

S2A6620 xStreamScaler

Modular File Storage for Real-Time
Broadcast Media HD Workflows

DataDirect
NETWORKS 

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Introduction

Whether performing post-production for a feature-length film or TV series, creating commercials, reporting on news and entertainment, broadcasting sports programming or hosting and delivering real-time streaming video - organizations working with digital media are facing serious challenges when it comes to storage. The volume and size of images, audio, and video being created, stored, and served is exploding, fueled not only by the digitization of virtually all film and video and moving it to higher resolution formats but by consumers all over the world watching video on a variety of devices and contributing to the burgeoning social networking sites.

More content is being kept online and will remain online for increased periods of time, especially by news organizations that often need immediate access to archived video clips. Streaming video and post-production in HD, 2K, and 4K resolutions; 3-D animation and visualization; cable and broadcast playout; video-on-demand (VoD); IPTV; and near-line storage and media asset management are all driving the need for responsive storage that delivers exceptional performance, massive capacity, uncompromising reliability, and scalability. As file sizes and resolutions increase, the storage and data access issues facing digital media companies will likewise escalate.

Understanding the competing requirements of these applications, an ideal media storage system must meet the following criteria:

- A single, shared namespace capable of containing all online and archived content
- Parallel, real-time performance for all applications and systems that are part of the workflow
- Scalable capacity to retain all digital content at minimal cost and maximum availability
- Easy-to-use, cost-effective and transparent to the creative staff

Modular Requirements for SD & HD Broadcast Workflows

According to Coughlin Associates, in 2009 the average television broadcast & cable television facility will deploy a sub-\$200,000 networked storage solution to power their tape-less workflow¹. As a result, the need for scalable, high-performance storage to power real-time workflows is clearly correlated to the need for storage solutions with modest price tags at an attractive entry-point.

Between 2008 and 2009, the number of organizations broadcasting in High Definition (HD) will increase by over 30%. In 2010, over 90% of all broadcasters worldwide will be broadcasting in HD format. This evolution from Standard Definition (SD) to HD will

¹ Coughlin Associates: 2009 Digital Storage for Media and Entertainment Report

impact production storage environments across the broadcast industry in a number of dimensions:

- HD content requires 833% more storage capacity/hour of than SD content – dramatically expanding capacity requirements
- HD video streams demand 8x the throughput of SD streams – requiring substantially faster infrastructure
- As more and more technology is added into real-time workflows (ad insertion, non-linear editors, asset managers) the demands on centralized storage become increasingly conflicting – escalating the need for solutions which can handle concurrent operations. Proper storage provisioning is key to ensuring guaranteed quality of service and elimination of video frame dropping.

DataDirect Networks xStreamScaler Solution for Digital Media

Built upon DDN's mid-range Silicon Storage Architecture™ (S2A™) technology, the S2A6620 xSTREAMScaler File Storage system virtualizes media file storage infrastructure to provide a single, scalable storage space to applications for low and high-resolution media workflows. DDN xStreamScaler systems combine intelligent, scalable file system technology with DataDirect Networks high-speed storage arrays, forming the foundation for scalable, cost-effective file storage systems for today's digital, file-based media workflows. DDN storage systems provide unparalleled storage performance combined with unique features designed to eliminate data corruption events and intelligently heal from failure events to minimize performance degradation.

DDN storage systems enable today's digital media workflows to capture and serve massive amounts of high-resolution digital and streaming content, provide shared, ultra-fast access to a common pool of data, and minimize data center footprint and storage costs for enormous archives. As the storage provider of choice for more than 450 digital media companies worldwide, DataDirect Networks has a thorough understanding for the needs of digital media professionals and the ability to deploy the right-sized, turn-key solution for any media workflow.

Worldwide, many of the largest broadcast workflow systems manufacturers depend on DDN storage solutions as the underlying data store which powers ingest/acquisition, edit and playout systems. Companies such as Sony, Dalet, Seachange, SGI and other organizations have incorporated DDN technology into their respective offerings in response to market demand for high performance, capacity-optimized data storage. These companies share data with the xStreamScaler file storage system across a heterogeneous mix of SAN and LAN clients all accessing a common, scalable namespace.

