NEXCOM

White Paper

Adding Video Analytics to Analog Surveillance

New Intel® Processors Provide Performance Gains for
Hybrid IP/Analog Security Solutions

www.nexcom.com

Video surveillance today is in the midst of a paradigm shift. Gone are the days of security staff watching fuzzy images on closed circuit TV (CCTV). In their place, high-resolution Internet protocol (IP) cameras are improving video quality and enabling new applications like video content analytics. This shift is also driving the integration of security and surveillance into broader enterprise IT infrastructures, enabling new cost efficiencies. However, the large installed base of analog cameras presents a critical question: How can end customers take advantage of digital technology while preserving their investments in analog cameras?

The solution to this quandary lies in the hybrid network video recorder (NVR), which receives, processes and records video from both analog and digital cameras. The recent introduction of Intel® 2nd generation Core™ processors provides these devices with significant new advances for accelerating video processing and video content analytics. This article will describe these advancements, as well as how NEXCOM is using these processors in their NEXCOM***** NViS 6200 NVR to provide a comprehensive solution for providing video intelligence and advanced management capabilities.

Why Hybrid Surveillance?

Hybrid surveillance systems, with the capability to incorporate both IP and older analog cameras within one system, are experiencing strong adoption in the surveillance market. Such solutions allow end users to:schedule. Even when a vehicle is off, the in-vehicle system can be activated by a remote wake-up feature using short message service (SMS). When the system is awakened from a remote site, content can be transmitted through 3.5G wireless connectivity and updated easily. Once the update is completed, the system can be automatically turned off. Mobile network connectivity has provided users the most convenient way to immediately update information no matter how far away the vehicle is located.

- Preserve existing investment in analog cameras while adding IP-based performance, intelligence and manageability.

- Digitize analog camera video streams for transmission across the IP network, remote access/viewing, data storage, and video content analysis.

- Provide a cost-effective transition path to a total IP video surveillance system as legacy equipment reaches end of life and is retired.

One great advantage of IP video surveillance is that it provides a way for digital intelligence to replace security staff. Video content analysis (VCA) allows computer algorithms to intelligently monitor real-time video for unusual movements, crowd formation, people counting, license plate reading, left-behind objects, and much more. VCA can also be used to search recorded video for particular events.

* This white paper is also published in Intel® Embedded Innovator Newsletter, Spring 2011.

To illustrate the advantages of a hybrid NVR, consider its utility for metropolitan police departments. As illustrated in Figure 1, police departments can use hybrid systems to:

• Manage and view both IP camera and digitized analog camera feeds across the city through a Central Management System (CMS).

• Remotely view camera streams through whatever network-enabled device they're using (even a smart phone) for more intelligent and appropriate response to incidents in progress.

• Simultaneously share with emergency response personnel the same video feed simultaneously for better coordination.

• Receive email alerts on potential incidents that have been detected by video content analysis software.

• Have cameras read license plates and report on stolen vehicles or driver identity.

• Search stored video for particular incidents flagged by video content analysis software.

Figure 1. A hybrid NVR enables flexible management, intelligent alerts, and remote viewing for both analog and digital camera streams.

Handling the High Processing Demands of IP Video Surveillance

While video analytics brings many benefits to surveillance systems, it imposes large computational loads on the NVR. Hybrid NVRs face additional workloads due to the need to encode analog video. Finally, NVRs that transmit video to networked devices must perform trancoding in order to convert high-resolution camera feeds into a more network-friendly formats. Together these workloads present a major computational burden.

2nd generation Intel® Core™ processors are ideally suited for this kind of work. The graphics and media capabilities built into 2nd generation Intel® Core™ processors provide performance levels that previously required a separate graphics card. The graphics engine moves video encoding, decoding and transcoding functions usually done in software into dedicated hardware known as Intel® Quick Sync Video. This hardware provides native support for all mainstream codecs and the ability to handle multiple 1080p streams simultaneously. To illustrate the advantages of this new hardware, processor power is cut in half over previous generation for HD video playback.

