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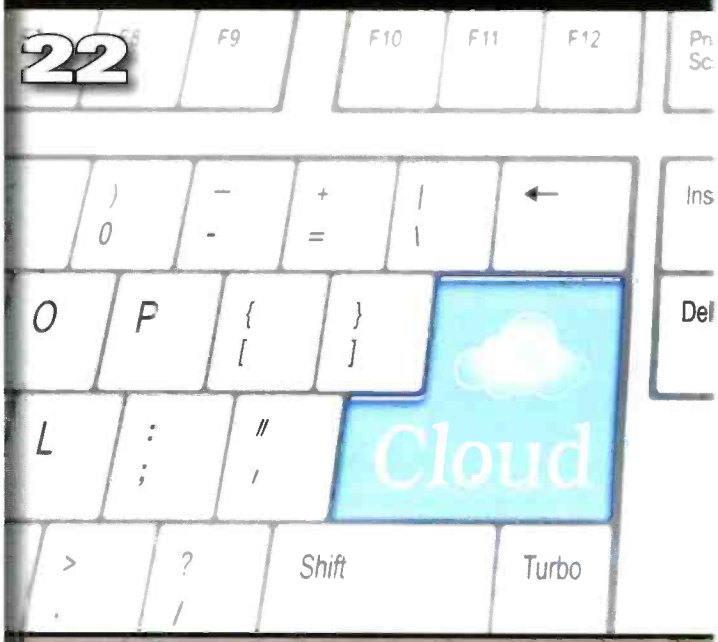
ON THE COVER:
AVCHD, developed jointly by Panasonic and Sony, is a proprietary version of H.264/AVC. Specifically, AVCHD employs both the H.264 Main Profile and High Profile. Thus, although it is marketed as a single codec, it uses a pair of codec profiles.



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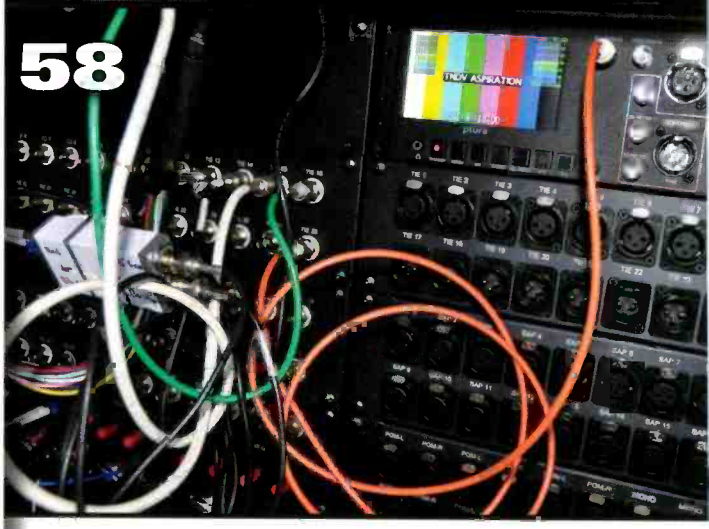

JUST THE FACTS!

After 10 months of anxious waiting, the FCC's net neutrality rules have finally been published in the Federal Register. The rules are set to take effect on Nov. 20. However, it's expected that Verizon and MetroPCS will challenge the rules in court. Earlier cases from Verizon and MetroPCS were tossed out of court because the rules hadn't been finalized.

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Do we need the cloud?

If I rated technical topics by the number of press releases received, cloud storage would be number one. Not a day goes by when I don't receive at least several press releases about new vendors, products or notices of webcasts or seminars about cloud storage. Today, I received a press release titled, "Cloud on a USB stick."

But the question readers continue to ask me is, "What does cloud storage have to do with broadcast and production applications?" That is a more difficult question to answer.

In looking for help, an hour on the Web merely left me more confused than before. One vendor offered 10 reasons to use cloud for backup. Another white paper suggested there are three types of clouds: private, public and hybrid. There were also many papers appearing to want to scare one off from the technology with titles like, "Cloud Application Deployment: 10 Deadly Sins." I also discovered the hybrid cloud, the rich cloud and the virtual cloud.

The recent IBC convention should have provided some guidance, right? Nope. While some of the convention's technical papers mentioned the cloud, I did not visit a single vendor claiming to offer cloud storage as an end product. That may not be so surprising as broadcasters are about as risk adverse and anyone.

Cloud technology is a huge business. Amazon operates the world's largest cloud-based service provider, the EC2 (Elastic Compute Cloud), which is said to use 40,000 servers. It generated $500 million last year, and some believe it will hit $1 billion in revenue next year.

While certainly large, that amount of storage is peanuts compared to Google. According to a report from Data Center Knowledge, Google has approximately 900,000 servers consuming about 220MW of power, or about 1 percent of total global electricity use by data centers.

All of this makes me wonder why cloud vendors are not scrambling to supply technology to this industry. Then, I reflected on a point above: Broadcasters are not risk takers.

Even so, IT-centric products are already core to some broadcast and production applications, so can the benefits of the cloud be far behind?

As one who likes holding my content on local servers, I would be hesitant to turn it over to the invisible cloud. But then, my own experience includes several system failures where several years of data suddenly disappeared. That alone should make me eager to hand that task to someone else.

However, before you upload your entire station to the cloud, it is worth reading what Oracle CEO Larry Ellison said about the cloud. Keep in mind he's made a lot of correct business and technical decisions that have made him the third richest person in America.

"The interesting thing about cloud computing is that we've redefined cloud computing to include everything that we already do," Ellison said. "I can't think of anything that isn't cloud computing with all of these announcements. The computer industry is the only industry that is more fashion-driven than women's fashion.