Fastest Entry-Level Midrange Array

Highly Optimized RAID SW, Multi-Streaming
2GB/s Throughput
350,000 Cache IOPS, 30,000 to Disk

Industry-Leading Density

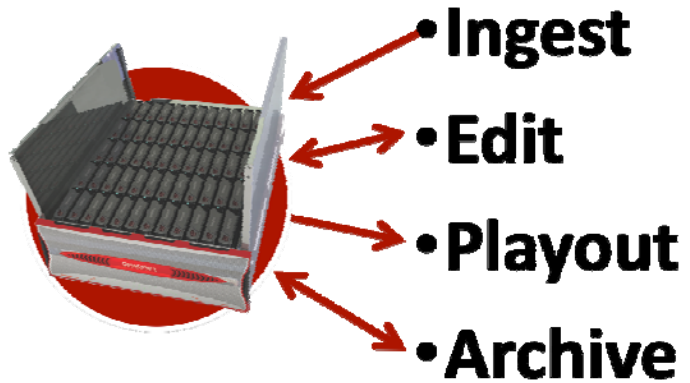
60 Drives in just 4U
Scales to 120 Drives with 4U Expansion

Flexible

Intermix SSD, SAS and SATA
Scale in as little as 5 drive increments

Highly Reliable

Active/Active Failover Storage Servers
SATAssure Data Integrity
RAID 1/5/6/10
Battery Backed Cache w/ Mirroring



S2A6620 Feature Overview

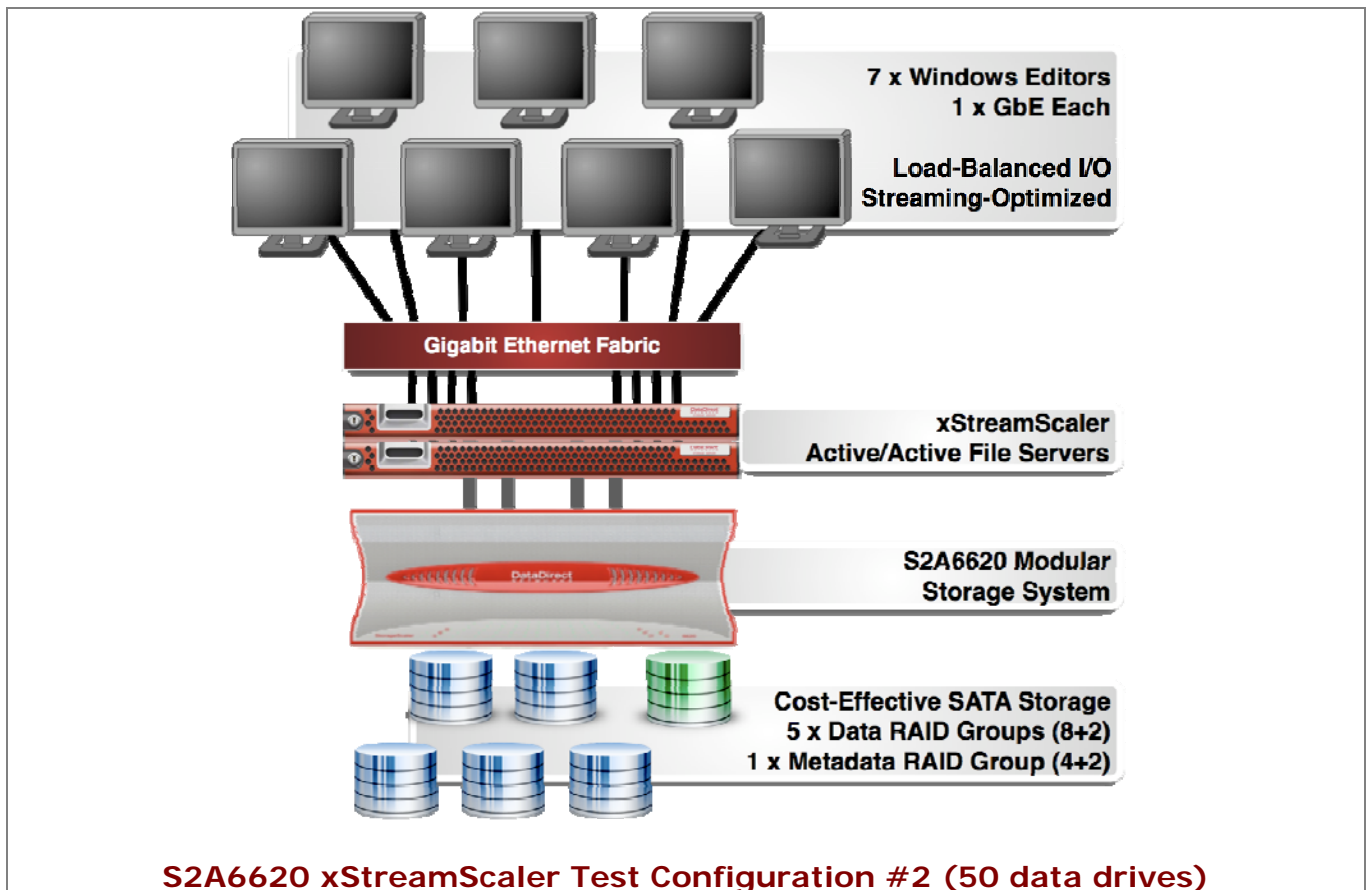
Responding to the needs of the larger storage market - DataDirect Networks has introduced the S2A6620 to cost-effectively deliver modular media solutions for the larger part of the digital broadcast community. Today, leading production broadcast facilities are building their next generation HD workflows with DDN's xStreamScaler system using the S2A6620 to power capacity and performance hungry applications. Scalable from 10-120 SAS, SATA and SSD hard disk drives – the S2A6620 provides a cost effective path to grow from Terabytes to 100s of Terabytes.

