INFINITY GREEN PAPER

IP RECORDING AND STORAGE SOLUTIONS

There is nothing more data intensive than video…..other than **multiple** streams of High Definition video and/or video analytics! You will find that your choice of server solution can have a significant environmental impact.

In recent years server technology has evolved rapidly, giving rise to specialist technology and more powerful servers with higher density storage solutions. As 'HD' and even 4K become the 'de facto' standard in professional security installations, Infinity brings to the industry the missing piece of the HD Surveillance Jigsaw by manufacturing a range of hardware appliances specifically designed and optimised to efficiently store, transmit and display multiple streams of HD video data. By utilising this specialist technology, as well as significant cost savings there is a greatly reduced environmental impact and we will look at some of these factors below compared with other commonly used technologies.

Requirements

Here we will look at three of the options available on the market today and compare the overall power consumption. For comparison we will be looking at a 600 analogue camera system migrated to IP using the Axis Q7046 Blade encoders. We will assume a constant recording bit rate of 2Mbps at 25IPS recording stored for a duration of 31 days with a peak bit rate of 3Mbps to allow for processing calculations. All calculations are based on the following table.

Cameras	600
Average Bit Rate (Mbps)	2
Peak Bit Rate (Mbps)	3
Days Recording	31
RAW Storage (TB)	401.76
Total Bit Rate (Peak) Mbps	1,800

1. IT Centric Storage Solution

Due to their multi-purpose design and generic non-optimised nature, most IT-Centric servers have a processing cap of 256 Mbps which can be more of a liming factor than the on board storage which typically does not exceed 21TB in RAID5. Electricity costs have been calculated at 15p per kWH, cooling costs and power are linear and cooling power requirements are generally similar to the total server power requirements.

Product	Quanty	Power (Peak)	Power (Avg)	Total Power (Avg)	BTU Per Power	Cost (Hour)	Cost (Year)
Server (20TB)	7	270	270	1,890	6,448.68		
Storage Arrays (20TB)	14	200	200	2,800	9,553.60		
			Total Power (W)	**4,690**		0.7035	**£6,162.66**
			Total Heat		**16,002.28**		

2. Linear Storage Solution

Linear storage is relatively new to the IP CCTV market and does require integration to specific VMS platforms for optimum efficiency. Using sequential storage method offers significant power savings in comparison to conventional server technology. Sequential storage only uses drives when they are being recorded to, so they use less power and become more energy efficient. The disadvantage of this method is that the throughput is limited to the read write speed of a single disk so on large camera count many more machines have to be used to achieve the same result. Linear storage also relies on server technology to process the IP video which must also be accounted for when calculating power.

Product	Quanty	Power (Peak)	Power (Avg)	Total Power (Avg)	BTU Per Power	Cost (Hour)	Cost (Year)
NVR Unit	12	140	100	1,200	4,094.40		
Linear Storage	12	100	65	780	2,661.36		
			Total Power (W)	**1,980**		0.297	**£2,601.72**
			Total Heat		**6,755.76**		

3. Optimised Server Technology for IP Surveillance

By utilising best-in-class components tested together and optimised for IP surveillance applications, Infinity have created a range of servers which at the top end can handle **more than** 4000Mbps throughput with installations of more than 2,000TB useable data on board a single 4U unit. Because they are running well under peak processing power and feature advanced RAID arrays to spread the load average power is significantly lower than the peak power requirements. Additionally each unit will replace multiple units available from other vendors, offering significant power savings. The units in the below feature 750Mbps throughput (duplex) and 140TB storage onboard.

Product	Quanty	Power (Peak)	Power (Avg)	Total Power (Avg)	BTU Per Power	Cost (Hour)	Cost (Year)
Infinity Server	3	550	350	1,050	3,582.60		
			Total Power (W)	**1,050**		0.1575	**£1,379.70**
			Total Heat		**3,582.60**		

Non-renewable Raw Materials

Known economically workable Aluminium deposits will be exhausted in 2139 and Iron (steel) in just 2087 [1]. Both elements are power hungry and environmentally dirty for their extraction so minimising the metal we use in an installation will have a significant impact in the future of the planet. Below we compare the metal usage of the 3 solutions. We will simply compare the chassis and racking as the other significant metal use, the hard drives will be roughly the same in each solution. For the following calculations and for simplicity I have assumed that a 1U chassis contains about 10Kg metal, a 2U will contain 20Kg and a 4U about 40Kg and that a rack is roughly 1Kg per 1U. Average power cost to make 1Kg of Aluminium or Steel is 16kWh [2]

	Chassis 1U	Chassis 2U	Chassis 4U	Total Rack Required (U)	Total Metal (Kg)
IT Centric		21		42	462
Linear	12	12		36	396
Infinity			3	10	112

Transportation costs and environmental impact

As the heaviest component of any IP CCTV system obviously the size and weight of a storage solution has a significant environmental impact. Many industry available servers have been the whole way around the world simply to undergo a rebranding process before being returned to their country of manufacture. As well as the additional cost for transporting heavy and bulky equipment the CO2 emissions from transportation between the options vary considerably as you can see in the table below [3].

	Total Weight (Kg)	CO2 Air freight LGW to LAX (Tonnes)	CO2 Sea freight 1000km (Tonnes)	CO2 Land freight 1000km (Tonnes)
IT Centric	**630**	**237.86**	**3.62**	**34.54**
Linear	**564**	**243.36**	**3.24**	**30.92**
Infinity	**185**	**9.72**	**1.03**	**10.49**

As well as minimising downtime in a mission critical installation, Infinity makes use of several Health Check utilities and multiple layers of resilience will also save fuel burning engineering visits or fast turnaround return to base fixes.
Healthcheck software offers real-time monitoring to alert a user if any component is experiencing issues. Redundant power supplies and multiple layers of disk resilience all in hot swap format means that replacement parts can simply be sent in the post for simple replacement by the end user saving valuable me, money and most importantly non-renewable energy resources!!!

Summary

The evidence is clear that by selecting a product that is designed specifically for purpose, i.e. servers that are optimised for high throughput high storage density video applications, the cost and space saving aspects will be welcome news to any Security Integrator or end user but one conclusion that cannot be ignored is the ultimate effect we can have on our environment offering a significantly lower carbon footprint in the manufacture, transportation and daily running of the solution and the preservation of the remaining limited non-renewable resources.

References

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3. hp://www.climatefriendly.com/Business/Calculators