

NEXIO Farad™ High-Performance Online Storage

Studio Production Application

Mid-to-large production studios typically produce non-live content, such as game shows, soap operas, sitcoms and talk shows. The production studio may be wholly owned by a broadcaster, a subsidiary company of a broadcaster, or an independent company that sells content to broadcasters. Regardless, the production studio is responsible for creating an entire TV program, from creative concept and writing right through to the final, finished program clip ready for distribution to a playout center. The production studio may also be responsible for making promo clips for the show.

Production studios have the following high-level objectives:

1. Produce high-quality, entertaining content in a timely manner
2. Control costs to ensure profitable margins
3. Protect video assets
4. Reduce future risks

Many shows are recorded in front of a studio audience, although some, such as soap operas and dramas, are not. If the show is broadcast on the same day (e.g., late-night talk shows), then the studio is used solely for that particular production. However, for shows that broadcast weeks in the future, the studio is used to record and edit multiple shows on the same day, thereby reducing the total costs for production.

Most storage solutions do not offer adequate performance, reliability and availability, so production studios are typically forced to use separate storage islands for ingest and editing.

The recording studio has multiple cameras set up for the show. The number of cameras will vary depending on the type of show, but typically there are at least three cameras and can be as many as 10. For some types of shows, an operator edits in real time on a production switcher to reduce the amount of post production work required. All of these feeds are recorded via SDI ingest into ingest storage.

Sometime after a record session is started, all the clips begin copying to the editing storage. The content is also copied to backup storage, typically through an automated process handled by a digital asset management (DAM) system. During the editing process, editors may need to search for and restore content from the archive or import clips from external sources, frequently using the same DAM software.

Multi-cam editing is very common, so the editor will need the same number of real-time video streams on the editor as was ingested during the record session. If a production switcher was used for live editing, the editors correct mistakes and add more shots from the available isolated (iso) feeds. Otherwise, the editor edits the entire show from scratch.

When the show has been approved and any final edits made, the finished product is ready for transfer to broadcasters. The final product is also copied to the backup storage and eventually to archive.

