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Case Study

The storage at the heart of enterprise HD surveillance systems.

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Video surveillance systems play an essential role in our lives today. They are found on our high streets, in and around public transport, as well as in private establishments such as offices, hotels, and sports arenas. Most people's experience with such CCTV (closed-circuit television) implementations are the grainy images that appear in the news or are printed in newspapers in conjunction with an investigation. However, the industry's move to IP (internet protocol) technology and HD (high-definition) cameras over the past decade has resulted in surveillance systems providing much higher-quality images that prove more useful for, among their uses, identifying assailants, victims, and the respective situations.

Such systems are a critical element in helping maintain public safety and protecting property, as several studies have shown[1]. As a result, worldwide investment in such solutions is expected to grow from US$ 22b in 2018 to around US$ 46b by 2027[2].
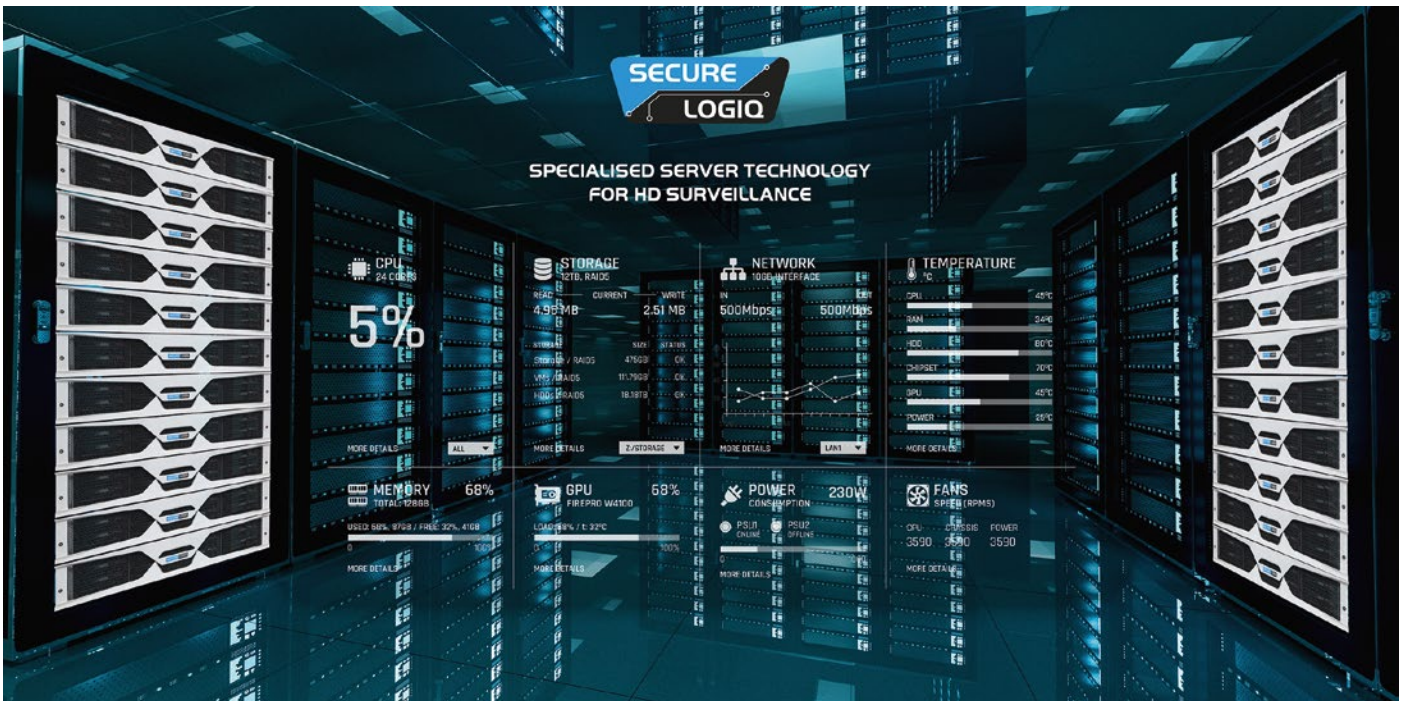

Figure 1: Secure Logiq – Specialised Server Technology for HD Surveillance

[1] Brandon C. Welsh & David P. Farrington (2009) Public Area CCTV and Crime Prevention: An Updated Systematic Review and Meta-Analysis, Justice Quarterly, 26:4, 716-745, DOI: 10.1080/07418820802506206

[2] https://www.businesswire.com/news/home/20200330005303/en/Global-Surveillance-Camera-Market-Nears-46-Billion

Remembering what happened

While there are many elements in a surveillance system, it could be said that a critical one is the storage solution. The days of racks of VCRs (video cassette recorders) storing analog CCTV feeds are, essentially, behind us. Today's digital IP solutions rely on HDD (hard disk drive) storage coupled with server hardware to gather digital video feeds, storing the compressed video they receive. While many storage providers offer HDDs tuned to the needs of surveillance, these only really target cost-optimised implementations. A COTS (commercial off-the-shelf) DVR or NVR (digital or network video recorder) featuring a single drive may simply be located in a store's backroom or the office of security staff. Here there is little re-gard for the environmental conditions (temperature, humidity, etc.) spinning platter storage requires, while the number of IP cameras in use, and hence data generation, will likely be fairly limited.

