Case Study
Intel® Core™ Duo Processor
Digital Security Surveillance

How Platform Performance Enables Intelligence in New Digital Security Surveillance Systems

This case study explains how Huper Laboratories’ huperVision* 4000 series utilizes a new digital security surveillance (DSS) platform developed by Portwell and Intel to deliver the security industry’s most intelligent, robust DSS solution.

Business Need: Conventional surveillance systems primarily detect motion and record activity. This isn’t enough to guard against today’s stealthy terrorist and criminal activities. Intelligent, proactive surveillance is needed to detect and prevent harmful events. And since it is not always feasible to use real people in this regard, the security industry needs tools that can supplement human efforts.

Challenge: The hardware platform needed to support computerized intelligence has a very high-performance threshold. It must be able to process very high-resolution video in real-time over multiple channels. Such video must be simultaneously captured, analyzed and stored, with quick and easy retrieval as needed. It must also be networked so that multiple surveillance systems can be controlled from a central location. Low power consumption is needed for deployment in harsh environments without a fan.

Solution: Portwell and Intel have developed a digital security surveillance (DSS) platform that can run the industry’s most advanced, computerized intelligence features from Huper Laboratories. The Portwell PVR-1140* uses the Intel® Core™ Duo processor, Intel® 945GM chipset, and other Intel* technologies to meet these performance requirements. With the highest performance at the lowest possible power consumption, the PVR-1140 can be deployed in very brutal situations. It is capable of multi-threaded execution to sustain real-time transmission, analysis and storage of massive video data files.

“The new DSS platform developed by Intel and Portwell is way ahead of the rest of the DSS industry in terms of performance, PCI Express availability, and low power consumption.”
Tony Lin, HuperLab Sales Manager
**Performance Challenges**

Most existing analog and digital security surveillance systems lack the performance and bandwidth needed to power these features. DVD-quality video resolution, real-time and simultaneous audio/video transmission, software intelligence, and network-centric operations all require a very high-performance hardware platform.

Additional challenges are posed by the harsh environmental conditions where DSS systems are often deployed, such as inside a moving vehicle (bus or train), outside (on top of a traffic light), inside a locked cabinet, or on an airport tarmac. The platforms used for DSS systems must be rugged and durable to ensure reliable operation without being affected by temperature variations, shock, vibration, or lack of ventilation.

For these reasons, Portwell and HuperLab agree that the next generation of DSS solutions requires platforms that meet the following performance conditions:

1. **PCI Express** interface: Sustained, real-time transmission of DVD-quality images will clog the PCI-based DSS systems in use today. Such high-resolution, DVD-quality video requires the robust transmission speeds and bandwidth enabled by PCI Express*, which “offers nearly double the throughput over the PCI interface,” explains Victor Liao, Portwell Product Manager. This is why HuperLab is developing DVR cards using the PCI Express interface, and why Portwell is building next-generation DSS systems with one or more PCI Express ports as well.

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**Trends in Digital Security Surveillance**

To guard against increasingly pervasive terrorist and criminal activity, the security industry needs help. They need constant surveillance over some venues, careful monitoring of others. Because human surveillance is not always practical or desirable, the industry often turns to technology for assistance.

This is especially true in Europe and the United States, where security agents seek tools that can help identify threats before they are executed, and hopefully thwart actions that could be harmful. As a leader in the development of digital security surveillance (DSS) solutions, HuperLab sees four major trends driving the next generation of products:

1. **High-resolution video at 720x480 ppi (DVD quality):** Images captured by DSS systems are used as evidence after an event, and higher resolution will ensure that those images are unquestionable. At the same time, new DSS features rely on computerized analysis of visual data. Higher resolution video will ensure the most accurate analysis.

2. **Real-time recording and transmission of both video and audio:** Computerized analysis must occur in real time in order to be most beneficial in both detection and prevention. This means audio and video transmission must also occur in real time.

3. **Intelligent software:** Security surveillance solutions often rely on human analysis to interpret the data recorded by audio and video devices. But human surveillance is not always desirable or feasible. Intelligent software is needed to supplement the efforts of security personnel. Such features might include the ability to detect if an object goes missing (such as a piece of art in a museum), or determine if a threatening object stays in one place for too long (such as a suitcase left on an airport tarmac).

4. **Network-centric security:** DSS solutions are increasingly networked to allow for centralized control and management of security operations. This also enables remote control and viewing of the surveillance system via the Internet.

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*Victor Liao, Portwell Product Manager*
Low power: The platform CPU must be capable of operating at very low power without generating much heat. Brutal deployment conditions and possible fanless enclosures require such rugged performance.

High performance: Because intelligence is critical to next-generation DSS solutions, real-time transmission, recording, and analysis is needed. The CPU platform must be capable of sustained, real-time processing of very large data files.

But that’s not all there is to it. Portwell explains that the design metrics of a high-end, intelligent DSS solution are fairly complex. “You cannot simply combine a motherboard and chassis and end up with a DSS platform,” explains Liao. “It takes a special design for the surveillance market segment. We’ve seen that most DSS companies encounter thermal issues during development, especially when integrating the video capture card.”

Similarly, HuperLab’s intelligent software requires a platform capable of supporting software compression, which relies on multi-threaded instructions. “Because the intelligence features of next-generation DSS solutions require real-time transmission and analysis, a parallel running structure is needed,” explains Tony Lin, HuperLab Sales Manager.

