



# **Series 8 Performance in a Windows Environment**

**Adaptec® RAID 81605ZQ vs.**

**LSI MegaRAID 9361-8i**

**White Paper**

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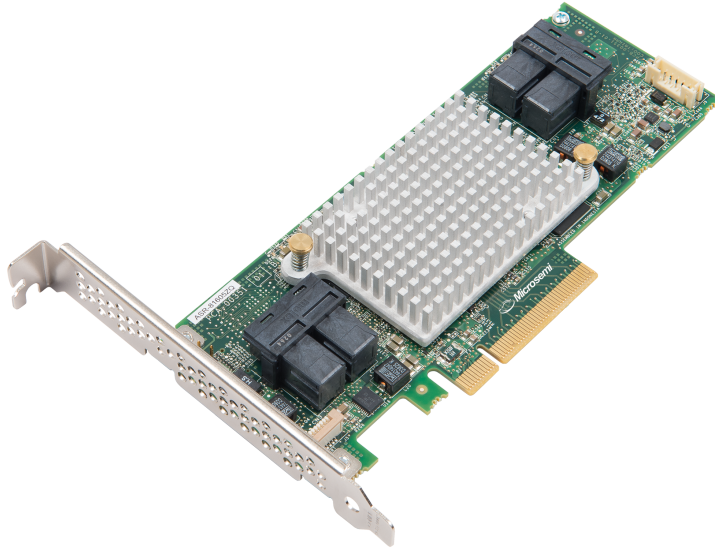
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## Introduction

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The Microsemi Adaptec® Series 8 family of 12 Gbps PCIe Gen3 high port count SAS/SATA RAID adapters is the fastest-performing, highest port-count solution in the industry. With the ability to connect directly up to 16 drives, Series 8 eliminates the need for an expander backplane in many use scenarios, which removes compatibility issues, reduces latency, cost, and complexity from the server environment while improving overall system performance.

**Figure 1 • Series 8 8160ZQ SAS/SATA RAID Adapter**



Some storage environments, however, require an adapter to connect to more than 16 drives. In such cases, an expander backplane is needed.

To measure the performance benefits of high native port count in an expander backplane scenario, we tested the 16-port Adaptec RAID 81605ZQ adapter against the 8-port LSI MegaRAID 9361-8i adapter in a series of real-world workload scenarios.

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## Testing Methodology

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### Adapter Specifications

Both adapters were tested straight from the box with no modifications or upgrades. The published specs for each adapter are:

#### Adaptec RAID 81605ZQ:

- 16 internal native SAS/SATA ports in an LP/MD2 form factor
- Data transfer speed: 12 Gbps per port
- Host bus type: PCIe Gen3 x8
- Four HD Mini-SAS SFF8643 (Horizontal and Vertical mount)
- Cache Protection: Flash backup circuitry embedded with a supercapacitor
- Cache memory: 1024 MB DDR3-1600 MHz DRAM
- Supported RAID level: Simple Volume, RAID levels 0,1, 10, 1E, RAID 5, 6, 50, 60, Hybrid RAID 1, 10
- Support Pass through device and HBA mode
- Support for up to 256 SAS and SATA devices
- MaxCache plus SSD Read & Write Caching (Included)

#### LSI MegaRAID 9361-8i:

- 8 internal native SAS/SATA ports in an LP/MD2 form factor
- Data transfer speed: 12 Gbps per port
- Host bus type: PCIe Gen 3x8
- Two HD Mini-SAS SFF8643 (Horizontal mount)
- Cache Protection: CacheVault Flash Module LSICVM02 (Optional)
- Cache memory: 1GB 1866MHz DDRIII SDRAM
- Supported RAID levels 0, 1, 5, 6, 10, 50, and 60
- Support for up to 128 SAS and SATA devices
- SSD Read & Write Caching (Optional)

