

Reference Architecture

The Dell R730XD as a dedicated video management system.

**Design It, Build It, Prove It at the
Dell Customer Solution Centre**

DELL IP Video Platform Design and Calibration Lab

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In collaboration with Milestone Systems, the Dell IP Video Platform Design and Calibration Lab is an environment that provides a scalable controlled loading facility tailored to IP camera architectures. Platform design concepts can be implemented and calibrated to validate their potential capability.

Based at the Dell Customer Solution Centre in Ireland, utilizing a network of **global Customer Solution Centres**, Dell helps customers strategize, architect, validate and build solutions.

Please contact Lee_Cauchie@Dell.com for more information.

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.

For specific projects or POC please contact:
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Focus Platform

Dell R730XD



R730XD Benefits as a VMS platform

- 2U platform scalable in performance and local storage.
- High local storage capability - Up to 131.6TB (with 16 x 3.5 8TB nearline SAS HDD + 2 x 2.5 1.8TB SAS HDD or SSD)
- High performance processor and memory potential. Intel® Xeon® processor E5 2600 v4 product family / Up to 1.5TB Memory (DDR-4 2133MHz)
- **OEM Ready**

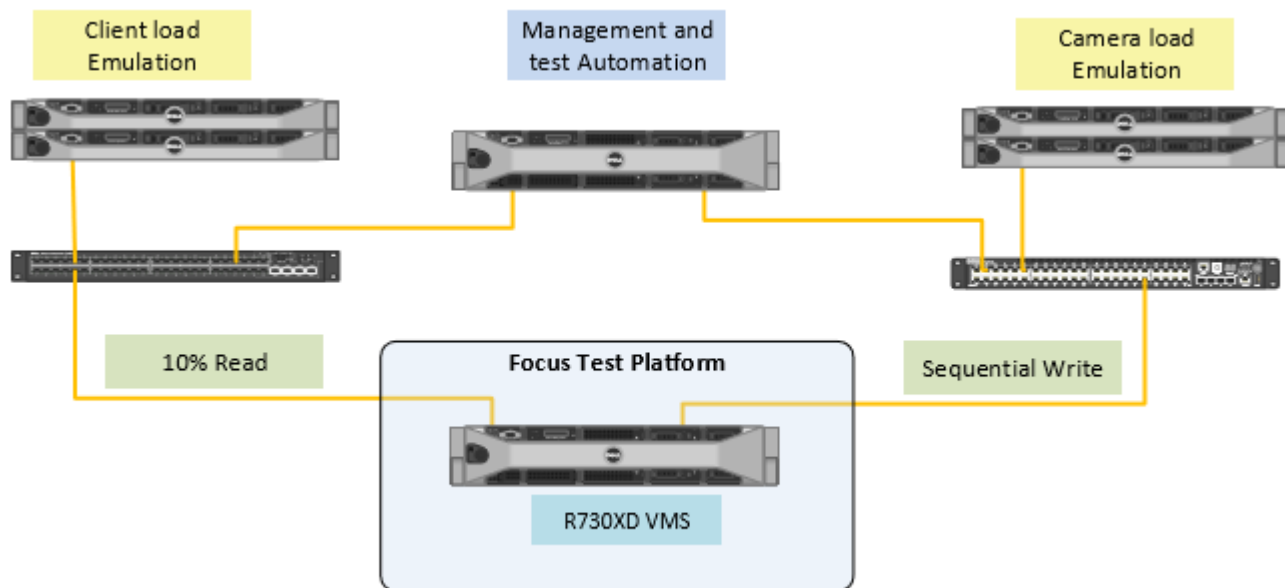
Platform Configurations tested

System	Processor	Memory	OS Hdd Config	Local Storage HDD config
R730XD High local storage	Dual Intel E5 2690	32Gb	Raid 1 – rear / 2 x 2.5” 15K 300G SAS	Raid 6 – 16 x 3.5” 8TB NLS
R730XD High performance	Dual Intel E5 2690	64GB	Raid 1 – rear / 2 x 2.5” 15K 300G SAS	Raid 5 – 24 x 2.5” 300G 15K SAS

Test Application

Milestone XProtect Corporate 2016, Version 10.0.a build 505, running on Microsoft Windows 2012 R2.

