Commission (FCC) still has not taken a definitive step toward mandating a conversion deadline for low-powered services. The NTIA has two grant programs to address the DTV conversion issues for low-powered stations. The current program allows eligible entities to apply for $1,000 to purchase digital-to-analog conversion equipment. The low-powered station must broadcast only in analog and must rebroadcast a full-service digital station. This is in essence a CECB for the translators and low-powered television facilities. The second program, which is still listed as a future program will provide $65 million in 2009 to allow eligible low-powered stations to upgrade from analog to digital in eligible rural communities.

Mobile/Handheld Video Broadcasting

Over the past few years, several manufacturers have demonstrated mobile delivery of content to portable devices using a portion of a station's Advanced Television Systems Committee (ATSC) stream. In May 2007, the ATSC issued a Request for Proposal for technology to enable development of an ATSC Mobile and Handheld Standard that will enable broadcasters to deliver television content and data to mobile and handheld devices via their DTV broadcast signal. A number of proposals were received. During the first part of 2008, field tests were conducted on the systems, and in May the results of the technical trials and evaluations were submitted to ATSC. The plan is for the standard to be finalized and in place by February 2009, so that manufacturers and programmers can begin creating content and marketing products.

Conclusion

The transition to digital broadcasting is at times very convoluted. It is part evolution and part revolution. Many broadcasters are still struggling with the very different and divergent directions in which the transition is taking them. On one hand, they are being told that they need to produce rich HD content for delivery to huge movie theater-quality screens in homes with 5.1 channels of surround sound. On the other hand, they are being told that they need to produce content that can be delivered to tiny handheld screens in cellphones and PDAs so that people can watch whatever they want, where ever they are, whenever they want. And, of course, there is the computer industry, where the broadband internet connection is the source of all knowledge and entertainment, in which broadcasters are said be dinosaurs that have no relevance. So who is right? Everyone and no one. In an environment in which the goal is to provide what the consumer wants at any time and any place, no single technology will meet all of the needs of all of the people all of the time. Broadcasters will continue to deliver products that will continue to be used by consumers. Remember, broadcasters were wireless long before it was cool.

Broadcast Acquisition and Post-Production

By Karl Paulsen, AZCAR

In North America and throughout the world, discerning consumers accompanied by high-definition (HD) programming, plus a significant increase in economical HD-product offerings, have driven up the number and the types of systems deployed for television broadcast. The growth is evident in television news and production. Supplementing the rollout in the professional HD space is a growing number of consumer-level HD cameras now hitting the sub-$1,000 price range. This overall seeding of the industry is now at all ends of the spectrum—from content creators, to the broadcasters, to home entertainment networks and event or venue distribution.

Large venue applications are now offered a mix of full-sized studio cameras, handhelds, cinematography-level and micro-sized units, all with full HD-capability ranging from HDV through 2K images. Although broadcasters, especially for news, may still be wrestling with the decision to go 16 x 9 wide-screen standard-definition (SD) or convert entirely to HD, the motivation is driven by the type and degree of infrastructure already in place at the facility—as well as the perception that branding "HD" has to the marketplace. This past year has seen significant HD increases in helicopter platforms for air-ENG, beauty cameras that show off the HD-perspective, and the marketing hype that allows stations or channels to brand

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themselves as "now broadcasting in full HD." The balancing act continues as the move into HD-acquisition, and post-production is in full swing, dwarfing straight SD-only upgrades.

In the professional broadcast acquisition space, 2007 saw narrowing formats of choice to either XDCAM or P2, with the two predominant forces (Sony and Panasonic) participating with media capture formats, physical media, and camera platforms. Sony's success in its XDCAM products includes, for SD, a 2/3-in. CCD camcorder and for HD, a 1/2-in. CCD camcorder, plus record associated record decks. The series has now expanded with a new 2/3-in. CCD HD camera (PDW-700), providing high-quality HD recordings at up to 50 Mbits/sec, using the MPEG-2 4:2:2P@HL compression technology, referred to by Sony as MPEG HD422. The progressive CCD yields 1920 x 1080 effective pixels and 14-bit A/D conversion dubbed Power HAD FX.

