

White Paper

GREEN SURVEILLANCE



INTRODUCTION

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Rising energy costs are compelling many organizations to optimize their computing environments. In fact, energy costs have quickly become the fastest growing operating cost, propelling many corporations to embark on new conservation and “green” initiatives. Fortunately, green IT not only helps the planet but reduces operational pressure, making it a win-win for both business and the environment.

Green IT becomes even more important when video surveillance is taken into consideration. With the recent proliferation of CCTV, energy consumption from video surveillance has increased dramatically, resulting in higher total cost of ownership (TCO). However, as video surveillance transitions from proprietary “black box” DVR deployments towards IP deployments using commercial-off-the-shelf hardware, video surveillance becomes both greener and leaner.

This whitepaper will describe how IP-Surveillance can lead to a greener environment and increased operational efficiency through reduced energy costs, increased server capacity utilization and higher scalability and availability as compared to analog CCTV deployments.

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REDUCING HARDWARE FOOTPRINT FOR VIDEO SURVEILLANCE DEPLOYMENTS: OVERVIEW

"For every dollar spent on IT equipment, 50 cents goes to powering and cooling them. IDC forecasts by 2010 this to exceed 70 cents."

Worldwide Server Power and Cooling Expense 2006-2010 Forecast, IDC

Video surveillance energy consumption is largely attributed to the electrical power required to operate the servers that are running the cameras and storing vast amounts of recorded video data. However, electrical power usage is not a typical design criterion for CCTV, nor is it properly managed as an expense. This is likely because the billed electrical costs are not clearly linked to CCTV, and the electrical bill is not within the responsibility or the budget of the security group.

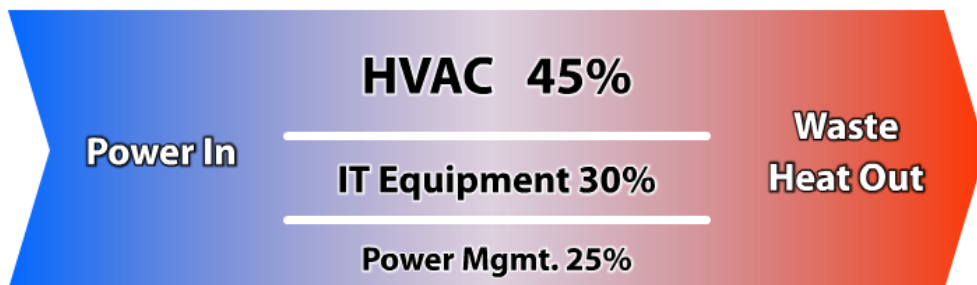
The fact that most CCTV deployments today make inefficient use of the energy they consume is hardly a surprise. With industry research estimates that more than 50 percent of the energy used in the server room goes to power and cooling equipment rather than computations and processing, the true costs of running excess servers and storage are not well understood.

A recent report by the Environmental Protection Agency claims data centers in the US consume 61 billion kWh annually, or approximately 33 billion kg of CO₂ emissions which is more than the total CO₂ emissions of several countries. In terms of dollars and cents this translates into a total electric bill for data centers in 2005 of

about \$2.7 billion for the U.S. and about \$7.2 billion for the entire world. On a per server basis this breaks down to an average cost of \$550 per year for operating and cooling alone according to an IBM Worldwide Study report.

With the above in mind, it goes without saying that when deploying a video surveillance system best efforts should be taken to reduce the number of servers required. This makes sense not only for the environment, but also for the pocket book. To this point, IP surveillance offers clear advantages over analog CCTV or DVR deployments with significant savings as a result of sharing existing network infrastructure, computation and storage.

It should be noted that IP surveillance software plays an important role in helping to reduce the hardware footprint. What follows is a description of features to consider when evaluating the environmental and operational impact of IP surveillance software.



REDUCING HARDWARE FOOTPRINT FOR VIDEO SURVEILLANCE DEPLOYMENTS

ABOUT VIRTUALIZATION:

In typical, non-virtualized environments, a single server can only support one application even though that application may utilize just 8-15 percent of the server capacity. With virtualization technology, organizations can run multiple applications and OS workloads on the same server, increasing server utilization to 70-80 percent. This plays a significant role in helping to contain and consolidate the number of servers in a datacenter, which in turn reduces energy consumption and cost.

CAMERA DENSITY PER SERVER

With CCTV deployments, typical camera density ranges from 4 to 32 channels per DVR, and come in increments of 4 or 8 channels. Consequently, numerous physical servers are necessary since the total number of cameras exceeds one server. With IP video surveillance software more than 200 cameras can be managed and recorded using a single, energy efficient server, which normally takes 2U of rack space (about half the typical rack space of a single 16 channel DVR).

