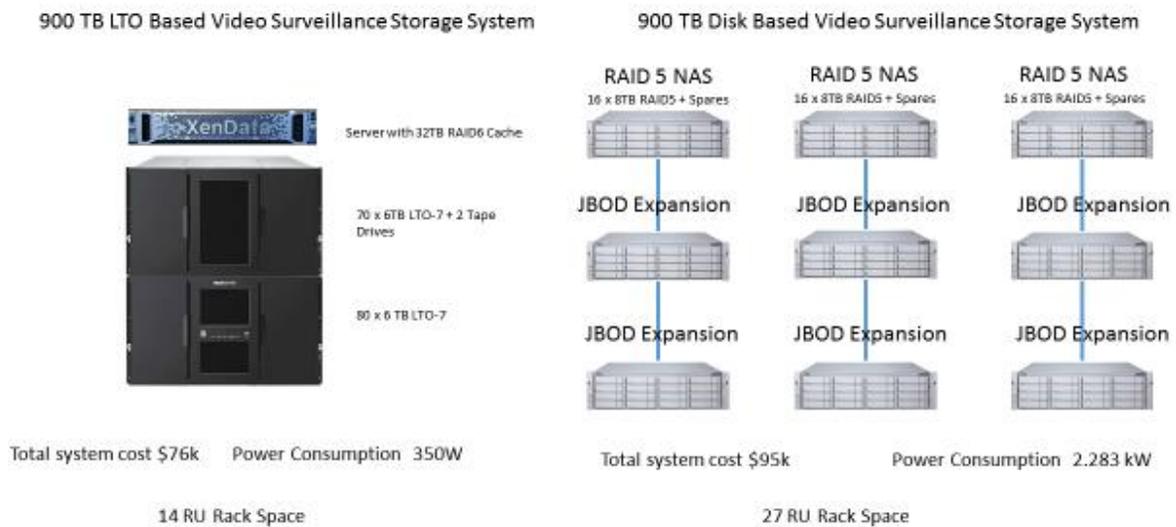


Multi-Tier Storage for Video Surveillance: Cost of Ownership

A multi-tier storage system will typically have front-end disk which is where the video content is initially retained. For the next tier, data tape cartridges now provide a very cost effective way to keep huge volumes of video files for long term retention. The market leading data tape cartridge type is LTO – Linear Tape Open – which provides a very stable and reliable storage medium at an attractive cost per TB. Today LTO cartridges are available with capacities up to 6 TB. By combining front-end disk storage and LTO, the overall cost of a high capacity centralized video surveillance storage system is reduced dramatically. The savings go beyond the initial purchase price because the operation costs are also much lower. This paper compares the operating costs for multi-tier storage and conventional all-disk systems using two examples: a 250 camera system and a 500 camera system.

250 Camera System



The diagram above shows a typical 250 camera, 2MP, 15fps camera video storage system needed for a retention period of 90 days. This requires approximately 900TB of storage. The LTO-7 based multi-tier video storage system uses XenData software running on a windows based server with 32TB of SAS disk drives configured as RAID6 cache (24 TB usable) and 150 LTO-7 data tapes located inside the robotics tape library. This system is compared to a disk-only solution. Only brand name systems were researched for this comparison and the cost associated with the disk based systems are from currently available products. Undoubtedly lower cost white box solutions can be configured, but lack the quality, reliability, service and onsite 24 hour support necessary for a 99.9 % video storage system.

The 250 camera storage systems cost \$76,000 for the multi-tier system compared to \$95,000 for the disk-only system. As you can see there is an initial cost savings when purchasing the multi-tier system vs disk as would be expected. But the cost savings continue to accumulate over the life of the system.

A key component of the operating costs is the electricity needed to run the system and to provide air conditioning to cool the location where the system resides. The multi-tier system consumes an average of 350W which is mostly for the XenData storage server. The LTO library consumption is minimal. In contrast the disk based system requires 2.283 kW of power to operate.

