

## Solution Brief

Intel® Multi-Core Processors

LightHaus Logic Equinox\*  
Network Appliances

Business Intelligence

# Expanding the Business Relevance of Video Surveillance in Retail

## Business intelligence capabilities increase marketing and operations efficiency

“The use of the Intel® Xeon® processor E5520 allowed us to double the performance of our intelligent video network appliance over the previous generation, in large part by leveraging the enhanced task parallelization provided by Intel® Hyper-Threading Technology.”

– Mario Palumbo, CTO,  
LightHaus Logic

Going beyond security and loss prevention, enhanced video surveillance systems are serving a broader set of business objectives associated with store operations and marketing. These systems incorporate anonymous video analytics and deliver key performance indicators (KPI) in real-time across departments, stores and regions. After gathering this information, retailers can optimize store layouts, measure promotional program effectiveness and provide better customer service, among other things.

Anonymous video analytics is one of the methods companies use to collect and analyze information about their market and customers, a discipline called business intelligence (BI). Security professionals can add this capability to their existing video surveillance systems by simply installing a “visual intelligence” network appliance that supports both security and BI analytics features. Whereas security surveillance helps to improve a store’s bottom line by reducing operating cost, business intelligence can boost the top line by driving more sales in existing stores. The dual role for surveillance systems – security and business intelligence – can improve the business case for future security investments. This solution brief explores some of the technologies behind video analytics, in particular Equinox\* visual intelligence solutions from LightHaus Logic and high-performance Intel® multi-core processors.

## Making Better Business Decisions

The objective of gathering business intelligence is to ultimately improve business decision making, as detailed in Table 1. For example, business intelligence helps retailers optimize their store floor layout and product placement by providing customer traffic information. This is achieved with video analytics, which monitors customers as they walk into the store, up to displays and through the aisles.

Video analytics systems also monitor customer dwell time, an indication of interest level, and thus a measure of the effectiveness of displays, promotional areas, endcaps and digital signage. In addition, long dwell times may indicate a customer who needs assistance, triggering the system to dispatch a sales associate.

Anonymous video analytics software can also detect personal features and generate an anonymous demographic breakdown of customers. With this capability, store marketing departments can modify their product mix and advertising in a way that best targets a prominent demographic. For instance, it's possible to dynamically change the advertising on digital signage based on who's in front of the display: male, female, a senior, etc.

## Accessing Business Intelligence Information

The key aspect to a useful business intelligence system is easy and effective access to the information that is collected. This is best achieved through the use of web-based data-mining applications supporting powerful data viewing and reporting capabilities from any location. With these tools, store personnel can quickly visualize historical in-store trends and real-time events to gain a clear understanding of customer behavior, streamline store operations and respond to subtle business changes. For example, Figure 1 is a dwell time chart showing the numbers of customers staying in aisles over a prescribed length of time, thereby identifying which store locations are attracting the most attention. Systems may also send real-time

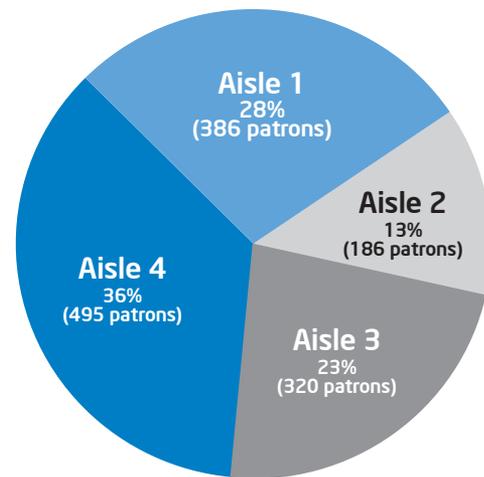


Figure 1. Dwell Time Report

alerts to a floor manager's smartphone or PDA for immediate response to in-store conditions such as excessively long checkout queues, crowd buildup in certain store departments or security infractions. The following lists other valuable business intelligence tools:

