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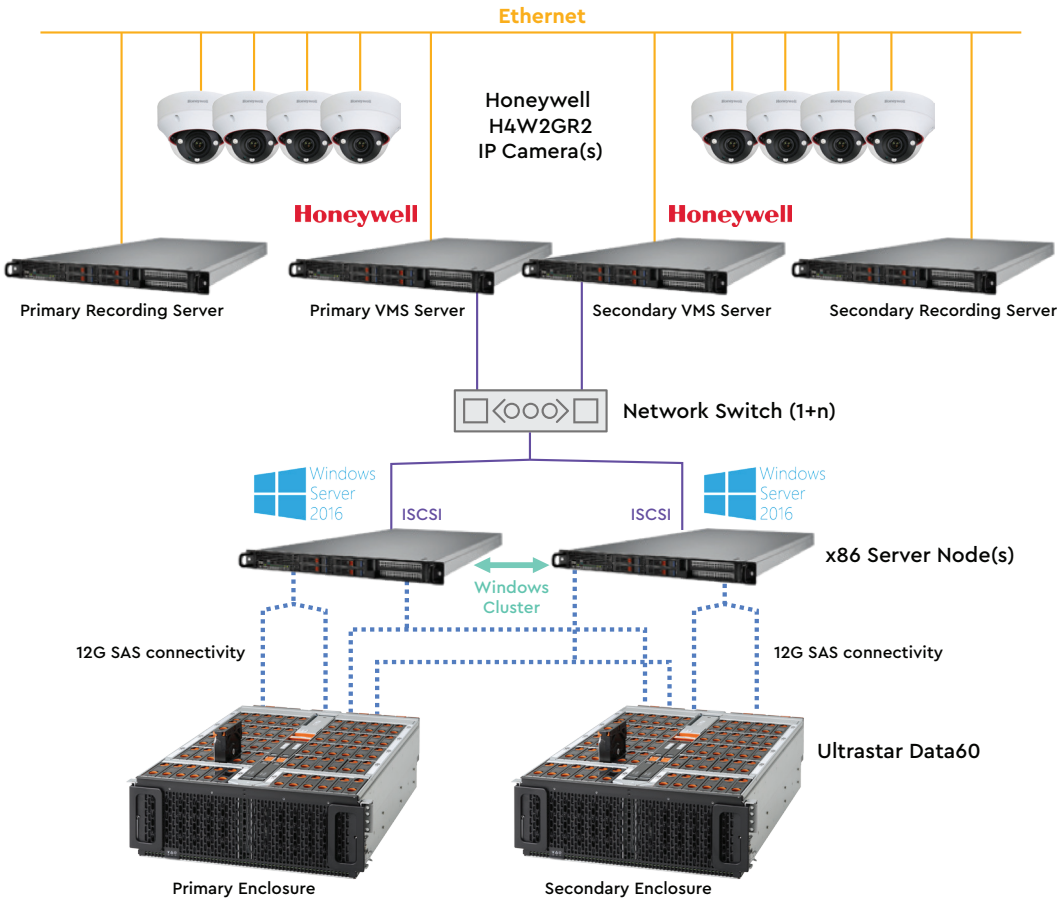
REFERENCE ARCHITECTURE

August 2020

High Capacity, Fail-over Surveillance Solution



Cameras: Up to 512 Honeywell H4W2GR2 IP cameras (for 4-month video data storage)

Servers: standard x86 servers

Storage: Ultrastar® Data60 Hybrid Storage Platform

Software: Honeywell MAXPRO® VMS

- VMS server(s) manage all cameras
- Recording of each camera is stored in both primary and secondary Ultrastar Data60 enclosure
- Virtual Disks from primary Data60 are used by the primary VMS server
- Virtual Disks from secondary Data60 are used by the secondary VMS server

This reference architecture describes the hardware configuration for a high capacity, failover storage solution for a large-scale surveillance installation with Honeywell MAXPRO VMS software and up to 512 IP surveillance cameras.

The architecture utilizes 2x generic x86 server/workstation to run the VMS software, 2x generic x86 recording servers, 1+n networking switch(es) and 2x generic x86 server nodes connected to 2x Ultrastar® Data60 hybrid storage platforms that can provide enough capacity to store 4 month of video data for up to 512 cameras (depending on the video resolution, frame rate, and compression).

