

Experience a New Breed of Speed



*"First they ignore you, then they laugh at you,  
then they fight you, then you win."*

—Gandhi

## Measuring Performance Accurately

### 3ware® 9650SE vs. Adaptec Unified Serial™ RAID 31605

Adaptec's report, "Measuring Performance that Matters to End-Users" (P/N: Printed in U.S.A. 09/07 4900\_1.3) is an attempt to confuse you with clumsy slight of hand and double talk. The tested environments included OLTP, File Server and Web Server which are more traditionally SCSI's domain and workstation, all with 16 drives. A 16-drive configuration, however, is not representative of workstation environments. Higher SATA drive counts are more typically found in storage appliances where sequential performance is king. Adaptec did not test storage appliance workloads, 3ware did. "Real world" SATA performance benchmarking should always include sequential testing. The vertical spaces for which SATA is specifically designed: disk-to-disk backup, video and surveillance, scientific research, HPC, video content editing for broadcast and video streaming applications for theaters and hotels, rely on sequential performance, or a combination of sequential and random performance. That is where SATA sells and where 3ware excels.

Adaptec decries striving for "ideal" performance numbers which "are good for (3ware) press releases and headlines." They want numbers that reflect actual workloads that a controller will only "need to handle." With the 3ware 9650SE you get both: bragging rights and considerably better "real-world" performance.

### Data Protection and Performance Matters to 3ware

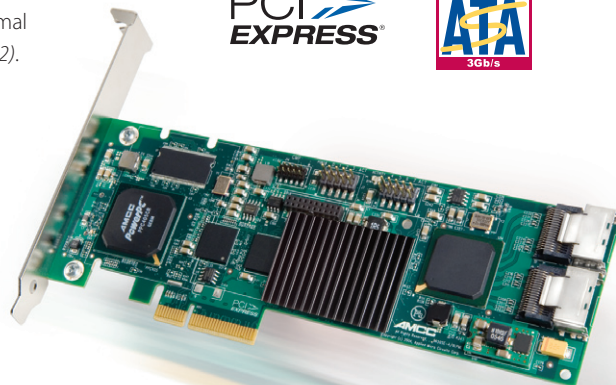
3ware RAID controllers can be (uniquely) set to provide maximum performance, or maximum protection, or set to deliver a balance of both performance and protection. This is a feature. It is called StorSave™ Profile (*figure 5*). Adaptec does not have this feature; with Adaptec: what you see is what you get.

The StorSave Profile default setting for 3ware controllers is "Protection Mode." The 3ware engineers believe the "Protection Mode" setting is the responsible default setting for a RAID controller. 3ware is a RAID company. Customers rely on 3ware controllers to primarily protect data. If, in the real world, maintaining the highest performance while still enjoying robust protection is the goal, the controller should be set to "Performance Mode."

Adaptec tested the 3ware controller for performance in Protection Mode and represented the results as 3ware's best attainable performance. Still, Adaptec reported the 9650SE to deliver performance to well within 5% of their controller in most cases. However, when 3ware controllers are set to Performance Mode they outpace the competition, even Adaptec, both in the lab and on the street.

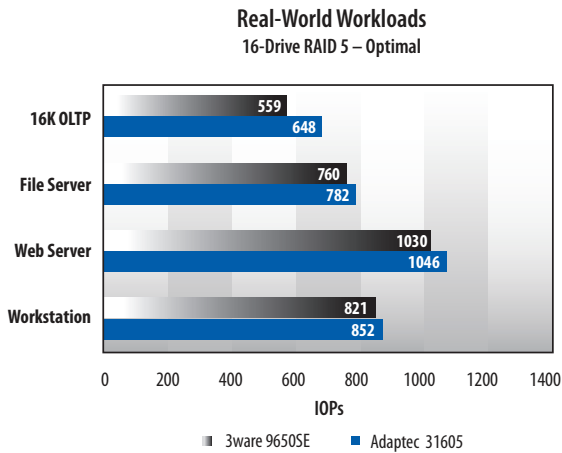
3ware test engineers tried to exactly duplicate the Adaptec benchmark scenarios, but due to slightly different equipment the two sets of results vary slightly. We saw dramatically better numbers for the 3ware controller in Performance Mode and actually squeezed a little more out of the Adaptec controller. Your test results will vary too, but when the two controllers are tested on equal footing, the 3ware controller prevails.