- **Occupancy Analysis:** Access store-wide and departmental occupancy history.
- **Conversion Rates:** Discover trends and correlations by comparing disparate data such as departmental occupancies, weather, advertising schedules and POS figures.
- **Demographics Analysis:** Gain better insight into existing customer segmentation.
- **Traffic Flow Analysis:** Review store and departmental traffic flow broken down by time interval.
- **Display Effectiveness:** Capture dwell times at key displays and locations.

| Business Intelligence                    | Marketing Improvements  | Operational Efficiency  |
|--|---|---|
| Measure customer traffic flow            | <ul style="list-style-type: none"> <li>▪ Calculate store conversion rates (sales per visitor)</li> <li>▪ Optimize store entry layouts based on traffic flow patterns</li> </ul>   | <ul style="list-style-type: none"> <li>▪ Modify labor plan based on actual visitor count patterns</li> <li>▪ Staff store according to environmental factors (e.g., weather, gas prices)</li> </ul>                            |
| Analyze customer dwell time              | <ul style="list-style-type: none"> <li>▪ Evaluate the effectiveness of key store promotional areas (e.g., endcaps)</li> <li>▪ Provide brand manufacturers an objective means to evaluate customer impressions</li> </ul>                | <ul style="list-style-type: none"> <li>▪ Identify store areas where customers may require more assistance</li> <li>▪ Minimize the number of customers waiting at checkouts by monitoring queue depths in real-time</li> </ul> |
| Determine demographics of store visitors | <ul style="list-style-type: none"> <li>▪ Adjust the store's product mix and promotions according to actual customer demographics</li> <li>▪ Recognize buying patterns by correlating sales receipts to customer demographics</li> </ul> | <ul style="list-style-type: none"> <li>▪ Respond to changing customer demographics, like adding staff to the toy department if more children start coming into the store</li> </ul>   |

Table 1. Meeting Business Objectives Using Business Intelligence

## Gathering Business Intelligence

Anonymous video analytics applications, also known as “intelligent video” applications, apply sophisticated software algorithms to detect and interpret events in live video, as pictured in Figure 2. Real-time video analytics are, by nature, extremely processing intensive, because the algorithms are complex and there’s a vast amount of high resolution video data to process. Until the availability of high-performance multi-core processors, many analytics systems were limited by processing power and plagued by system-level bottlenecks associated with handling and storing large data streams.

Equinox Visual Intelligence Systems, a new class of video analytics platform, combine powerful Intel® Xeon® processors E5520, sophisticated analytics algorithms and an optimized network architecture to deliver real-world, real-time video analytics. Intel® Xeon® processors provide four processor cores each, enabling up to 30 video streams to be processed simultaneously in each network appliance. Putting all this processing power to work, the video analytics software is multithreaded and uses Intel® Streaming SIMD Extensions (Intel® SSE) to further increase parallelism.

While evaluating different hardware platforms, LightHaus found that Intel multi-core processors provided significantly more performance and software flexibility than standard DSPs. “A DSP can typically handle one complex analyzer at best, so DSP-based platforms often become processor bound. On the other hand, each Intel® processor core can run several complex analyzers simultaneously, and the dynamic nature of the Intel processor roadmap ensures we will always be on the cutting edge with regard to the performance of our visual intelligence appliances,” says Mario Palumbo, CTO at LightHaus Logic.

