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Purpose-Built Storage

Winchester Systems FlashDisk™ All Flash Array (AFA)

TECHNOLOGY BRIEFING – SUPERCAP ADVANTAGES

This technology brief outlines how the super capacitor and non-volatile flash memory design of the FlashDisk AFA from Winchester Systems offers compelling reliability, serviceability, safety and performance improvements over other array designs.

LIMITATIONS OF TRADITIONAL BATTERY BASED RAID STORAGE ARRAYS

Traditional RAID storage arrays utilize either internal batteries or an external UPS to retain the RAID controller cache contents in the event of a power failure. While this makes for a relatively simple design, it suffers from some critical limitations including: limited longevity, slow recovery time, short lifespan, safety and disposal challenges.

Limited Longevity

A fully charged, brand new battery can only provide enough power to preserve the data within the cache for a finite time limit, often between 24 to 72 hours. If the power outage exceeds this time, whatever data within cache not yet written to disk is lost. Since batteries have a limited lifespan and their performance degrades over time as they both age and go through discharge – recharge cycles, the time data within cache may be preserved also becomes unpredictable.

Slow Recovery Time

The recharge duration for either a partly or fully discharged battery can often be lengthy, extending many hours. During this time, cache contents are not protected, forcing the array turn the cache off ("write-through" mode) which degrades performance.

Short Lifespan

The typical lifespan of a RAID cache battery is between two to three years, after which they must be replaced. This results in both service costs as well as disposal issues on a regular basis over the life of an array.

Safety and Disposal Challenges

Lithium ION (Li-ION) batteries present both safety and disposal challenges. These batteries can be volatile and have been documented as fire risks, resulting in restrictions around storage, shipping and handling. A Lithium ION battery fire could have a catastrophic impact to the datacenter.

Additionally, they are considered hazardous waste that must be properly disposed to avoid environmental damage.

ADVANTAGES OF FLASHDISK AFA SUPERCAP DESIGN

The FlashDisk AFA utilizes a combination of super capacitors and non-volatile flash memory to preserve any in-flight data within the RAID controller cache on loss of power. This approach solves all the shortcomings of battery or UPS designs outlined above.

This approach offers unlimited data protection longevity. Once the contents of cache are saved into the non-volatile flash memory, it can survive without power indefinitely. Your data is always safe.

Super capacitors offer fast recovery times, and typically recharge within minutes versus hours or longer for batteries. This allows the FlashDisk AFA to turn the controller cache back on ("write-back" mode) more quickly, giving you optimal performance.

Super capacitors are extremely low-maintenance, with typical lifespans exceeding 10 years. They may be discharged and recharged virtually an unlimited number of times compared to batteries. They are extremely stable devices, without fire hazard concerns. If replacement is ever required, super capacitors present no disposal issues and may be handled without special safeguards or procedures.

SUMMARY

The FlashDisk AFA design, utilizing super capacitors and non-volatile flash memory offers superior reliability, safety, performance and greater environmental responsibility versus other arrays still using batteries or UPS devices.