We benchmarked the same workloads that Adaptec chose to test: OLTP, File Server, Web Server, and Workstation (*figure 1*). Then we measured sequential reads and writes under optimal conditions because the sequential world is SATA's true real-world environment (*figure 2*). We tested read and write performance both during rebuild and in degraded modes (*figure 3*) and compared the two controllers in rebuild time (time-to-optimal) (*figure 4*). Our tests yielded consistent, predictable results.



# RAID 6

## Adaptec Test Results



## 3ware Test Results

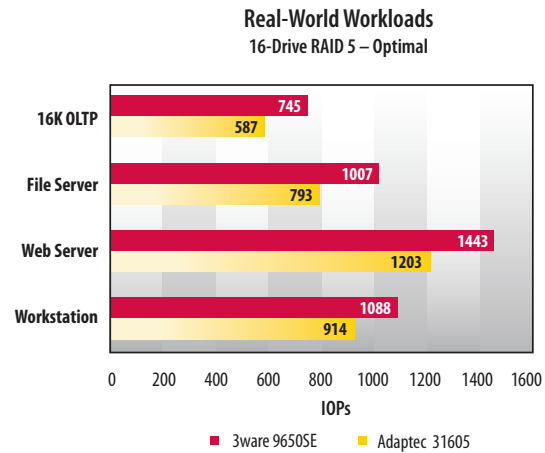
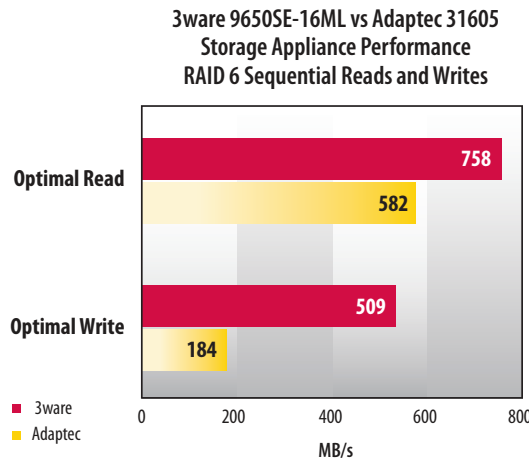


Figure 1: Adaptec reported (left) that the 3ware 9650SE, while in Protection Mode, delivers RAID 5 performance to well within 5% of their controller in most cases. When the 3ware 9650SE-16ML is set to Performance Mode (right) it walks away from Adaptec's reported results in every metric tested. RAID 6 yields similar results.

## Adaptec Did **NOT** Test Sequential Reads and Writes



### Storage appliances are SATA RAID mainstays.

They are scalable, cost & performance optimized standalone computing devices that assume storage-related functions traditionally performed by general purpose servers. Storage appliances may perform backups, handle license or storage management, or perform file and volume access control for the storage.

Figure 2: We measured sequential reads and writes under optimal conditions because the sequential world is SATA's true real-world environment. The 3ware 9650SE -16ML made short work out of Adaptec's offering.