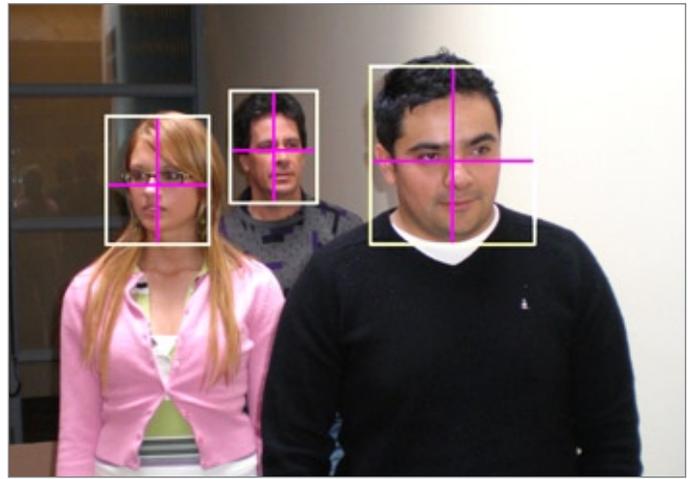


Figure 2. Demographic Analysis

## How Equinox\* Works

Equinox network appliances can operate within the corporate network or as a closed system, completely independent from corporate LANs and IT infrastructure. They continuously analyze in-store camera feeds to generate business intelligence data, which is available for analysis and reporting through the secure Equinox Intelligence web interface. For privacy and security, no video ever leaves the store premises, unless requested. Only the statistical information extracted from the video by the analyzers is exported to the Equinox Datacenter. The Equinox Datacenter is hosted within the cloud, as depicted in Figure 3, allowing all video analytics data, across all stores, to be aggregated in one place. Equinox network appliances can easily interface to existing analog and digital cameras, preserving prior infrastructure investments.

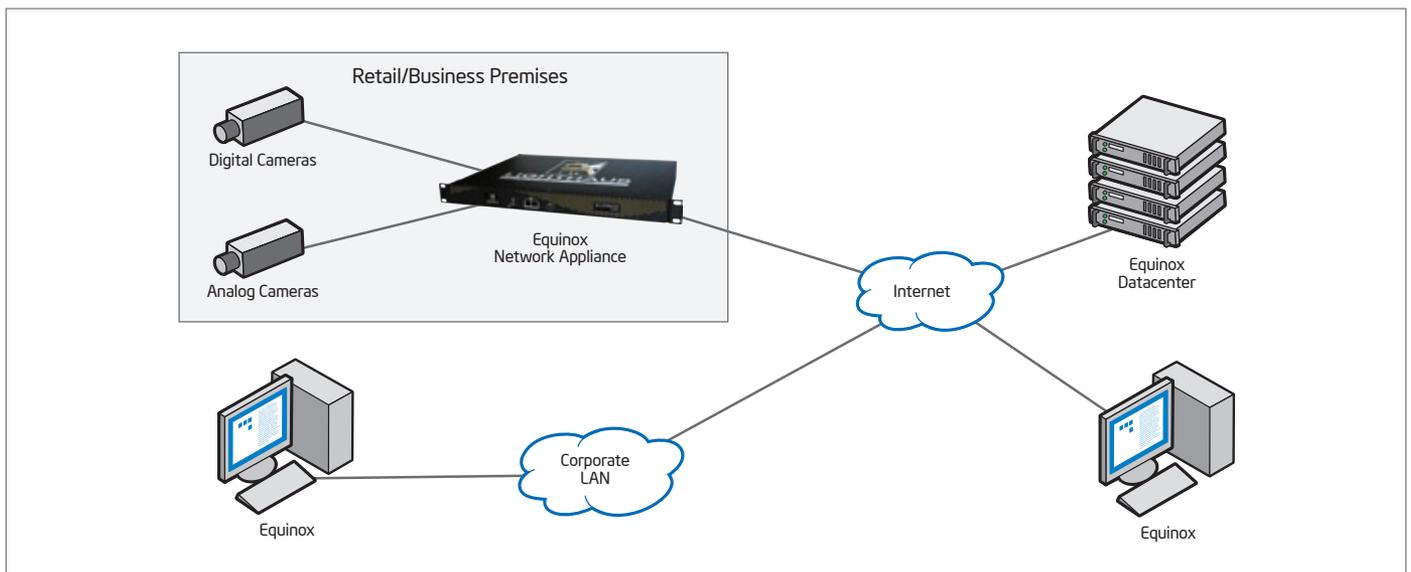


Figure 3. Network Architecture for Video Surveillance with Visual Intelligence

## Increasing Video Analytics Performance

By upgrading their network appliance with Intel Xeon processors E5520, LightHaus improved video analytics throughput by two times,<sup>1</sup> which ultimately translates into lower CAPEX and OPEX for retailers. The performance improvement is illustrated in Figure 4, which shows the doubling of “people counting” channels that can be processed by successive generations of LightHaus network appliances.