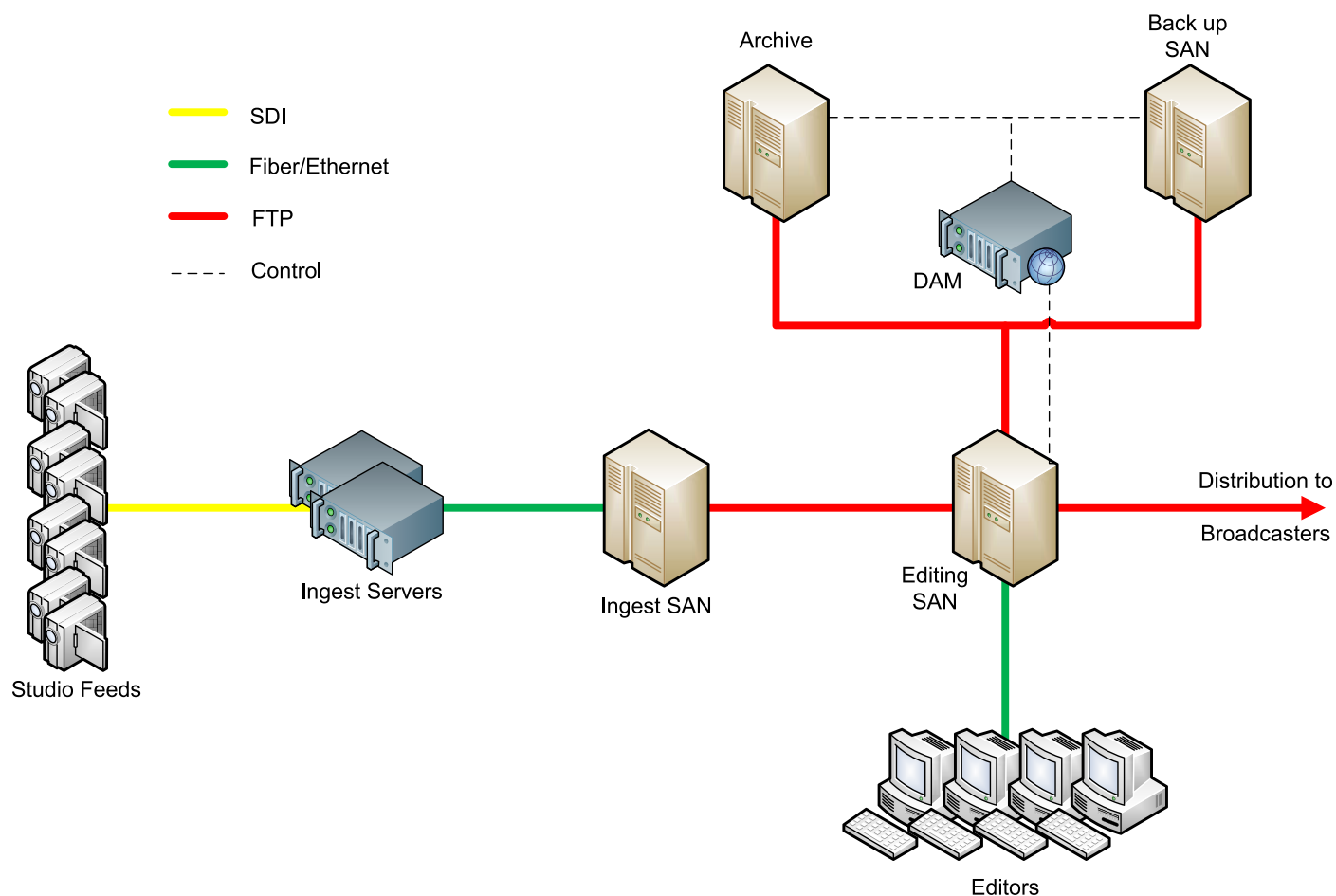


Figure 1: Production Studio Workflow Using Multiple Storage Islands

Business Challenge

Maintain and Improve Quality

More and more studios are producing content in HD. Even if the content is being broadcasted to viewers in SD, content providers are still moving to HD to ensure their video assets retain their value in the future. However, viewers have greater amounts of content to choose from — some of it lower-quality, yet cheaper web content — so quality has become a distinct competitive advantage for traditional production studios. To maintain or even improve image quality, studios are starting to move to advanced codecs such as DNxHD, DVCPRO HD and AVC-Intra. With studios requiring simultaneous ingest from many cameras and multi-cam editing — sometimes for multiple shows at the same time—the bandwidth requirements are crippling for current storage solutions on the market.

Meet Tight Deadlines

Whether the show broadcasts the same day it is recorded, or multiple shows are recorded per day for broadcast weeks later, production studios need to meet very tight deadlines. Editors can waste a lot of time transferring assets among multiple storage islands, and this can threaten those deadlines. A large quantity of hard disk drives is required in storage to support high bandwidth and capacity, and this

can result in a higher frequency of drive failures. Suspect or failed drives need to be replaced, and a reduction of bandwidth performance during rebuild operations for replaced drives is undesirable, slowing turnaround times and threatening deadlines and quality of the final product. Rebuilds also contribute to reduced productivity of editors.

Control Costs

Competing content and advertising models are putting pressure on prices, while also increasing viewer demands for higher-quality content. This dual-pronged pressure is forcing production studios to control as many costs as possible to ensure their business remains profitable.

Labor is a significant component of operating expenses. To protect against data loss and downtime, studios are forced to use storage solutions with non-optimized workflows. Complex storage system infrastructure requires extra IT resources to maintain. The productivity of editors also decreases while they search and wait for content to become available. This can be further compounded if the performance of the system is degraded, due to maintenance operations through failed drive and other storage system components.

Another factor in cost control is production equipment, which is a very significant upfront investment. Having to prematurely replace equipment could have a serious impact on its ROI. With 3 Gb/s, UltraHD and unknown technological and market changes on the horizon, a studio's storage needs could change unpredictably, but many storage solutions are not flexible enough to grow and accommodate the demands of new technology. Even if a studio's solution can be upgraded, complex, destructive upgrades can waste valuable IT and editor resources, driving up labor costs.