"Maybe I'm an idiot, but I have no idea what anyone is talking about. What is it? It's complete gibberish. It's insane. When is this idiocy going to stop?"

What's your opinion? Is there a cloud in your future? Let me know at *editor@broadcastengineering.com*. BE

EDITORIAL DIRECTOR
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- Digital signage and digital cinema products/technologies.
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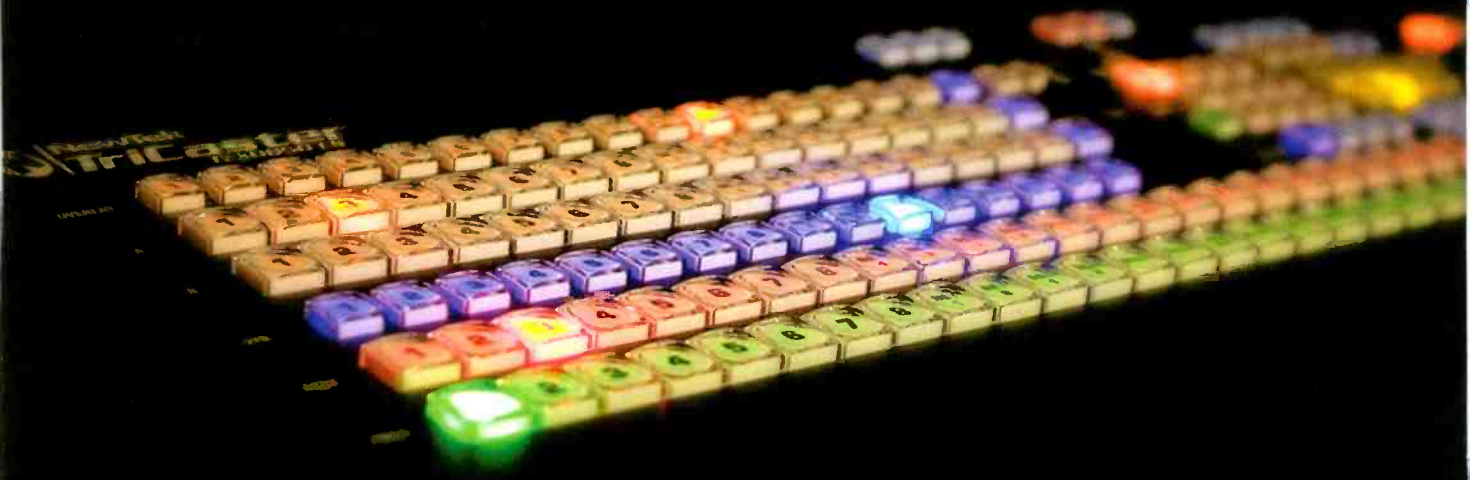

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Audio-visual archives

As other options increase, tape may not make the cut.

BY DAVID AUSTERBERRY

The demise of videotape presents a challenge for broadcasters. It is no longer possible to send program videotape to the archive — a climate controlled warehouse — and expect to check it out sometime in the following 25 years. Instead, programs now exist as data files, and new systems and working practices are required.

Virtually all new cameras shoot as files written to data cards or optical discs, and videotape as an acquisition format is becoming a memory. More finished content is being delivered to master control as MXF files or another similar format, so again, videotape has had its day.

There are two issues with tape: How long will the medium last, and how long will tape decks be around? Tape generally lasts 20 to 30 years in a climate-controlled environment. However, finding a working tape deck older than 20 years is nearly impossible. There are still working quad machines, but they are relatively easy to repair, with discrete electronics and large mechanical parts. The miniaturized parts of modern decks are difficult to manufacture without special tools, so sourcing parts decades ahead will be difficult. The same applies to the highly integrated electronics.

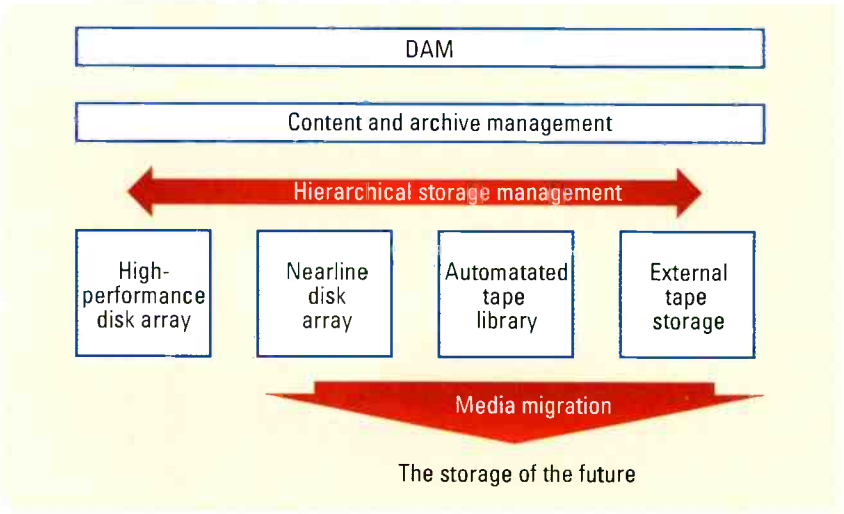


Figure 1. An archive consists of a hierarchy of storage, with a management layer to control file transfers and migration to future storage media.

In the data storage world, this problem is solved through ongoing migration to the latest format. Data on SCSI drives is copied to SAS, LTO-2 to LTO-5, and so on. Migration is carried out before the media wears out or the drives become obsolescent. Some tape libraries include lifecycle management software that monitors tape condition and migrates when appropriate. Archive management software similarly manages tapes, migrating when needed, and "defragging" partially erased tapes, compacting them to fresh media. (See Figure 1.)