## Adaptec Did **NOT** Test Data Availability Under Stress

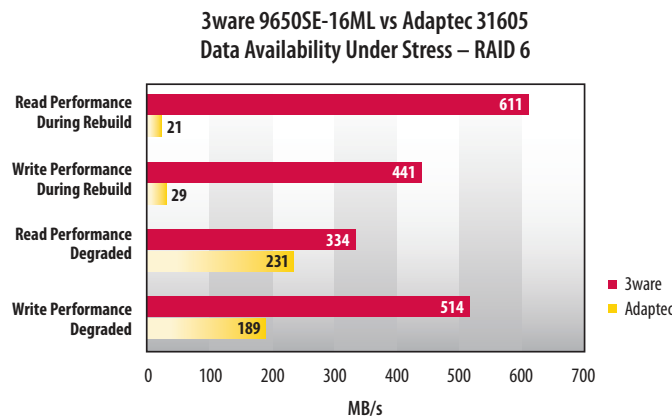
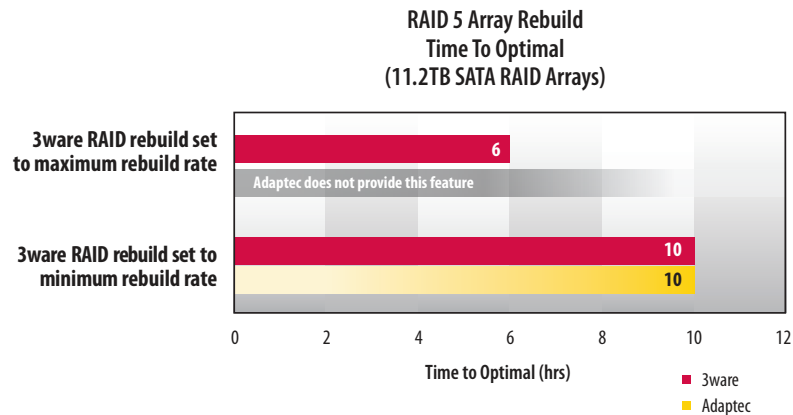


Figure 3: Pure controller read and write performance was measured under two RAID stress scenarios: during rebuild and in degraded mode. Maximum performance under these conditions is important because slower access to data under stress will impact system performance and could result in loss of business, loss of streaming data capabilities and slower backup times.



**Figure 4:** 3ware RAID controllers have user selectable controls that concentrate processing power on either the rebuild or on data transfers. Users select which is more important: returning the array to optimal or accessing data. The 3ware 9650SE-16ML, set to the slowest rebuild setting, equaled the rebuild time of the 31605. When set to the fastest rebuild rate, the 3ware 9650SE got the job done 40% faster than Adaptec.

## Conclusion:

StorSave, 3ware’s combination of powerful reliability enhancements and a Battery Backup Unit (BBU) maximizes data protection without sacrificing performance. Adaptec boasts that their controllers are specifically tuned to enhance performance, but they did not bother to flip the performance switch on the 3ware 9650SE-16ML for their head-to-head performance testing. 3ware flipped the switch and the results were telling.

AMCC encourages all RAID users to test their specific applications and/or performance simulations and re-test to verify results. We are confident that the 3ware SATA II RAID controllers will outperform the Adaptec 31605 RAID controllers under equalized conditions.

## About the 3ware 9650SE Product Family

The 3ware 9650SE PCI Express to SATA II RAID controller pushes AMCC’s established leadership in RAID controller performance to new heights.

The 3ware 9650SE offers a comprehensive line of PCI Express controllers, available in both low profile and half card footprints with 2-, 4-, 8-, 12-, 16-, and 24-port configurations. Supported RAID levels include 0, 1, 5, 6, 10, 50, Single Disk, and JBOD.

The 3ware 9650SE’s advanced RAID features, SATA II connectivity and powerful 3ware performance architecture make it the ideal controller for vertical applications that require the highest levels of sustained read and write performance.