Finally, energy costs have continued to increase over the years, making power consumption a larger portion of operating expenses each year. Some countries also have carbon reduction initiatives, such as carbon taxing, in place. Production studios need to reduce the amount of electricity needed to run and cool their equipment to reduce costs and carbon emissions.

Protect Assets

Apart from the brand value that a show builds over time, a production studio's time and money are invested in the video content it produces. To protect this investment, studios need to protect these video content assets from becoming damaged or lost. Complex workflows and inadequate storage, server, and editing architectures introduce too many points of failure and leave too much opportunity for human error, thereby increasing the risk that video assets will be compromised.

The Solution – NEXIO Farad™ High-Performance Online Storage

Maintain and Improve Quality

The Harris® NEXIO Farad™ online storage system offers unparalleled bandwidth for media stream size and quantity. NEXIO Farad can manage multiple ingests and handle many editors performing multi-cam editing at the same time, even when using DNxHD, DVCPRO HD and AVC-Intra codecs.

Meet Tight Deadlines

NEXIO Farad greatly decreases turnaround time by facilitating collaboration and improving workflow. With all assets stored in a single location and sufficient bandwidth to allow shared access to all stored media, NEXIO Farad removes the need to transfer assets between ingest and editing storage islands, giving editors instant access to any part of the recorded content, and eliminating time wasted while waiting for files to be copied. Editors can also start editing content seconds after a recording starts. Allowing editing to start earlier is particularly important when producing promo clips for a show that broadcasts the same day. Even an hour of saved time ensures a promo clip has more time to attract viewers to the show.