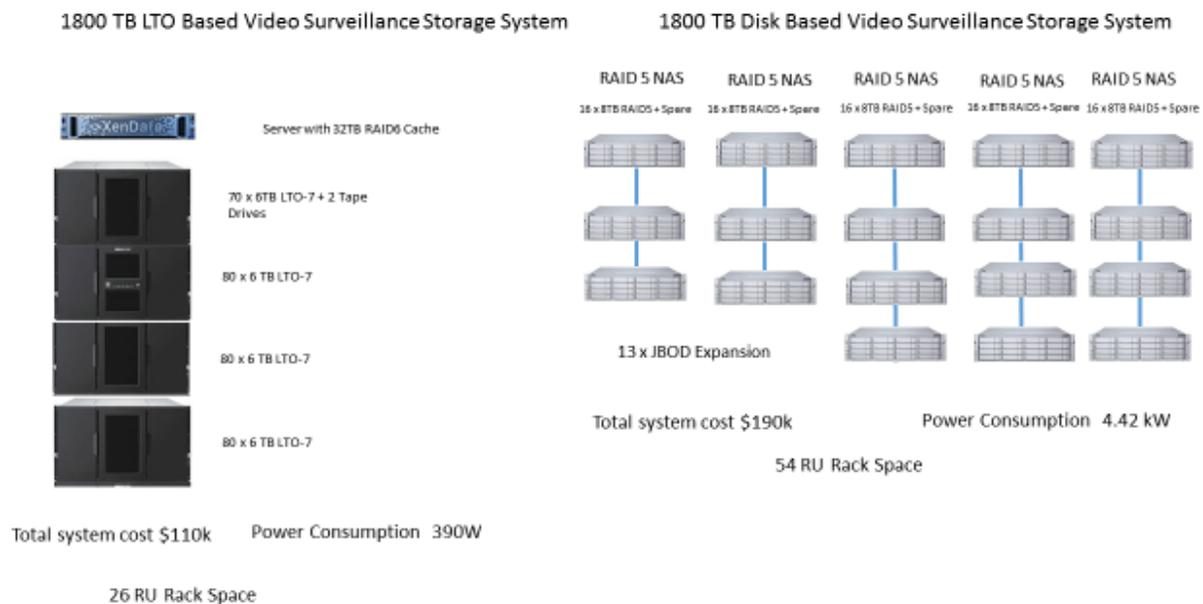
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What does this mean in terms of cost? Using an average 11.88 cents/kwh electricity rate for the USA, the XenData multi-tier system costs \$364 a year to operate vs \$2,376 for the equivalent disk-only system.

However, the costs do not stop there. Cooling the systems is a necessity and current methodology has a 1:1 factor for dense disk based rack systems and 0.5:1 for a low density system such as the LTO library. So our cost for cooling the multi-tier system is \$264 per year and \$2,376 for the disk-only system.

Over 5 years the electrical operating costs for the multi-tier system total \$3,140, compared to \$23,760 for the disk only system.

500 Camera System



The diagram above shows a larger 500 camera system. Here the cost savings are even more dramatic as the increase in storage for the extra video only requires additional LTO cartridges and shelf space inside the robotic library. With an initial cost of \$110,000 for the multi-tier system vs \$190,000 for a disk-only system, the initial purchase price alone would be sufficient to sway the decision on which system to buy. In addition, power consumption becomes a big factor with these larger storage systems. The multi-tier system only consumes 390W vs the disk based system at 4.42kW. Add in the cooling necessary and the annual cost to operate the multi-tier system is \$878 compared to \$9,200 for the disk-only system. Over 5 years this amounts to \$4,390 for the multi-tier system and \$46,000 for the disk-only system.

Post Warranty Support Costs

Now let us look at the cost of post warranty support. Our comparisons above, are for systems that have 3 years of warranty built into the initial purchase price, but what happens when we look at years 4 and 5 of our 5 year life cycle costs? The multi-tier storage system has a single server with a total of 8 disk drives and a tape library with 2 LTO tape drives. There are only 6 power supplies for the entire system as well as fewer cooling fans. Whereas the disk-only system has 9 chassis, 144 disk drives, 18 power supplies and many more cooling fans. Consequently, the multi-tier system has a lower post-warranty support cost – and for good reason.

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In Conclusion

Multi-tier systems provide substantial savings on both initial purchase costs and on-going operating costs for larger centralized video surveillance storage. For a 250 camera system with 90 days retention, the electrical operating costs for a multi-tier system are one sixth the cost of a disk-only equivalent system. The cost saving are even more dramatic for larger systems.

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