## 3ware 9650SE Product Selector Guide

|                       | 9650SE-2LP              | 9650SE-4LPML                   | 9650SE-4LPME          | 9650SE-8LPML                          | 9650SE-12ML                           | 9650SE-16ML                           | 9650SE-24M8                           |
|-----------------------|-------------------------|--------------------------------|-----------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| <b>Form Factor</b>    | Low profile             | Low profile                    | Low profile           | Low profile                           | Full height                           | Full height                           | Full height                           |
| <b>Port Count</b>     | 2                       | 4                              | 4                     | 8                                     | 12                                    | 16                                    | 24                                    |
| <b>PCI Express</b>    | x1                      | x4                             | x4                    | x4                                    | x8                                    | x8                                    | x8                                    |
| <b>RAID Levels</b>    | 0, 1, Single Disk, JBOD | 0, 1, 5, 10, Single Disk, JBOD | 0, 1, 5, 10, JBOD     | 0, 1, 5, 6, 10, 50, Single Disk, JBOD | 0, 1, 5, 6, 10, 50, Single Disk, JBOD | 0, 1, 5, 6, 10, 50, Single Disk, JBOD | 0, 1, 5, 6, 10, 50, Single Disk, JBOD |
| <b>Onboard Memory</b> | 128MB DDR2 533          | 256MB DDR2 533                 | 256MB DDR2 533        | 256MB DDR2 533                        | 256MB DDR2 533                        | 256MB DDR2 533                        | 512MB DDR2 533                        |
| <b>Connector Type</b> | Discrete                | Multi-lane                     | Multi-lane (external) | Multi-lane                            | Multi-lane                            | Multi-lane                            | Multi-lane                            |
| <b>BBU Support</b>    | No                      | Yes                            | Yes                   | Yes                                   | Yes                                   | Yes                                   | Yes                                   |

## StorSave Profile Definitions (Page 113, Table 9, 3ware Serial ATA RAID Controller User Guide)

|                                 | Protection (Default)   | Balanced   | Performance                                   |
|---------------------------------|--|--|---|
| <b>Definition</b>               | Maximum data protection, but slower performance                    | More data protection than Performance but less data protection than Protection | Maximum performance, but less data protection |
| <b>FUA (Force Unit Access)</b>  | Honor FUA (If no BBU is present)<br>Ignore FUA (If BBU is present) | Honor FUA (If no BBU is present)<br>Ignore FUA (If BBU is present)             | Ignore FUA                                    |
| <b>Write Journaling</b>         | Enabled  | Disabled, if no BBU present<br>(Enabled, if BBU is present)                    | Disabled if BBU is present                    |
| <b>Disable Cache on Degrade</b> | Enabled  | Disabled   | Disabled                                      |

Figure 5: 3ware's revolutionary combination of powerful reliability enhancements and BBU maximizes data protection without sacrificing performance.

StorSave permits the user to select appropriate levels of performance vs. protection on a "per unit" (array) basis.

This allows for maximum system flexibility and can greatly improve an array's performance characteristics.

For more information on the features and benefits of StorSave please see 3ware's StorSave Tech Brief at:

[http://www.3ware.com/products/pdf/StorSave\\_TechBrf\\_0215b.pdf](http://www.3ware.com/products/pdf/StorSave_TechBrf_0215b.pdf)

## 3ware Test Bed System Configuration

|                          |  |
|--------------------------|--|
| <b>Motherboard:</b>      | Super Micro X7DBE  |
| <b>Processor:</b>        | Dual Intel Xeon 5150 @ 2.66GHz   |
| <b>Memory:</b>           | 3GB RAM DDR 566  |
| <b>Test Hard Disks:</b>  | ST3750640NS - Seagate 750GB ES series , 16 MB Cache, 7200 RPM  |
| <b>RAID Level:</b>       | Write back, RAID 5 and 6 (read ahead caching enable on Adaptec)  |
| <b>Operating System:</b> | Windows 2003 SP2 (32-bit)  |
| <b>Testing Tool:</b>     | Iometer 2006.7.27  |
| <b>Stripe Size:</b>      | Controller shipping default (64K)  |
| <b>Block Size:</b>       | 16K for OLTP and 8K for Workstation; 64K for sequential  |
| <b>Controller:</b>       | 1. AMCC 3ware 9650SE-16ML (9.4.2 codeset) fw = 3.08.00.016<br>2. Adaptec RAID 31605 fw = 15323 (Driver: 5.2.0.15317 dated: 10/21/07) |



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