P.O. Box 5509, Fullerton, CA 92838-0509 Ph: 714.447.4993 Fx: 714.447.6020

By Curtis Chan, Contributing Editor

Post HPA Retreat Editorial

Last month's Hollywood Post Alliance Technology Retreat reaffirmed a long standing observation. The overwhelming access to on-demand media and information anytime and anywhere via the internet, cable and airwaves has forever changed the time-to-market and monetization models for content providers, aggregators, distribution hubs, service providers and broadcasters. In this evolving digital landscape, media companies and their delivery partners face the growing challenge of seamlessly and efficiently producing and delivering high quality assets across a myriad of media platforms and formats, while ensuring the asset's quality and security throughout the workflow chain, all-the-while trying to reduce the creation-to-distribution time gap.

Emerging technologies and their byproducts that can address these challenges for broadcasters will be a welcome addition to their arsenal – in light of the latest broadcast initiatives toward electronic file encoding and delivery of promos, commercials, public service announcements and programming; Mobile DTV, 'Smart TV with Internet' and the continual battle to preserve/recapture spectrum between TV vs. cable, FIOS, U-Verse and satellite. To this end, several companies stood out amongst the rest at the HPA Tech Retreat with product technologies that are game changers, and would aid in maintaining quality throughout the broadcast workflow chain or shortening it.

Keeping up with Volume and Quality in broadcast file-based workflows – Cinnafilm and RadiantGrid

As television and film content moves more and more toward (semi-to fully automated) file-based workflow standards and solutions, broadcasters (and post facilities) face two consistent challenges while attempting to keep up with delivery demand: volume and quality.

The volume of generated content is increasing exponentially as we move into the future. One of the outcomes of this trend is that the quality bar (which isn't going down, but is being redefined and in some areas and going up in others) has become harder to achieve (i.e., consistent video quality) with the same limited human resources, or fewer dedicated video engineering experts…exasperated with the continual downsizing of broadcast staff.

In other words, requests for international content conversions (NTSC -> PAL, PAL -> NTSC) and conformance with online video formats (3:2 pulldown removal, de-interlacing, motion compensated frame rate conversion, noise/grain management) are only increasing with more content delivery solutions and fewer resources at the disposal.

Lance Maurer, CEO of Cinnafilm, Inc. explained, "Currently, you have to use dedicated hardware devices in baseband to achieve high-quality conversions (before video digitizing, and require moving in and out of the file-based workflow – analog-to-digital to analog-to-digital and so on)." "Each copy degrades the essence and creates opportunity for further error – this is a poor model and is only a stop gap solution," he added. "We're combining our Dark Energy technology with RadiantGrid Technologies to end this dilemma by creating the highest quality transcoding and optimizing solution for file-based video."

Specifically, RadiantGrid provides a scalable platform for keeping up with the increasing workload of generated content, and can support faster-than-realtime grid transcoding as well as high-volume batch transcoding. Cinnafilm provides the high-speed, GPU-accelerated format and frame rate conversion, cadence correction, and noise/grain management (Dark Energy) which fits seamlessly into the RadiantGrid Platform.

Integrating the Cinnafilm video processor into the RadiantGrid transcoding engine affords low-level control over frame rate conversions and noise/grain management, while also providing the capability for auditioning changes to the pre-processing settings, and allowing the ability to fine-tune the preparation process. Similarly, audio is processed and managed by RadiantGrid's Linear Acoustic Module.

The combined integrated solution allows content to be reliably created and delivered in an automated fashion, and optimized using the latest in motion-based solutions, all in one place.

Added Kirk Marple, President, Chief Software Architect of RadiantGrid Technologies, LLC, "Moreover, the system offers broadcasters a unique business case in light of ever tightening budgets. By moving the high-quality video conversions and pre-processing into the file-based workflow, and separating these steps into the preparation stage rather than the transcoding stage, broadcasters can amortize the cost of these operations, saving money for their customers and providing them the quality edge, which can be a key differentiator in this competitive business."

"This solution provides high-quality preprocessed mezzanine content into the transcoding engine for multi-format distribution, editorial, and archival workflows – covering the customer for all types of media delivery platforms for years to come and providing the number crunchers with a strong ROI," concluded Maurer.