Hitachi also improved its 2/3-in. SK-HD1000 offering 60 dB (HDTV) signal-to-noise ratio at F10.0 with 1100 horizontal TV lines of resolution in a two-piece camera platform. The camera is based on three RGB high-dynamic-range progressive CCDs with 2.2 million pixels and 14-bit A/D converters. At another corner of the spectrum, aimed at the semi-professional environment, Canon's XL H1 HD (first released in 2006) camcorder emulates significantly more expensive cameras and includes a "Professional JackPack" that outputs an uncompressed HD signal (as HD-SDI) and allows input and output of SMPTE 12M time code, plus a genlock signal. These trends seem headed to provide for an intermixing of all flavors of imaging devices for all forms of HD-production, again driving the overall demand for HD upward.

From a New Point of View

Yet it does not seem to end at just pure studio or portable high-definition camera imaging. Point-of-view (POV) cameras are now ready for 2K digital cinema and are suitable for HD and adaptable for stereoscopic 3-D applications as well. POV cameras have become versatile platforms that can be utilized in mobile and fixed productions. HD-POV cameras are often grouped into the "box-camera" classification and have become a definitive requirement for special venues such as sports, hostile environments, or confined spaces where humans cannot be afforded easy or safe access. Selected examples of POV include Hitachi's HV-HD30 HDTV compact, box-type color camera weighing in at 1.3 lb (600 g) that employs three HDTV 1/3-in., 1.3-megapixel CMOS sensors. This camera provides both 1080i and 720p HDTV digital signals that are SMPTE 292M compliant with a wide range of remotely controlled adjustments allowing it to be mounted in active areas of sports venues, especially where human camera operators would be prohibited. Ikegami supports this form factor in the HDL45 series, configured specifically for the scanning and frame requirements of the application. The need to upconvert the SD camera for HD production is a trend that is rapidly diminishing as this and other forms of HD-imaging become more affordable.

For versatility, the Iconix newest generation HD-RH1F camera system (Studio2K) features a capability of 45 format and frame rate conversions. Capturing and outputting video for 2K digital cinema formats at 2048 x 1080p and 2048 x 1080PsF at rates of 23.98, 24, 25, 29.97, and 30 frames/sec; the same platform handles HD resolutions of 720p, 1080i, and 1080p at rates of 24, 25, 30, 50, and 60 frames/sec, as well as NTSC and PAL. 2K-data via dual-link HD-SDI ports are at 4:4:4 RGB. Claimed as the smallest high-performance 2K-capable POV camera available in the industry, this lightweight camera system comprises a 2.5-oz (77g) camera head and a 4 lb (1. kg) processing controller unit plus power supply and 3-, 6-, and 10-m cables.

Connections and Corrections

With these and other new camera configurations comes the evolution for the capture and transmission of 1080p, now being addressed in both its hardware configurations and in new standards. The emphasis on quality is coupled with the "1080p reality," which is evident as new production facilities are specifying an infrastructure capable of transporting live signals over significant distances without compression. A camera-mounted fiber optic HD dual-link video system for conversion of electrical signals to fiber that moves uncompressed 4:4:4 and 4:2:2 signals between the camera head and a recording device over one lightweight, battle-rated fiber optic cable is now available. Signal transmission over distances from several hundred feet to as great as nine miles is now possible, with an offering from Telecast in their CopperHead DLV3X1 product, which mounts to any dual-link camera. The product line allows certain smaller camera systems to feel and work like a larger studio-like camera, at a significant cost reduction.