### System Platform

- System: Intel Grizzly Pass R2600GZ Server System
- Board: Intel S2600G (Z/L) Server Board
- System BIOS Version: 1.06.0001
- ME firmware: 2.01.05.107
- BMC firmware: 1.16.4010
- FRUSDR: 1.06
- CPU: (Single CPU) Intel XEON E5-2680 (Sandy Bridge)
- Cores: 8
- HyperThread: Disabled
- Frequency: 2.7Ghz
- Total memory: 16 GB
- Memory speed: DDR3-1333
- Operating system: Microsoft Windows 2012 Server Edition, 64-bit

**Code Used****Adaptec RAID 81605ZQ SAS 12 Gbps:**

- Firmware: B30855
- Driver: B30850 Windows
- BIOS version: B30855
- MSM: B20853

**LSI MegaRAID 9361-8i SAS 12 Gbps:**

- Firmware: 24.0.2-0013
- Driver: 6.600.25.00
- Bios version: MR 6.0.1
- MSM: 13.04.03.01

**Number of Ports Used**

- Adaptec RAID 81605ZQ: 16 ports: Maximum connections, 4x expander/ 1x deep
- LSI MegaRAID 9361-8i: 8 ports: Maximum connections, 4x expander/ 2x deep

**Expander Backplane Configuration**

- Backplane: Supermicro SAS2-216EL2 24bay Dual SAS
- 6.0 Gbps LSI Expander Backplane
- Adaptec Connection: 4 SAS links per expander – 16 total
- SAS links (Connector 0,1,2,3)
- LSI Connection: 4 SAS links per expander – 8 total SAS links (Connector 0,1)

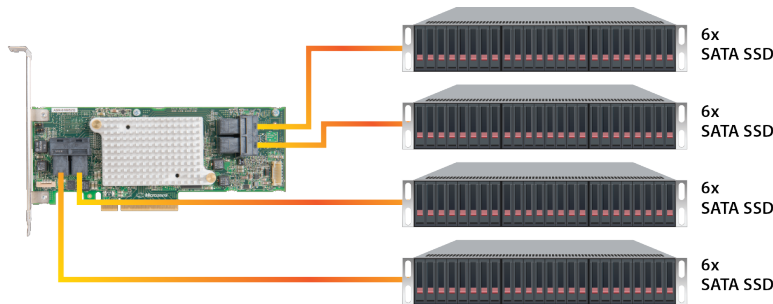
## Results

### 24x SATA SSD Configuration

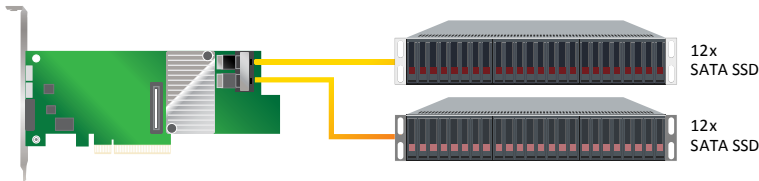
This scenario was built on 24 6 Gbps OCZ Deneva “R” Series SLC SATA SSDs, each with a 50 GB capacity (Model D2RSTK251S14-005, Firmware version 3.20E).

The Adaptec platform was configured with 4 enclosures of 6 drives each, 1 enclosure deep on 16 lanes (Figure 2). The LSI platform was configured with 2 enclosures of 12 drives each, 1 enclosure deep on 8 lanes (Figure 3).

**Figure 2 • Adaptec RAID 81605ZQ 24x SATA SSD Configuration**



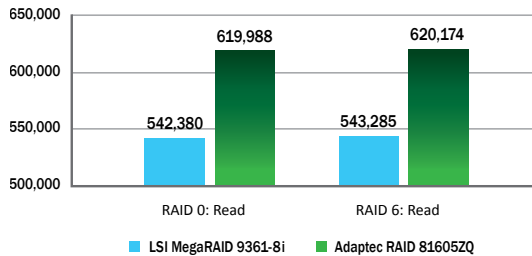
**Figure 3 • LSI MegaRAID 9361-8i 24x SATA SSD Configuration**



### 24x SATA SSD Performance

The Adaptec 81605ZQ delivers 14% higher random read IOPs than the LSI MegaRAID 9361-8i (Figure 4).