Figure 2: Video Surveillance is becoming smarter and more effective than ever

The quality of the images collected by a surveillance system is key to resolving crime. HD cameras are increasingly the solution of choice, thanks to their falling prices and ease of installation. However, their use generates significant network load due to the quantity of data generated, as well as placing high demands on the server implementation used to collect, analyse, and store that data.

While compression techniques have improved significantly over the years, even today's state-of-the-art codecs, such as H.264, still generate significant quantities of data. It should also be noted that the data generated is not a consistent flow; it comes in waves. Such encoding techniques capture a full frame at a defined moment in time, known as an I-frame. This will be followed by a series of P-frames that only store the difference in image between itself and the previous I-frame.

As a result, recording events in a hotel corridor, where there is typically little traffic, results in a low amount of data being generated. However, should the fire alarm go off and guests fill that corridor as they exit, the quantity of data generated jumps significantly due to the large difference between the P-frames and I-frame. For a standard, 2 megapixel HD camera, assuming 6 IPS (images per second), this results in data being generated at anything from 3 to 12 Mbps (megabits/second). It quickly becomes clear that, with a significant quantity of cameras, or a move to higher camera resolutions, surveillance is truly a challenging 'big data' problem.

Serious surveillance solutions

Such Enterprise IP CCTV solutions require fully-fledged server technology with storage solutions to match that reach far beyond the bandwidth and storage capacity of an HDD often marketed as a 'surveillance drive'. Solution providers such as Secure Logiq tackle this challenge with custom-built, dedicat-ed surveillance servers. HDDs in such systems are the most important component and, due to the demands of their cus-tomers and their commitment to quality, their systems utilise enterprise-grade HDDs.

In Secure Logiq's search for the optimal available storage solu-tion, they selected Toshiba's MG Series of enterprise capacity HDDs.

Such devices are designed for nearline use and target busi-ness-critical workloads that require 24/365 performance with high reliability. They are rated with an annual workload of 550 TB and a minimum MTTF (mean time to failure) of 1,400,000 hours. For the MG Series, Toshiba offers a producer's guaran-tee of five years from purchase. Should a drive of the MG Series fail within the warranty period, the drive is replaced with a new HDD rather than a product that has been re-certified. Maintaining high levels of service such as this is critical to the success of businesses such as Secure Logiq's.

Choosing between SATA and SAS

Surveillance solutions that implement DAS (direct-attached storage) are well supported by drives such as the SATA models of the MG Series. Combined with multiple RAID cards to attain high levels of resilience, while also minimising rebuild time should a disk fail, the SATA HDDs provide more than enough bandwidth together with sufficient random read/write per-formance. This is the approach taken with HD servers such as Secure Logiq's HPS-4U-XL Series that provide up to 1344 TB of

storage in a 3 × RAID6 configuration, neatly configured within a 4U rack, and capable of handling over 4000 Mbps of IP traffic.

At the highest end of the product spectrum, SAS drives of the MG Series offer performance improvements, such as gains in seek time and read/write throughput, that should offset the additional acquisition costs for a SAS drive. Such storage solutions find their home in SAN (storage area network) implementations and systems that can make use of JBOD.

Staying ahead of the pack

Since HDD form factors and interfaces are standardised across the industry, businesses such as Secure Logiq benefit from having a range of HDD suppliers available offering a commoditised product. While this helps to ensure price competition, price alone does not win in the surveillance market. Here it is the less tangible aspects, such as business relationship, that is the value-add Toshiba offers and helps Secure Logiq to differentiate in their market segment.

How Toshiba manages its sales channels have helped to ensure that HDDs are available in the quantities required and at a price-point that works. This allows Secure Logiq to deliver new systems within the time scales promised, and ensures that, should a storage component fail on-site, it can be replaced swiftly.

Secure Logiq's in-house testing facilities for the development of surveillance systems are a prerequisite for achieving the performance levels the enterprise end of the surveillance market requires. This is achieved using an in-house tool, Logiqal Benchmark, that allows virtual IP surveillance systems to be configured to test hardware in conjunction with the various VMS (video management software) offerings available. However, a storage supplier that also both understands the technical challenges and has laboratories for experimentation is of immense help for the customer.

Figure 3: Toshiba Enterprise Capacity Hard Drive – MG Series

Toshiba operates its own Tech Lab for storage technology, allowing its team of engineers to configure, build, and test proof-of-concept storage approaches and guide customers to the optimal storage solution. The results are compiled in a Lab Report delivering insights into configuration options, the various advantages, as well as the inevitable compromises each entails.

Both the IP surveillance and HDD storage markets are highly competitive. As a result, it is the intangible aspects of the business relationship that make all the difference. By selecting Toshiba as their partner for HDDs, Secure Logiq has gained a quality-of-service level for the storage aspect of their solutions that is based upon mutual understanding, technical support, and optimised supply chain.

As High Definition becomes the 'de facto' standard in professional security installations, Secure Logiq brings the missing piece of the HD Surveillance Jigsaw to the industry by manufacturing a range of hardware appliances specifically designed and optimised to efficiently store, transmit, analyse and display multiple streams of HD video data.

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