Take an example of a 70 camera deployment. In this scenario, three 4U DVRs can be replaced by one, industry standard 2U server running Windows and Aimetis Symphony™ video surveillance software. Consequently, energy consumption is reduced by more than \$1000 per year when factoring savings from fewer servers and less cooling requirements. Better still, vital rack space is returned and re-usable for other projects.

VIRTUALIZATION

One of the reasons that energy costs spiral can be found in the “one-to-one-to-one” hardware approach, where each server hosts only one operating system that, in turn, runs a single application. Not only are these environments expensive, but they also promote IT inefficiency because multiple servers operate at a fraction of their computing capacity.

This under utilization scenario is typical with deployments using DVRs. For example, supporting nine cameras may require the use of two 8-channel DVRs. However, both DVRs are typically operating with a CPU load of less than 10 percent.

This “one-to-one-to-one” hardware approach also unnecessarily increases software maintenance and support due to the sheer number of physical servers requiring software patches or hardware

maintenance. Worse still, the risk of data loss is significant since not only is the cost of purchasing numerous back-up servers prohibitive, but the additional required rack space is non-existent, and the additional 400W of electricity required to support them further adds to operating costs and carbon emissions..

With virtualization technology, organizations can consolidate servers and easily reduce IT power requirements. A virtualized IT environment also dramatically decreases IT administration costs. For example, with only one physical server instead of two, server BIOS updates are cut in half, backups and disaster recovery becomes a fraction of the cost with fewer physical servers to protect and network ports are relinquished with fewer physical servers requiring connectivity to the network.

Typical analog and DVR CCTV deployments cannot leverage the excess computing and storage capacity that virtualization provides due to their proprietary nature. Conversely, a surveillance solution that uses open IP video management software product running on commercial-off-the-shelf hardware is able to benefit from virtualized computing environments, provided the video management software supports virtualization technology as Aimetis Symphony does. As a result, IP surveillance is not only better for the environment but substantially lowers cost.

Virtualization also improves resiliency of the IP surveillance deployment because existing IT staff are already maintaining the server and network infrastructure. Since this hardware is used by other mission critical applications which are core to the business, IP surveillance freely benefits from this enhanced availability without adding additional support costs.

REDUCING HARDWARE FOOTPRINT FOR VIDEO SURVEILLANCE DEPLOYMENTS

VIDEO ANALYTICS

Video analytics can play a sizeable role in reducing video storage requirements by only recording when relevant activity occurs. This, in turn, reduces space and energy requirements. It should also be noted that video analytics are significantly more accurate at detecting relevant activity than video motion detection (VMD) which means less storage is wasted for false events.

In a typical surveillance environment not using video analytics for event based recording, the amount of storage required for 16 cameras, storing 24 fps at 640x480 resolution for 7 days using MPEG-4 is about 20GB per camera. Aimetis studies have shown in a difficult outdoor environment that using Aimetis Symphony™ (with video analytics enabled) results in storage savings of more than 50% as compared to DVRs using VMD.

With video analytics, video recordings caused by irrelevant background noise is greatly reduced, resulting in less disk space required for the same 7 day period. Better still, video analytics also reduces rack space and electricity dedicated for storage.

Unfortunately, in many cases video analytics is supplied by a different vendor than what was used for video recording. By adding an additional piece of hardware for analytics which runs parallel to the existing recording product (such as a DVR or NVR), it undermines the green IT strategy by duplicating unnecessary hardware. Aimetis Symphony eliminates this problem by providing a single software product for both video management and video analytics. As a result, users are able to take full advantage of the cost-saving benefits without the corresponding server increase for running analytics.

Another caveat with video analytics is the extra processing power it requires as compared to VMD. This extra processing power poses a challenge in many environments as not enough CPU may be

available, and camera density per server is reduced. Consider the following:

Not all analytics algorithms are created equal

Simply put, higher processing power allows for better analytics accuracy, regardless of whether the analytics are being executed in the PC environment or directly on the camera. However, vendors with high processing requirements don't necessarily equal high accuracy. Many vendors may not have properly optimized their analytics and CPU is used inefficiently. End-user comparison testing consistently shows Aimetis analytics provide the best accuracy per Ghz ratio in the industry.

Embedded Analytics

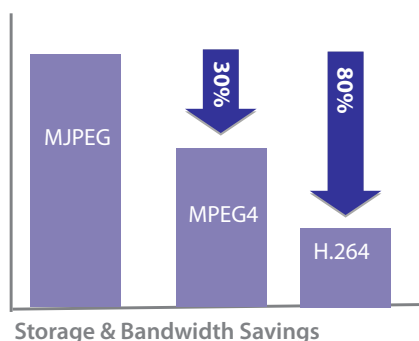
Embedding analytics on network devices allows the processing of video to occur directly on the device itself. This dramatically increases the scalability of the solution since PC based processing is no longer a bottleneck. As a result, embedded analytics and virtual PC environments go hand in hand. Aimetis offers a subset of analytics to be embedded on network cameras.