**Figure 4 • SATA SSD Random Reads IOPs Performance<sup>1</sup>**

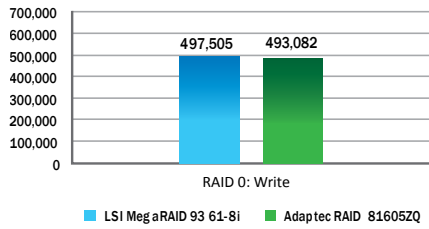


**Note:**

1. Read performance based on 4KB random reads at queue depth of 256 workloads.

In RAID 0, the Adaptec 81605ZQ offers slightly lower performance (about 1%) than the LSI 9361-8i (Figure 5).

**Figure 5 • SATA SSD Random Writes IOPs Performance, RAID 0<sup>1</sup>**

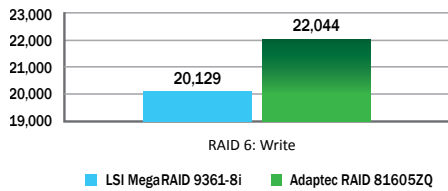


**Note:**

1. Write performance based on 4KB random writes at queue depth of 256 workloads.

When the complexity of the RAID reaches RAID 6, which can support up to two drive failures, the 81605ZQ delivers 10% higher IOPs than the 9361-8i (Figure 6).

**Figure 6 • SATA SSD Random Writes IOPs Performance, RAID 6<sup>1</sup>**

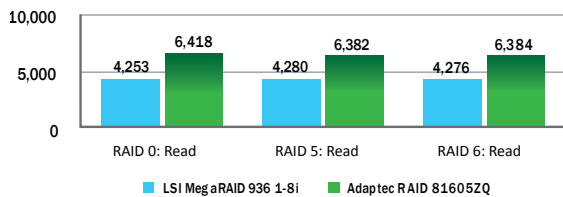


**Note:**

1. Write performance based on 4KB random writes at queue depth of 256 workloads.

In streaming reads, the Adaptec 81605ZQ delivers 50% higher throughput than the LSI 9361-8i (Figure 7).

**Figure 7 • SATA SSD Streaming Reads MBPs Performance<sup>1</sup>**

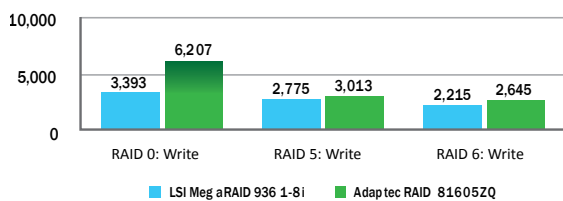


**Note:**

1. Read performance based on 1MB streaming reads at queue depth of 256 workloads.

In streaming writes MBPs, the Adaptec 81605ZQ outperforms the LSI 9361-8i by 9% in RAID 5, by 19% in RAID 6, and by 83% in RAID 0 (Figure 8).

**Figure 8 • SATA SSD Streaming Writes MBPs Performance<sup>1</sup>**



**Note:**

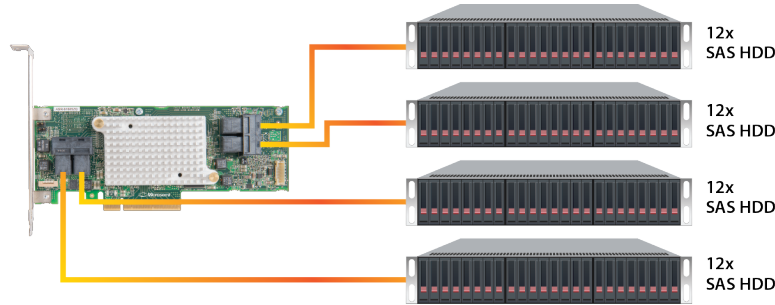
1. Write performance based on 1MB streaming writes at queue depth of 256 workloads.