Portwell Harnesses Dual-Core Performance

HuperLab turned to Portwell for the platform needed to sustain simultaneous, real-time transmission of multiple DVD-quality audio and video channels. “The most important thing is that Portwell is quite experienced at designing DSS platforms, and they really understand how to solve the thermal problems associated with high-resolution video. Portwell really understands how to mitigate the heat-generating effects of the wiring, video capture card, CPU, chipset, etc. Portwell executes exceptionally well on that point.”

Tony Lin, HuperLab Sales Manager

In turn, Portwell looked to Intel for the processing technology that could support the performance characteristics of HuperLab’s newest DSS solution. “Intel is coming out with new dual-core processors that nearly double the performance without increasing power consumption,” says Liao. “This allows us to build a very efficient platform that can perform extremely well under very brutal DSS conditions.”

The Intel Core Duo processor and the Intel 945GM chipset provide the platform performance needed for HuperLab’s intelligent DSS features, PCI Express-based DVR card and software compression. The Intel® chips also support both the PCI and PCI Express interface, which gives Portwell and HuperLab customers many choices in the selection of the DVR capture cards, implementation and deployment of their DSS system.

The power-efficient performance of the Intel® processor and chipset enable Portwell to produce a fanless motherboard for the PVR-1140 system. This reduces the heat output and cooling requirements of the system significantly.

Portwell and HuperLab both have been extremely pleased with the performance of the new dual-core technology. “The two cores of the Intel Core Duo processor have a much higher capacity to execute the sophisticated algorithms of intelligent surveillance and recognition applications, while also processing high-resolution video streams,” says Liao. “Our huperVision 4000 series will run on both single- and dual-core platforms,” says Lin. “But it runs great on the Intel Core Duo processor.”

Other Intel® technologies that enhance surveillance applications come into play on the Portwell platform, including:

- **Intel® Smart Cache.** An intelligent L2 cache that reduces latency to data, improving performance and power efficiency. Intel Smart Cache is integrated into the large L2 cache.

- **Intel® Advanced Digital Media Boost.** Doubles performance of streaming instructions (SSE/SSE2/SSE3) by executing complete 128-bit instructions in one clock cycle, instead of two cycles as in previous microarchitectures.

- **Intel® Matrix Storage Technology.** With RAID 0/1 levels, Intel Matrix Storage technology enhances data retrieval capabilities and improves safekeeping of critical video data across multiple drives.
Portwell’s platform is also forward compatible with the new Intel Core Duo processor, making it easy to migrate to even greater processing capacity when necessary. Flexibility and scalability are available with the ability to choose either the PCI Express or PCI interfaces, allowing customers to continue to use legacy PCI-based video cards or HuperLab’s newer PCI Express-based (PCIe) capture devices. The platform incorporates one PCIe x4 link dedicated for video capture and one PCI (133 MB/s) interface.

Portwell’s PVR-1140 supports 4 or more channels of D1 video resolution (depending on capture card capabilities) or 16 channels of CIF resolution1. Large-capacity SATA1 drives enable quick storage and retrieval of massive video data files, a feature necessary to enable fast recall and analysis of recognition software.

**Intelligence Makes the Difference**

The main differentiating factor in HuperLab’s huperVision 4000 series DSS solutions is the intelligence. “Conventional surveillance solutions can only detect motion and record activity,” explains Lin. “That’s not enough anymore, as human interactions and threats spread into more and more venues. We need new tools that can help security personnel monitor and observe many different areas at one time. We need intelligent systems that can alert them to potentially harmful activities, even before those events occur.”

Among the intelligent capabilities of the huperVision 4000 series are:

- **Smart detection**: Smart detection features include the ability to detect missing objects, or unwanted objects left behind. Virtual fence detection and secure zone detection are also possible. (Complete details about these features can be found on the HuperLab Web site.)

- **PTZ (Pan, Tilt, Zoom) Camera Tracking and Direct PTZ Control**: The camera can intelligently track a moving object or zoom in on a specific area of interest.

- **Intelligent Search**: Unique size filtering allows you to filter your search according to the size of a target object. Advanced motion search and missing/lost object search allow you to zero in on specific video segments from a massive database.

The Portwell PVR-1140 platform supports the HuperLab software by providing enough robust performance to allow for the simultaneous capture and analysis of streaming real-time video. This is key, because the intelligence features cannot function without real-time performance. These capabilities are provided in turn by the high-performance/low-power Intel Core Duo processor.

HuperLab’s expertise in the development of DVR capture cards is also important, because the newer PCI Express-based solutions enable the real-time performance needed to power these intelligent features. Both Portwell and HuperLab are setting the pace for the industry by developing systems based on PCI Express.

“The new DSS platform developed by Intel and Portwell is way ahead of the rest of the DSS industry in terms of performance, PCI Express availability, and low power consumption,” says Lin. “They’ve done all the right things in terms of helping HuperLab meet customer demand for the next generation of DSS solutions.”

**Conclusion**

The intelligence behind the camera is what the HuperLab story is all about. And it won’t stop there. HuperLab is continuously evolving its cutting-edge applications, getting more and more human-like with each iteration.

Portwell and Intel are also working on even more powerful DSS platforms to support HuperLab’s intelligent features. We can only imagine the possibilities.

**For more information:**

- www.huperlab.com
- www.portwell.com.tw
- www.intel.com/info/dss

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1Based on HuperLab’s huperDVR 2400 v1.3 system software.

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