Despite the challenges that analytics poses due to the increased CPU requirements, the storage savings are real, and embedded cameras make analytics even more compelling. In many cases, servers have under utilized processing power which can be leveraged for PC based analytics, so even in cases where PC based analytics are needed, it is no guarantee that additional servers are required.

REDUCING HARDWARE FOOTPRINT FOR VIDEO SURVEILLANCE DEPLOYMENTS

VIDEO COMPRESSION

H.264 is the preferred video encoding compression standard capable of providing good video quality at substantially lower bit rates than previous standards. H.264 represents at a 50% reduction in bandwidth and storage over MPEG-4 and an 80% reduction over MJPEG, which reduce hardware, space and power requirements. Aimetis Symphony allows organizations to choose the best compression to meet their application.



POWER OVER ETHERNET

Power over Ethernet (PoE) is a technology for wired Ethernet LANs (local area networks) that allows the electrical current, necessary for the operation of each device, to be carried by the data cables rather than by power cords. This minimizes the number of wires that must be strung in order to install the network. The result is lower cost, less downtime, easier maintenance, and greater installation flexibility than with traditional wiring. Additionally, using PoE it is possible to provide the data required for network software to reduce enterprise energy consumption with better power allocation and management.

GREEN LICENSING

Most video surveillance software vendors offer different license versions depending on surveillance requirements. The problem is that more often than not, the different software versions are unable to run on the same server. Aimetis licensing model allows for each of the three available license versions to be mixed and matched on a single server. This means that the end-user can choose to run analytics (Enterprise version) on selected cameras, and standard video management (Standard or Professional version) on other cameras without the need to add additional servers.

Some software vendors also charge a license fee per server. As surveillance software is typically sold through system integrators, this licensing model actually encourages integrators to sell more servers than may be necessary in an effort to increase sales. Aimetis licensing model is on a per camera basis only. This encourages integrators and end-users to maximize server usage.

THE EFFICIENCY OF REMOTE MONITORING

Remote surveillance is an effective tool for eliminating unnecessary driving or flying to verify alarms and track job-site progress.

Consider a construction site which will often deploy cameras to protect against raw material theft. With video analytics, remote monitoring personnel can be notified of suspicious activity (e.g. perimeter breach) and verify the alarm before sending a guard, or police to drive to the site. The same argument applies for corporate facility security as well.

Additionally, remote surveillance can be used in place of management driving or flying to job-sites to track job-site progress. To put the benefit of remote surveillance into perspective, eliminating just one 50 mile drive, or one three hour flight saves 88.2 and 1543 lbs of carbon dioxide emissions respectively.

GOING GREEN WITH AIMETIS

Aimetis is committed to helping build a clean energy future. As Aimetis grows, we want to make sure we minimize our impact on the Earth's climate. This means taking every step we can to implement innovative and responsible environmental practices across our company to reduce our carbon footprint, ensure efficient computing and help our employees be green. To this end, Aimetis has implemented a green distribution and marketing strategy.

ONLINE DISTRIBUTION MODEL

A study commissioned by Microsoft and conducted by WSP Environment and Energy found that digital delivery reduced total tonnes of carbon emissions by 88%. The elimination of transportation and packaging provides the greatest opportunity for carbon emissions reduction.

By making products available online via digital download, Aimetis is able to eliminate nearly 100% of the carbon emissions associated with transportation as shipping is not required. Additionally, without the need for packaging, online software distribution eliminates carbon

emissions associated with creating and disposing of plastic packaging.

DIGITAL COMMUNICATIONS

Traditional print communications for newsletters, advertising, brochures and other marketing documents requires a huge amount of paper and requires shipping, storage and waste; contributing to a negative environmental impact. Aimetis strives to reduce this environmental impact by executing a largely digital marketing communication strategy.

By providing a consistently updated online document library, Aimetis is able to provide up-to-date information while significantly reducing printing and waste incurred by disposing of out-of-date material. Additionally, Aimetis chooses to conduct most of its advertising via online industry websites and Google ADwords in place of traditional print publications in an effort to support green initiatives.

CONCLUSION

Aimetis Symphony™ Intelligent Video Surveillance software provides users with many green technology features and a licensing model that helps to reduce server usage and waste. This has a significant effect in reducing datacenter energy consumption and environmental impact. Additionally, as an open integration platform with video analytics built in, Aimetis Symphony™ provides the necessary intelligence to help reduce energy outside the server room, presenting an opportunity to further reduce carbon emissions, and

cost. Finally, by employing green business practices, Aimetis allows customers to reduce their carbon footprint and contribute to the global environmental initiative in a positive way.



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