DDN S2A6620 – Performance and Capacity for Broadcast Media Workflows

Peak Simultaneous Active Streams 25/35/50/100Mbps (actual)	327/234/163/81
Broadcast Content Archive Capacity 25/35/50/100Mbps (in hours, 120 x 2TB SATA drives)	14,818/10,584/7,408/3,704

DataDirect Networks S2A6620 xStreamScaler: Benchmarking

Recently, DDN performed a series of benchmarks with a leading manufacturer of HD news broadcast systems by using a customer-developed media streaming benchmark utility. This test is designed to replicate the demands of ingest, playout and non-linear editing in an HD workflow. A highly parallelized utility, this benchmarking tool is built to simulate a multi-threaded, multi-editor environment in order to understand how concurrent operations impact underlying file storage infrastructure.



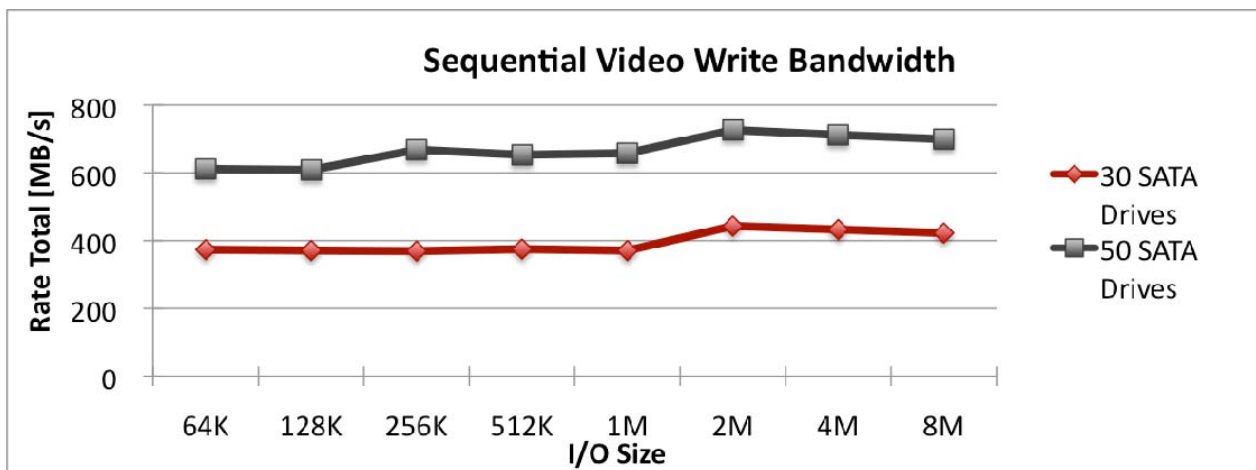
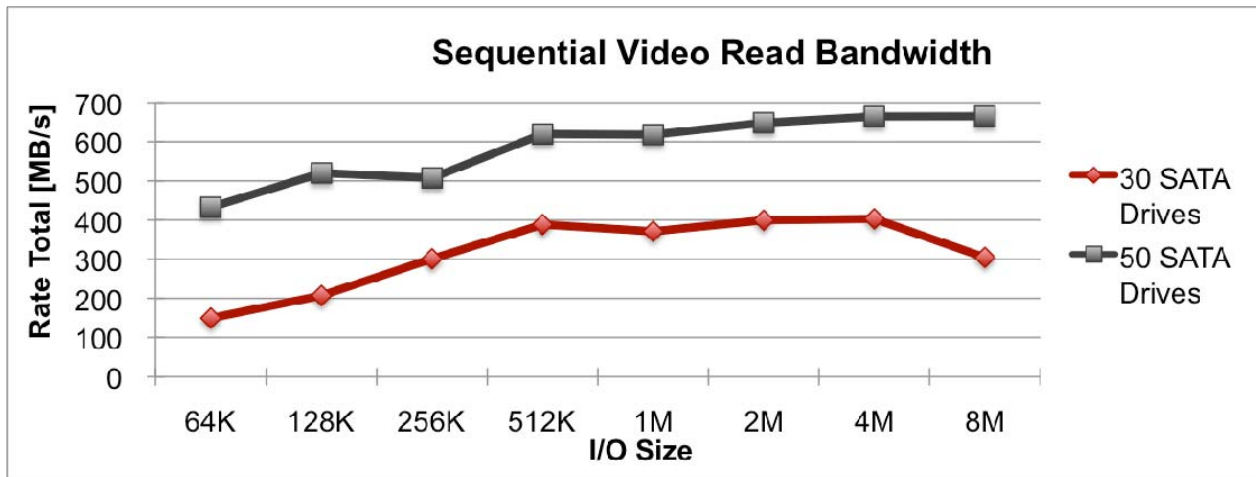
For this benchmark, DDN provided a 60-drive S2A6620 system using cost-effective SATA hard disk drives (HDDs) and two xStreamScaler storage gateway servers. The system was connected as follows and benchmarked in 2 configurations:

- Test Configuration #1 = 3 x 8+2 RAID Groups (30 data HDDs total)
- Test Configuration #2 = 5 x 8+2 RAID Groups (50 data HDDs total)

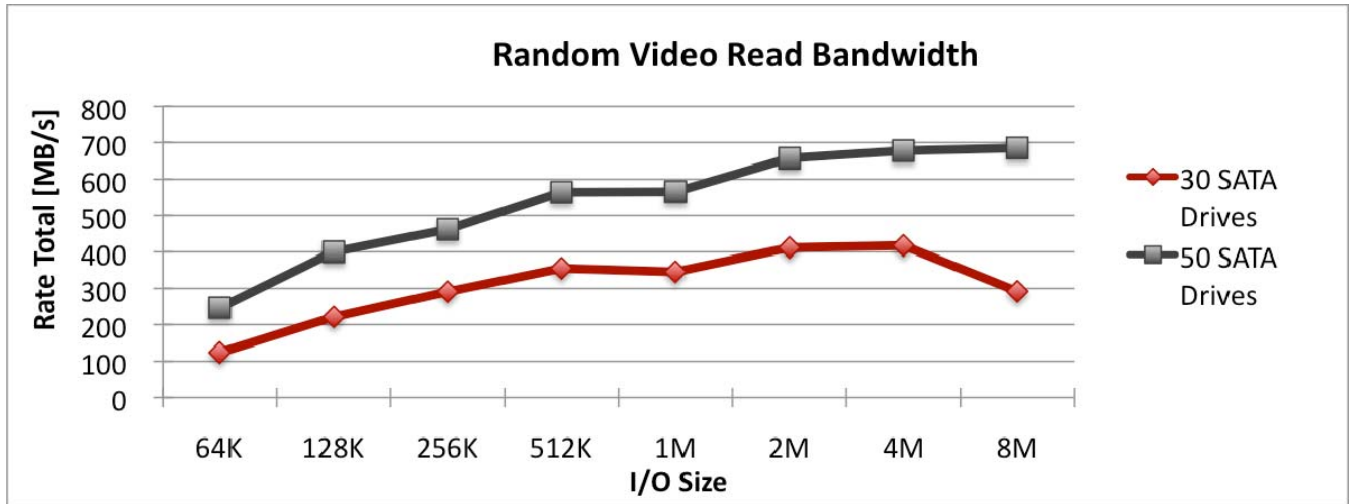
The benchmark showcased many of the benefits of the xStreamScaler platform as compared to other NAS-based file serving technologies. Because the xStreamScaler has purpose-built accelerated SAN and NAS client software, systems accessing the file storage system are provided additional benefits over traditional NFS and CIFS clients, specifically:

