



Take the guesswork out of video surveillance with pre-validated, virtualized Milestone solutions from Dell EMC

Intel Xeon processor-powered Dell EMC PowerEdge R740xd2 servers handled a 112-camera load without failure

Video surveillance is big business. In 2019 alone, research firm IHS estimated that 180 million surveillance cameras shipped worldwide.¹ Businesses of all sectors and sizes use surveillance to protect employees and assets and face the challenge of finding reliable solutions that can handle and store the large amounts of video data they accumulate.

This is where the Dell EMC™ Surveillance Validation Labs come in. These dedicated labs pre-validate software and hardware solutions for surveillance. To show how pre-validation can help surveillance customers, we worked with engineers at the lab in Durham, NC, to validate Dell EMC PowerEdge™ R740xd2 servers, powered by Intel® Xeon® Gold 5120 processors, and Milestone XProtect® 2019 R1, an open-platform video management system (VMS) that allows companies to customize their surveillance software. In two use cases, the first with 112 cameras recording normally, and the second with 52 cameras operating during a simulated disk failure, the Dell EMC and Milestone solution featuring four virtual recorders passed validation testing.

Choosing a validated digital surveillance infrastructure solution of Milestone XProtect and Dell EMC PowerEdge R740xd2 servers powered by Intel Xeon processors could help your organization reliably protect your valuable assets: customers, employees, inventory, and more.

Different surveillance setups met stringent verification standards

Efficient recording under normal load



206 MB/s average disk throughput



17% average CPU utilization

Reliable performance during simulated disk failure and rebuild



102 MB/s average disk throughput



17% average CPU utilization

About the Dell EMC PowerEdge R740xd2 server

The enterprise-grade PowerEdge R740xd2 server allows organizations to “bring storage closer to compute” and help “save space” with a 2U design.² With the PowerEdge R740xd2, organizations can store up to 364 TB of data or scale out to 7.2 PB (520 drives) in a 42U rack full of R740xd2 servers.³ Learn more in the Dell EMC PowerEdge R740xd2 server [data sheet](#).

The PowerEdge R740xd2 server used in this testing had two Intel Xeon Gold 5120 processors, 28 physical cores, and 256 GB of memory, and it ran VMware ESXi™ 6.5.0 with four VMs. Each VM had 16 vCPUs and 24 GB of RAM. For storage, the server had 26 8TB 3.5-inch NLSAS HDDs. We configured the storage under test using the Dell EMC PERC H730P Mini controller and created a RAID6 disk group with two dedicated hot spares for a total usable capacity of 160 TB.



What is the Dell EMC Surveillance Validation Lab?

Not all major data center technology suppliers have their own validation lab for surveillance solutions, which is what makes Dell EMC stand out in the surveillance infrastructure marketplace. The Surveillance Validation Lab works with leading surveillance providers from the Dell EMC partner ecosystem to test their video management solutions. Dell EMC then uses those findings to help organizations choose a tested and validated solution that meets the organizations' demands. Dell EMC believes their Surveillance Lab is the “most advanced, longest-running video surveillance validation lab in the world.”⁴ Globally, Dell EMC runs three surveillance testing and validation labs, which are part of a network of 20 test centers total.⁵ Dell EMC claims to be the number one global surveillance infrastructure provider.⁶

Engineers in the Surveillance Lab put hardware and software solutions through the paces in what Dell EMC calls extreme, real-world scenarios.⁷ Extreme conditions include zero video frame drop over multiple failure scenarios, including drive, network, and controllers failures. The performance numbers the Dell EMC Surveillance Lab produces are not hero numbers, but worse-case numbers, as the lab aims to show customers they can maintain performance without video loss under strenuous conditions.

Because the Surveillance Lab looks for worst-case realistic test scenarios, their results may vary when compared to the results from other partners (i.e., integrators and VMS vendors).

Solution validations include:⁸

- Virtual/non-virtual
- Best practices
- Compute
- Networking
- Storage
- ISV application

Dell EMC also provides validation support that includes “solution documentation including reference architectures, white papers, technical notes, sizing guidelines, and technical presentations.”⁹ When your business implements a VMS validated by Dell EMC, you do so knowing that Dell EMC has already tested and approved it for use.

