Credit : © John Benson; NBA Entertainment, NBA Entertainment Images®.

SGI and Snell & Wilcox:
Deliver Collaborative Content Management Workflow Solution

NBA is the first professional sports league to benefit from the collaboration resulting in NBA Entertainment's high-quality, high-speed digital media management system.

NBA Entertainment is a leader in utilizing the latest technology to enhance the game experience for basketball fans around the world.

To assist NBA Entertainment in their deployment of a high quality, high-speed Media Management System, SGI system architects looked to Snell & Wilcox for their superior pre-processing and ingest technology as part of the massive digital workflow and archive management system. As the installation progressed, Snell & Wilcox's expert integrators and SGI Professional Services discovered that the SGI® InfiniteStorage solutions and the Snell & Wilcox standards conversion technologies were a perfect fit. The two companies became partners in a new initiative to offer the highest quality, highest speed, turnkey solution for sports broadcasters and other media content owners around the globe.

While this solution was built within a sports broadcast environment, the ability to rapidly manage large volumes of content in this manner is a challenge found in a wide range of areas, even outside traditional media conglomerates. For example, media management for the military or homeland security requires rapid sorting through a flood of new incoming images, and quick comparisons to historical content. In media, there are digital cinema mastering facilities that digitally process full-length feature films managing terabytes of content in a workflow, create trailers, DVDs, mobile clips and do standards conversion. News broadcasting is another example where a tremendous amount of content streams into a facility. In sports broadcasting, content needs to be brought live

Credit : © John Benson; NBA Entertainment, NBA Entertainment Images®.

from multiple camera feeds into a digital environment, edited and then delivered as highlights within the live broadcast itself or to arena screens, sports news and update shows, IPTV, the Internet and mobile devices. In news and in sports, the same networked workflow can also provide seamless and immediate access to deep archives, enabling producers to add rich context to the new material.

Whether a sports league, major broadcast network or government agency each fundamentally has the same problem; how to digitize and manage vasts amounts of content in a very dynamic workflow environment.

The NBA Entertainment Installation
During the regular season schedule, 30 National Basket-ball Association (NBA) teams each play 82 games across the U.S. and sometimes several – or more – are played simultaneously. Each game is captured using a mix of nine high definition (HD) and standard definition (SD) cameras and there are over 500 time-stamped logging events per game. All of this content is routed – in real time – to NBA Entertainment production and transmission headquarters in Secaucus, N.J., and equals 6 to 8 terabytes (TB) of new content each week.

As the production arm for the league, NBA Entertainment repurposes and creates content for NBA TV, the league's 24-hour cable channel. This includes a large variety of NBA interview and magazine shows and countless highlights packages, promos and spots for network and cable distri-bution, and video on demand. NBAE also runs the league's Web site, NBA.com, which features extensive video clips of games through NBA TV Broadband. They also provide content for other Web sites and wireless devices. NBA Entertainment sends game broadcasts, clips and other NBA content to 214 countries worldwide.

Throughout the digital transition process, NBA Entertain-ment worked with SGI toward one goal: implementing a complete media management environment that would

allow the NBA to utilize all of its media assets efficiently. With everything in digital form, searchable by any of their internal and external clients, the stage is set for any type of digital distribution available today and in the future.

NBA Entertainment began the first stage of migrating from analog to all-digital production and content management several years ago. Nonlinear editing (NLE) systems were introduced to a centralized SGI network-attached storage (NAS) environment. Low-resolution browse, search and retrieve capability was added later. During the ingest process, Snell & Wilcox iCR (integrated content repurpos-ing) workstations capture all of the NBA games directly into the online SGI InfiniteStorage environment as they occur in real time. Online storage and iCR workstations also allow the facility to steadily transfer historical material from decades of content – some of it going all the way back to film reels of the first NBA game in 1946 – then digitize it to make it easily available for producers.

One of NBA Entertainment's most important requirements was retrievng specified segments or clips from larger files, also known as "partial file restoration." A basketball game can run between two to three hours and producers typically take only seconds or brief highlights of the game. Bringing only the required segment back from the data tape archive is a huge savings in time and online storage resources. The ability to map storage data sectors to time code for partial clip extraction as developed by SGI software engineers in Germany.

"NBA Entertainment required workstations for ingest and preprocessing that offered SD and HD ingest on a single system and the quality benefits of a hardware encoder in a flexible and efficient file-based workflow," said Stephane Blondin, Director of Software Applications, Snell & Wilcox Canada Inc. "We say the iCR offers 'Fewer Bits, Better Pics' – it has the best compression performance on the market. For a given quality, iCR files are smaller than the competi-tion and for a given bit rate, iCR files offer better quality than the competition, meaning highest Peak Signal-to-
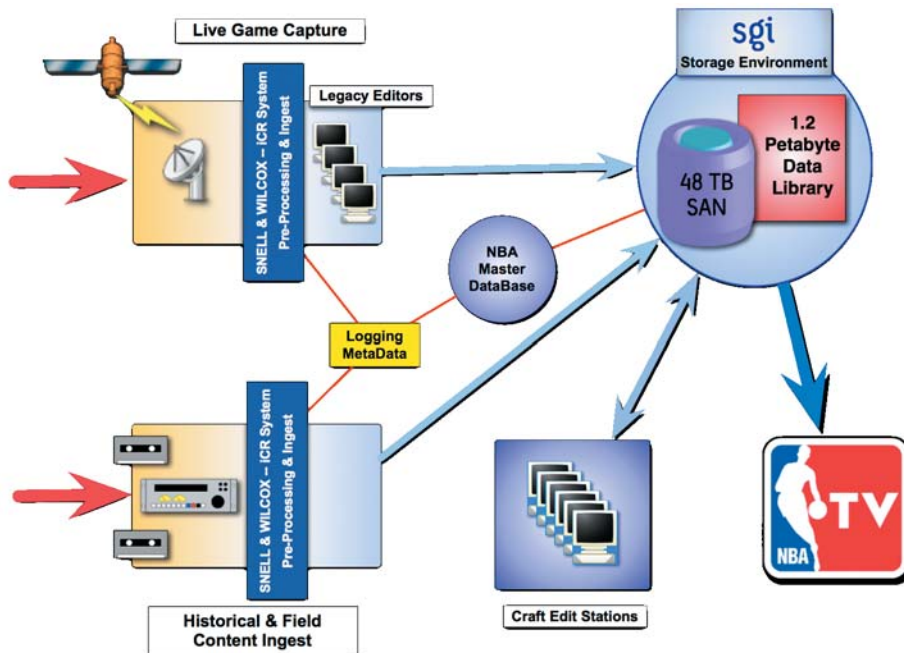
Since NBA Entertainment has dramatically streamlined its editing and archiving workflow, the NBA has near-instant access to its vast archive of film and tape, greatly enhancing the fans' experience – via television, in the stadium or through a mobile device.