## 48x SAS HDD Configuration

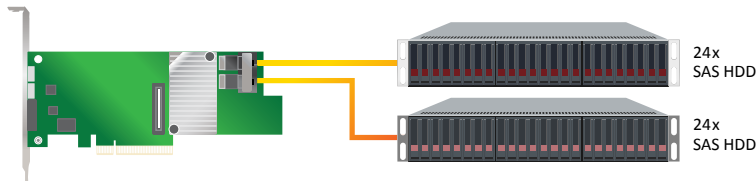
This scenario was built on 48 6 Gbps Seagate Savvio 15K.3 SAS HDDs, each with a capacity of 146 GB (Model ST9146853SS, Firmware version 0002).

The Adaptec platform was configured with 4 enclosures of 12 drives each, 1 enclosure deep on 16 lanes (Figure 9). The LSI platform was configured with 2 enclosures of 24 drives each, 1 enclosure deep on 8 lanes (Figure 10).

**Figure 9 • Adaptec RAID 81605ZQ 48x SAS HDD Configuration**



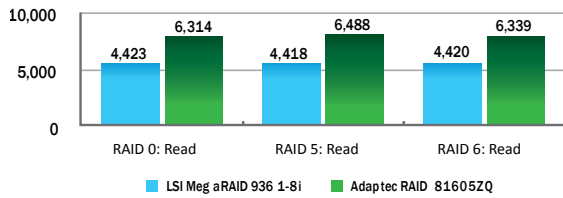
**Figure 10 • MegaRAID 48x SAS HDD Configuration**



## 48x SAS HDD Performance

The Adaptec 81605ZQ outperforms the LSI 9361-8i in streaming reads by 44% (Figure 11).

**Figure 11 • SAS HDD Streaming Reads MBPs Performance<sup>1</sup>**



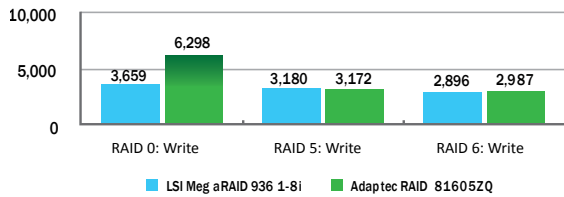
**Note:**

1. Read performance based on 1MB streaming reads at queue depth of 256 workloads.

In streaming writes, the Adaptec 81605ZQ slightly outperforms the LSI 9361-8i in RAID 6 offers 70% higher throughput in RAID 0 (Figure 12).



**Figure 12 • SAS HDD Streaming Writes MBPs Performance<sup>1</sup>**



**Note:**

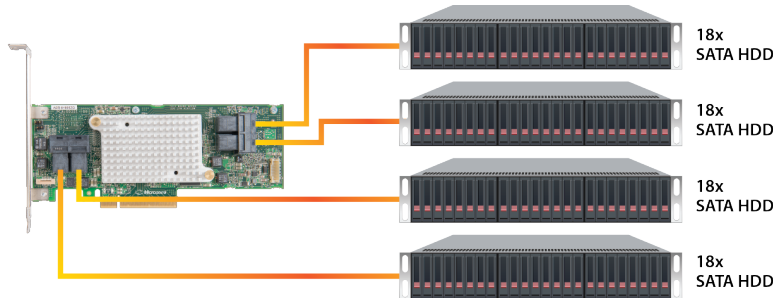
1. Write performance based on 1MB streaming writes at queue depth of 256 workloads.