3D Image Quality Metrics and the Quest for a new 3D Visual Language – SRI International

David Brewster introduced the Stereoscope, a device for taking stereo photographs in 1844. This event spawned the first color 3D movie in 1935; the first Russian 3D movie 'Robinson Crusoe' in 1947; and the world's first feature-length 3D movie, 'Bwana Devil' in 1952; which heralded a short-lived 3D boom in movie production, including the first 3D movie with stereo sound 'House of Wax' directed by André De Toth (who had only one eye); and abruptly ended in 1953 with 'The 3-D Follies' – which was cancelled during production. It wasn’t until the 1981 release of ‘Comin at Ya!’ (using the “over and under” anaglyphic format) that 3D movie making again started to pick up steam, culminating with the 2009 release of James Cameron’s ‘Avatar’, which pushed 3D into the mainstream.

Interestingly, the world's first dedicated 3D television channel, South Korea's SKY 3D, launched last year along with several broadcast trials in the US without too much fanfare – as evidenced by the lack of discussion about its progress from this year’s HPA Tech Retreat broadcast panel.

Like so many nascent technologies with evolving standards and practices, many things can go wrong, and at any stage in production, from image capture through post-production, transmission and display. The resultant visual errors can manifest as negative viewer reactions, both from the immediate visibility of distortions (lack of naturalness) to longer term physiological discomfort.

Needed are a standardized set up quality metrics that can separate errors according to their perceptual impact, along with recommended fixes – and perhaps in the future, a new 3D visual language that addresses all aspects of the 3D chain, from hyperconvergence and hyperdivergence to depth mismatch and alignment/geometry errors.

SRI International offered a potential solution to address the first part at the HPA Tech Retreat. Their demo, a 3DTV/3D glasses setup fed with predefined test patterns based on a set of algorithms, showcased a number of different 3D errors, improved quality measurements to interpret the errors that takes into account spatial and temporal anomalies, and guidance on how to fix the errors. The progression of demos was impressive, showing errors that were clearly visible, to not visible, to not visible but clearly disturbing.

Dr. Jeffrey Lubin, Sr. Research Scientist at SRI International explained how their research (he cited Norm Hurst as the developer of the 3D test patterns) and recent findings might level the playing field for 3D workflows. “Many 3D movies looks and feels ‘bad’, but cannot be easily explained,” he noted. “We realized that the 3D industry needed a common set of metrics that could help analyze and interpret content throughout the workflow chain and set guidelines on how to cure the errors.”

Justification for this much needed process is easily validated with the recent 3D release of "The Last Airbender," earning four Razzies from The Golden Raspberry Award Foundation for Worst Picture, Worst Screenplay, Worst Misuse of 3D and Worst Director.

In application, SRI’s ‘black box’ would be fed L/R image sequences and would output in text printout or visually on a monitor where the errors are on a per frame and per region area, what the perceptual magnitude of the errors are and what kind of problems they are. Further, a database of fixes can be built up over time that would address problems from camera setup and production to artifacts being generated in the encoding / decoding or transcoding stage.

Lubin continued to explain real world applications from jitter artifacts derived from camera bounce or between cameras during setup; to mismatch between monocular and disparity depth cues on artificially moving objects in post; to twinkling distortions from encode cycles. “Our tests allows you to quantify why in one region of an image sequence where temporal flutter in disparity might make you feel ill and in another region see how compression artifacts can cause twinkling in depth perception, and yet in another region showing how excess motion and interaction with depth perception can make the viewer queasy. We can also interpret crosstalk errors as to what kind of downsampling has occurred, how much compression loss took place and whether it was concurrent or sequential.”

SRI’s demonstration has bridged the gap between basic science and real engineering and reinforces the need for standardization of 3D practices.

Seeing is Believing with Sony’s OLED

The ubiquitous video monitor, common throughout the broadcast workflow chain, is about to have another makeover with OLED (Organic Light emitting Diode) display technology.

