



# High-Performance Shared Storage For Media and Entertainment with Maxx Digital and Solarflare

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Advancements including richer content, higher video resolution and increases in frame rate are driving bandwidth requirements of next generation high performance video editing systems. But the critical criteria is the ability to effectively pull multi-stream 2K and uncompressed HD Video formats including 1080 to post-production editing stations from scalable shared storage and to do so at high transfer rates without dropping frames. Additionally these solutions must be easily configured and reliable, and must support the Mac and OS X.

Maxx Digital, a leading integrator of solutions for video / audio editing and data storage in the media and entertainment industry, delivers on these requirements with a new watermark in high performance video editing shared storage based on the Evo 6G 8 Bay storage array and Solarflare 10GbE server adapters with OS X driver support.

## Start With the Fastest Performance Storage

The primary requirement of any high performance shared storage solution is the raw throughput performance of the storage array and the Maxx Digital Evo 6G 8 Bay is ideal for any business that needs the highest quality of data storage and performance. With the capability to be daisy chained with up to 15 other Evo 6G 8 Bay units, the 24TB storage can be turned into a massive 384TB media store. The Evo 6G 8 Bay includes:

- Handling data transfer at speeds of 900MB/s
- Supports DV, HDV, ProRes 422 Standard & ProRes 422HQ, DVCPRO HD, HD 8-bit and 10-bit uncompressed, and Standard HD and Extra HD video modes such as 2k and 4k
- Standard high-end creative software with no loss of transfer rates
- Silent Fan Technology, cutting out any mechanical noise and giving the level of quiet ideal for the audio and video recording environment

When used with the Areca 1882X SAS 6G RAID Controller, AJA System Test benchmark results using the 2048x1556 10-bit RGB video frame size resulted in write speeds of over 900MB/s and read speeds of over 700MB/s.

## Add High Performance Networking

Ethernet and TCP/IP remains the most dominant and understood networking technology that is both easily configured and managed, and widely supported with multiple storage protocols for shared storage applications. For the media and entertainment industry, the Mac and OS X is the primary platform for post-production video editing and the preferred file services protocol is the Apple Filing Protocol (AFP).

To increase the network bandwidth, some solutions have used link aggregation to combine multiple 1GbE (Gigabit Ethernet) links. However, for higher performance and reliability required for multi-stream 2K or uncompressed HD Video formats including 1080 file transfers, the Maxx Digital shared storage solution uses 10GbE with an LG-Ericsson 10GbE switch and Solarflare 10GbE server adapters and OS X drivers.

SolarflareSolutionBrief

[sales@solarflare.com](mailto:sales@solarflare.com)