## 72x SATA HDD Configuration

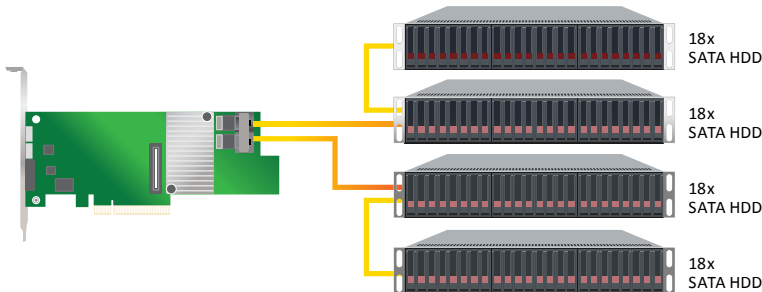
This scenario was built on 72 6 Gbps Seagate Constellation. 2 SATA HDDs, each with a capacity of 500 GB (Model ST9500620NS, Firmware version SN03).

The Adaptec platform was configured with 4 enclosures of 18 drives each, 1 enclosure deep on 16 lanes (Figure 13) while the LSI platform was configured with 4 enclosures of 18 drives each, 2 enclosures deep on 8 lanes (Figure 14).

**Figure 13 • Adaptec RAID 81605ZQ 72x SATA HDD Configuration**



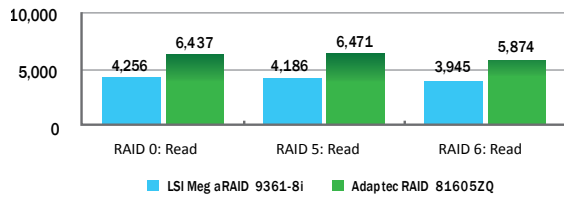
**Figure 14 • LSI MegaRAID 9361-8i 72x SATA HDD Configuration**



## 72x SATA HDD Performance

In streaming reads, the Adaptec 81605ZQ delivers 52% higher throughput than the LSI 9361-8i. (Figure 15)

**Figure 15 • SATA HDD Streaming Reads MBPs Performance<sup>1</sup>**

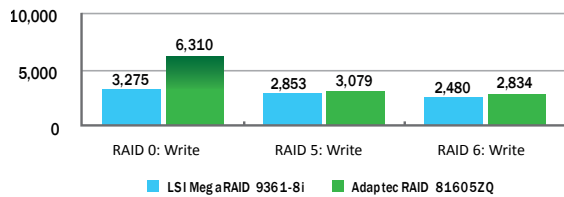


**Note:**

1. Read performance based on 1MB streaming reads at queue depth of 256 workloads.

In RAID 5 and 6 streaming writes, the Adaptec 81605ZQ delivers an average of 11% higher throughput than the LSI 9361-8i. In RAID 0, the 81605ZQ outperforms the 9361-8i by 93% (Figure 16).

**Figure 16 • SATA HDD Streaming Writes MBPs Performance<sup>1</sup>**



**Note:**

1. Write performance based on 1MB streaming writes at queue depth of 256 workloads.

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## Conclusion

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In head-to-head testing of real-world storage workload scenarios, the Adaptec RAID 81605ZQ with 16 native ports outperforms the 8-port LSI MegaRAID 9361-8i:

Workload Scenario	Winner	Performance Advantage
SATA SSD	Adaptec	<ul style="list-style-type: none"> <li>• 14% more IOPs in random reads</li> <li>• 10% more IOPs in RAID 6 random writes</li> <li>• 50% higher MBPs in streaming reads</li> <li>• 83% higher MBPs in RAID 0 streaming writes</li> <li>• 19% higher MBPs in RAID 6 streaming writes</li> </ul>
SAS HDD	Adaptec	<ul style="list-style-type: none"> <li>• 44% higher MBPs in streaming reads</li> <li>• 70% higher MBPs in RAID 0 streaming writes</li> </ul>
SATA HDD	Adaptec	<ul style="list-style-type: none"> <li>• 52% higher MBPs in streaming reads</li> <li>• 93% higher MBPs in RAID 0 streaming writes</li> <li>• 11% higher MBPS in RAID 5 and RAID 6 streaming writes</li> </ul>



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