Additional graphics optimizations come from the new Intel® Clear Video HD Technology. This advanced video processing logic provides better performance in de-noise, de-interlace, sharpen, scaling, and color processing operations. This suite of hardware and software technologies uses advanced video techniques to remove jitter and create crisper visuals – all the better for reading license plates or identifying a face.

To improve analytics performance, 2nd generation Intel® Core™ processors include the new Intel® Advanced Vector Extensions (Intel® AVX) instruction set, an advanced form of Intel® Streaming SIMD Extensions (Intel® SSE). Intel® AVX widens the data path from 128 bits to 256 bits and introduces other upgrades that provide up to double peak FLOPS performance compared to Intel® SSE4 instructions. This performance boost is no small matter when a single NVR can have up to 32 channels of megapixel cameras feeding it video.

Applying 2nd Generation Performance Gains to a Hybrid NVR

To enable security customers to take advantage of 2nd generation Intel processor performance gains, NEXCOM has developed the NViS 6200 (Figures 2). This intelligent, hybrid NVR is a 2U rackmount system designed to accept uncompressed analog video input from older analog cameras, as well as digital video input from IP cameras and high-resolution IP megapixel cameras.

Figure 2. The NViS 6200 (motherboard shown here) is a 2U rackmount system.

In addition to leveraging all of Intel's recent advancements, the NViS 6200 includes smart technology of its own. While many hybrid solutions depend on add-in cards to capture feeds from analog camera, the NViS 6200 includes embedded video capture chips that can capture 32 channels of video at D1 resolution (Figure 3). This reduces the risk of compatibility problems with add-in cards and simplifies system design.
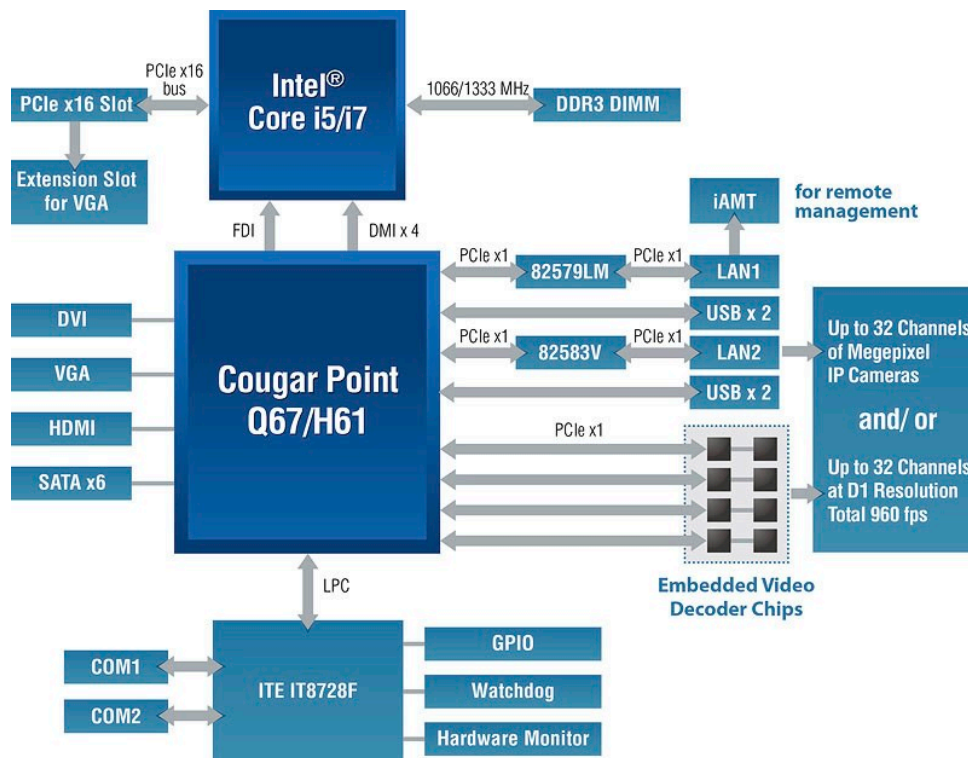

Figure 3. NEXCOM's architecture includes 32-channel video capture incorporated on the motherboard.