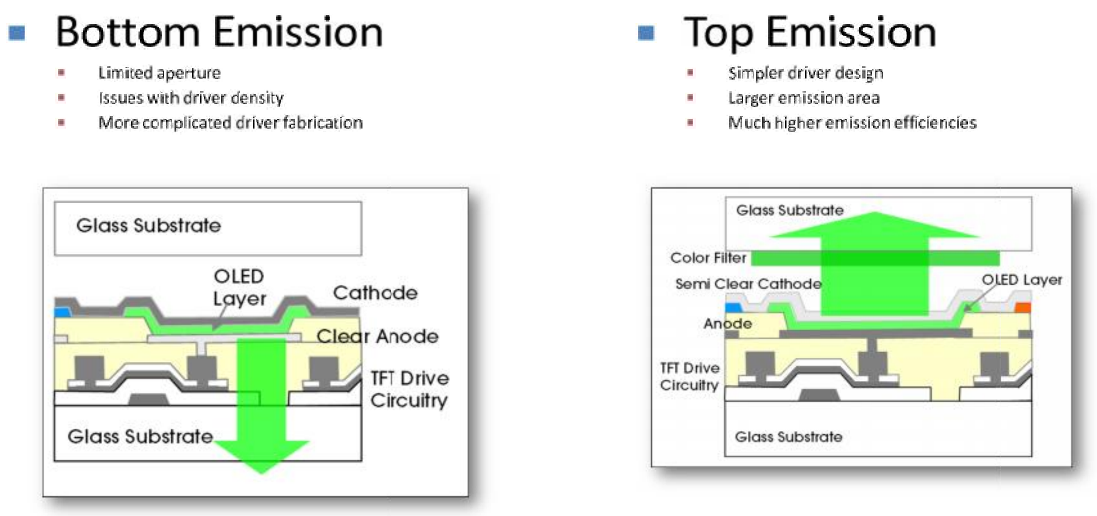
Sony unveiled its new OLED reference master monitors, the 25” BVM-E250 (~ $26,000 with mid-April delivery) and 17” BVM-E170 (~ $17,000 with June delivery) at the HPA Retreat, of which the BVM-250 was used for the demo, alongside a similar-sized Sony LCD display and a BVM-series CRT monitor.

BVM E170 BVM E250

According to Gary Mandle, senior product manager for Sony Broadcast & Production Systems Division, Professional Display Group, “Amongst the vendors that are producing OLED displays including AUO, LG, RiT and Samsung, Sony is the only vendor investing heavily and exclusively with larger display sizes for cinematic and broadcast applications. Companies stopped producing CRT based monitors due to environmental reasons which led to LCD/Plasma displays – both of which have drawbacks in viewing angle, black level, contrast, pixel speed and power efficiency as compared to OLED. We see the transition to OLED being very quick.”

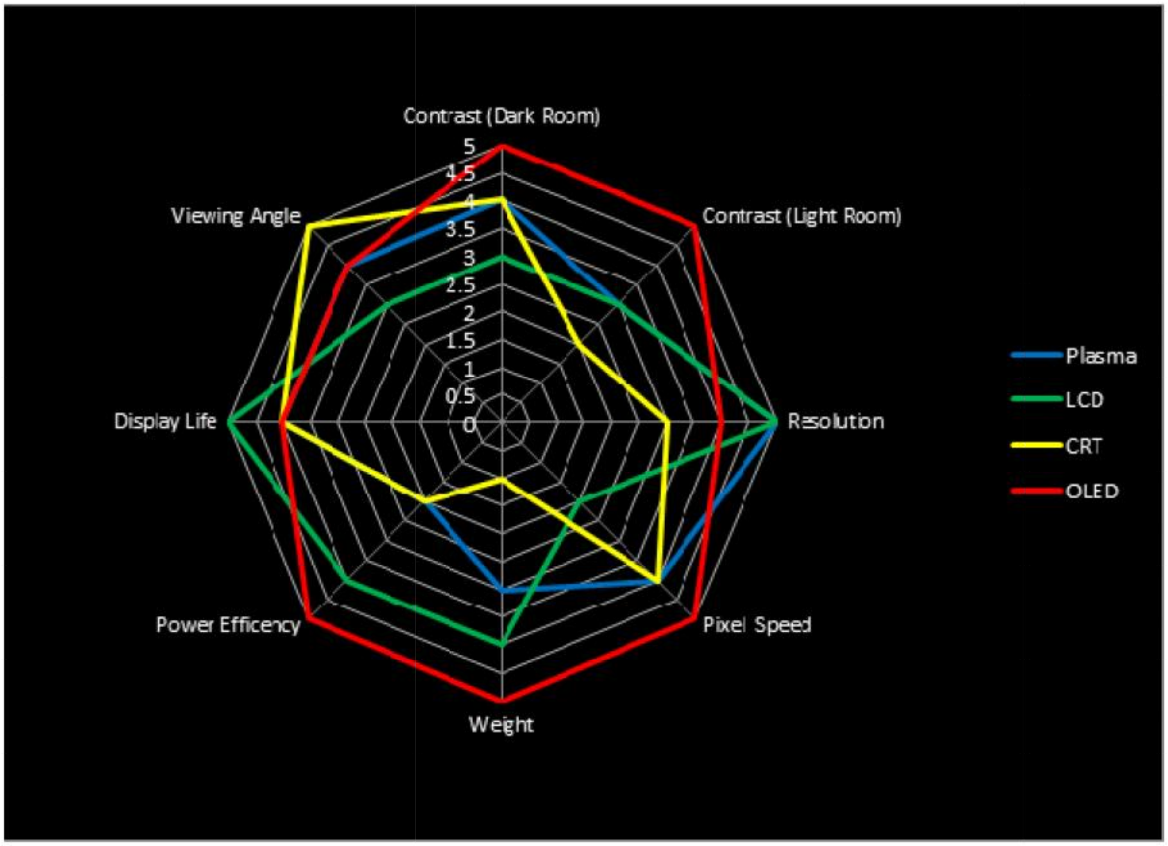
ABI Research, an independent research company concurred with Mandle, recently stating that a technology transition is underway in which older display technologies such as MTN-LCD and CTN-LCD are giving way to TFT-LCD and OLED – forecasting double digit growth rates for both in the near future.