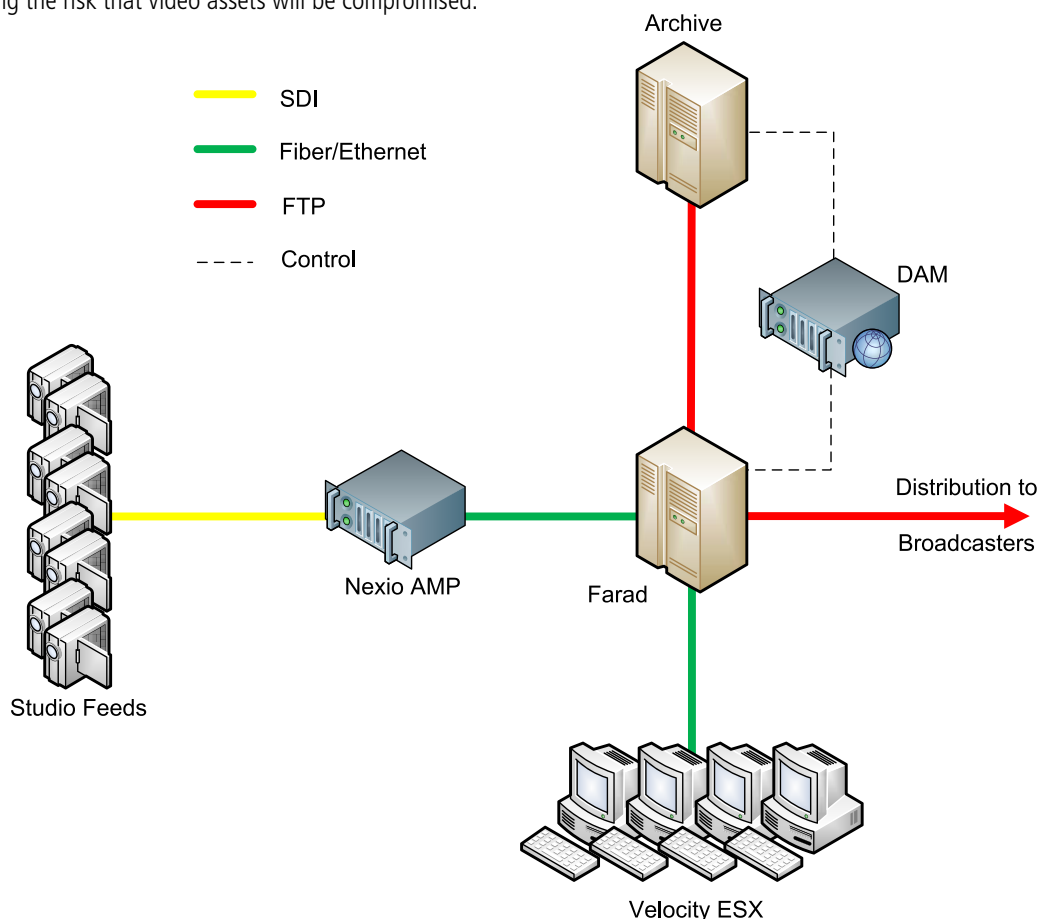


Figure 2: Production Studio Workflow Using NEXIO Farad High-Performance Online Storage

Some shows frequently use older content. The NEXIO Farad system's flexible and scalable architecture allows studios to expand their capacity independent of bandwidth, so they can cost-effectively store more content for a longer period of time. NEXIO Farad also benefits from the latest generation of networking and archive technology, enabling content to be restored from archive at very high speeds. These capabilities combine to dramatically reduce the amount of time consumed through file transfers to and from archive.

Finally, NEXIO Farad enables continuous operations through high asset availability. The innovative NEXIO Farad uses RAID-601 technology, protecting studios against drive, controller and storage chassis failures, while maintaining system throughput. NEXIO Farad can even simultaneously rebuild multiple drives without affecting bandwidth performance, ensuring editors can continue working at the fast pace required to meet tough deadlines. When a studio needs to upgrade its storage, the NEXIO Farad system's non-destructive restriping happens in the background, without degrading normal I/O operations, so editors can still meet their deadlines.

Control Costs

NEXIO Farad is architected to help studios control costs. Its flexibility allows studios to invest in only the capacity and bandwidth they need. This flexibility also ensures studios can cost effectively upgrade their storage infrastructure regardless of how their needs change. NEXIO Farad delivers nearly a 20% advantage in total cost of ownership.

The Harris® NEXIO AMP® server ingests SDI streams from cameras into NEXIO Farad. The latest generation of the NEXIO AMP server hardware platform is designed with the same ingenuity as NEXIO Farad, allowing studios to control costs even further.

NEXIO AMP servers benefit from software codecs. Rather than having to replace expensive cards or even entire systems with servers that use hardware codecs, production studios can take advantage of new codecs with NEXIO AMP through simple software upgrades. If new codecs require more processing power, the CPUs on AMP servers can usually be upgraded to add the necessary capability.

NEXIO AMP systems can also mix codec types. If a production studio changes to a new codec, they can continue to use old content without having to maintain legacy systems, or perform time-consuming and quality-degrading transcodes.

The NEXIO Farad system's true shared storage keeps all assets in a single location without sacrificing asset availability. Editors don't have to waste valuable time waiting for assets to transfer from other SANs and can even begin editing shortly after the show begins recording. Drive failure and storage upgrades do not affect an editor's work because bandwidth is not degraded during drive rebuilds or even storage upgrades.

NEXIO Farad also reduces maintenance costs through operational improvements. In fact, NEXIO Farad can deliver nearly a 10% operating cost advantage when it comes to maintenance of the system. The NEXIO Farad system's spare drive provisioning technology provides a pool of standby media drives that are used for unattended and automatic drive rebuild following a drive failure, allowing studio IT staff to replace drives at their convenience. NEXIO Farad also makes monitoring systems easier with its simple, yet powerful management console.