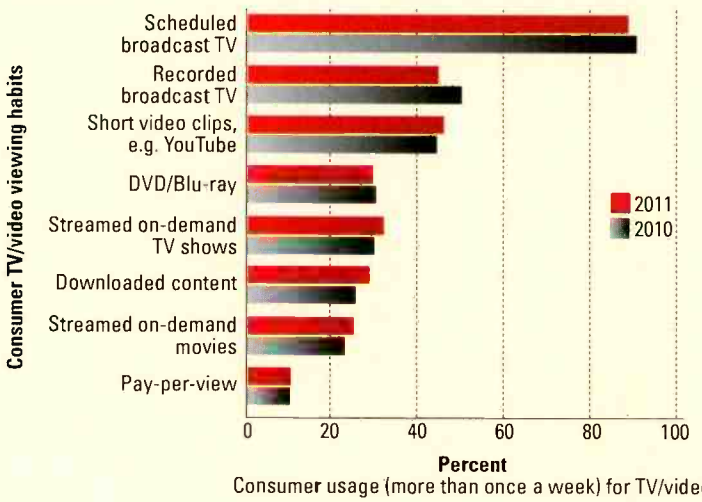
Videotape can be similarly migrated, but each dub is a generation loss. For compressed digital videotape formats, losses from error concealment and correction can occur. For composite recordings, there are additional artifacts of decoding.

Data tapes and disks can be copied with very low data losses. An archive system should include a data integrity

FRAME GRAB *A look at the issues driving today's technology*

Watching the streaming cloud

With better devices, more people are choosing Internet-based, on-demand viewing.



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check to ensure the file hasn't been tampered with or corrupted while in storage.

LTO

LTO is a popular format for archiving because it has media and drives available from several manufacturers. Also, the format has a well-defined roadmap, with the current generation being LTO-5. Each generation drive is backwards-compatible two or three generations, providing for easier transition.

LTO-5 also introduced support for Linear Tape File System (LTFS). This is useful for small archives where single tape may be used to store projects, jobs or program series. It allows direct access to tape from Linux, Mac and Windows operating systems without the need for tape management software.

With a large robotic library, a DAM system and archive manager is used to catalog and index data tapes, but LTFS offers a low-cost alternative for ad-hoc archiving.

LTO-5 cartridges store 1.5TB data. The projected LTO-8, three generations ahead, is planned to store 12.8TB. Since LTO-3, support was added for write-once read many (WORM), and hardware encryption was added in generation 4. These are both of potential application in media archives.

One day, there will be a successor to the LTO format, and, in time, the archived files will be migrated to an as of yet unknown storage medium.

Cost vs. performance

Data can be stored on spinning disks or data tape, and each has its advocates. But, will one eventually overtake the other? While that answer is unclear, the choice will be largely determined by cost and features like integrity, resilience and restore times.

The choice of local server systems, or "the cloud," is partly a business issue, balancing CAPEX and OPEX. However, security and disaster recovery are important issues to consider. Cloud-based storage services are backed by strong marketing. But, with broadcasters' experience at maintaining program archives, there is not necessarily a great need to turn to a service provider. Also, many IT solutions are designed for a data life of less than a decade, making them unattractive for a lot of broadcast content.

A secure archive will house a minimum of three copies. These would be a local copy and two different cloud suppliers, which would give very good resilience against disaster or business failure of a cloud service provider.

Data can be stored on spinning disks or data tape, but will one eventually overtake the other?

DAM

Resiliency is important, but how do you find the content? Any videotape and film library will have a catalog. Originally, it could have been a card index, but now more likely a database. In a similar fashion, digital assets need a catalog, index, and a means to search and retrieve content.

But, how do you protect the catalog? Again, the answer lies in data migration. This is where standards are important for asset records. It makes it much easier for future generations to use the information if it conforms to a standard. There is much work ongoing to standardize file wrappers and metadata for content archives, but the work continues, and, in 2011, there is no complete answer as to which standards are best.

The issues to be considered include: the choice of video and audio codecs, wrappers and containers, and metadata. Much of this has already been covered by SMPTE standards and AMWA specifications, but there are particular issues for archives. How do you know what you are viewing is what was originally stored? Has it been edited or tampered with over time? File integrity checks are one way to assure that you are viewing the original content. Some storage systems support WORM, and this is a good way to prevent tampering.

Heavily compressed video data is not ideal for an archive, as it is more subject to picture impairments than uncompressed or mezzanine codecs. Long GOP compression is also less suitable for further editing. The choice of codecs should balance storage cost against the compression ratio that suits future repurposing. Too much compression could damage the future value of an asset.

For many reasons, the content file and DAM record can become separated. During mergers and acquisitions of media companies, data can be lost. Also, databases corrupt for many reasons over decades. For this reason, it is essential that content files be self-describing. That means sufficient metadata is wrapped with the files to ensure the audio-visual data can be decoded, and that descriptive metadata provides explanation of the content and its ownership.

Summary

Setting up a program archive is a complex balance of cost versus performance. An archive must be more resilient against failure than general IT systems. The reason is because lost files are a business' lost assets.

Judging an asset's value 20 or 50 years in the future requires a crystal ball, which makes it even more difficult to judge the ROI of an archive system. Additionally, some media companies are attempting to develop a best practice for media preservation; so, for now, learn from the guys with valuable assets as they will have given the task considerable time and effort. BE

David Austerberry is the editor of Broadcast Engineering's *world edition.*

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TV-51 under attack

The wireless industry's wish is granted as the FCC freezes applications and changes to Channel 51.

