ADLINK
Leading EDGE COMPUTING

Application Story: Traffic Surveillance

Intelligent Traffic Surveillance Platform

Media Cloud Server MCS-2080





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Introduction

2017 can be considered the dawn of the adoption of video surveillance equipment based on the H.265 video codec. At the Security China 2016 exhibition held in Beijing, the top three Chinese surveillance vendors, Hikvision, Dahua, and Uniview, unveiled a series of H.265 based IP cameras and NVR products. VIVOTEK, Taiwan's top vendor of surveillance products, had already launched its H.265 solution including IP cameras, digital video storage and surveillance system, as well as video management software at the end of 2015. For the traffic surveillance market where IP cameras are in great demand and superior video quality are required, 2017 is the year that worldwide users are replacing or upgrading their H.264 cameras and NVR/DVR equipment.

Traffic surveillance systems in developed countries must meet basic requirements such as high resolution video (minimum 1440p, ideally 4K), high image quality (starlight level low-light, super wide dynamic range, dynamic video optimization), high efficiency compression (H.265), but must also include video analytics and smart image recognition functions. Traffic surveillance systems that incorporate intelligent video analytics and recognition now represent a brand new challenge for all server platforms on the market.

New Intelligent Video Analytics (IVA) technology not only provides basic real-time video analysis functionality for traffic condition, traffic volume and pedestrian flow, such as detecting traffic accidents and abnormal congestion, but also enables intelligent searches after a crime, or the ability to detect and prevent crimes before they happen. Basic traffic surveillance video analytics functions include logging pedestrian and traffic flow, face detection, and vehicle color and model detection from each camera. Advanced functions include preliminary analysis to obtain critical frames for image recognition which can be used to search for stolen vehicles, wanted criminals, as well as the presence of suspicious persons or vehicles near a crime scene.

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Construction and Planning Requirements for Intelligent Traffic Control Centers

A local government unit (Taipei, Taiwan) issued the following requirements for the construction, upgrade and future planning of an intelligent traffic control center:

- Old and failed products are to be replaced with new H.265 IP cameras with a resolution 1440p or greater. However, some H.264 IP cameras and video management systems (VMS) within their warranty period will be retained.
- Addition of new 4K high-definition IP cameras at important public venues, road junctions, road sections and urban viaducts.
- Legacy VMS software can remain in use on the new server. However, it must be compatible with the new server platform and also support future system upgrades over the next three years.
- The new VMS and central management system (CMS) software must incorporate intelligent video analytics and recognition functions. The new server must be able to satisfy the performance requirements of related application software.
- The new VMS and CMS software system will have a high availability (HA) architecture and redundancy. The new server platform must comply with the system planning requirements.
- The new intelligent traffic surveillance system must be compatible with 4K HDMI monitors so that it can comply with the requirements of a high-definition video wall.
- The new server must be energy efficient to ensure that the upgraded equipment will reduce overall system power costs.
- The new VMS/CMS must be able to simultaneously process at least 64 video streams in real-time (H.265, 720p, 15 fps) for display on a video wall.

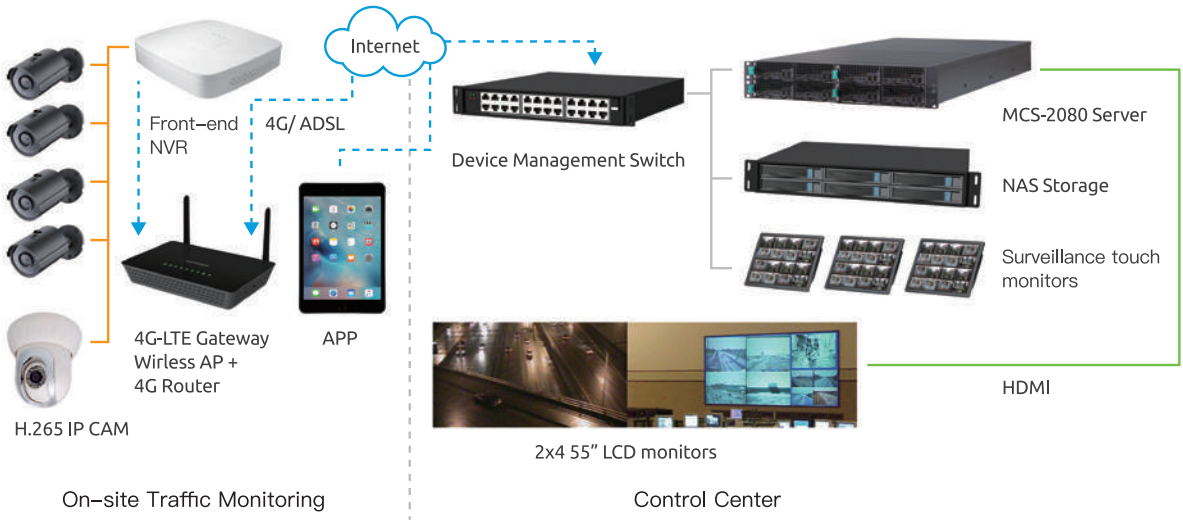


Image 1: Intelligent video surveillance solution

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ADLINK Solution

Based on the application and cost-performance requirements of this intelligent traffic surveillance system, ADLINK proposed its MCS-2080 Media Cloud Server platform for the city's new traffic surveillance system. The MCS-2080 platform is composed of modular compute and switch nodes and offers the following features:



