Plasmon UDO: A "Green" Approach to Archiving

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Abstract: Data archive volumes are rapidly growing in size, creating a number of new challenges for business and IT. An increasing concern is how to improve energy efficiency (i.e., reduce your energy footprint and associated costs) while storing more data and providing faster access to that data. Rethinking the type(s) of technologies and how they can be used can have a big impact. Plasmon's Ultra Density Optical (UDO) is one option.

Today's Energy Challenges

When you consider that the average cost of power in the United States has increased 32% since 2000 to 9.28 cents per kilowatt-hour[1] (and is still rising) and digital archive volumes are quickly approaching the 10,000 PB mark[2] with 27,000 PB well within sight, it is no wonder that power consumption and other "green" topics (such as carbon footprint) are key concerns for organizations today (see Figure 1).

From a pure dollar standpoint, it is costing companies more each day to store their archive data—a whole lot more if they are storing their archive data on traditional storage systems, which spin disks 24x7 regardless of I/O activity. For some organizations, however, it's not necessarily the cost of power that is the real stumbling block, but rather the "supply" of power, or lack thereof. More and more end-users tell us that they have simply run out of electricity to power and cool their IT gear.

In either case, organizations are finding themselves caught in an increasingly vicious cycle: The more archive content they create, the more capacity they need to store it. The more capacity they need, the more electricity they need for power and cooling… the bigger the carbon footprint, and so on. Today, large organizations with racks and racks of traditional servers and storage systems as well as organizations in metropolitan areas where power tends to be in shortest supply are feeling the greatest pinch. However, virtually every organization—regardless of its size or geographic location—is in some way dealing with energy issues, even if only from an environmental consciousness standpoint.

> **Telling statistic …**
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> "Data center electricity consumption increased 97% from 2000 to 2005 and now accounts for between 1-2% of all U.S. electricity consumption."
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> —Source: *Estimating Total Power Consumption by Servers in the U.S. and the World*, Jonathan G. Koomey, Ph.D., February, 2007.

How can organizations break this cycle?

There is a direct correlation between the number and speed of disk drives and the electricity required to power them. It takes electricity to spin up disk drives and continuous power to keep them spinning, in addition to the power needed to keep them cool. Rethinking how you use technology can have a huge impact on power consumption and cost.

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[1] According to the U.S. Department of Energy.
[2] ESG Research Report: *Digital Archiving: End-User Survey & Market Forecast 2006-2010*, March, 2006

Implementing an Archive Tier

Begin by assessing your current archive management strategy, if you have one. For many, this may be a true "greenfield" effort. Understand the types of corporate data you are generating, which data is persistent or static (a.k.a. "archivable") and—importantly—make sure that this data is being stored appropriately. Most organizations have huge quantities of archive data sitting on traditional primary storage systems—draining disk, energy and IT resources. Archive data by definition is unchanging and infrequently accessed, which means it doesn't belong on primary—or Tier One—disk. Rather, it belongs on lower-cost—or Tier Two—storage.

Once you've classified your data, the next step is to get all the archive data off primary storage systems and onto an appropriate secondary archive tier. It is also important to put policies in place that ensure the data is moved from primary storage as it becomes persistent going forward.

Tier Two storage options include SATA disk, MAID (or MAID-like) disk, next-generation archive appliances—such as Plasmon's UDO—or a combination of technologies that match business objectives and IT requirements while minimizing risk. Additionally, data de-duplication technologies offered by an increasing number of vendors can reduce storage requirements on this tier by 10 times or greater.

In Plasmon's case, this Archive Tier can consist of a stand-alone UDO library; a UDO Archive Appliance (AA) that consists of UDO media with SATA disk cache and integrated software; or an Enterprise Active Archive (EAA). The EAA is a multi-tier archive in which energy reducing MAID-like SATA disk is used for the active portion of the archive and an Archive Appliance with UDO media is used for a near-line second copy or removable disaster recovery copy. The EAA also integrates software functionality for governance and compliance, including data de-duplication, replication, encryption services and legal hold—among others. The power and cost savings for all three Plasmon archive implementations can be significant, especially if the data is currently spinning on high-end disk.