NEXIO AMP is designed for reduced power consumption delivering nearly a 40% reduction in operating costs as a result of power and cooling efficiencies. NEXIO AMP now has more record channels, and with this increased channel density comes a reduction in power consumption and air conditioning requirements. The NEXIO AMP server's power consumption is also proportional to its workload, consuming less power when idle or during lower usage periods. NEXIO AMP uses the latest 2.5 in. SAS hard disc drives (7,200 rpm), which require as much as five times less power to operate and cool compared to the more common 3.5" drives. All of these factors contribute to lower power and cooling requirements and hence reduced cost and carbon footprint.

Protect Assets

The NEXIO Farad system's RAID 601 combines RAID 6, 0 and 1 technology for unparalleled reliability, availability and performance. NEXIO Farad uses RAID 6 parity protection for every six-drive array in the entire storage system, ensuring that any array can survive two drive failures. The six-drive arrays are striped together as virtual drives for increased bandwidth. NEXIO Farad also supports spare drive provisioning, which designates six drives to automatically replace a failed drive in any array in the storage system automatically, including automatic data rebuilds. This not only reduces the probability of drive failures impacting on-air operations to a negligible amount, but also allows drive replacement to be scheduled as a regular maintenance activity instead of an emergency call-out.

RAID-601 incorporates Harris-patented Intrinsic Mirroring™ technology, which simultaneously creates two copies of any assets ingested or rendered to the NEXIO® shared storage system, creating a real-time backup system with seamless failover during playout. Intrinsic Mirroring protects the system against chassis and controller failure, effectively removing every single point of hardware failure.

NEXIO RAIDsoft™ manages data striping and Intrinsic Mirroring. This software RAID controller resides on all servers attached to the SAN, removing any single point of software failure.

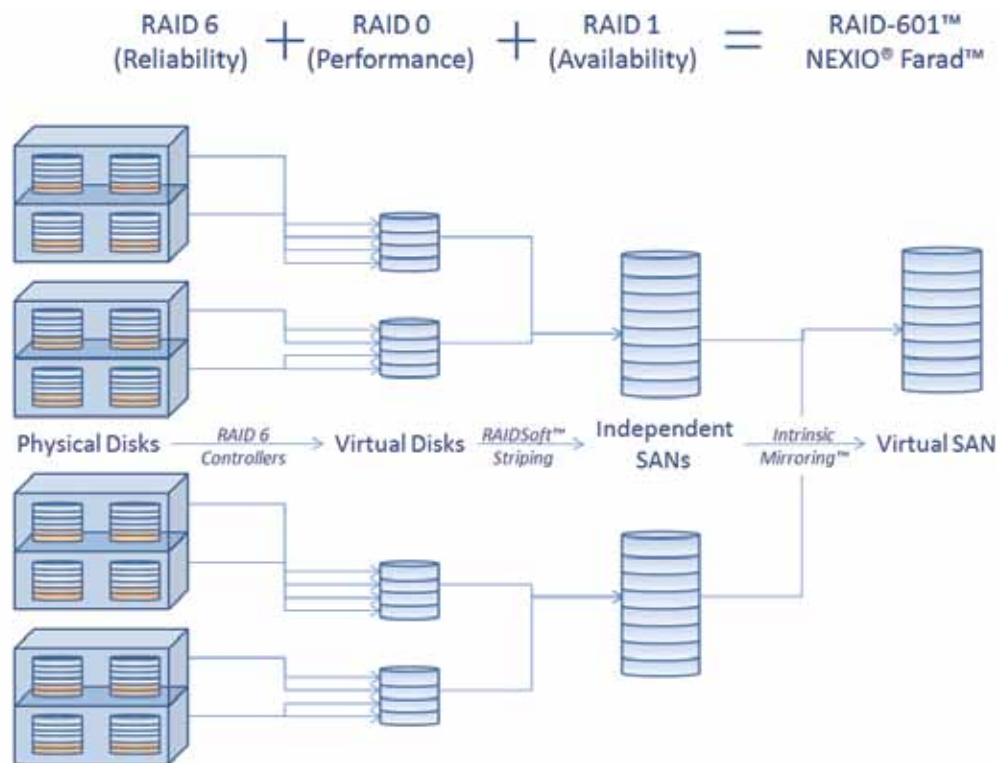


Figure 3: RAID 601 explained

Business Value

1. Produce high-quality, entertaining content in a timely manner

The NEXIO Farad solution's unparalleled bandwidth ensures studios can use the latest high-quality HD codecs to produce shows with stunning image quality. By reducing turnaround time, editors can put more effort into quality editing and still meet their deadlines. Promo clips can also be on air quicker, allow broadcasters to attract more viewers for each show.