Noise ratio. NBA Entertainment was also interested in our development roadmaps for real-time automated Quality Control and file-based repurposing, which will be deployed in a second phase of the project."

Snell & Wilcox's iCR has the ability to ingest at high bit rates in real time – up to 160 Mbps. iCR can record straight to a NAS or SAN driven by an automation system, a capability usually not found on open-storage solutions, only on servers. iCR automatically creates technical metadata within the product, enabling editors to log to clips and log shots, export them to a library and wrap them with SMPTE-compliant metadata. This allows content to be more easily found and tracked, and therefore monetized, to multiple customers on multiple platforms.

NBA Entertainment, with an eye toward increasing amounts of HD content, also required the ability to scale. They need-ed to be able to take their existing infrastructure and grow it to accommodate increased amount of content, without a "forklift" upgrade. SGI InfiniteStorage systems can scale to hundreds and hundreds of terabytes with simple, plug and play additions of servers and storage. Snell & Wilcox's iCR, with modular architecture, enables users to build the system to meet the specific requirements of their business and has the flexibility to grow as their requirements change.

How does all this help the editor/producer? Game feeds come streaming down and the highlights are edited from that game, packaged, and then sent back out within minutes, because the highlights need to go out to broadcast stations throughout the U.S. for use in their evening sportscasts. This requires a very flexible workflow. NBA Entertainment has 100+ editors and 15 edit suites. Previously it took 30-60 minutes to transfer content to the edit suite. When the clip was edited, it would have to be transferred back to the storage environment, making the edit room unavailable to anyone else. The SGI central storage solution enables NBA Entertainment to have any editor sit down in any edit suite and do a job, because they're editing off of a shared central storage environment. Now, when they log the file footage, it is immediately at their disposal. They can do their edit and, in minutes, be off the machine and on to another project, or out of the room and another editor can work on another program.

The SGI and Snell & Wilcox Strategic Partnership
"SGI has partnered with Snell & Wilcox for the simple reason that there is no other company in the industry that has such high quality and high standard for preprocessing and ingest," said Louise Ledeen – Segment Manager, Media, SGI. "The quality of their encoding is absolutely superior and their product enables the professional level of

workflow that is necessary in high-value content such as the NBA or other entertainment content owners. By interfacing directly with SGI InfiniteStorage solutions Snell & Wilcox expands their capabilities into a variety of data-centric environments ensuring that customers get the most benefit out of their investment."

"We are working with SGI in response to customers needs to create a best of breed solution for the capturing of content, the storage of content and for the repurposing of content across multiple distribution platforms," said Joe Zaller, vice president of marketing at Snell & Wilcox (U.K.). "The power of the solution is that it is a real turnkey solution with high reliability and high quality. It has been proven in a very large installation, it has been integrated tightly, it is a best of breed solution, and it offers real benefits to customers."

The combination of Snell & Wilcox's image processing feeding into their high-quality, Emmy® award-winning Prefix compression pre-processing in a metadata-rich environment – all tightly integrated with the SGI server and storage system and asset management systems – enables the customer to get high quality images into the archive and then ultimately repurpose. Because of Snell & Wilcox's Emmy® award-winning Ph.C motion estimation software, a very high quality digital master is created. This is extremely important for sports content, particularly with basketball, where there's very fast action resulting in lots of camera pans. Within the camera pans there's lots of motion of the players and the ball, all moving very quickly. Because the

iCR can cascade technical metadata from one process to another, from the preprocessing to the encoding to the editing and repurposing, more fidelity from the image is extracted. Higher fidelity means that much more of the image quality and its emotional impact is preserved, especially when going to lower bit rate applications like iPods and mobile phones.

NBA Entertainment Results
"The action that takes place on the basketball court pro-duces enormous amounts of desirable content that can be provided to millions of fans throughout North America and the world, said Steve Hellmuth, senior vice-president of technology, NBA Entertainment. "As command central for all NBA broadcasts, our production facility literally captures everything that happens in each game –with sometimes a dozen games going at once. Snell & Wilcox's ingest and preprocessing and SGI's storage solution helps us improve our ability to work with that content in the window in which it is most valuable, immediately following the game, and puts the games in a secure archive for preservation and future programming.

"What make this all possible is that computer-based digital storage is not only enormously more efficient than video tape, it is also now less costly –and with Moore's Law remaining in effect, a great cost-saver in the future as we are dedicated, comprehensive archivists of the NBA's film and video," concluded Hellmuth.