This past year has seen advances in on-board image processing for studio and handheld HD camera systems. Precise control over skin-tone, gamma correction to match contrast settings within the image; range stretching for variable lighting condition compensation; and protective control over hue shifts in high light areas or brightly lit scenes are now common packages. Signal-to-noise ratios at or above 60 dB are being achieved, with portable systems in the 54- to 58-dB regions, dependent on the type of sensor, the transfer methods, and the scanning (i.e., progressive vs. interlaced). Advanced features for picture grooming extend to dynamic detail control and programmable/realtime gamma and contrast correction. The European Broadcast Union (EBU) color matrix presets ensure that color response is consistent when using the cameras in HD and SD video intermixing. Higher sensitivity for low-light shooting (F10 at 2000 lux) and low vertical smear (less than -130 dB) are coupled with even lower power consumption (in the range of 30 W without viewfinder).

For digital cinematography, Sony added the F35 camera, which is built on last year's F23 principles and compat-

ible with a variety of ARRI film camera accessories. The F35 accommodates film camera bridge plates, follows focus units, and lens focus/zoom/iris servo controls without modification to the camera. The F35 docks to the companion SRW-1 HDCAM-SR recorder forming a self-contained, cable-free portable combination. Variable frame rate recording capability for "over-cranking" and "under-cranking" with frame rates from 1 frame/sec to 50 frames/sec in one-frame increments. RGB 4:4:4 recording is possible with this combination for extremely high picture quality. Panasonic offers its new VariCam HD Cinema model 3700 and the VariCam 2700 solid-state camcorder for master-quality, 10-bit 4:2:2 AVC-Intra 100 recording for film-like qualities. The camera also supports the more bandwidth-efficient AVC-Intra 50 compression, as well as the DVCPRO HD format.

IP-centric Evolution

The migration from tape-based capture of content pushes new developments for digital media. Here, too, the industry seems to be split between P2 and XDCAM, whether for SD or HD recording. One of the driving factors in product selection boils down to the type of recording media, affected in part by its propriety, longevity, versatility, and availability. Group broadcasters take a good hard look at each product line, knowing they will be purchasing by the dozens. The rationale for these decisions takes into account human actions, as well as operational and economical conditions for the media. Some feel that the traditional multi-purpose generic media (i.e., Flash memory) may be too easily lost or may find its way to other inappropriate non-business uses, which places risk on the availability of the media for its intended purposes. This philosophy in turn supports more proprietary media carriers, despite the cost differentials.

The incremental movement toward IP-based new media continues with a variety of offerings. Developments include improvements in the field of environmental packaging and ruggedized protection of the forthcoming disk media itself. The renewal and subsequent launch of Thomson Grass Valley's Infinity now shows a highly versatile product line that includes the DMC 1000/20, a high-performance camcorder for both ENG and EFP applications that utilizes the REV PRO XP (eXtra Performance) and ER (Extended Recording) media. REV PRO disks, which are based on the Iomega REV removable storage system, have extended the storage capacity to 40 and 65 Gbyte, with the REV PRO XP optimized for high-performance and the REV PRO ER focused on capacity. Thomson incorporates JPEG 2000 wavelet compression for HD recording at 75 Mbits/sec, which is the same (non-DCT) format used in other scalable compression formats for high-quality reproduction, and allows for data offload from the disk at extremely high speeds (e.g., nearly 10x realtime transfer of DV25 encoded material). A minimum total sustained data rate of 110 Mbits/sec can support a single stream of HD video or two simultaneous streams of SD video. Camcorder components further provide for solid-state recording via commercially available CompactFlash cards with a choice of MPEG-2 and JPEG 2000 compression profiles for HD and SD, coupled with legacy DV compression for SD.

Ikegami, which in 1995 produced the industry's first tapeless camcorder, has a Flash-based GFCAM system as its lower cost tapeless HD ENG solution. The recorder, developed in cooperation with Toshiba, includes the GFCAM HDS-V10 tapeless camcorder, the GFSTATION GFS-V10 studio deck, and GFPAK high-capacity Flash media that provide for more than two hours of HD video recording. Ikegami also offers both IT CCD and CMOS camera platforms.