BY HARRY MARTIN

On Aug. 22, the FCC imposed an immediate freeze on applications for new stations and improvements in existing stations on Channel 51, currently the uppermost TV channel. The freeze was imposed at the request of the wireless industry, which wants interference protection for future wireless operators on 698MHz to 704MHz, which is adjacent to Channel 51 (692MHz to 698MHz).

Seeking protection

Channel 52 has been auctioned within the wireless world, and the winning bidders do not want high-powered TV stations operating next to their lower-powered wireless devices. Wireless advocates asked the FCC to, in effect, create a guard band on the TV side of the spectrum divide rather than on the wireless side by stopping any growth on Channel 51. These requests resulted in the freeze imposed in August.

Fixed database priority

While the FCC is considering how much of the TV band it can rededicate to wireless, it has already frozen growth in the entire TV band. No new applications or channel changes are allowed for full-power stations, and no new applications are being accepted for low-power TV stations on any channel. All of this is to ensure a fixed database when the FCC receives congressional authority to incentive auctions and channel repacking. The August freeze signals the FCC's determination that sanitizing Channel 51 is a higher priority over having a fixed database.

Immediate changes

Full power TV stations on Channel 51 are invited to move to any lower channels they can find. Their rulemaking petitions to amend the TV Table of Allotments, and their applications for construction permits to change channels, will get expedited treatment. On the other hand, pending applications for new LPTV stations on Channel 51, most of which were filed in 2009 and 2010, and were being processed up to now, have been frozen. Although, they were given a 60-day window, ending Oct. 21, to file channel change applications. Such window applications will be treated as minor changes.

Moving not mandatory

Existing full- and low-power stations authorized on Channel 51 may continue to operate undisturbed — at least until the FCC decides on permanent rules governing the wireless-Channel 51 interface. Incumbent TV-51 stations will be permitted to file minor change applications, but only if they do not propose to cover any area they did not cover before.

Only TV-51 affected

The relaxed rules governing frequency changes are limited to Channel 51 stations and applicants. All other television licensees remain subject to all old processing rules. Thus, full-power stations on channels other than 51 may not change channels, and pending LPTV applications for new stations on other channels will not be accepted. But, unlike Channel 51 stations, licensees on other channels may file for minor changes even if they propose an expanded service area.

Those in limbo

The Commission's initiative raises some important questions. Will LPTV stations that want to abandon Channel 51 now be allowed to claim displacement status and be eligible for priority over pending applications for new LPTV stations or changes in existing stations? Will Class A stations be treated any differently from LPTV stations in this context? Will frequency-change amendments to pending Channel 51 LPTV applications take priority over pending applications on lower channels? What about granted but un-built construction permits for new LPTV stations on Channel 51? May they build on 51? And finally, if they prefer to move, may they do so as a minor change the way pending applicants are permitted to do? BE

Harry C. Martin is a member of Fletcher, Heald and Hildreth, PLC.

? Send questions and comments to: harry.martin@penton.com

Dateline

- On or before Dec. 1, 2011, Noncommercial TV and Class A stations in Alabama and Georgia must file their biennial ownership reports.
- On or before Dec. 1, 2011, commercial TV and Class A TV stations in all states and territories must file biennial ownership reports reflecting their ownership as of Oct. 1, 2011.
- By Dec. 1, 2011 TV and Class A TV stations in the following locations must place 2011 EEO reports in public files and post them on their websites: Alabama Colorado, Connecticut, Georgia, Maine, Massachusetts, Minnesota, Montana, New Hampshire, North Dakota, Rhode Island, South Dakota and Vermont.

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Interactive services

An upcoming ATSC standard supports interactivity.

BY ALDO CUGNINI

The killer app of computer interactivity, when considering popularity, is probably the Web browser. But interactivity requires more than just a browser; a rich user experience requires access to live and cached multimedia content as well as static pages. This month, we'll look at how these capabilities will be supported in an upcoming ATSC standard.

Local interactivity with non-real-time services

When adding interactivity to a DTV broadcast service, both "local" and "system" interactivity can be provided. The former provides a complete mechanism within a DTV receiver, relying on stored content; users interact with their DTV, and the cached content can be retrieved and presented at a time after it was broadcast. The latter uses an out-of-band return channel that provides signaling back to the broadcaster.

ATSC NRT (Non-real time) is a Candidate Standard that provides support for delivery of content in advance of use (i.e., files, as opposed to streaming content) to both fixed and mobile broadcast receivers. NRT services will usually carousel (i.e., retransmit) content throughout an announced availability window, since receivers will begin "connecting" to a broadcast at different times. In the simplest use cases, the set of available files is fixed for the duration of an NRT session. However, dynamic update of available content is also supported.

NRT content carried in an ATSC broadcast stream is delivered via extensions to the File Delivery over Unidirectional Transport (FLUTE) protocol. Developed by the Internet Engineering Task Force (IETF), FLUTE provides for unidirectional delivery of files over the Internet, where error correction, and not bidirectional handshaking with retransmission, provides protection against data delivery errors. The specification builds on Asynchronous Layered Coding (ALC), an Internet protocol designed for massively scalable multicast distribution. When used with ATSC NRT broadcast streams, FLUTE applies to fixed receivers using the ATSC DTV Standard and mobile receivers per the ATSC Mobile DTV Standard. FLUTE file packets are allowed to use the entire transport, up to the maximum bit rate (i.e., 19.4Mb/s for fixed), minus signaling overhead.

ATSC NRT is a Candidate Standard that provides support for delivery of content in advance of use to both fixed and mobile broadcast receivers.