- Outstanding computing power
- Enhanced reliability
- High availability
- Reduced downtime risk
- Easy maintenance and fast system recovery

MCS-2080 Specifications:

(MCN–1500 compute node)

- 16 independent systems in 8 MCN-1500 compute nodes
- Intel® Xeon® Processor E3-1585 v5 (2 per node)
- Intel® Iris Pro Graphics P580
- Intel® C236 Chipset
- 4x DDR4-2133 SODIMM, max. 64GB (per node)
- 4 ports 10/100/1000BASE-T
- 2x mSATA slots, support SSD modules up to 512GB (per node)
- 2x HDMI ports on front panel (per node, 1 port per system)
- Supports Microsoft Windows & Linux

Highlights:

1. Intel processors with integrated GPU offer high computing performance and video processing power.
2. Can be configured as a distributed or centralized system (cluster system) for flexibility during use.
3. Can be connected to existing storage devices such as NAS or a SAN disk arrays for centralized storage of video files.
4. Two-way audio-video conferencing for crime prevention or the reporting of traffic accidents and violence can be supported on one of the systems without adversely affecting other security processing being performed on the platform.
5. Can be integrated with a video wall consisting of multiple computers and monitors to enhance the usability and flexibility of surveillance displays in the control center.
6. Information from IoT sensor modules can be integrated with the surveillance management system logs to provide integrated alarms. Can be used for the tagging of alarm video files to quickly search through videos of related incidents.

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High Availability: Redundant power supply and switch modules

The MCS-2080 is a high density integrated video platform with 16 independent systems in 8 MCN-1500 compute nodes, redundant power supplies, and two 10GbE switch modules. Each switch module is equipped with 4 fiber ports that can transmit data at up to 40Gbps. 10GbE fiber ports ensure the stability of video streams from IP cameras to prevent system anomalies due to network latency or cabling quality. An additional two 1GbE RJ-45 ports are available for the integration of a DIDO controller, IoT network sensor and gateway equipment. Short bursts of data and video streams that must not be interrupted therefore pass through separate ports. This prevents mutual interference during transmissions and improves overall transmission quality.

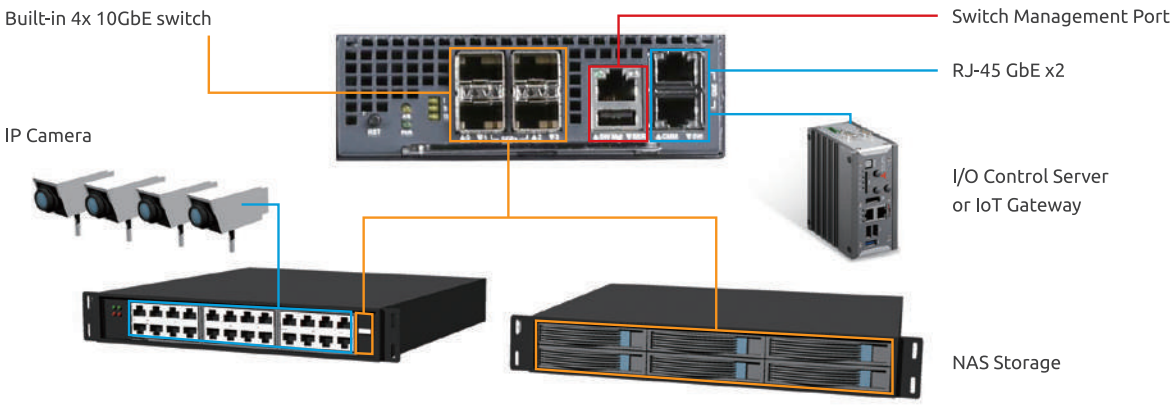


Image 2: Built-in network switch application architecture

High Density: Server rooms space saved

The MCS-2080 includes two power supplies, each with a maximum output of 1600 watts. The entire system equipped with 16 processors has a maximum power consumption of 1380W and occupies significantly less rack space than 16 stacked 1U server systems. The MCS-2080 also offers the optimum balance between performance and energy-efficiency.



Image 3: High density design to save the server room space

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High Extensibility: PCI Express x8 slots for expansion needs

There are eight PCI Express x8 expansion slots inside the MCS-2080 that can be used for Fibre Channel (FC) adapter cards to connect to SAN storage. High-speed network cards with speeds of over 10 GbE are also supported for connecting to NAS storage. If large amounts of video recognition data need to be buffered, then the expansion slots can be populated with SSD cards to provide additional onboard storage.

