Enabling the onboard cache on a RAID adapter card significantly enhances performance — especially in RAID 5 and RAID 6 scenarios — by accommodating both read caching and write caching of data. But data stored in the cache for write caching can be lost if the cache is not protected against a power or system failure.

Lithium-ion (Li-ion) battery backup units (BBUs) are traditionally employed to protect cached data on RAID adapters. Once installed, a new BBU will take several hours to reach a full charge. During the charge cycle, write cache is unprotected (i.e. turned off), which adversely affects the RAID adapter’s performance. A typical BBU requires routine capacity testing and performs sub-optimally during those test periods. Lastly, a fully-charged BBU can only preserve data for a maximum of 72 hours during a power loss before the battery power depletes.

Li-ion BBUs have hidden costs that can drastically increase a RAID adapter’s Total Cost of Ownership (TCO) by hundreds of dollars per year through monitoring, maintenance, replacement, and disposal expenses.

**Zero-Maintenance Cache Protection**

Now in its third generation, Adaptec Zero-Maintenance Cache Protection (ZMCP) drastically reduces a RAID adapter’s TCO through the use of flash memory versus Li-ion batteries. These flash modules provide full protection of cached data without the costs associated with Li-ion batteries.

**Adaptec Flash Module 700**

ZMCP is included with the Series 8Q/8ZQ (12Gb/s) and Series 7Q (6Gb/s). The new Adaptec 81605ZQ and 81605Z has the flash backup embedded on the board. ZMCP is available as an option for Series 8 (12Gb/s) and Series 7 (6Gb/s) RAID adapters with the AFM-700 kit, which includes a mounting plate to secure the cap module to an unused PCIe slot. The modular aspect of the AFM-700 gives data centers the flexibility of adding ZMCP at any time, depending on their needs and budgetary parameters. Competitive alternatives force data centers to purchase a new card in order to add cache protection, as certain functionality is built into their base adapter.

The AFM-700 features NAND flash memory and super capacitor technology that work together to save cached data in the event of system power loss. The super capacitor charges while the system is booting to provide instant cache protection upon startup, and is fully charged within four minutes. When the module detects loss of power, the super capacitor keeps critical parts of the RAID adapter active long enough to allow data to be copied from the onboard adapter cache to the flash memory. Once the data has been copied, the flash memory can store it for years without power. When power is returned to the RAID adapter, the data in the flash memory is copied back to the onboard adapter cache and operation resumes as normal with all outstanding I/O requests intact.

Lastly, with ZMCP’s new monitoring features (Real-time Health and Instant Capacity Monitoring), data center administrators can instantly check the temperature, capacity and remaining lifetime of the super capacitor through Adaptec maxView Storage Manager, a web-based interface that makes it simple to view, monitor, and configure all Adaptec RAID adapters in a system without disrupting operations or impacting performance.
BBUs vs. ZMCP: Maintenance Requirements

<table>
<thead>
<tr>
<th>Lithium-ion BBUs</th>
<th>Adaptec by PMC ZMCP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Batteries must be &quot;conditioned&quot; during initial deployment, adding custom steps</td>
<td>No action required</td>
</tr>
<tr>
<td>Battery performance must be continually monitored so that failing batteries</td>
<td>No action required</td>
</tr>
<tr>
<td>A failed battery must be replaced within 72 hours, and sometimes less</td>
<td>No action required</td>
</tr>
<tr>
<td>Batteries must be replaced on a regular maintenance cycle, so replacement</td>
<td>No action required</td>
</tr>
<tr>
<td>batteries must be kept available at each location and maintenance staff must</td>
<td>No action required</td>
</tr>
<tr>
<td>be on-site or on-call</td>
<td>No action required</td>
</tr>
<tr>
<td>Replacement batteries “age” even when on the shelf, so a continual purchasing</td>
<td>No action required</td>
</tr>
<tr>
<td>process must be developed and implemented</td>
<td>No action required</td>
</tr>
<tr>
<td>Lithium-ion batteries must be properly disposed. A process to dispose of the</td>
<td>No action required</td>
</tr>
<tr>
<td>hazardous material must be created, staffed, and funded</td>
<td>No action required</td>
</tr>
</tbody>
</table>

Adaptec Flash Module 700 (AFM-700)

Why to buy
The Adaptec Flash Module 700 (AFM-700) provides Zero-Maintenance Cache Protection (ZMCP) for Adaptec Series 8, Series 8Q/8ZQ (12Gb/s) and Series 7 and Series 7Q (6Gb/s) RAID adapters to protect data in the controller cache without incurring monitoring, maintenance, replacement, or disposal costs.

Customer Needs
Solutions that require advanced protection of data and reduced Total Cost of Ownership (TCO).

Compatible Products
12Gb/s RAID Adapters
• Adaptec RAID 8885
• Adaptec RAID 8805
• Adaptec RAID 8405
• Adaptec RAID 81605Z (flash backup embedded)
• Adaptec RAID 8885Q (included)
• Adaptec RAID 81605ZQ (flash backup embedded)

6Gb/s RAID Adapters
• Adaptec RAID 72405
• Adaptec RAID 78165
• Adaptec RAID 71685
• Adaptec RAID 71605
• Adaptec RAID 7805Q (included)
• Adaptec RAID 7805Q (included)

Operating Temperature
0°C to 50°C (with 200 LFM airflow)

Operating Current
In addition to the operating currents for the adapters listed below, the AFM-700 typically draws 500mA during its initial charge cycle. No further power is required once the super capacitor is fully charged.

12Gb/s RAID Adapters
ASR-8405/8805/8885/8885Q: 1.0A@3.3V and 1.1A@12V
ASR-81605ZQ/81605Z: 1.5A@3.3V and 1.0A@12V

6Gb/s RAID Adapters
ASR-7805/7805Q: 0.1A@3.3V and 1.5A@12V
ASR-71605/71605Q: 0.1A@3.3V and 1.6A@12V
ASR-71685/72405: 0.1A@3.3V and 1.8A@12V
ASR-78165: 1.1A@3.3V and 1.3A@12V

Cable Length
Cable connected to the AFM-700: ~7 inches; extension cable: ~18 inches

Regulatory Certification
CE, FCC, UL, C-tick, VCCI, KCC

Environmental Compliance
RoHS

Typical Lifespan
5 years at 50°C

Warranty
3 years

Part Number
2275400-R