NRT uses URL conventions that provide multiple capabilities to client browsing of HTML files. With these rules, receivers can distinguish between files that are available only via FLUTE versus files that are available via both FLUTE and an Internet link. Specific NRT URL constructions also facilitate using relative URLs for files delivered by FLUTE, rather than longer absolute URLs. They also support hyperlink resolution among the files within a FLUTE session, similar to how file paths are defined in a computer's file system. Thus, conventions like virtual folders can be used.

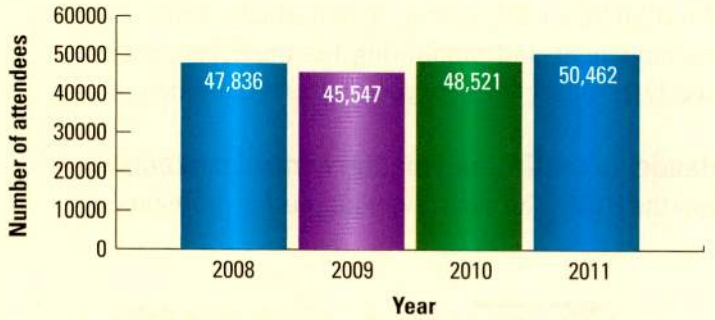
Three distinct consumption models are described in the ATSC NRT standard: Browse and Download, Push, and Portal. Browse and Download

FRAME GRAB

A look at tomorrow's technology

IBC2011 attendance

At the IBC Show, attendance was slightly up (about 4 percent) from last year's numbers. Officially, 50,462 visitors attended this year, compared to 48,521 in 2010.



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describes content that can be selected for later download. There are two basic operations expected to be supported: one where the user browses for content to be retrieved from the digital broadcast and one where the user chooses to view previously downloaded content. The Push service offers continuously updated content and is similar in function to an RSS news feed on the Internet. The Portal NRT service provides an experience similar to browsing the Internet using a Web browser.

When an out-of-band interaction channel is present in an ATSC DTV service using NRT (e.g., on a fixed receiver with an Internet connection), it must conform to ATSC A/96 Sections 6 (Application-layer protocols) and 7 (Network and Transport-layer protocols), and can additionally support other protocols. Network layer protocols enable communications between a remote server and the interactive television client in the DTV, over a return-channel network. Transport-layer protocols are deployed on top of the network-layer protocols and are used for end-to-end data exchange between the servers and clients. The A/96 specification does not define the physical and data-link layers.

Receiver customization provides personalization

NRT also supports a receiver targeting mechanism, which is based on the optional association of targeting criteria with services or individual content items. Using this mechanism, DTV receivers personalized by means of a user setup (or other automatic mechanisms) can be programmed to behave differently and present different content to different users, all in a seamless fashion. Various targeting criteria are currently supported in the NRT stream, such as geographical location, postal code or demographic category, and new criteria can potentially be added in future versions of NRT. Using the NRT specification, receivers can also be built that support different codecs, compression formats and container file formats, including AVC, MP3 and DTS-HD audio, and the multimedia container format profiled in the DECE Media Format Specification.

NRT services are fully backward-compatible with existing DTV receivers, which would simply ignore the additional content. (If a receiver firmware update mechanism is available, then current receivers could potentially access the new NRT features, too.) The Candidate Standard is expected to go to Draft Standard this month, unless otherwise extended by the ATSC.

NRT services are fully backward-compatible with existing DTV receivers, which would simply ignore the additional content.

Mobile devices support interactivity with other tools, too

ATSC Mobile DTV (A/153) provides for the delivery of auxiliary (graphical) components that support interactivity, based on the OMA-RME (Open Mobile Alliance Rich Media Environment) specification, written specifically for mobile devices. OMA-RME is an umbrella standard, encompassing elements of application creation, delivery and control. OMA-RME content consists of scenes of objects such as video, images, animation, text and audio that are composed together. By defining each object separately, the presentation can follow scripts that control the appearance and dynamic behavior of the objects.

OMA-RME includes Scalable Vector Graphics (SVG) Tiny 1.2 (a W3C standard), Dynamic and Interactive Multimedia Scenes (DIMS) and the ECMA Script Mobile Profile. SVG is an object coding specification, an alternative to the JPG or GIF formats, that provides a way to generate and render both static and dynamic (i.e., animated) graphical elements on display devices. DIMS is a 3GPP multimedia standard that provides for the development and delivery of rich media services over mobile networks, optimized for computationally constrained devices. DIMS is used to synchronize graphics elements with audio and video, and provides for the spatial and temporal layout of a multimedia scene. Scenes generated using DIMS can consist of any combination of still pictures, video, audio and animated graphics. DIMS also defines an update mechanism that supports partial updates of an existing scene, as well as on-the-fly tune-in functionality. ECMA Script is an OMA standardized version of JavaScript, which enables Web applications to have a compact environment within which to run computationally intensive programs and scripts.

The various interactive features described here are under development (NRT) or in early deployment (OMA-RME). (ATSC 2.0, currently in development, will include Internet connectivity and NRT file-based content delivery, as well.) Expect new tools and business models to emerge as interactivity and mobile broadcast go forward. BE

Aldo Cugnini is a consultant in the digital television industry.