Clear Viewing and Ruggedized Media

The statement "it's all about the glass" gets more attention as developments in smaller format lenses for HD have continued. Lenses that are designed to meet the performance expectations of new cost-effective HD cameras are also enabling the growth in HD. Lenses must now be designed for the highest optical performance in very low-light settings to meet the push toward green studio environments that utilize low output compact fluorescent fixtures. Thus progress continues in managing the balance between lower cost cameras and higher performance lenses.

In this past year, wide-angle and telephoto lenses for HD ENG applications have expanded. For example, Fujinon's HD Select Series of ENG lenses are focused on 2/3-in. HD video cameras (the wide-angle ZA12x4.5BE and the 22x-telephoto ZA22x7.6BE). Collaboration between Vinten and Canon have produced a system that eliminates any trace of lag after fast pan or tilt shots, providing significant advantages in the production of HDTV sports and live entertainment events. Vinten's Vector 950 Active pan-and-tilt head, which complements Canon Broadcast's lens-stabilization Optical Shift Image Stabilizer (Shift-IS) technology, can now be used with most existing Canon HD field Shift-IS lenses.

Digital recording and portable systems are paving the road to a fully mobile digital cinematography capture and recording platform. With a footprint no larger than that of a toaster, the Codex Digital Portable recorder includes dual-channel 4:4:4 and 4K recording capabilities with a ruggedized, removable RAID DiskPack subsystem. It utilizes an integrated touch screen controller and provides for eight channels of digital audio and a network-accessible Virtual File System. The recorder is designed to interface with most of the digital camera systems, including the Sony HD range, Dalsa Origin, Thomson Viper FilmStream, Panavision Genesis, Arri D-20, Red Digital Cinema System, and Vision Research Phantom series. A remote interface is designed to run on a number of OS platforms, including Windows, Linux, OSX, and PocketPC for PDAs.

In search of economical HD video archiving solutions, Ikegami has the HDS-300R external holographic drive that enables users of its GFCAM tape-

less HD ENG system, Editcam3, or EditcamHDtapeless camcorders to transfer edited or camera-original video content via network interfaces to highly stable 300-Gbyte cartridges. The original equipment manufacture (OEM) product from InPhase Technologies provides the advantages of tapeless nonlinear archiving and retrieval.

Grading Image Reproduction

For displays, the venerable "broadcast-quality" image reproduction progresses at a steady state, but the answers are incomplete, at least for today. Fixed pixel displays have solved some of the static image problems of the past, yet may have the ability to process and handle interlaced images on what is a native progressive (frame-based) display format, thus forcing reliance on electronic image processing, which in turn creates its own artifacts.

The EBU recently produced, in Tech 3320 (May 2008), some definitions and classifications of monitors for professional and broadcast applications. Defined in the Grade 1 monitors class are devices that are used for high-grade technical quality evaluation of picture capturing, post-production, transmission, and storage. Monitors of this caliber must possess at least the quality properties of the equipment that they are intended to control. For a monitor to fit into the Grade 1 class, artifacts should not be unduly masked nor should additional artifacts be introduced. Settings should be adjustable, as well as lockable (mechanically or electrically). Intended as a "measuring instrument" for visual evaluation of image quality, it is highly desirable to have the ability to reproduce the scanning mode of the signal in the native format or as should be viewed (e.g., 50-Hz presentation of 25p material). Typical applications in which Grade 1 monitors would be employed are camera control, color grading, and quality control. Lighting control positions in which video technical quality parameters are evaluated, controlled, and corrected may also command this level of monitor.

Grade 2 monitors would be used where tighter tolerances (e.g., accuracy of color reproduction and stability) and other equipment features are unnecessary. Applications for Grade 2 monitors would be for the preview of sources, single-image or multi-image control room monitoring walls, or in edit suites, if no picture quality manipulation is performed. Grade 2 and Grade 1 monitors could potentially be used together, that is, in the same television production control walls.