Explained Mandle, the Sony AMOLED (Active Matrix OLED) displays uses a top-emission pixel structure whereby a matrix drive system is used to power each pixel, instead of the bottom-emission structure employed by others.



Top emission, according to Sony's presentation, improves luminous efficiency unlike bottom emission where light from the emission layer must pass through the driver layer. Mandle also points out that their claimed 30,000 hour display life (to half-brightness) is the result of Sony specific material compounds, pixel architecture and the use of top emission architecture which doesn't drive the OLED as hard as other techniques.

Further, the chart below compares OLED to CRT, Plasma and LCD technologies, with values at the outer most edge providing the best performance. As can be seen in the chart, OLED touts several advantages over its competition in power efficiency, weight, pixel speed and contrast (black performance).

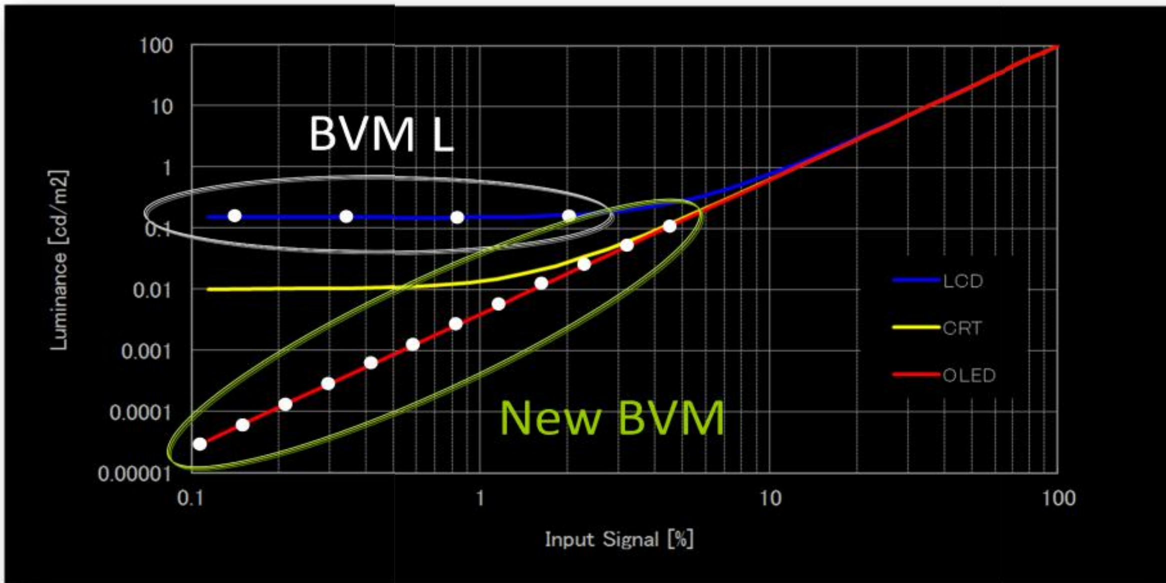


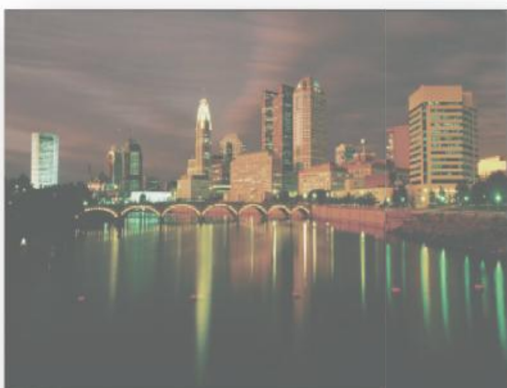
Unlike LCD which employs polarizers, diffusers and light pipes; plasma needing a gas to excite a phosphor or electron gun for CRTs; OLED derives its power efficiency from emissive technology through the recombination of an electron and a hole within certain organic materials sandwiched together between two glass substrates with a total thickness of less than 1.4mm. The very thin display as compared to its brethren also saves on weight.