2. Control costs to ensure profitable margins

Unnecessarily complex storage architectures are expensive to maintain and use. The NEXIO Farad system's true shared storage architecture and easy-to-use interface can significantly reduce labor costs. With power rising in price, powering and cooling equipment is driving up operating expenses. NEXIO Farad and NEXIO AMP both help to reduce power costs, providing a nearly 40 percent savings in cost.

Studios can also rest assured that their investment will continue to deliver well beyond its amortization period. The NEXIO Farad system's support for high bandwidth and capacity and the system's flexibility to support the desired mix of bandwidth and capacity ensure that studios can upgrade their system with the minimum cost. The NEXIO AMP platform's support for mixed resolutions and software codecs helps avoid expensive hardware and system upgrades to support new codecs.

3. Protect video assets

Most of a production studio's value is invested in the shows they make. Losing video assets means a loss of value. The NEXIO Farad system's RAID 601 architecture is designed to ensure the studio's hard-earned investment is safe.

4. Reduce future risks

Studios need to ensure they get an adequate ROI on equipment investments despite the fast changes to technology. Studios cannot afford to replace equipment before they have gained enough of a return from their investment. NEXIO Farad and NEXIO AMP were both designed so customers can easily adapt to technological changes without having to replace equipment. The design of NEXIO Farad and NEXIO Amp delivers more than a 30% reduction in operating costs related to space.

The NEXIO Farad system's high bandwidth and capacity potential, coupled with the ability to be configured to focus on capacity, bandwidth or both, ensure that studios can expand their storage to meet their changing business and technological needs. The NEXIO AMP server's software codec architecture and support for multiple codec types and resolutions allow studios to move to new codecs and

standards without costly hardware or system replacements.

Making a Difference with NEXIO Farad High-Performance Online Storage

Maximum Collaboration for Faster Time to Air

Many competitors claim to offer shared storage, but a storage solution is only truly shared storage if all assets are stored in one location. A true shared storage solution like NEXIO Farad optimizes workflows to remove many roadblocks that slow a show down. With NEXIO Farad, all editors have equal and simultaneous access to all the media. Editors can collaborate easily, since all media and projects exist on the shared storage. One editor can work on the show open, another editor on segment one, another on segment two, and another editor on the show close. They can then edit it all together at the end. All of this with no FTP or media movement required.

Moving files between different storage islands adds unnecessary delay to the editing process. NEXIO Farad maximizes collaboration and turnaround times by giving all users access all the time. Not only are all clips stored in a single location, but editors can even start editing within seconds of a record session starting. Competitive products force editors to copy content to another storage system before they can begin editing.

For shows that need to use older content often, the NEXIO Farad system's ability to increase capacity independent of bandwidth makes storing content on the online storage system affordable. Limitations in the architecture of competitive offerings force studios to always increase bandwidth along with capacity, making time-saving additional storage too expensive.

Reliability

Assured Protection for Valuable Assets

The NEXIO Farad system's RAID-601 provides unparalleled reliability and availability. NEXIO Farad uses RAID 6 parity protection for every six-drive array in the entire storage system, ensuring that any array can survive two drive failures. Some competing products use inferior RAID protection such as RAID3, which only protects against a single drive failure. Furthermore, NEXIO Farad also supports spare drive provisioning, which designates six drives to automatically replace a failed drive in any array in the storage system automatically, including automatic data rebuilds. This not only reduces the probability of drive failure impacting on-air operations to a negligible amount, but also allows drive replacement to be scheduled as a regular maintenance activity instead of an emergency call-out.

