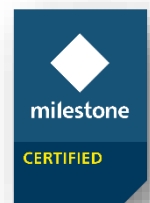




Milestone Certified Solution



**Western Digital®**



**Ultrastar Serv60+8 Hybrid Storage Server**

Date certified: 26<sup>th</sup> March 2019

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## About Western Digital

Western Digital Corporation (Western Digital), is a developer, manufacturer and provider of data storage devices and solutions that address the needs of the information technology (IT) industry and the infrastructure that enables the proliferation of data in virtually every industry. The Company's portfolio of offerings addresses three categories:

1. Datacenter Devices and Solutions (capacity and performance enterprise hard disk drives (HDDs), enterprise solid state drives (SSDs), datacenter platforms and system solutions);
2. Client Devices (mobile, desktop, gaming and digital video hard drives, client SSDs, embedded products and wafers),
3. Client Solutions (removable products, hard drive content solutions and flash content solutions).

## 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](http://www.milestonesys.com) for more.

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## Executive Summary

This report presents the results from Milestone certification testing of the Western Digital Ultrastar Serv60+8 Hybrid Storage Server with Milestone XProtect Recording Server and components. Results from the formal certification demonstrate that the Ultrastar Serv60+8 Hybrid Storage Server can support up to 600 High Definition (1920x1080) H.264 camera streams at 30fps (stream rate of ~4Mbit/s) without motion detection and up to 300 High Definition H.264 camera streams with motion detection enabled. The maximum storage capacity of 840TB in the storage server allows for up to 52 days of storage capacity when 300 HD cameras are connected @30FPS (with motion detection enabled), and 28 days when 600 HD cameras are connected @30FPS (without motion detection enabled).

Four scenarios are tested, allowing for different number of cameras connected, and motion detection enabled or disabled. In none of the scenarios, CPU utilization exceeds 54%, staying well within the specification requirements of Milestone.

## Certified Product

### Ultrastar Serv60+8 storage server

The Western Digital Ultrastar Serv60+8 Hybrid Storage server has dual high-performance Intel® Xeon Scalable Processor-based CPUs to deliver the performance to manage demanding workloads in surveillance environments. With over 840TB in a 4U-enclosure, it delivers high density (up to 210TB per rack unit) hard drive storage. Out of the 60 available drive slots, 24 of these can be used for SAS or SATA SSDs, providing a fast data tier for additional performance and fast video playback for two-tier configurations. Alternatively, 8x SAS or SATA SSDs (up to 15.36TB per SSD) can be added if all 60x drive slots are used for HDDs.

Innovative IsoVibe™ and ArticFlow™ technologies mitigate vibration interference and temperature spread in these high density storage units, resulting in more stable performance and world class reliability.



For more information, please visit: <https://www.westerndigital.com/products/storage-platforms/ultrastar-serv60-8-hybrid-server>.

## Test Setup

The certification test setup is shown in Figure 1 below. Software used is Milestone XProtect Corporate 2018 R3 v12.3a build 9446.