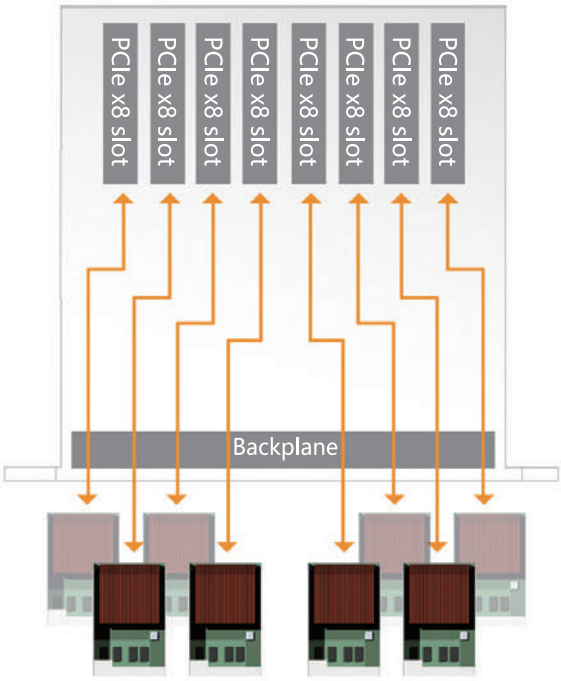


Image 4: Integrated storage device application via PCIe expansion slots to save the recording files

High Flexibility: One platform with many functions

The MCS-2080 system architecture is designed for flexibility and can be treated as a server platform with 16 Intel® Xeon® Processor E3 servers with dual redundant power supplies, functioning as 16 independent systems. The clustering functions of Windows Server 2012 or Linux operating systems can also be used to combine the 16 servers into one super high performance operating platform. For traffic surveillance applications, some of the systems can be for installing an existing VMS with the new server platform boosting the performance of the legacy video management software. CMS software or VMS software can also be installed on two systems simultaneously for a HA implementation. Using a HA architecture with VMS or intelligent video surveillance software for important locations will improve the reliability of the video analytics system and avoid the risk of shutdowns that can occur with a single system.

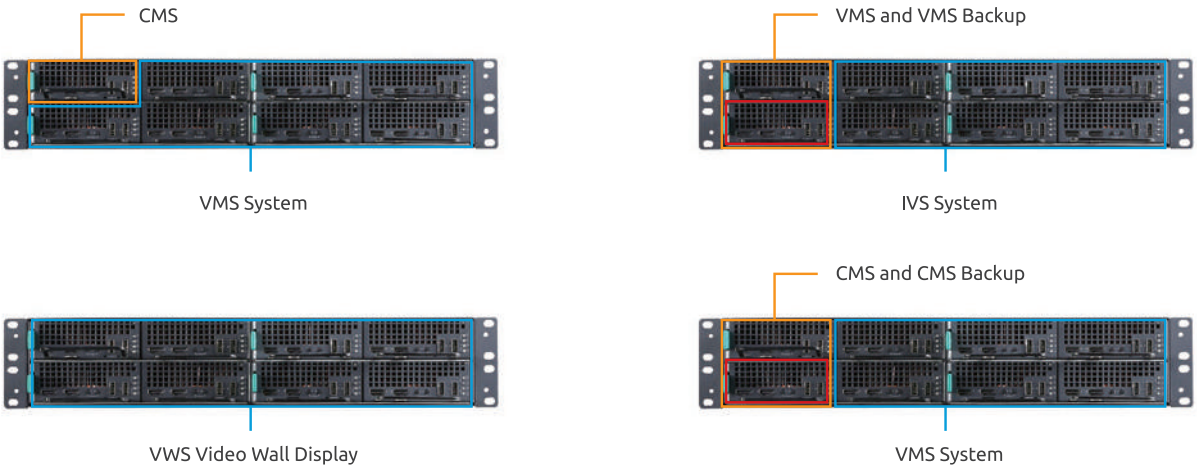


Image 5: Examples of application combinations

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High performance for video wall display

The MCS-2080 can support LCD video walls up to 4x4 in size with its 16 4K HDMI video outputs. ADLINK has tested software from its partner VIVOTEK, a leading provider of surveillance solutions, that allows a single system to process 64 real-time H.265 IP camera channels at once (720p, 15 fps). This means the MCS-2080 with 16 systems can process in real time up to 1024 channels of H.265, HD 720p, 15 fps video and output it to a video wall. This level of performance is superior to server systems with standalone graphics cards. The risk of a single machine failure causing the entire video wall to become inoperable is also reduced.



Image 6: Video wall application

Conclusion

Integrated verification testing conducted by ADLINK demonstrates a high level of compatibility between the MCS-2080 Media Cloud Server platform and major types of video surveillance system software. In addition to more efficient use of server room space and better energy-efficiency management, it also allows the flexible integration of new and legacy surveillance systems. Hot-swapping of individual systems is also supported, reducing the risk of lost surveillance coverage during shutdowns. The server can also be expanded to keep pace with the number of cameras managed by the system. System migration in the event of failure is also supported for a HA architecture.

The MCS-2080 Media Cloud Server is an integrated platform that implements the hardware architecture of distributed servers while offering the advantages of centralized high physical density management. If the surveillance system or software is upgraded in the future, there is no need to replace the entire unit because components can simply be re-purposed. For video recognition software that requires high processing power, support for clustering at the operating-system level allows the maximum performance of the 16 processors in the platform to be harnessed using software programs that support parallel processing.

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