? Send questions and comments to: aldo.cugnini@penton.com

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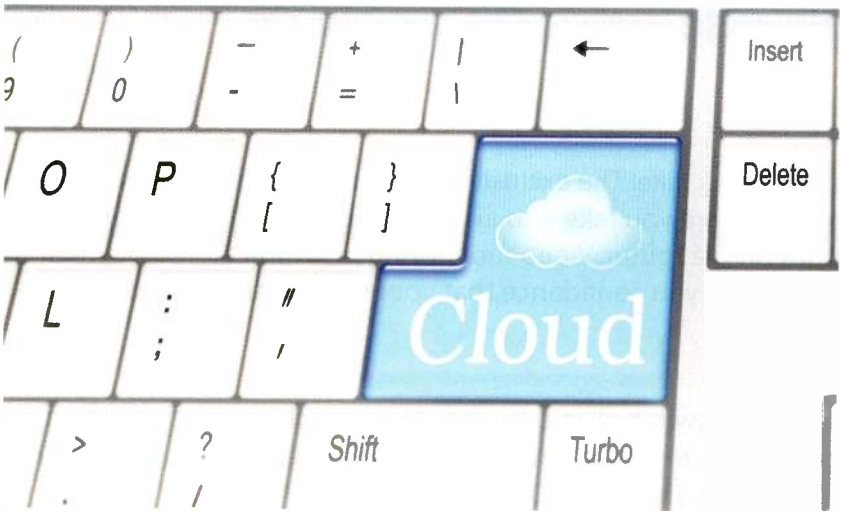
Networked media

Storage and usage are almost completely disconnected.

BY BRAD GILMER

It will not be long before there is a complete disconnect between where professional media is stored and where it is being used. This is a profound shift, and it opens possibilities that are only now being contemplated, including professional media applications hosted in the cloud. This new frontier is being enabled by cutting-edge innovations that combine IT technology in new ways for professional media. It is also fueled by some fundamental changes in large-scale corporate and consumer environments on the Internet.



Hit enter these days, and your data can just as easily be stored in a cloud-based network as it once was on a local server. The option is becoming more attractive as security continues to develop.

For some time now, this column has looked into technologies that remove barriers to accessing professional media over LANs. At this point, many of the issues surrounding LAN-based editing, file transfer and quality of service have been addressed. In fact, collaborative, LAN-based professional media applications are common place.

We are at a point where one can conceive of a sequence of technical developments that allow a media professional to access content for professional purposes over WANs; in fact, some would argue we are already there.

You might wonder exactly what I mean by "networked media over a WAN." Well, it depends upon the use case. The WAN in question might be a VPN between a broadcaster and a post house. It might also be a privately managed network used by a media company with facilities all across the U.S. Or, it might be freelance people working on a project that is hosted in the cloud. From where I sit, it is the last case that is getting interesting, and that is what I would like to look into in this article.

Securing the cloud

If you assume professional content can be stored in the cloud (another way of saying content is stored on servers accessible across the Internet) and that extremely fast connections are generally available, then the stage is set for professional use of networked media in the cloud. Almost immediately, one runs into objections about storing content in the cloud rather than in a facility. After all, this is almost the same as saying you want to upload a bunch of content to the Internet, and we all know this could have serious security implications.

Actually, it is not the same. What if smart people are able to figure out ways to secure professional media in the cloud? After all, security is always a risk/reward decision. I think this is not only possible, but also I think it is highly likely that media companies will accept the security risks associated with cloud-based storage of media assets.

With this barrier out of the way, the next question is whether professional applications accessing networked media in the cloud can be built and still meet professional user requirements for speed, security, quality and overall functionality. I believe such applications not only can be built, but also I have seen early implementations of these applications, and they are quite amazing. Surely challenges exist, but let's look at one example where these challenges are met and resolved using a creative approach.

One potential problem is latency. Latency could result in unacceptably slow response time in a viewer or editor. One way this challenge could be addressed is by intelligently predicting what content the user will require next, and moving the content onto the edit platform in the background while the user continues to edit. The concept of a "viewable window" (let's say 10 seconds before and after the currently displayed content) has already been employed in a number of networked editing systems. Extending smart solutions to networked media allows functional barriers to be removed.

But this scenario begs a question: Where is the system that is being used to manipulate the professional media? Traditionally, the system might be an editor sitting in a small room in a

television station. Over time, we have seen these edit bays move from tape-based facilities to laptops, and the laptops move from edit bays in the station out into the field. But, in these cases, as we moved from specialized hardware to a combination of commodity hardware and specialized software, the application has still resided on the same platform as the media. (For example, you may be using a laptop editor, but the video and audio you are editing resides on the laptop as well.) As network performance across LANs and now WANs has increased, it has become possible to remotely access the content you are editing. In some cases, vendors have even demonstrated editors that operate using a Web interface. But now, however, we are at a tipping point.

Applications as a service

We know we can run professional editors on commodity computer platforms. We also know we can separate the location of the content we are editing from the location of the edit software. We can use network attached storage to edit content located on a remote server. And, as I have just pointed out, we are at a point where we can edit content stored on servers not within our four walls, but in facilities located in other cities accessed across a WAN.

Right now, we are moving from a paradigm in which we know exactly which servers are storing our content, to a notion of content stored in the cloud, on servers in places where it makes the most financial sense. The physical location is not dependent upon a specific place, but instead is based upon meeting performance criteria for latency, lost packets, etc. In this environment, professional media companies have no idea where content is stored or copied and only care that their contract with the cloud vendor ensures their business requirements for security and performance are met. How the cloud vendor achieves these requirements, while important, are ultimately left to the cloud vendor.

Wow, this is a very different world! But, this is not the end of it. What if our professional media applications are pulled into the cloud as well? For example, imagine professional editing software offered as a service in the cloud. In this world, you can walk up to any computer, open a Web browser, log in to your editing application and begin editing content. In this world, it does not matter whether you are using a PC or a Mac. Eventually, you can do the same thing using a hand-held device such as a tablet, an iPhone or Android device. You do not own the software, nor do you own the servers on which the applications or media are stored. In fact, the software and the media are stored in many different places in the cloud. The content and even the editing software are not only replicated in a number of physical locations on the Web, fragments of the content and software are cached close to the user in edge devices.