FIGURE 1. INCREASING POWER COSTS

2007 Retail Cost of Commercial Power

National Average = 9.28 (¢/KwH)
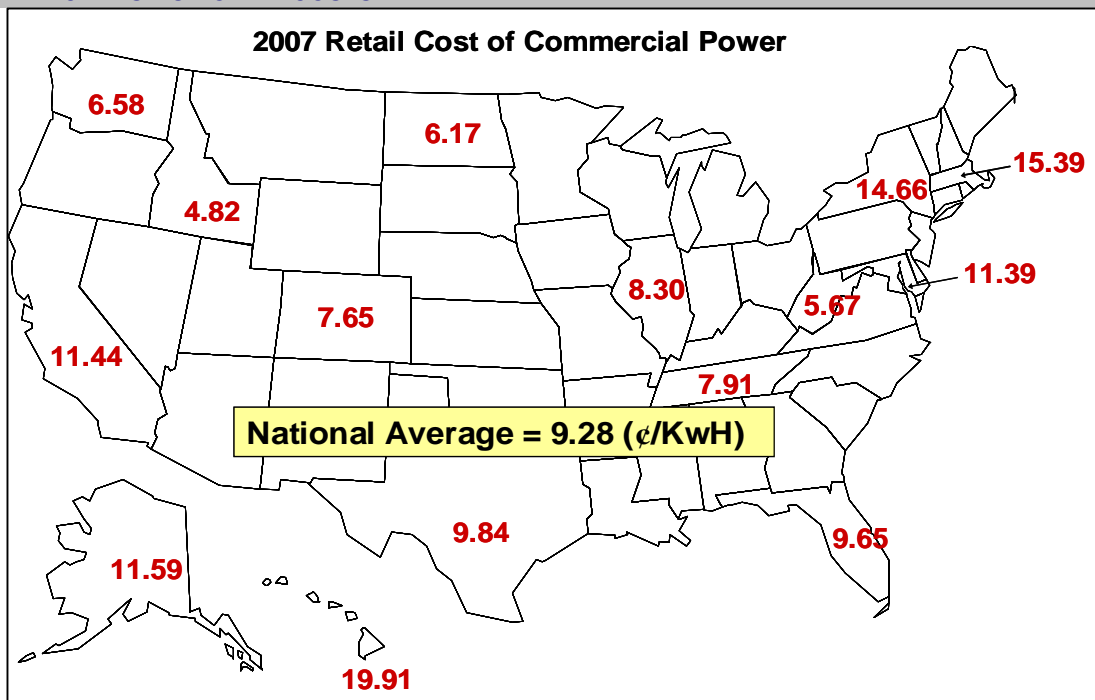
Ultimately, the Tier Two technology an organization implements will depend on a number of factors, including power considerations, capacity and performance tradeoffs (such as recovery time objectives), corporate governance and compliance requirements and available floor space, as well as the acquisition and ongoing maintenance costs for hardware, software and media. Analyze the archive's lifetime total cost of ownership to help understand how to best leverage tradeoffs and provide both business and financial justification for a green

technology decision. Implementing an archive tier can have huge benefits for users. It can lower power consumption considerably, reduce the size of an organization's overall carbon footprint and possibly mean the difference keeping an IT organization running or not.[3] Newer optical technologies, such as Plasmon's UDO, are a viable alternative to tape and disk systems—particularly from a power and cooling perspective.

While ESG Research shows that a significant number of organizations are still using tape for archiving purposes, we firmly believes that tape should be reserved for doomsday scenarios. We encourage these end-users to move this data from tape to a more appropriate archive technology. For a long time, tape was used for archive purposes simply because there was a clear economic advantage to doing so. That is no longer the case.

The Plasmon UDO Effect

ESG analyzed the cost of acquisition and ownership of 12 TB tape, UDO and disk archive systems over a three-year period. Though this analysis was conducted in October 2006, we believe these numbers highlight the potential power consumption benefits of a UDO-based archive tier in certain user environments and are still relevant today. Specifically, we evaluated Plasmon's G-Series UDO library and UDO Archive Appliance against competitive tape (LTO-3), SATA (non-MAID) and CAS systems. Total cost of ownership (TCO) was determined using factors such as power consumption, floor space, software maintenance, hardware maintenance and the acquisition costs of media, software and hardware. For the purposes of this paper, we'll look only at power consumption.[4]

In our analysis, we found Plasmon's UDO Archive Appliance to be only slightly better than tape in terms of power consumption (percentage of TCO). However, competitive disk solutions (non-MAID) used more than three times more power than the UDO Archive Appliance. The power savings become even more significant when considered over the extended life of an archive—often in excess of 20 years.

There is a "time to data" penalty of up to 10 seconds when using a near-line Plasmon UDO solution versus other disk-based alternatives. For many organizations (and data types), this penalty is acceptable given business objectives and can be further justified due to the potential power and cost savings of a near-line archive solution. Rethinking the way companies use archive technology can have a big impact, so users should weigh these factors in addition to other TCO and technology considerations when evaluating potential archive solutions.

The Bottom Line

The proliferation of energy-inefficient server and storage systems is already stressing power grids—to the point that in some data centers, servers are literally sitting idle because there isn't enough electricity to power them. For others, rising power costs are making already tight storage budgets even tighter. Implementing an appropriate archive tier can help relieve some of this stress, while improving overall efficiency.

Plasmon's UDO-based archive story delivers a sound green message. Plasmon gives users several low-cost alternatives to reduce their power consumption and carbon footprint, while meeting business objectives and ensuring secure, random access to archive data.

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[3] For a more complete discussion of the benefits of an archive tier, or building a Tier to Tier (T2T) environment, see the ESG Brief *Plasmon's Multi-Tier Enterprise Active Archive,* August 2007.
[4] For a full competitive TCO analysis, see the ESG Report: *Active Archival Storage: A Cost of Ownership Analysis*, October 2006