While developing the Intel Xeon processor E5520, Intel made changes to the microarchitecture that increased overall performance and power efficiency without adding more cores. The dramatically improved performance is a result of various architectural enhancements, such as integrating L3 cache memory on-chip, integrating the memory controller and migrating to faster memory technology. Another architectural enhancement, called Intel® Hyper-Threading Technology (Intel® HT Technology)<sup>2</sup>, enables each processor to execute two tasks (or software threads) concurrently, increasing performance by as much as 30 percent.<sup>1</sup>

## Maximizing Profitability in Retail

In addition to the safety and theft prevention benefits derived from video surveillance, retailers can leverage the same infrastructure to increase top-line growth, as described in Figure 5. This is possible with anonymous video analytics, which help retailers better understand their customers and make operational improvements, leading to higher sales and lower costs. All that’s needed is a LightHaus network appliance equipped with powerful Intel Xeon processors capable of crunching large amounts of video data in real time. This retail solution helps drive higher profitability and paves the way for new, innovative business intelligence solutions.

People Counting Channels per System  
Higher is better

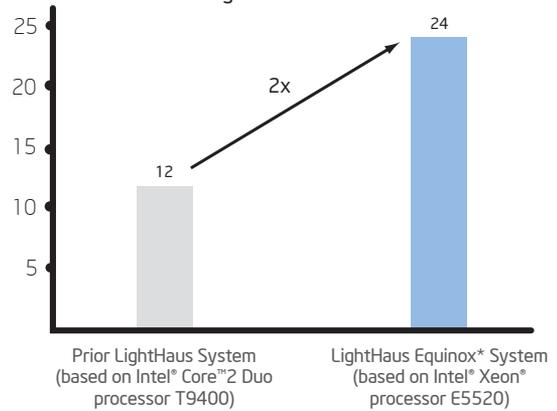


Figure 4. Improving Video Analytics Performance

|  |   |
|--|---|
|  | <b>Customer Experience</b> <ul style="list-style-type: none"> <li>Improve customer service</li> <li>Identify top customers</li> </ul>                                 |
|  | <b>Operational Efficiency</b> <ul style="list-style-type: none"> <li>Optimize efficiency</li> <li>Calculate service ratios</li> </ul>                                 |
|  | <b>Merchandising Effectiveness</b> <ul style="list-style-type: none"> <li>Base store layout on traffic patterns</li> <li>Gauge interest level at promotion</li> </ul> |
|  | <b>Marketing Return on Investment</b> <ul style="list-style-type: none"> <li>Increase display effectiveness</li> <li>Target specific customer</li> </ul>              |

Figure 5. Anonymous Video Analytics and Surveillance in Retail

## About LightHaus Logic

LightHaus Logic develops and deploys a new class of high-performance video analytics for security and business intelligence applications in retail, hospitality, banking and critical infrastructure. Through a unique combination of optimized multiprocessor hardware, advanced video algorithms and an innovative network architecture, LightHaus provides breakthrough intelligent video systems that finally deliver on the promise of video analytics. Visit [www.lighthauslogic.com](http://www.lighthauslogic.com).

<sup>1</sup> Performance tests and ratings are measured using specific computer systems and/or components and reflect the approximate performance of Intel® products as measured by those tests. Any difference in system hardware or software design or configuration may affect actual performance. Buyers should consult other sources of information to evaluate the performance of systems or components they are considering purchasing. For more information on performance tests and on the performance of Intel products, visit Intel Performance Benchmark Limitations: [www.intel.com/performance/resources/benchmark\\_limitations.htm](http://www.intel.com/performance/resources/benchmark_limitations.htm).

<sup>2</sup> Intel® Hyper-Threading Technology (Intel® HT Technology) requires a computer system with an Intel® processor supporting Intel HT Technology and an Intel HT Technology enabled chipset, BIOS, and operating system. Performance will vary depending on the specific hardware and software you use. See [www.intel.com/products/ht/hyperthreading\\_more.htm](http://www.intel.com/products/ht/hyperthreading_more.htm) for more information including details on which processors support Intel HT Technology.

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