About the Milestone XProtect video management system

According to Milestone Systems, their company “develops and produces world-leading IP-based video management solutions for organizations of all shapes and sizes.”¹⁰ Milestone Systems claim that XProtect products support over 8,000 cameras and hardware devices.¹¹ [Learn more here.](#)

How we tested and what we found

We worked with Dell EMC engineers to validate the Intel Xeon processor-powered PowerEdge R740xd2 server running the Milestone VMS. The Dell EMC Surveillance Lab in Durham, NC, housed the server under test and testing equipment. Our engineers installed BIOS and firmware updates, provisioned local storage, and installed Windows Server 2016. Dell EMC engineers configured the networking, deployed the software required to complete the validations, and performed the validation testing. Our engineers ensured servers performed optimally during testing. They also reviewed raw testing results as well as Dell EMC Live Optics™ storage and server performance reports captured during validation testing to ensure that Dell EMC engineers completed the validation successfully without error.

A surveillance solution can fail to receive validation by either dropping one or more frames or losing video. The Milestone solution passed the validation testing in two different use cases: (1) normal server load with 112 cameras recording continuously, and (2) 52 cameras simultaneously recording while experiencing a server disk failure and a disk rebuild.

Milestone XProtect uses virtual recorders, which discover camera feeds, check cameras to see if they are recording, process all video and multimedia streams, and commit them to storage. The results in this report show data for four virtual recorders. In one use case, each recorder has 28 camera streams, for a total of 112 streams. In the other use case, each recorder has 13 camera streams, for a total of 52 streams.

About Intel Xeon Scalable processors

According to Intel, their Xeon Scalable processors support “hybrid cloud infrastructure and most demanding applications—including in-memory analytics, artificial intelligence, autonomous driving, high performance computing (HPC), and network transformation.”¹² Intel Xeon Scalable processors are available in four feature configurations (Platinum, Gold, Silver, and Bronze) to match the needs of organizations operating at many different levels. [Learn more about Intel Xeon Scalable processors.](#)

Test results - Use case 1 - Server under normal load with four virtual recorders

Camera parameters

- H264 codec
- 1.07 MBps camera/bandwidth
- 30 frames per second
- Continuous recording enabled for all cameras

Recording results	Four virtual recorders
Maximum number of cameras	112 (28 streams per recorder)
Read/write ratio (%)	49/51
Read/write latency (ms)	17/2
Disk throughput (MB/s)	206
IOPS at 95% CPU utilization	759
Peak IOPS	869
Average CPU utilization	17%

Test results - Use case 2 - Server under simulated disk failure and disk rebuild with four virtual recorders

Camera parameters

- H264 codec
- 1.43 MBps camera/bandwidth
- 30 frames per second
- Continuous recording enabled for all cameras

Recording results	Four virtual recorders
Maximum number of cameras	52 (13 streams per recorder)
Read/write ratio (%)	55/45
Read/write latency (ms)	23/8
Disk throughput (MB/s)	102
IOPS at 95% CPU utilization	380
Peak IOPS	519
Average CPU utilization	17%

For detailed performance results, see [Appendix A](#).

It's important to note that the number of cameras and the throughput results were the minimum requirements set for this validation. These results do not reflect the maximum capability of the Dell EMC and Milestone surveillance solution.

What do these results mean for your business?

A validated Dell EMC and VMS partner surveillance infrastructure can simplify the process of implementing a surveillance solution. Choosing a pre-validated, custom-tailored solution provided by Dell EMC can help take the guesswork out of the purchasing equation, which cuts down on research, trial and error time, and more. This frees IT staff to focus on other critical tasks while ensuring your organization gets a properly sized solution. By reducing the costs associated with solution acquisition and implementation, organizations can see a higher overall return on investment for their purchase. Buying a solution that's too big or small could require additional time and effort from IT staff to get infrastructure up and running and increase the time to successful implementation.

Figure 1: The Dell EMC PowerEdge R740xd2



Conclusion

The right digital surveillance infrastructure can put your organization in a good position to handle the security issues of today and tomorrow. But you should confirm the reliability of your surveillance infrastructure—you're protecting your customers, employees, and inventory, among other vital elements. The Dell EMC Surveillance Validation Labs can help your organization choose tested and validated solutions that meet your needs. We worked with the labs to validate a Milestone XProtect VMS on a Dell EMC PowerEdge R740xd2 server. The solution proved to be reliable by meeting verification requirements in two use cases, demonstrating its reliability by handling the tests with no dropped frames. This validation shows that your organization can be confident running these Milestone VMS configurations on Dell EMC PowerEdge R740xd2 servers for a dependable surveillance infrastructure.

