Adaptec Series 5Z RAID Controllers lose the batteries
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Adaptec rolled out this month a family of RAID controllers – the Adaptec Series 5Z RAID Controllers with Zero-Maintenance Cache Protection -- which eliminate backup batteries and still provide superior performance and reliability. Why is this important? In three decades of designing portable computing products, my standard comeback to what I've learned is that 'I hate batteries. I really hate batteries.' Batteries are made out of nasty stuff, wear out, need recharging circuits, cost a lot of money and never work when you really need them. So any system that eliminates batteries, in my experience, is a Really Good Thing.

Cache protection with batteries

So what does this have to do with RAID controllers? Cache is the well-practiced answer to RAID performance, but cache involves DRAM memories whose contents evaporate when the power goes out, causing data corruption on the drives. The answer to this problem has been the use of batteries, first at the server level (big batteries), and then at the RAID controller level (lithium ion batteries like the ones in a cell phone). Lithium ion batteries are expensive and wear out, even when they aren't used. And, like all batteries, they need to be replaced, recharged, pre-conditioned, recycled and re-expensed – all not a pleasant situation. All batteries use heavy metals in their construction, be it lead, nickel, cadmium and now lithium. Heavy metals are not good to have in the environment, and must be recycled. Further, due to the explosive nature of lithium, increasing transportation and electronic circuit protection regulations apply to lithium ion batteries.

Zero-Maintenance Cache Protection

Adaptec has nailed the answer to this problem in the new Series 5Z RAID Controllers with Zero-Maintenance Cache Protection (ZMCP – pronounced "zemcap"). ZMCP uses tried-and-true technology (at least in the portable computing world), that can eliminate battery backup units (BBU) and still provide superior performance and reliability. So how did Adaptec do this magic? They use great big capacitors. Now, before your eyes glaze over, capacitors are very simple devices that soak up input current and maintain output current at a given level despite input variations, and are deployed throughout electronic devices. Super-capacitors can maintain output current for more than a minute.

Twenty-five years ago, vendors used 'supercapacitors' to maintain memory in portable devices while the operator switched out the AA batteries. Nowadays, flying in close formation with inexpensive nonvolatile flash memory (such as in a USB memory stick), the Adaptec Series 5Z controller automatically writes its 512MB cache to flash when a power failure occurs, while the supercapacitor keeps the current going during the process. When the power comes back, the DRAM is recovered from flash, and the system goes on without loss of data. No battery, no hassle and net-net, a big advantage. Since power failures can often exceed the typical 72 hour backup battery life in many situations, the flash memory adds the advantage of extending the power outage/recovery time to years. Many data centers in Florida lost primary power for 5 to 10 days during the big hurricane years of 2004-2005. And after Hurricanes Katrina and Ike, some Louisiana and Texas data centers lost power for weeks.

Cost Advantage

Cost reductions at the flash memory level have made this type of system pay back very quickly, particularly in context with the battery maintenance issue. And data center operators can sleep soundly knowing that a power outage won't introduce data errors in their RAID systems.

The following chart shows the cost of BBU replacement when both hardware and labor are factored in:

	BBU	ZMCP
BBU	$150.00	$(150.00)
Replacement BBU	$150.00	$(150.00)
Systems Admin	$265.00	$(265.00)
Disposal – Hazmat	$25.00	$(25.00)
Total 4-Year Cost	$590.00	$(590.00)

SSG-NOW Assessment

Adaptec has not only created a very successful RAID implementation, it has created a pre-emptive cost and environmental benefit in its Series 5Z RAID controllers. DRAM cache provides tremendous performance advantages, and the Adaptec Series 5Z has totally eliminated the downside that historically has required battery backup.