Grade 3 monitors for observation or presence are devices equivalent in many respects to high-end domestic or consumer displays. For television production applications, important considerations include the availability of professional interfaces, mechanical robustness (including the ability to mount in racks or stacks), and transportability, as well as electromagnetic compatibility and acoustic noise. Work areas where applications for Grade 3 monitors would be employed are, for example, in audio production, dialog dubbing, signal presence (confidence or repeat) monitoring, commentator positions, and displays for the audience in a studio.

Sony's critical evaluation line of LCD monitors provides solutions to the vanishing cathode ray tube. The offerings are made up of its professional master and evaluation BVM L series monitors, and the legacy studio-quality LUMA line. Still, others are steadily working toward Grade 1 FPD, using the acronym to describe both flat-panel and fixed-pixel displays.

The concept of the cathode ray tube may not be entirely shelved. From Field Emission Technologies comes a new kind of field emission display (FED) that reproduces images using an array of nanocone emitters to excite the phosphors. Taking advantage of highly efficient self-emissive phosphors combined with a line-sequential impulse drive system, the display delivers the visual performance required of a next-generation flat panel display, including a wide viewing angle, lifelike color, and outstanding contrast with true black reproduction. The no-blur display of quickly moving images is provided, and tables describing the compatibilities of the nano-Spindt FED with EBU-Tech 3320 and ARIB TR-B28 user requirements for master monitors are included. A 19-in. display consists of 1280 x 960 dots (4 x 3 aspect ratio SXGA) with a 0.306-mm pitch at a brightness of 400 cd/m2, and a contrast ratio of more than 20,000:1 at a 10-bit resolution.

Dolby has also developed a process called high dynamic range (HDR) display technology whereby the combination of blur correction through an image processing algorithm make up subsystems that incorporate dual modulation, high- and low-resolution and correction, and control over veiling luminance (used for masking imperfections) by way of a unique LCD backlight comprised of an array of LEDs. Each LED set is controlled with an 8-bit (255-step) signal in which brightness is adjusted to a level demanded by the source image. The LED arrays and the LCD panel are optically combined to deliver 16-bit performance, with the LED providing greater brightness while simultaneously saving power.

Post-Production Progress

For the past year, steady growth has been evident in software-based systems for editorial work, graphic and special effects, audio and video composition, and animation. Nonlinear editing (NLE) offerings continue to add new editing features and format capabilities that fill in the gap between the mainstream players. There is also tremendous pressure in the production community, especially in the high-end motion picture visual effects and finishing sectors, to move four times as much data than was possible a few short years ago. More efficient workflows, more capability, and better interoperability are keys to managing and reaching those goals.

Technology from Autodesk, which took home its fifth Academy of Motion Picture Arts and Sciences honor with a Scientific and Technical Award earlier in the year, continues to lead the visual effects industry with releases of its Flame, Smoke, Lustre, Maya, Toxik,

and Motion Builder, which is augmented with new versions of 3Ds Max modeling, animation, and rendering software. The post-production process now combines 3-D applications typically tailored for architects, designers, and visualization specialists, opening a new door to combining isolated segments of visual design.

For visual effects the use material libraries for simulating real-world surfaces allows for streamlining of workflows and a more rapid, and efficient, leap to completion of program content. The Autodesk Extension 1 addition to Toxik now includes a Warp Image tool through a new programming tool called Pixel Expression Language (PXL) that allows compositors to create and customize commonly applied effects and support for video previewing that allows artists to make more informed color decisions.

In the editorial arena, the Adobe Media Player is rapidly migrating throughout many areas of post-production, coupled with Adobe Premiere Pro CS3 editing software on Windows PCs and Intel-based Macs; it is featured as part of Adobe Creative Suite 3 Production Premium for multimedia design. This suite supports every major video format from DV to HD and beyond. The Adobe Premiere Pro CS3 does not need to transcode or rewrap the P2 format into another file format, and therefore shortens the acquisition process and allows editors the flexibility to edit footage in the native MXF format.