OLED also trumps LCD and CRT in pixel speed, averaging between 3-6us vs. 12-16ms for LCD and Green/Blue of 100us/Red of 1ms. CRT has always had a tradeoff between pixel speed vs. the brightness of the emission, which has been compounded with the introduction of HD horizontal frequencies. Since OLED is a column/row matrix drive, equal time can be given to each pixel as the image loads, making refresh rates almost independent of pixel brightness.

As an emissive device, OLED claims a contrast ratio nearing 1,000,000:1. In addition, OLED exhibits better black performance because its pixels can be turned completely off whereas LCD has some intrinsic light leakage and CRTs use a bias voltage applied to place the gun at the proper operating level.
According to Sony as depicted in the chart below, their OLED display technology can be tailored to just about any gamma number (white dots on red OLED line represents gamma 2.2) since it can go blacker than any of the other technologies – allowing for more accurate color management for CRT emulation if need be. The two side-by-side pictures below the graph are representative of one of the tests shown at the demo, with

the BVM-E250 displaying super-deep blacks, rich (accurate?) saturated colors, contrast and illumination at a 1920 x 1080 resolution.





Is OLED ready for primetime?

Since the first technology showing of Passive Matrix OLED displays by Pioneer in 1999 and an AMOLED by IDTech in 2003, vendors have been trying to improve manufacturing yields and consistency – which has a direct impact on pricing.

Part of the challenge noted Mandle is unlike consumer OLED displays, building professional OLED panels necessitates being consistent in quality and performance over hundreds of units, along with developing a better display engine.

Since the manufacturing process entails measuring layer thickness in Angstroms (0.1 nanometer), a 25 inch full HD display may have an area of 6,618 sq. mm and as many as 6,220,000 pixels – all of which the different layer thicknesses must be kept constant.

Mandle is quick to point out that he sees the initial adoption most likely in post production due to the BVM's performance and price – whereas broadcasters wouldn't necessarily need this level of performance in many instances and certainly not at the present price point. "I think the sweet spot for broadcasters will be in the $10k - $12k range, which may happen within a year…with larger display sizes in the years to come."

On a personal note, the post production industry has faced several down cycles in the past few years and studios are under close scrutiny when making capital expenditures – in light of the drop in pricing for professional LCD and Plasma displays in recent years vs. Sony's initial pricing points.

Secondly, although adequate for some post workflows, a number of studios may wait for larger display sizes for viewing digital dailies, 2K-4K digital intermediate, special effects, restoration and some color correction work.