US 1.949.581.6830 x2000

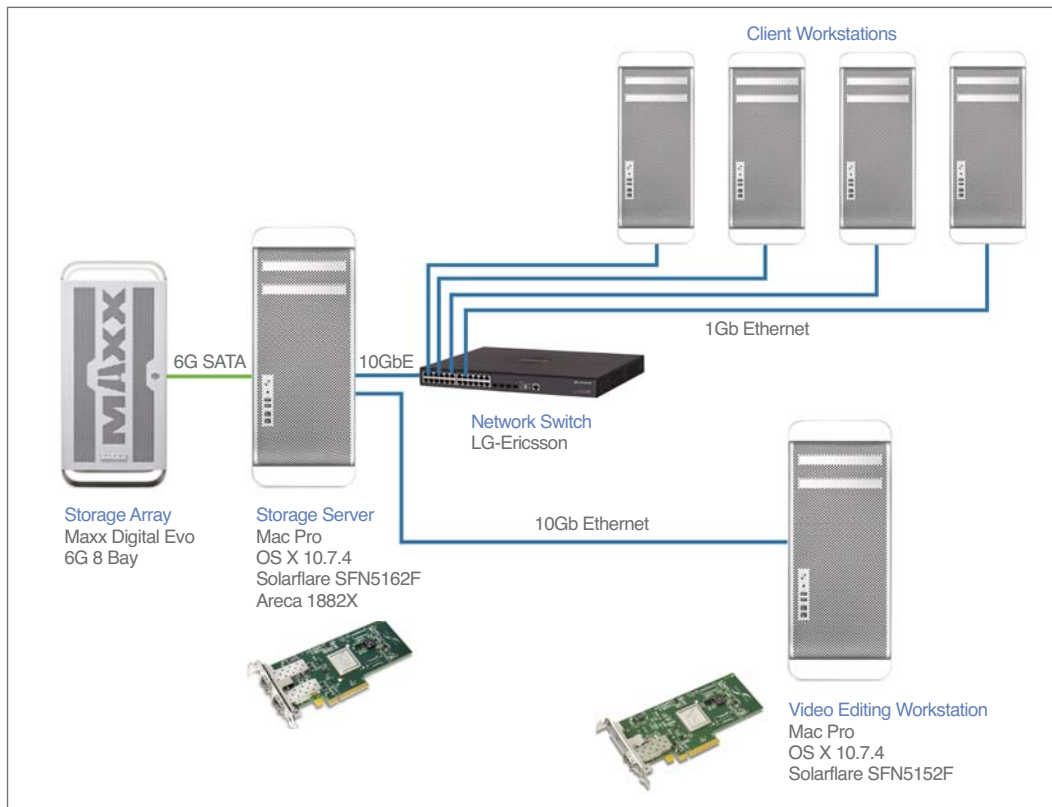
UK +44 (0)1223.518040 x5530

[www.solarflare.com](http://www.solarflare.com)

The Solarflare 10GbE adapters are designed to provide high-performance and low-latency in the most demanding applications and virtualization environments delivering 40Gbps of full, bidirectional line-rate throughput. The Solarflare 10GbE adapters and the OS X driver include:

- Cut-through architecture/intelligent interrupt coalescing
- Large Receive Offload: TCP receive frame coalescing to reduce CPU utilization and improve TCP throughput
- Large Sendoff Offload: TCP transmit segmentation to reduce CPU utilization and improve TCP throughput
- Checksum offloads: IPv4, TCP and UDP
- MSI Interrupts
- Standard 1500 byte and jumbo 9000 byte MTU

For a common Maxx Digital high performance video editing shared storage configuration, as shown in Figure 1 below, the Maxx Digital storage server, through a Solarflare 10GbE server adapter port, is connected to a high performance video editing workstation. The Maxx Digital storage server is also connected through the other 10GbE server adapter port to a 10GbE port on the LG-Ericsson switch for fan out to 1GbE clients typically running at 90-100 MB/sec for reading and writing compressed video formats for editing and storage.



**Figure 1. High Performance Video Editing Shared Storage.**



## Tuning and Testing

The three primary components of the Maxx Digital shared storage solution plus the client workstation are identified below.

Shared Storage Solution	Details
Storage Array	Maxx Digital Evo 6G 8 Bay
Storage Server	Mac Pro OS X 10.7.4 Apple Filing Protocol (AFP) Solarflare SFN5162F Dual-Port SFP+ Performant 10GbE Server Adapter Areca 1882X SAS 6G RAID Controller
Network	LG-Ericsson Ethernet Switch
Client Workstation	Mac Pro OS X 10.7.4 Solarflare SFN5152F Single-Port SFP+ Performant 10GbE Server Adapter

## AJA System Test Benchmark

Benchmarking was conducted using the AJA System Test benchmark tool available at [www.aja.com/en/products/software](http://www.aja.com/en/products/software).

The AJA System Test result for a 2048x1556 10bit-RGB video frame size at a 1.0 GB file size running on AFP showed a read performance with jumbo frames in excess of 400 MB/s and write performance with jumbo frames in excess of 500 MB/s. This result verifies that the Maxx Digital shared storage solution including the Maxx Digital Evo 6G 8 Bay storage array, the Areca 1882X SAS 6G RAID controller, the LG-Ericsson Ethernet switch, and the Solarflare 10GbE server adapters with OS X drivers meets the requirements for a high-performance video editing system supporting multi-stream 2K and uncompressed HD Video formats, including 1080.

## Tuning Parameters

For many applications including the AJA System Test, tuning the OS X network stack for 10GbE operation can improve network performance by applying the following settings in the `/etc/sysctl.conf` file:

```
kern.ipc.maxsockbuf=4194304
net.inet.tcp.sendspace=2097152
net.inet.tcp.recvspace=2097152
net.inet.tcp.delayed_ack=2
```

In addition, delayed acknowledgements was disabled in the client workstation `/etc/sysctl.conf` file with

```
net.inet.tcp.delayed_ack=0
```

And the MTU was set to jumbo frames (9000 bytes) on both the client workstation and the storage server.

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