Smaller, more compact support hardware for the integration of various I/O-formats includes a smorgasbord of bridge systems between formats. Blackmagic Design has developed several devices and applications, including PCI Express editing and conversion solutions. The DeckLink HD series, Intensity HDMI capture and playback card HDLink are complementing the desktop post-production processes. The April introduction of a highly-compact 3-Gbit video router and machine control product adds new dimensions to productions that utilize 1080p as its format.

Extensions of those traditional post-production activities are making their way into television news production and editing. Both HD and SD newsroom systems can now connect directly to fiber channel storage and software-only packages, installed on a Windows computer, which can then connect over Gigabit Ethernet software-based laptop editors. Feature sets, such as those outlined in the Harris NewsForce products, offer full integration with Apple's Final Cut Pro (FCP) editing software through a gateway. Omneon has integrated FCP on both Spectrum and on MediaGrid. Overall, the integration of FCP has crossed into the post-domain both for news and programming as users seek more cost-effective solutions for mainstream dedicated news platforms. Bridging these systems is consistent across all the major and minor players, with nearly all broadcast server manufacturers recognizing and integrating various levels of cross-pollination between Apple and Avid product sets.

Edit-in-place (EIP)—productions from software-based edit platforms with connections that utilize the media stored on a high-performance video server's storage platform—enable editing directly onto the storage area network (SAN) architectures; this mitigates the lag between the ingest and production editorial steps. Suitable for a limited number of seats, EIP is becoming the secondary optional requirement in specifying broadcast server storage architectures. The alternative and supplement is for proxy generators that allow editors to use lower resolution copies of content produced during the ingest process. This permits multiple users the ability to utilize the same content to produce different programs under the "collaborative editorial process."

This year also showed progress in the integration of alternative compression formats (e.g., H.264 and JPEG 2000) into desktop, card-based, or rack-mounted codecs and even recent video server product lines. For the editor, standard desktop PCs can now access H.264 low-resolution images, created and ingested as HD, from the browse server, scaling back the previous scenarios of making a downconverted SD-copy of an HD image for preview or prerelease approvals.

Formulating Formats

The future of transcoding devices as integral elements in the post-production release domain is not far away. Migration from high-bandwidth MPEG-2 to MPEG-4 (AVC) has emerged as a means to distribute high-quality approval releases in the file-based arena. The concept of the "dub-house" portion of the post-production world may take on new meaning, because matching duplicates in alternative formats may be required for the age of broadband distribution.

In the editorial space, professional realtime native HDV, P2 MXF, and DV editing is becoming a standard operating environment. A new concept, from Maximum Throughput, called the MAXedit Web Edition, is essentially a hosted, subscription-based, online editing service that editors can access on-demand from any location via the Web. Content is stored on the company's Maximum Throughput server system, and editors can then collaboratively work with anyone on the internet. Thus, progress in extensibility on a global basis continues.

The renewed interest in stereoscopic 3-D post-production is quite evident. Quantel provides a full spectrum of new and improved systems that includes a new interactive color-correction system, Pablo Neo, and its genetic engineering approach to team working in post-production and Digital Intermediate creation. Displays, which debuted at this year's Consumer Electronic Show, now incorporate 120 Hz frame rates, thus enabling 3-D for gamers or the capability to show two differing programs on the same screen simultaneously (external glasses required).

Delving into 64-bit operating systems, products have begun to move from the previously only available 32-bit software systems to newer 64-bit versions. Although not fully flushed out, preview demonstrations of a 64-bit upgrade

for Sony's Vegas Pro 8 NLE on Windows Vista should, like others, accommodate the requirements in increased computing horsepower for HD production workflows. JPEG 2000 codecs are also emerging as products (e.g., Thomson Grass Valley Infinity Digital Media Camcorder), allowing users to take full advantage of this format without having to renew or relearn existing editing systems. JPEG 2000's bit layering provides not only a full 100 Mbit/sec encoded stream, but it serves a dual role at an intermediate level (30 Mbits/sec) or as a high-quality browse level (6 Mbits/sec) extending post-production to laptop users—including the ability to edit JPEG 2000 in the field.