Test Setup



Test Process

The test environment comprises of two separate networks, one to emulate camera feeds, and the other to emulate client loading. Both emulation environments can be calibrated to induce precise scaling to the focus test platform. They are controlled by Milestones test automation tools that can step up the loading while monitoring the key resources of the test platform. In this case the video streams are calibrated to provide a 4.4Mbit/s throughput comprised of a H.264 ,1080p, feed at 30 FPS.

To represent a realistic use case both writing (recording) and reading (playback) are performed on the disk with the aim of having 10% playback of the write throughput. Milestone Server side Video Motion Detection is enabled for all cameras.

Once the optimum level is reached, the Dell DPACK (Dell's Performance Analysis Collection Kit) gathers the test case information over a 24 hour period. DPACK is a vendor, hardware, and platform agnostic standard for IT professionals to record and communicate their achieved benchmarks, workloads, or support concerns to others to accelerate decision time and reduce risk. Further Milestone Performance monitor and Microsoft resource monitor performance and frame loss.

Test Criteria

Designed to represent a live IP Camera environment over time, in a controlled test lab. This environment is controlled for calibration to the maximum sustained system performance and application operation.

- Video Images –1080p , 30 FPS, H.264 codec, 4.4 Mbit/s
- Video stream distribution - 60% continuous motion, 40% low motion
- Video Motion Detect: On
- Read Playback – playback from recorded images at 10% of the write throughput
- System disk space running at 80% full disk capacity, ensuring first in first out rotation.

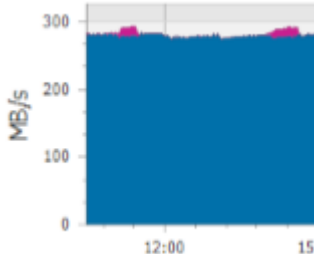
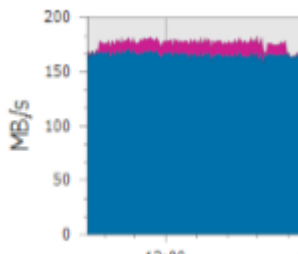
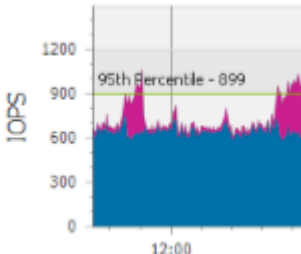
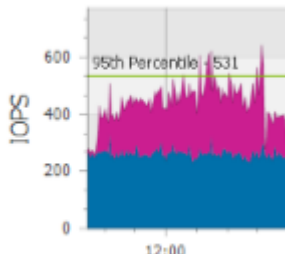
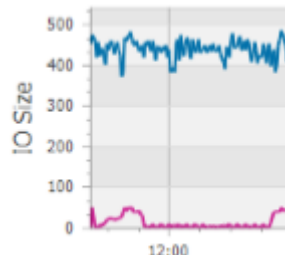
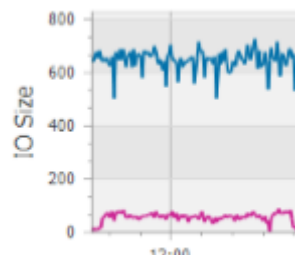
Test Data Points gathered