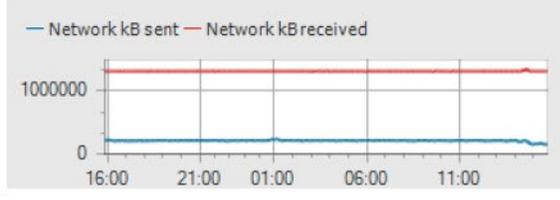
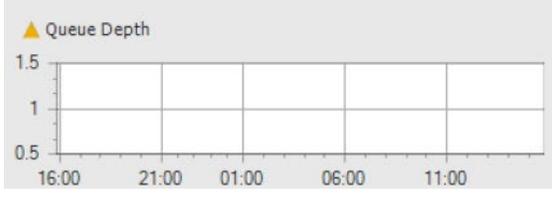
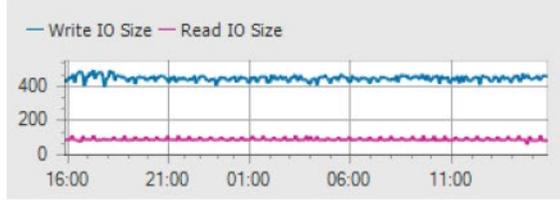
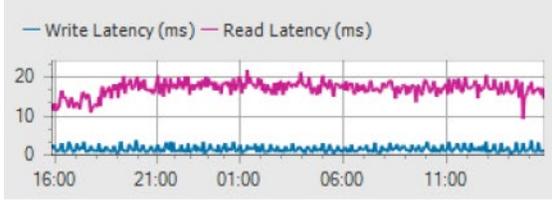
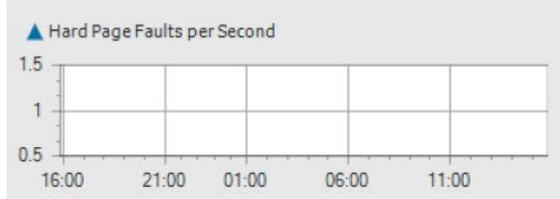
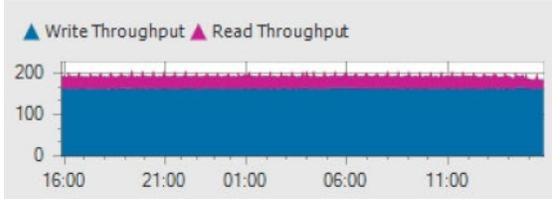
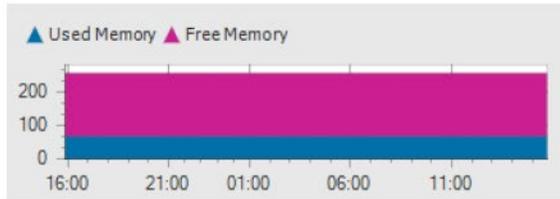
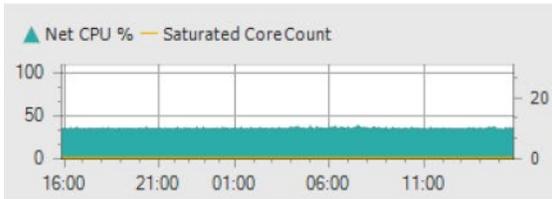
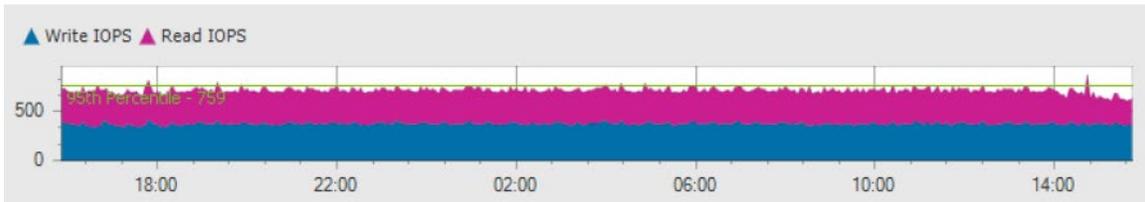
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We concluded our validation on September 6, 2019. The results in this report reflect configurations that we finalized with Dell EMC on August 23, 2019 or earlier. Unavoidably, these configurations may not represent the latest versions available when this report appears.