I know that, by now, many of you are thinking this scenario is not only out there, but that it is completely off the deep end. However, I can tell you that not only is this possible, but that I have seen early demonstrations of it from several vendors. Yes there are barriers — some technical, some cultural. Yes, it is true that in the future not all professional media applications will work this way. That said, a significant number of professional media applications will move to the cloud, so it is important that professional media engineers start thinking about this new future. BE

Brad Gilmer is Executive Director of the Advanced Media Workflow Association, Executive Director of the Video Services Forum, and President of Gilmer & Associates, a management and technical consulting company.

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In-stadium entertainment

Vendors and venues find new revenue in equipping sports arenas.

BY MICHAEL GROTTICELLI

The market for a wide variety of live sports production technology continues to grow significantly, but we're not talking about mobile trucks. As new outdoor stadiums and indoor arenas continue to be built — or retrofitted — with new large HD (and 3-D) displays, electronic scoreboards and hundreds of flat-panel monitors at concession stands throughout, equipment vendors are reaping newfound revenue without having to develop new products to support them. Indeed, sports stadium entertainment is big business with a substantial return on investment.

In addition to producing content, this "new" technology is also being leveraged to send ads and other sponsored content to this captive audience, increasing the sports team's bottom line revenue as well.

The trend is clear: Stadiums and teams are trying to keep people in the seats by creating a multimedia experience that is similar to, but can't be replicated at, home. These new media production and distribution capabilities often require separate all-digital HD control rooms, IP network backbones and deterministic switching to distribute the numerous signals to different locations (simultaneously) within a venue.

In many cases, this has resulted in an infrastructure that is designed and implemented as a completely separate entity from the network or regional sports telecast production facilities, although it also includes HD cameras, production switchers, multiviewers, servers and routers.

Harris is one vendor that has targeted the space in a big way. The company has designed and installed an entire IP-based digital signage and live entertainment system inside Amway Center, in Orlando, FL, and is now working on the rebuilding of Madison Square Garden (MSG), in New York City. At MSG, Harris is designing the IP-centric core infrastructure and an infinitely customizable digital signage network based around Cisco Systems hardware (data delivery) and Harris' encoders, as well as its Infocaster (digital signage) and Punctuate (scheduling and invoice management) software.

The Amway Center, in Orlando, FL, features an IP-based digital signage and live video display network.

At the Amway Center, the mostly Harris system (NEXIO servers, HD routers, CENTRIO and IP multiviewers, template-based Inscriber graphics systems and modular gear) features an HD video production and distribution and IPTV system, integrated with a multichannel digital signage network. This allows the Magic to address more than 1100 individual screens located throughout the arena with tailored content. Displays can be driven to show high-impact replays and highlights, venue messaging, out-of-home advertising or any combination of the three.

In addition, the system enables advertisers to have their names displayed on every screen in the facility at the same time, providing exclusive marketing opportunities.

Serving fans in new ways

New innovations include taking some of the traditional production capabilities of a video control room, which usually pushes out images to a center-hung scoreboard, and making that content available to fans individually either through special receiving devices supplied by the team or mobile apps on their smart phones. This often requires significant transcoding capabilities to convert baseband video into an easily consumable format delivered over an IP and/or Wi-Fi network. Working with established system integrators around the country, Harris has been implementing Cisco switching technology with its own HD servers and routers to make this happen.

Harris is also working to develop less costly systems, with less capability but the same high-quality image processing, for colleges and smaller-market stadiums. It would be an integrated system that has been preconfigured to ensure system interoperability.

Colleges get in the game

On the collegiate level, many schools are upgrading their in-house A/V capabilities to enrich the fan experience. The University of Oklahoma operates a state-of-the-art video and television production department, complete with in-house production

ion, which events (for facilities, called campus ven- produces 65 V broadcasts attendees ly on campus idwest. ues), a this high-value that th Sony XDCAM ol's athletics de- video production

The University of Oklahoma's SoonerVision department develops content for in-stadium and team training purposes.

control room in 2009 that included a Grass Valley Kayak HD production switcher. It has now built a second control room and populated it with a new Grass Valley Kayenne HD video production center switcher and two K2 Summit (four channels each) HD video servers.

Facilitating dual broadcasts

These all-digital control rooms are located inside Oklahoma Memorial Stadium (the main football and soccer venue) and are connected via fiber-optic cables to a total of six athletic venues across the campus in Norman, OK. During most games, the department produces a "dual broadcast," one for the people in the stadiums and another for the broadcast TV audience at home. To accomplish this, the school purchased two Grass Valley Kayenne panels, which are both operated off a single switcher mainframe. One panel is dedicated to the in-stadium entertainment, and the other handles the live TV broadcasts.

For the Miami Heat NBA basketball team, managing its vast array of assets was a problem until it installed an Avid Interplay asset management system, the same type used at TV stations around the country. The Heat Group's Media Production Department, leveraging a shared storage infrastructure designed and implemented by SGI Professional Services (Fremont, CA), uses Interplay to search, retrieve and archive the media it needs to create high-profile, brand-centric content for those in attendance at games. The Interplay gives the group's staff total access to their media and enables everyone in the workflow to manage both data and the metadata associated with it.

The Heat Group has expanded by building an infrastructure that moves material among EVS servers, Sony XDCAM optical disc players, and Avid editing and storage systems.

Keeping fans in the seats

The Washington Redskins have completed a new HD upgrade to their FedEx Field video control room and infrastructure, with the help of Communications Engineering, Inc. (CEI), in Newington, VA. CEI was responsible for the project management, space planning, final design, equipment procurement and systems integration as part of an ongoing development of the multimedia technology in the stadium.

