Corporate 60 cameras Continuous Recording

Benchmark Test - 60 cameras total - 1 XProtect Recording Servers

- 1 Megapixel resolution (1280x720)
- H.264 codec
- 30% compression
- 30 FPS
- Continuous recording
- One Smart Client displaying recorded video loop from 25 cameras per Recording Server
- All 16 NVR7816 Disks in one pool
- RAID 10

Maximum Performance Test

- 3 Megapixel resolution (2048x1536)
- H.264 codec
- 30-60% compression
- 10-30 FPS
- Continuous recording
- One Smart Client displaying recorded video loop from 25 cameras per Recording Server
- Same Disk Configuration

Scenario 2: XProtect Corporate - Video Motion Detection - RAID5 - Archiving

Benchmark Test - 30 cameras total - 1 XProtect Recording Servers

- 1 megapixel resolution (1280x720)
- H.264
- 30%
- 30 FPS
- 30% motion with Video Motion Detection based recording
- Smart Client displaying recorded video loop from 25 cameras/server
- All 16 NVR7816 Disks in one pool
- RAID 10
- Archiving to JB216
- All 16 JB216 Disks in one pool RAID 5

Maximum Performance Test

- 1 megapixel resolution
- H.264
- 30-60%
- 10-30 FPS
- 30% motion with Video Motion Detection based recording
- Smart Clients displaying recorded video loop from 25 cameras/server
- Same Disk Configuration

Performance Results:

Key Findings

The Surveon Technology NVR7800 Series NVR solution performs as a video recording and archiving platform with the Milestone XProtect VMS system at a level that is two times higher than the benchmark levels determined by the Milestone Server and Storage Calculator. The calculator indicates that the NVR7812/7816 should support 60 cameras at the benchmark level based on scenario 1, and it was able to support a maximum of 110,145 and 150 cameras based on i3-4330, E3-1225 and E3-1275 Intel processors. Meanwhile, the calculator indicates that the NVR7812/7816 should support 30 cameras at the benchmark level based on scenario 2, and it was able to support a maximum of 70,110 and 140 cameras based on i3-4330, E3-1225 and E3-1275 Intel processors.

The systems performs at a high level of data throughput, and with acceptable read/write latency when using the optimal logical disk configuration, please also see the “test scenarios” for the detailed configuration. The NVR7800 Series family of NVR products is certified solutions. The maximum performance of the NVR7800 Series family are listed below, in each of these scenarios there was one XProtect Recording Server installed on each NVR and it was recording and archiving as many cameras as possible to the NVR’s built-in storage and Infortrend JBODs.

Scenario 1 (NVR only)	NVR	CPU	Cameras / Compression %	Read Latency (ms)	Stream Size (Mbps)	Disk I/O (MBps)
Benchmark	NVR7812/7816	i3-4330	60 / 30%	2	10.17	120.64
		e3-1225	60 / 30%	2	10.17	375.92
		e3-1275	60 / 30%	9	10.65	119.98
Maximum	NVR7812/7816	i3-4330	110 / 60%	4	13.94	293.71
		e3-1225	145 / 60%	7	9.91	267.61
		e3-1275	150 / 60%	10	14.41	498.1

Scenario 2 (NVR +JBODs)	NVR	CPU	Cameras / Compression % / Motion %	Read Latency (ms)	Stream Size (Mbps)	Disk I/O (MBps)
Benchmark	NVR7812/7816	i3-4330	30 / 30% / 30%	3	10.06	493.41
		e3-1225	30 / 30% / 30%	2	5.2	486.79
		e3-1275	30 / 30% / 30%	1	10.23	557.91
Maximum	NVR7812/7816	i3-4330	70 / 60% / 30%	1	5.09	445.29
		e3-1225	110 / 60% / 30%	2	5.07	631.17
		e3-1275	140 / 60% / 30%	2	5.18	516.83

Conclusion:

The NVR7800 Series is a certified storage server as NVR platform for use with the Milestone XProtect VMS. With the chosen hard disk configuration used in the test, the NVR7800 Series easily supported the benchmark level of performance. In the first scenario, using continuous recording and a two tier storage architecture, the system outperformed the estimates of the Milestone Server and Storage Calculator by 200%. After enabling 30% motion with Video Motion Detection based recording, and archiving to the Infortrend JBODs in the second scenario, the system supported more than four times the number of IP cameras compared to the benchmark.

Integrators and end users designing, installing and operating surveillance systems which incorporate these solution components can have confidence that the system will record and archive video reliably. 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.