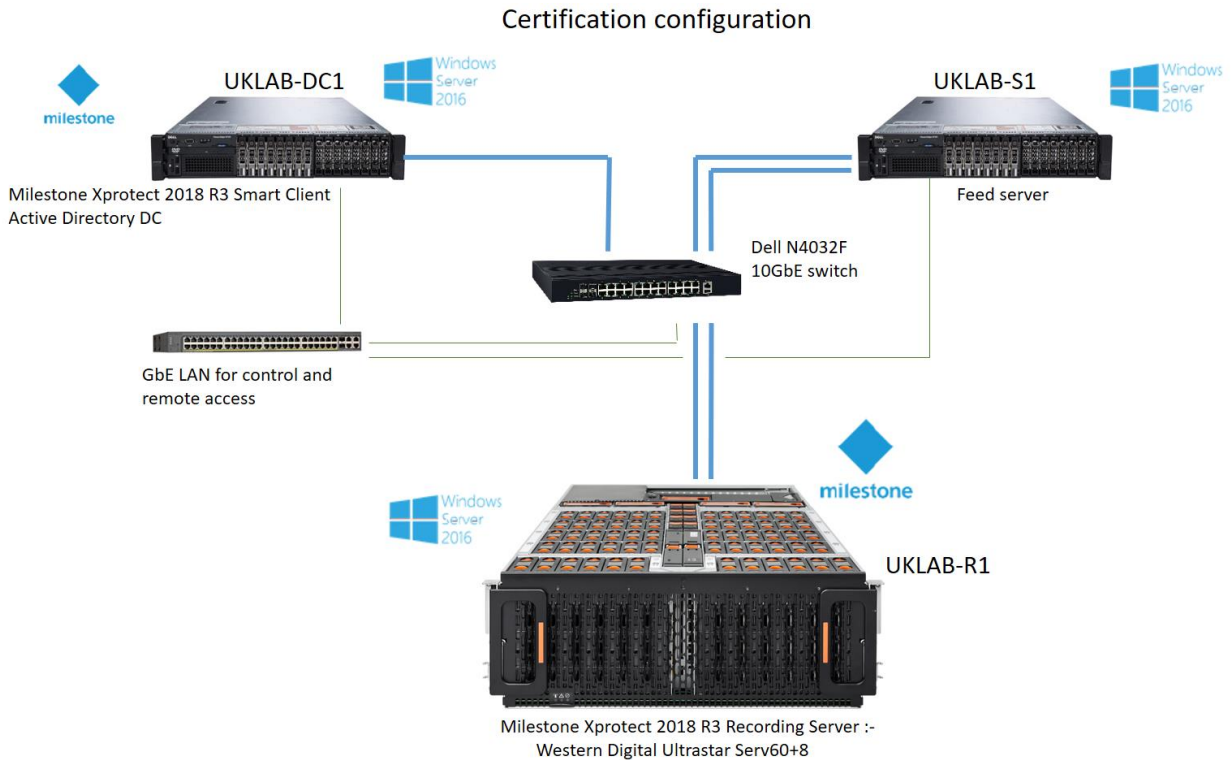


Figure 1: Test Configuration setup

	<b>Serv60+8 configuration 1</b>
<b>CPU</b>	Dual Xeon Gold 5118 @2.3GHz
<b>Memory</b>	192GB
<b>Storage</b>	60 x HUH721212AL4204 SAS 12TB HDDs
<b>Operating System</b>	Windows Server 2016 Standard version 1607 build 14393.2273
<b>Milestone XProtect Versions</b>	4 instances of Milestone XProtect Recording Server 64bit V12.3a build 9446

### Smart Client and Feed Server Configuration

The feed server and XProtect Smart Client system (which doubled as the Active Directory Domain Controller) were identical lab test systems with the following specifications:

- Dell PowerEdge R720 with dual Xeon E5-2620 v2 CPUs, 64GB RAM.
- Network connections were via motherboard LAN (GbE) and dual port 10GbE Intel X520 adapters.
- Operating system was Windows Server 2016 Standard version 1607 build 14393.2273
- UKLAB-DC1 (Smart Client server) – Xprotect Smart Client 2018 R3
- UKLAB-S1 (Feed Server) - ImDisk virtual disk driver toolkit build 20180917 (for StableFPS media)

## Recording Server Configuration

1. Windows Server 2016 1607 (build 14393.2273) was installed on the Ultrastar Serv60+8 Hybrid Storage Server.
2. Four instances of Milestone XProtect 2018R3 Corporate Recording Servers, 64bit version 12.3a build 9446 were installed, along with The XProtect Management Client (2018 R3 build 9446).
3. Four instances of the StableFPS v115 driver were installed (one per Recording Server service).
4. HDD storage capacity was provisioned through Microsoft Storage Spaces. Microsoft MPIO was installed and configured for all storage devices.
5. For simplicity and to ensure the storage performance was identical for each of the four recording server instances, the 60x Western Digital Ultrastar DC HC320 12TB SAS HDDs (4kn) were divided into four equal pools of 15HDDs.
6. Four virtual disks were created (one per pool) using single parity resiliency, each of size 143TiB. The Powershell command below shows the parameters used to create the virtual disks (example for 1st VD)

```
New-VirtualDisk –FriendlyName “RS1_VD” –StoragePoolFriendlyName “RS1_POOL” –  
NumberOfColumns 8 –ProvisioningType Fixed –ResiliencySettingName Parity –Interleave  
4194304 –WriteCacheSize 1GB –UseMaximumSize
```

7. Four volumes were created on the VD's as NTFS, 4096 allocation unit size, max available capacity and assigned drive letters M, N, O and P. Each was then assigned to one of the four Recording Server instances via the Xprotect Management Client.

## Network Configuration

1. Network infrastructure was configured using 10GbE for camera simulation traffic with two connections to the feed server (UKLAB-S1) and recording server (UKLAB-R1).
2. One 10GbE connection was made to the Smart Client system (UKLAB-DC1). Four subnets were defined with IPv4 and IPv6 addresses (one unique subnet per recording server).
3. A 1 GbE network connection was used for Active Directory, remote administration and monitoring.

Figure 2 shows the network layout and address assignments.