Taking Full Advantage of Intel's Hardware-Accelerated Video Codecs

The NViS 6200 is also designed to take advantage of the Intel® Media Software Development Kit (Intel® Media SDK). This SDK provides a standard application programming interface (API) to help create high-performance video solutions. The API exposes the media acceleration capabilities of 2nd generation Intel® Core™ processor platforms for encoding, decoding and video preprocessing. This improves utilization of the hardware-accelerated video codecs of these processors, thus enhancing the NViS 6200's handling of the continual stream of video from a surveillance system's cameras and the conversion of this video into different formats for viewing and storage.

The advantage of the NViS 6200 is that, by using 2nd generation Intel® Core™ processors, it can handle a wide range of workloads, giving system integrators much greater flexibility in camera selection and system design. The power of the system is also important in the use NVR-based video content analysis to search for and retrieve video of specific events from stored video.

The advantage of the NViS 6200 is that, by using 2nd generation Intel® Core™ processors, it can handle a wide range of workloads, giving system integrators much greater flexibility in camera selection and system design. The power of the system is also important in the use NVR-based video content analysis to search for and retrieve video of specific events from stored video.

Abundance of Expansion Options

Another valuable feature of NEXCOM's hybrid surveillance solution is its abundance of expansion options. Users who want to expand the system with their own devices will find 16 PCI Express* (PCIe) 2.0 lanes slot for exceptional scalability. Moreover, a Mini PCIe socket is available for wireless communication, which is especially useful for transmitting real-time alerts, video and images. For backing up recorded data, NEXCOM's NViS 6200 includes 6 Gb/s SATA 3.0 hard drive options in a variety of capacities. This enables the NViS 6200 to store massive amounts of video.

Efficient Remote Management

One final feature of the NViS 6200 is noteworthy from a maintenance and management point of view. 2nd generation Intel® Core™ vPro processor platforms include a collection of capabilities known as Intel® vPro™ technology. One of these capabilities, Intel® Active Management Technology (Intel® AMT), provides intelligent, hardware-assisted remote management features that can help IT departments and third-party

IT providers to query, fix, update, update, and protect networked embedded devices, even when they're powered off, not responding or have software issues. With Intel AMT activated, IT staff in a central location can manage a large number of NViS 6200 NVRs spread all over a site or many sites. This can significantly reduce total cost of ownership (TCO), greatly minimizing the number of physical visits IT staff has to make to monitor and service equipment.

Low Cost and High Performance

By combining legacy analog cameras with high-definition IP cameras and video content analytics, hybrid surveillance systems offer a cost-effective yet high-performance solution. The NEXCOM NViS 6200 shows how to realize these benefits by leveraging the 2nd generation Core™ processors, which offer powerful encoding and decoding accelerators as well as signal processing features that support advanced analytics.

About NEXCOM

NEXCOM International Co Ltd. is an Associate Member of the Intel® Embedded. Founded in 1992 and headquartered in Taipei, Taiwan, NEXCOM is committed to being your trustworthy partner in building the digital infrastructure. NEXCOM offers innovative and versatile industrial computing solutions and security surveillance applications built around industry leading technology, localized customer support and worldwide logistic services.

About the Intel® Embedded Alliance

The Intel® Embedded Alliance is a global ecosystem program dedicated to providing OEMs and developers with the advanced hardware, software, tools, and systems integration they need to advance innovation, set new performance standards, and speed time to market. Learn more about the Alliance at: intel.com/go/eca.