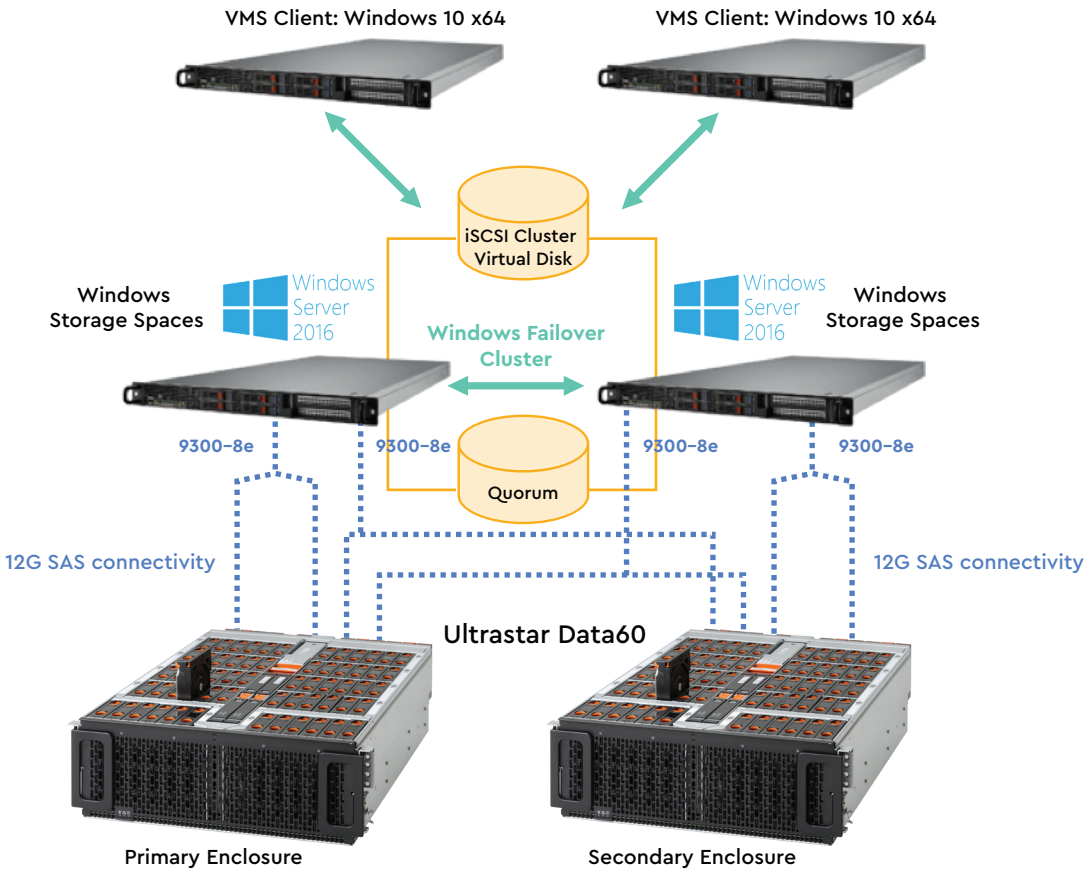
The VMS server /workstation uses Honeywell MAXPRO VMS software to control multiple sources of video subsystems to collect, manage and present video in a clear and concise manner. For this reference architecture Honeywell IP Cameras (H4W2GR2) were used to capture the videos.

When there are hundreds of cameras connected, the architecture will need more than one switch. Usually switches will have 12, 24 or 48-ports, and therefore larger surveillance installations will contain multiple switches (n units) that will converge to one single switch that gets connected to the Windows Server® failover cluster. The drawing above depicts these multiple switches as n+1. This reference architecture only uses 5 cameras and hence one 12-port switch (Ruckus ICX 7150-C12P) was installed.

The x86 server nodes contain each 2x Western Digital SATA SSDs for the Windows Server operating system. For purposes of server sizing, the PCIe bus is used to install backend and frontend controllers. Two Broadcom 9300-8e Host Bust Adapters are used to connect the Ultrastar Data60 hybrid storage platform to the x86 servers. The QLogic HBA controller is used to interconnect the servers and connect the servers to the switch.

The solution is set up as a Microsoft failover cluster, consisting of 2 servers to maintain high availability. In case one server fails, the ownership will move to the other server in the cluster without any downtime. To create the highest reliability, redundancy is provided in every layer of the failover cluster:

- Dual ported SAS drives in the Ultrastar Data60 storage platform
- Dual Ultrastar Data60 hybrid storage platforms
- Dual expander in Ultrastar Data60 hybrid storage platform
- Dual HBAs in each server node
- Dual server nodes
- Dual NICs in each server node



The cluster exports block storage from the iSCSI target (Ultrastar Data60) to the initiator (recording server). On the Ultrastar Data60 storage platform, it is recommended to create multiple RAID-5 volumes exposed as an iSCSI target to archive the video data. Recommended steps to create the Failover Cluster are as follows:

- Create multiple storage pool in each enclosure with a few hot spare drives;
- Create two or more iSCSI Virtual Disks (RAID5) in both primary and secondary enclosure
- Assign and export the iSCSI Virtual Disks from the primary enclosure to the primary VMS server
- Assign and export the iSCSI Virtual Disks from the secondary enclosure to the secondary VMS server

The Ultrastar Data60 can be equipped with any of the Western Digital Ultrastar SATA/SAS HDDs options, providing a data repository of up to 840TB in a 4U storage rack. Minimum configuration is 24 HDDs, providing an upgrade path of up to 60 drives. If an additional performance tier is required to enable fast replay of video content, it is possible to install up to 24 SAS/SATA SSDs. This reference architecture uses the maximum capacity drives, and maximum configuration inside the JBOD (60x Ultrastar Data Center SAS HDDs), enabling up to 840TB of video data to be stored.