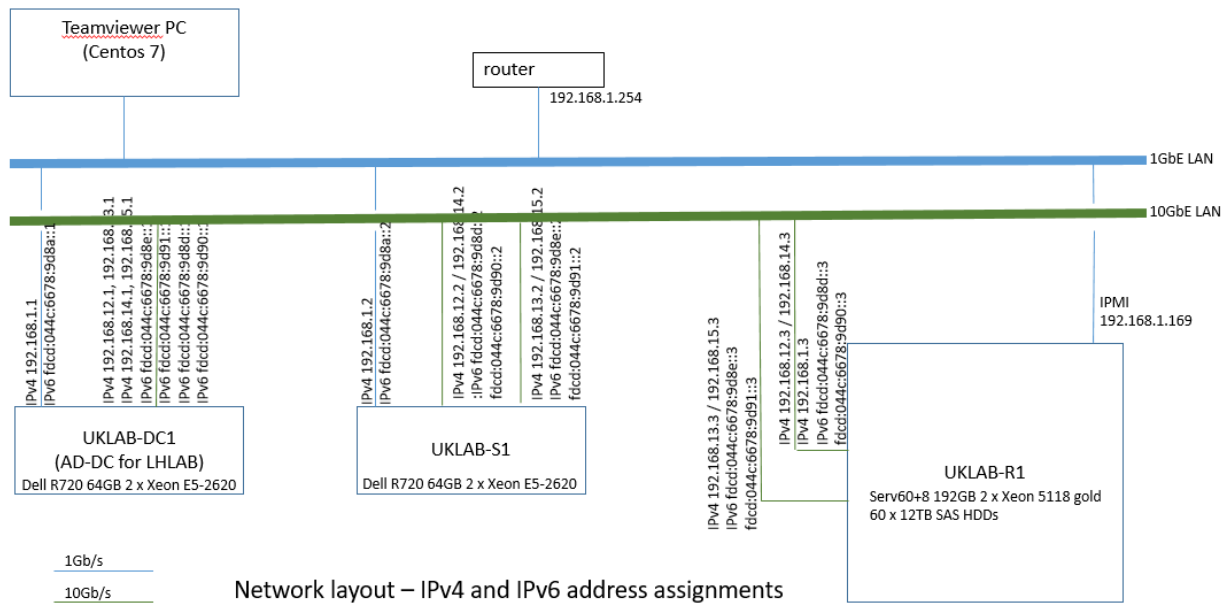


Figure 2: Network Layout

## Video Stream details

All video streams were configured to use the H.264 video codec. Measurements for maximum possible and maximum recommended workloads were taken without motion detection using HD 1920x1080 video resolution at 30fps, resulting in individual camera streams of approximately 4Mbit.

## Performance Results

Benchmarking was performed to establish certification test scenarios for the maximum supportable and recommended safe number of cameras based on key metrics defined by Milestone. The benchmark level (the recommended maximum) is chosen to be conservatively lower than the maximum possible to ensure sufficient system headroom.

Following analysis of logs and expert advice from the Milestone Solutions Certification team, the following test scenarios were identified.

Test scenario	Type	Description
1	Benchmark	600 Cameras, without VMD using four Recording Server instances and one Management Server. All running on Western Digital's Serv60+8 Hybrid Storage Server.
2	Maximum	700 Cameras, without VMD using four Recording Server instances and one Management Server. All running on Western Digital's Serv60+8 Hybrid Storage Server.
3	Benchmark	300 Cameras, with motion detection and no GPU hardware assist using four Recording Server instances and one Management Server. All running on Western Digital's Serv60+8 Hybrid Storage Server.
4	Maximum	400 Cameras, with motion detection and no GPU hardware assist using four Recording Server instances and one Management Server. All running on Western Digital's Serv60+8 Hybrid Storage Server.

Formal results from Milestone Solutions Certification team

The following test results were obtained during formal certification by the Milestone Solutions Certification team in February 2019 for the described scenarios.

1. Cameras used 1920x1080 resolution, H.264, 30 FPS, ~4 Mbps stream size.
2. Video used: 1920\_1080\_4Mbit\_Metro1 (scenario 1 & 2) and Door\_1920x1080\_4Mbit\_20\_Motion (scenario 3 & 4).
3. XProtect version: Milestone XProtect Corporate 2018 R3 "All-In-One"

Table 1 below summarizes the test results:

Scenario	Cameras	Total FPS	Motion Detection Enabled	Network Ingress	Disk Write throughput	CPU usage	Memory Usage	Max storage in days
1	600	18,000	No	2.48 Gbit/s	300.1 MB/s	23%	18%	28 days
2	700	21,000	No	2.89 Gbit/s	349.5 MB/s	41%	17%	23 days
3	300	9,000	Yes	1.27 Gbit/s	31.3 MB/s*	50%	18%	52 days
4	400	1,600	Yes	1.69 Gbit/s	39.9 MB/s*	54%	18%	40 days

\*20-25% motion in video

## Conclusion

High density storage servers are ideal solutions to store video surveillance data. Compute and storage in one box delivers simplicity to the IT manager that is deploying surveillance solutions.

The Ultrastar Serv60+8 is targeting mid-range to high-end surveillance installations, enabling 300-700 cameras installed when fully populated with 840TB. It is of course possible to start with a smaller capacity configuration (minimum 144TB), enabling for growth in number of cameras or longer storage retention time for your surveillance video data.

This report describes multiple configuration tests, ranging from 300 to 700 HD cameras in four different scenarios, with and without motion detection enabled. In none of the scenarios, CPU utilization exceeds 54%, staying well within the specification requirements of Milestone.

For further guidance, please reach out to your local Western Digital sales support representative: <https://www.westerndigital.com/support/wdc/data-center-platforms/storage-servers/ultrastar-serv60-8-hybrid-server>.



## Resources

[Product Web Page](#)

[Datasheet](#)

[Installation Guide](#)

[User Manual](#)

[Service Brief](#)

[Warranty](#)