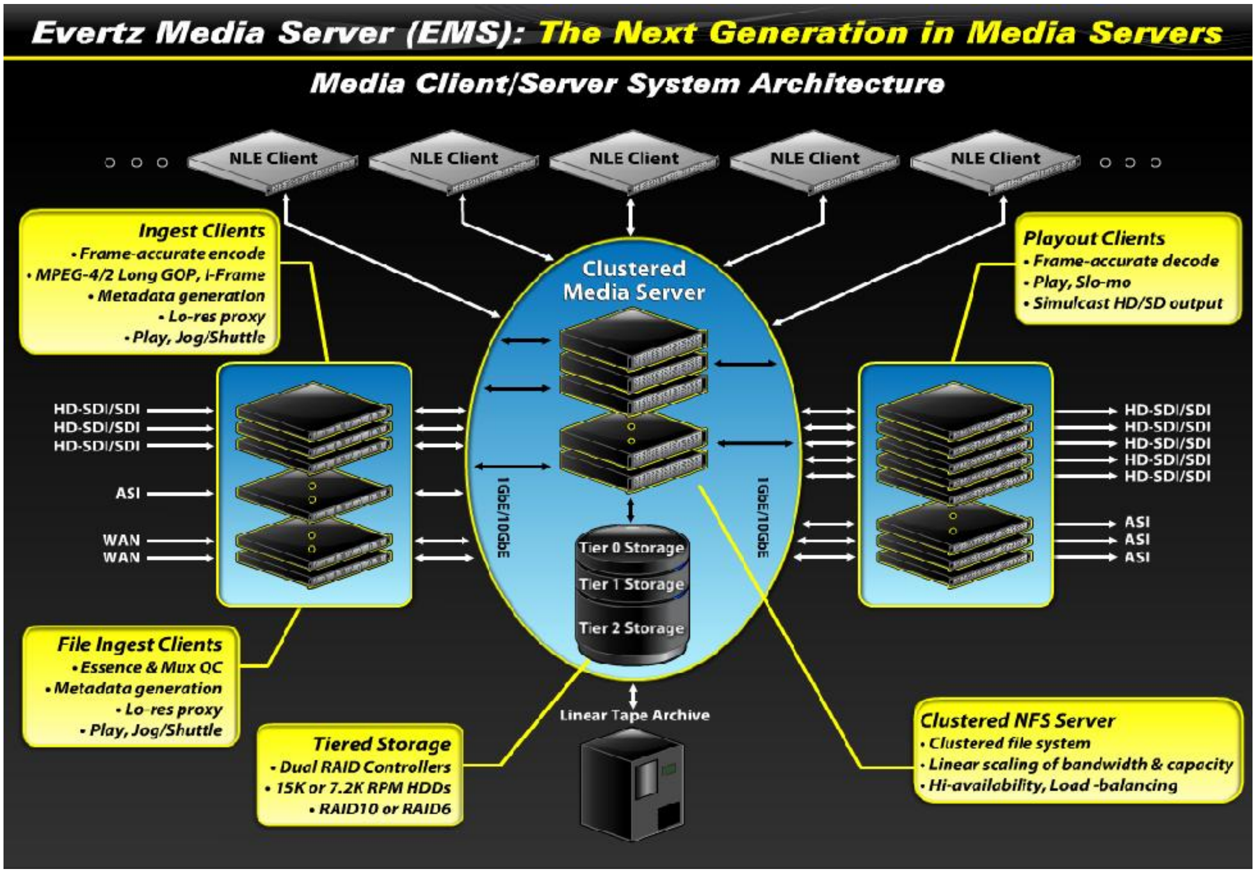
Will Sony's investment in current and upcoming BVM series of OLED reference displays for broadcast be a success – most likely….in time. As with their professional LCD flat panel technologies displacing CRT reference displays roughly 4 – 5 years ago, size variations and pricing drops are almost guaranteed. Seeing is believing.

Addressing file based workflows with Evertz Microsystems' Media Server System

Evertz, a mainstay in the broadcast landscape since 1966, demonstrated their Media Server System for broadcast and post-production workflows, which will be released near NAB time. The multi-tiered storage 3rd generation media server system performs real-time multi-channel HD or SD ingest, playout and branding, as well as file ingest for file-based workflows.

The media client/server architecture integrates media ingest/playout clients; a media server clustered (NFS) file system (from 2 – 16 nodes); and tiered 0, 1, 2 high-performance, high-capacity storage that supports multiple operational models and delivers up to 8GB/s or about 1000 XDCAM streams.

According to John Pittas, Sr. Director of Product Development at Evertz, the system's unique architecture affords several benefits over its competition. "The Media Server System is an application specific machine – software defines how it behaves and the hardware flexibility allows it to behave in different ways. The system competes with both traditional and higher end vendors like Isilon and NetApp, affording many benefits in scalability, flexibility and reliability over its competition."



He added that the media client/server architecture is highly scalable - easily scaling storage, server and I/O network bandwidth as needed and being able to expand storage to multiple Petabytes using 7.2k RPM HDDs. System flexibility, too, is designed in using a multi-tiered storage architecture.

As such, users can architect a central storage based system (essentially a super NAS connected to multiple I/O ingest and playout clients to do processing) to address differing service demand, implementing multiple storage tiers in one physical machine that affords recording to and playing to from any central storage tier. This architecture allows the core server to be scalable in both bandwidth and storage capacity, independent of I/O applications.

Using local storage, users can also cache content between central and client storage to record and play back to any client machine. Further, the system can also accommodate a distributed storage model, allowing playing from central storage, local storage or both per output channel. In this model, users can record at the edge on local storage; cache to the core; cache back to the edge and playout clients from the core and play from the playout clients.

Pittas added that reliability is maintained with no single point of failure because all system components feature 2N or N+1 redundancy.