Appendix A: Live Optics performance overview

Performance of R740xd2 solution under normal load

Operating System	VMware ESXi 6.5.0 build-13932383		
Time Recorded	23 Hour(s), 56 Minute(s), 8/23/2019 - 8/24/2019		
Disk Throughput	206.40 MB/s	Average IO size	Read: 96.03 KB / Write: 431.49 KB
IOPS	759 at 95%	Average Latency	17 ms Reads and 2 ms writes
Read/Write Ratio	49% / 51%	Average Queue Depth	0.00
Total Local Capacity	153.02 TB	Peak/Min CPU	39% / 34%
Free Local Capacity	111.25 TB (73%)	Peak/Min Memory	185.92 GB / 185.93 GB
Used Local Capacity	41.78 TB (27%)	Peak/Min Memory In Use	68.53 GB / 68.52 GB



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Performance of R740xd2 solution during disk rebuild test

Operating System	VMware ESXi 6.5.0 build-13932383		
Time Recorded	6 Day(s), 23 Hour(s), 56 Minute(s), 8/30/2019 - 9/6/2019		
Disk Throughput	102.80 MB/s	Average IO size	Read: 104.71 KB / Write: 383.74 KB
IOPS	380 at 95%	Average Latency	23 ms Reads and 8 ms writes
Read/Write Ratio	55% / 45%	Average Queue Depth	0.00
Total Local Capacity	153.02 TB	Peak/Min CPU	41% / 0%
Free Local Capacity	111.22 TB (73%)	Peak/Min Memory	153.81 GB / 153.84 GB
Used Local Capacity	41.81 TB (27%)	Peak/Min Memory In Use	100.64 GB / 100.62 GB



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Appendix B: System configuration information

Server configuration information	Dell EMC PowerEdge R740xd2
BIOS name and version	Dell 2.2.11
Non-default BIOS settings	N/A
Operating system name and version/build number	VMware ESXi 6.5.0, Build 13932383
Date of last OS updates/patches applied	08/23/19
Power management policy	Performance
Processor	
Number of processors	2
Vendor and model	Intel Xeon Gold 5120
Core count (per processor)	14
Core frequency (GHz)	2.20
Stepping	H0
Memory module(s)	
Total memory in system (GB)	256
Number of memory modules	16
Vendor and model	Micron® MTA18ASF2G72PDZ-2G6E1
Size (GB)	16
Type	DDR4-2400
Speed (MHz)	2,400
Speed running in the server (MHz)	2,400
Storage controller	
Vendor and model	Dell PERC H730P Mini
Cache size (GB)	1
Firmware version	25.5.5.0005
Driver version	6.603.6.0
Local storage (type A)	
Number of drives	26
Drive vendor and model	Dell ST8000NM0185 (Seagate OEM)
Drive size (GB)	8,192
Drive information (speed, interface, type)	7.2K, 12Gbps, SAS, HDD
Local storage (type B)	
Number of drives	2
Drive vendor and model	Dell SSDSCKJB240G7R (Intel OEM)
Drive size (GB)	240

Server configuration information	Dell EMC PowerEdge R740xd2
Drive information (speed, interface, type)	6Gbps, SATA, M.2 SSD
Network adapter	
Vendor and model	Broadcom® BCM57412 Dual 10G SFP+ Ethernet
Number and type of ports	2 x 10GbE
Driver version	20.8.24.0
Cooling fans	
Vendor and model	Nidec® UltraFlo® 4VXP3-X30
Number of cooling fans	6
Power supplies	
Vendor and model	Dell D1600E-S0
Number of power supplies	2
Wattage of each (W)	1,100

Appendix C: How we tested

PT engineers installed BIOS and firmware updates and provisioned local storage. Dell EMC engineers configured the networking, installed the hypervisor, configured the VMs, deployed the software required to complete the validations, and performed the validation testing. PT engineers ensured that server performance was optimized during testing and reviewed raw testing results and Dell EMC Live Optics storage and server performance reports captured during validation testing. We cannot disclose Dell EMC proprietary processes related to this testing.

Installing firmware updates on the PowerEdge R740xd2 server

1. Download all firmware updates from the Dell EMC firmware repository.
2. To update the firmware on the following components, run the .exe files in this order:
 - a. Dell iDRAC
 - b. BIOS
 - c. CPLD
 - d. OS Driver Pack
 - e. Network firmware and drivers
3. Reboot the server as required between firmware updates.

This project was commissioned by Dell EMC.



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