The matrix below shows the amount of capacity that is required to store the video of a single camera (100% recording, H.264 compression) for 30 days with different video resolutions:

Resolution	Frame size	FPS	Bandwidth (kbit/s)	HDD space	HDD space (RAID-5)
704×576 (4CIF)	41 KB	25	1025	0.33TB	0.42TB
1280×720 (HD)	81 KB	25	2025	0.66TB	0.83TB
1920×1080 (Full HD)	162 KB	25	4050	1.31TB	1.67TB
4 MP	260 KB	20	6500	2.10TB	2.67TB

It is therefore theoretically possible, to connect up to 2000 cameras (4CCIF), 1012 cameras (HD), 502 cameras (Full HD) or 314 cameras (4MP) when the Ultrastar Data60 is fully populated with 60x 14TB HDDs in a RAID-5 configuration.

Note: The number of cameras that can be attached to one VMS server depends on the number of licenses used for the Honeywell MAXPRO VMS software, but is limited to 512 per VMS Server. If more cameras need to be added, one or more VMS servers/workstations need to be added to the architecture.

Note: Max # of cameras per recording server is ~135 cameras (full HD resolution). If more cameras are added to the configuration, then more recording servers are required, and the VMS server will require additional storage for staging.

VMS Server Configuration (1x Server/Workstation)

Item	Description	P/N	Qty
Server	Generic x86 server/workstation		1
CPU	Intel® Xeon® Silver 4110 or higher	Intel Xeon Silver 4110 or higher	2
Memory	16GB DDR4 ECC Registered DIMM – 2400/ 2666MHz	Can be from any vendor	8
System Disk	Western Digital SA210 480GB SATA SSD *(2 system disks per server)*	0TS1650	2

Recording Server Configuration (1x Server)

Item	Description	P/N	Qty
Server	Generic x86 server/workstation		1
CPU	Intel Xeon Silver 4110 or higher	Intel Xeon Silver 4110 or higher	2
Memory	16GB DDR4 ECC Registered DIMM – 2400/ 2666MHz	Can be from any vendor	8
System Disk	Western Digital SA210 480GB SATA SSD *(2 system disks per server)*	0TS1650	2
Solid State Drives	Ultrastar DC SS530 SAS SSD 7.68TB	0B40374	2
Network card	Qlogic™ 16Gb dual port Fibre Channel HBA *(1 per server) (This can be any network card with 10Gb with any interface, based on requirements)*	QLE2692-SR-CK	1
SAS cable	Ultrastar Data60 Cable IO HD mini-SAS to HD mini-SAS 2m 2Pack	Included in OpenFlex Data24 and Ultrastar Data60 platforms	8

Server Node Configuration (1x Server)

Item	Description	P/N	Qty
Server	Generic x86 server *(min. 3 free x8/x16 PCIe slots)*		1
CPU	Intel Xeon Silver 4110 or higher	Intel Xeon Silver 4110 or higher	1
Memory	16GB DDR4 ECC Registered DIMM – 2400/ 2666MHz *(256GB per server)*	Vendor-specific	16
System Disk	Western Digital SA210 480GB SATA SSD *(2 system disks per server)*	0TS1650	2
RAID controller for JBOD connection	Broadcom® 9300–8e Host Bus Adapter *(each server should have 2 HBAs)*	H5–25460–00	2
Network card	Qlogic 16Gb dual port Fibre Channel HBA *(This can be any network card with 10Gb with any interface, based on requirements)*	QLE2692-SR-CK	1

Storage Configuration

Item	Description	P/N	Qty
JBOD	Ultrastar Data60 Hybrid Storage Platform *(Different quantity and capacity drives can be used, depending on the requirements of the installation)*	0F31002	2
SAS cable	Ultrastar Data60 Cable IO HD mini-SAS to HD mini-SAS 2m 2Pack	Included in the Ultrastar Data60 platforms	4
SAS cable	Ultrastar Data60 Cable IO HD mini-SAS to HD mini-SAS 2m 2Pack	Included in OpenFlex Data24 and Ultrastar Data60 platforms	8

Software

Item	Description	P/N	Qty
Operating System	Windows® 10 Standard	OEM SKUs from server vendor	2
Operating System	Windows Server 2016 Standard	OEM SKUs from server vendor	2
Video Management Software	Honeywell MAXPRO		2

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