RAID-601 incorporates Harris-patented Intrinsic Mirroring technology, which simultaneously creates two copies of any assets ingested or rendered to the NEXIO shared storage system, creating a real-time backup system with seamless failover during playout. With most competing offerings, there is a delay between ingest/render and backup, leaving assets vulnerable. Competitors also use architectures that leave one or more single point of failure. Intrinsic Mirroring protects the system against chassis and controller failure, effectively removing every single point of failure.

Some competitors claim that their multi-system offering provides better reliability than shared storage because putting video assets in one storage system is too risky. The NEXIO Farad system's RAID-601 architecture — using Intrinsic Mirroring to integrate two independent storage systems to provide real-time failover — makes storing video assets in one system safer than a distributed architecture. RAID-601 assures assets are safe, and not having to constantly move content around removes the risk of human error and data corruption during transfer. Utilizing a central, shared storage system can also reduce the cost of asset management and movement. Of course, NEXIO Farad does not eliminate the possibility of using a distributed architecture for those studios whose workflow requires it.

Bandwidth protection is almost as important as data protection. Some competitors cannot maintain their published bandwidth rate during a rebuild. This degradation in performance can disrupt playout or the editing process. RAID-601 assures continuous operation, maintaining performance when components fail or during drive rebuilds, so editors can maintain their peak performance without interruption or delay.

Flexibility

Ready for the Future

Competitive servers frequently only support a very limited number of codecs on a system. Changing to an unsupported codec either requires an expensive proprietary hardware change or an even more expensive replacement of the entire system. If older content is still needed for future shows, existing content needs to be transcoded to the new codec. NEXIO AMP uses software codecs — and supports the widest range of codecs — so moving to a new codec is inexpensive and easy, and older content is still supported. If a new codec requires more processing power, AMP systems are designed to allow CPU upgrades. Due to economy of scale, PC components are generally less expensive than dedicated hardware.

The NEXIO Farad architecture allows for systems to be designed to meet unique bandwidth and/or capacity requirements. This flexibility allows studios to build the storage solution that fits their needs. If a studio's needs change, they can easily add capacity, bandwidth or both. Since the upgrade process does not destroy assets, the downtime during an upgrade is minimal. Competitive solutions tightly bind bandwidth and capacity, and their destructive upgrade process forces long downtimes to protect assets. These limitations hinder studios from adapting the solution to their changing needs without a serious waste of capital.

Lowest Total Cost of Ownership

True shared storage like NEXIO Farad dramatically increases collaboration and turnaround, improving editor efficiency. With distributed storage solutions, editors waste too much time, and hence money, waiting for content to copy between different storages.

The flexible NEXIO Farad architecture allows studios to build a solution that meets their unique capacity and bandwidth needs. With non-destructive restriping that minimizes downtime, upgrading NEXIO Farad is easier and cheaper. Competitor solutions force studios to buy capacity and bandwidth together, regardless of their needs. Furthermore, upgrading the storage requires expensive downtime, as they back up assets and rebuild the entire array.

Competitor server offerings also cost more to run and cool. NEXIO AMP uses 2.5 in. drives, which use less power and require less cooling than the 3.5 in. drives that most competitors use, delivering a cost advantage of nearly 40%. NEXIO AMP also offers superior channel density and proportional power consumption, which again reduces power costs compared to competitor servers.

Summary

Viewers have more and more content to choose from. Studios need to improve their content to stand out in such a competitive media landscape. NEXIO Farad allows studios to use new codecs that offer superior image quality in high definition.

But viewers expect more than just pretty pictures; they expect better-quality shows. The NEXIO Farad system's true shared storage architecture facilitates collaboration and optimizes workflows to enable fast turnaround times, giving editors more time to perform quality edits. NEXIO Farad and NEXIO AMP also offer the lowest total cost of ownership on the market, which helps studios reduce costs so they can direct more money to producing better content.

Viewer demands change almost as quickly as technology, so studios can never predict what they will need to stay competitive in the future. With the flexible NEXIO server and storage architecture, studios can adapt to those changes quickly and at minimal expense, giving them a competitive edge over other studios.

For more information, visit:
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