The Sony XDCAM EX format (introduced a year ago) and the AVCHD are adding to the pool of available systems that deal with the growing volume of image capture platforms and release formats. Inputting Panasonic P2 MXF files and common professional QuickTime codecs are becoming standard offerings in NLE systems for post-production.

The Power of the PC

Increases in power and performance from the PC platforms are yielding significant improvements in system architectural designs that tightly integrate software and hardware with the CPU, host graphics card, and PCI Express connections. The high-bandwidth, high-performance effects engine eliminates the lag time in responsiveness, improving the user experience when working with HD material during the editorial process. Mixing baseline software on PCs with hardware-based components lets the user extend capabilities to a multitude of formats, principally supporting the more commonly employed JPEG 2000, DVCPRO 50, DVCPRO HD, P2, XDCAM, and XDCAM EX compression and media applications.

SMPTE standards and new toolsets from Avid, offer realtime output of all the major SD and HD formats, eliminating the need for rendering with the (Avid) DNxHD codec. Codec and file-based format support is improved and includes native support for "thin raster" formats. DVCPRO HD and XDCAM HD are augmented with realtime outputs of multiple HD streams. Native editing support for AVC-I (50 Mbits/sec and 100 Mbits/sec) now utilize the same Avid workflow as in P2/DVCPRO HD editing, with support for Sony XDCAM-EX (via Sony Clip Browser software) and JVC 23.976p, and 25p HDV codecs.

Animation is one of the more highly-collaborative art forms, which has requirements for exacting color imagery, absence of stuttering or delays in playback sequencing, and the reliable delivery of all data in a timely and consistent manner. HP has provided a solution for DreamWorks that answers the color consistency issue in their DreamColor display technology, a system that manages color accuracy to ensure that every screen conforms to a given image standard. The DreamColor concept is to displays, what THX is to sound reproduction, i.e., setting and defining measurable expectations that can be consistently utilized by the industry.

Network Management with Global Connectivity

File-based platforms aimed at editing have enabled a global extension of the post-production process across distinct geographic locations, thus requiring that long-distance communication and exchange of digital content be improved. A dilemma for much of the industry, two relatively new directions have emerged that are providing solutions to distant collaboration: first, the exchange of material across large geographic areas; and second, the management of the networks both intra-facility and inter-facility.

The two issues can be combined as evidenced by the post environment, which continues its path toward the all file-based workflow. The concept of configurable and manageable networks grew out of the long-distance file interchange challenges that can grow to enormous proportions. Server and storage vendors have in most recent times begun to integrate content interchange platforms that manage the QoS of a network from the transport side and the workflow delivery side. Products that control the network traffic on a scheduled and prescribed basis are being employed so as to maximize efficiencies based on time to delivery, network bandwidth availability, and workflow priorities.

Solutions designed to optimize content distribution among platforms now provide for an all-integrated approach to production, post-production, and transmission. The concepts include the ability to schedule and prioritize transfers based on a rules-based structure. Adjunct to this is the management of the bandwidth associated with individual transfers, extensible both locally (inside the facility) and across or between sites (globally). This further enables content exchange, disaster recovery, and remote file access between geographically separated locations. Methodologies include agents that monitor network traffic flow on a LAN segment that communicate to a central control processor and adjust for content data movement, ensuring that the priorities set by the systems administration or production management staff can be met and optimized. This systems management perspective may soon become an integral requirement for the file-based, network-centric architectures of the future.

This has been an interesting year for broadcast and post professionals. Although the early part of 2008 showed a modest set of new technologies, the applications of the past two years of technology development are now more profoundly integrated with the workflow issues of tomorrow. Technological improvements are inevitable, but make little practical sense if improperly managed. The focus for 2009 might well be affected by any new directions taken as the sunset of analog broadcasting approaches; and by the extension of broadband delivery technologies. This entire perspective may not settle down for at least another year. Rest assured, high-definition production and television viewing, on any platform, is not going away and continues to keep the door open for increased technologic innovations and new user experiences.