- DDN xStreamScaler clients natively load-balance their I/O requests across multiple storage gateways for higher per-port network utilization and streaming bandwidth than what can be delivered by a single NFS or CIFS session. The load-balancing is active-active for maximum performance across nodes and storage gateway network interface cards (NICs).
- No complicated client settings were needed. Because the xStreamScaler system is designed for media streaming – the client software already understands how to optimize performance and network access for video content data service
- At up to 4MBs per I/O, DDN xStreamScaler client-server network transfer sizes are much larger than NAS transfers which are generally no larger than 32KB. This allows latency to be minimized by keeping network pipes full and reducing network ping-pong.

In terms of both sequential video read and write bandwidth respectively, the tested configurations supported the targeted 62x 60Mbps streams (a total of 3.7Gbps in the 50 disk configuration) or 20x 60Mbps (a total of 1.2Gbps in the 30 disk configuration). 60Mbps streams were chosen to support 50Mbps of video plus audio and subtitles.



For random video read bandwidth, the tests show that even for randomly requested reads the system sustains the stream rate of 62x 60Mbps streams and 20x 60Mbps streams, respectively.



As seen in the performance graphs above, the benchmarking efforts demonstrated that the DDN xStreamScaler solution is clearly optimized for scalable, performance-efficient file delivery:

- The benchmarked solution satisfied up to **70 concurrent, random I/O streams** while maintaining low latency to enable real-time applications. While the system was ingesting and servicing other requests, **media playback was smooth with no dropped frames.**
- Tests further confirmed **under 100ms latency** running real-time effect streams and scrubbing
- The system delivered extremely efficient performance, nearly **saturation all of the 8 client Gigabit Ethernet (GbE) connections concurrently.** Clients were concurrently capable of **reading and writing over 100MB/s using only one GbE port each.**
- **Performance scaled linearly to over 700MB/s** when scaling from 30 data drives to 50 data drives with a single S2A6620 using SATA hard disks. Capable of supporting up to 120 SAS, SATA and SSD HDDs and delivering up to 2GB/s, the S2A6620 has additional headroom to grow as the number of clients and video resolutions increase.

Summary

Through this real-world benchmark, DDN has proven that the S2A6620 xStreamScaler can handily manage a scalable, real-time HD video streaming workflow. As this file storage solution has an entry-point offering of under \$200,000 USD, the system is designed to appeal to the performance and budgetary sensitivities of HD broadcasters around the world.

Simple to configure and administer – the xStreamScaler solution delivers NAS simplicity while performing at the client and server level in ways that NFS & CIFS storage systems never can. Further, the industry-leading capabilities of the xStreamScaler offering provide investment performance protection as broadcasters migrate from compressed HD to uncompressed HD and 2K - while also allocating bandwidth to additional revenue-generating initiatives. By marrying intelligent storage SW and the capacity and performance efficient use of disk, storage infrastructure, commodity networking and storage gateways – the S2A6620 xStreamScaler system from DDN is also the economical choice for HD broadcasters.

www.ddn.com

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