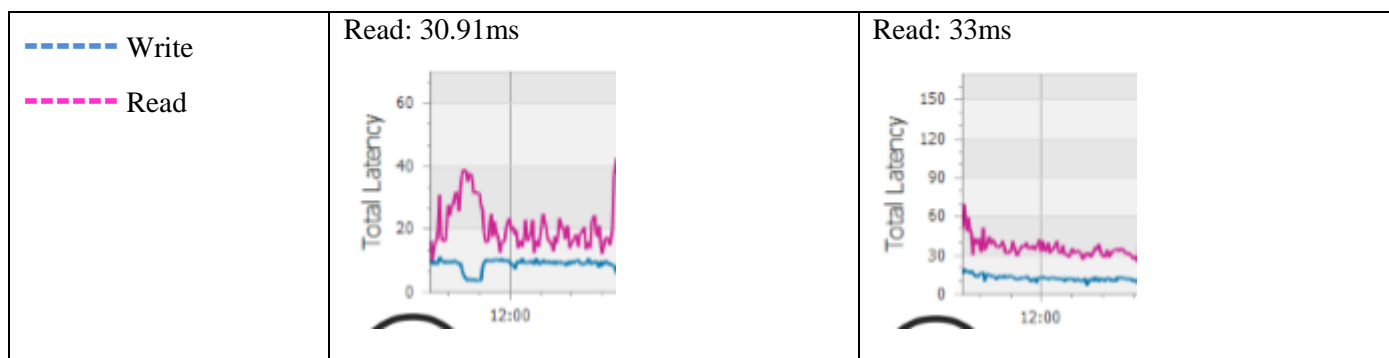
- Microsoft system resource monitor
 - o CPU % Peak / Min
 - o Memory usage
 - o Network throughput on both the Camera load interface and the Client interface.
 - o Local storage write throughput
 - o Local storage write Latency
 - o Local storage read throughput
 - o Local storage read Latency
- Dell DPACK information (24 hour run period)
 - o Disk throughput
 - o IOPS
 - o Read / Write Ratio
 - o Read and Write Latency
 - o Total CPU Utilisation
- Milestone in Application resource points.
 - o Frame drops
 - o System performance
 - o Storage capacity usage

Test Stop Criteria

- < 0.1% Frame Dropping over the 24 hour observation period.

Test Results

System	R730XD High performance	R730XD High local storage
Max sustained camera count	500 cameras @ 4 Mbps @ 1080P	300 cameras @ 4 Mbps @ 1080P
Write Throughput	2.1 Gbit/s	1.2 Gbit/s
Read Throughput	210 Mbit/s	120 Mbit/s
CPU % (Peak /Min)	55% / 45%	29% /25%
Memory Usage	42 GB	25Gb
Storage usage per hour	945 GB	540 GB
Storage usage per Day	22.95 TB	13.72 TB
Read / Write ratio	30% / 70%	48% / 52%
Used Local Capacity	9.85 TB (82%)	42.34 TB (83%)
Free Local Capacity	2.15 TB (18%)	8.86 TB (17%)
Disk throughput <div> <div>Write</div> <div>Read</div> </div>	297 MByte/s 	182 MByte/s 
IOPS <div> <div>Write</div> <div>Read</div> </div>	1358 at peak, 899 at 95% 	700 at peak, 531 at 95% 
I/O Size <div> <div>Write</div> <div>Read</div> </div>	Write: 429.81 KB Read: 34.52 KB 	Write: 598.9 KB Read: 44.0 KB 
Total Latency	Write: 4.94ms	Write: 11ms



Findings and Design Considerations

The R730XD is an ideal VMS platform in a 2U form factor. It will step up to performance requirements, while having high local storage capabilities. It is ideal as a stand alone unit or as a building block in larger installations.

Testing was performed in a controlled lab environment and focused on two comparative configurations. This document is intended for use as a reference when tailoring the platform towards an intended installation.

The key system components of focus in this environment as it scales are the network bandwidth, the local storage and the CPU processing capabilities.

- Close consideration of the network adapter on the video ingest network may require a 10G adapter if the potential throughput could exceed the onboard 1G limits.
- As storage performance is key, utilizing the H730P raid controller with 2048MB of onboard cache is recommended.
- Any level of analytics increases the load on the CPU, and memory. Motion detect in particular substantially increased the CPU load.

An additional test was conducted with Video Motion Detection disabled and recording was set to always. This highlights the impact of analysing motion on all system components.

R730XD High Performance – Maximum performance with Motion Detect disabled					
Motion Detection	Video Motion %	Camera Count	Write	Read	CPU %
Off	100%	700	3.1 Gbit/s	310 Mbit/s	10%