A full complement of HD technology has been installed that enables the "event-day" control room to mix a variety of feeds and send images (both live and prerecorded) to fans in attendance at FedEx Field. The signals are delivered to two 100ft-wide Daktronics screens as well as to a stadiumwide video distribution system that can be configured to send different signals (and promotions) to different parts of the venue.

A full complement of HD technology has been installed at FedEx Field in Washington, DC, that enables the "event-day" control room to mix a variety of feeds and send images (both live and prerecorded) to fans in attendance.

Key technology pieces of the project include a new HD Ross Video production switcher; Boland, LG and Planar HD displays; Click Effects multichannel HD clip server system; EVS slow-motion video system upgrade; Evertz multiviewer system; GMS wireless camera system; Grass Valley server; Harris video routing equipment; Image Video tally system; Sony HD cameras with Fujinon lenses; Sony HD video recording and playback equipment; Apple edit system upgrades; Tektronix test equipment; Wohler audio monitors; an upgrade

to fiber optics for the stadium's truck dock; and new operating consoles.

Another noteworthy project is the MLB's Florida Marlins' ballpark, known as Miami Ballpark, which is less than 2mi west of downtown Miami — on the site of the former Miami Orange Bowl. The new ballpark will become home to the Florida Marlins in 2012; the team will then change its name to the Miami Marlins after moving into the stadium.

The team's current home, Dolphins Stadium, includes a game presentations and events department that is responsible for creating content displayed on the large screen in the ballpark. It uses a predominantly tape-based workflow, facilitated by HD editing and networking technology from Avid.

The department has three staff members who work collaboratively to develop all of the video displayed in the ballpark as well as marketing spots that are aired in TV and radio. They also make community outreach videos and dubs for a number of other departments within the Marlins organization. They are discussing building a new section of the team website that includes content shown at the ballpark that day on the "Marlin Vision" (Daktronics) displays.

All of the Avid gear, including Avid Media Composer edit stations, an Adrenalin, an AirSpeed multichannel video server, Mojo and Unity shared storage and an Interplay connected to it, will be moved to the new ballpark. Storage capacity will be increased from 16TB to at least twice that much.

Beginning in 2012, at the new Miami Ballpark, the game presentations and events department will deploy an all-tapeless environment that will handle two separate feeds from a single control room, one that goes to the large ballpark displays and a second for all of the monitors throughout the vending areas. This will give the team flexibility to customize ads and other promotions for different parts of the ballpark.

[Note: Avid offers Avid InGame, a preconfigured video production system that enables sports marketing organizations within leagues, teams and facilities to deliver fan experiences as well as drive enhanced brand visibility and revenue.]

Entertainment

The name of the game in sports today is entertainment. Teams want to monetize as much of that entertainment experience as they can by quickly creating content, such as video packag
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all, who knows television produc
and video signal delivery better? T
best part for equipment companies is
that they can easily carry over existing technology to support these new types of digital signage and multimedia AV applications.

The ROI for manufacturers is pretty good when you consider the minimal re-engineering required to support in-stadium video applications. For sports teams and colleges, the benefit for fans is even more rewarding. BE

Michael Grotticelli regularly reports on the professional video and broadcast technology industries.

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BXF explained

The new open SMPTE schema standard levels the playing field.

BY SID GUEL

For years, broadcast automation systems and business systems needed manual access and conversion interface applications to convert metadata to/from their respective systems. The multitudes of proprietary interfaces are difficult to keep up with, especially as system upgrades and enhancements were added to either side.

The new SMPTE 2021 BXF 1.0 schema standard is one of the biggest advances in broadcast automation in this decade. The holy grail of automation has always been to provide a system that uses a central database for metadata between traffic and master control. Since centralizing a database between business systems and master control/operations is easier said than done, the next best thing is to standardize on a communication schema for the exchange of mission-critical data.

Technology standards are needed to organize varying systems and technologies. While manufacturers offer the promise of tight integration between varying systems, they still offer varied proprietary systems. BXF changes that. The new open SMPTE schema standard levels the playing field for manufacturers. By enabling their systems to work within the protocol's framework, manufacturers can assure broadcasters of getting nonproprietary full-feature metadata conversions and messaging systems.

History and stats

In 2008, SMPTE developed and published a schema standard called BXF (Broadcast Exchange Format) 1.0 or SMPTE 2021. In a nutshell, BXF was developed to replace the various archaic text conversion schemas that have been developed over the years to interface, access and transfer schedules, playlists, dubs lists, record lists, delete lists, etc., from business systems to automation systems.

Today, SMPTE representatives note there are dozens of manufacturers that have developed applications and workflow systems using the BXF schema. There have been more than 150 national and international SMPTE members, including industry-leading manufacturers, involved in the development and enhancement of BXF. In this new digital world of broadcasting where multichannel, multimedia operations are the norm, the BXF schema standard helps manufacturers

BXF-based applications and their open-standard schema save on costs.

build applications for automating processes and procedures to next-generation enterprise levels.

The current BXF 1.0 includes an exchange schema definition (XSD) collection for schedules, as-run, content, content transfers, etc. The BXF schema helps manufacturers simplify and automate the communication and workflow between a broadcaster's diverse business and transmission systems such as traffic, program management, content delivery and automation. The master control and traffic departments are the most common broadcast uses. When properly implemented, BXF-based applications automate the workflow process, streamline operations, maximize value of content and inventory, and increase flexibility for sales and advertisers.

As an XML-based communication schema, BXF allows for near-real-time messaging and updating between disparate systems. The XML-based messages include instructions about program or interstitial changes, allowing an automated approach to as-run reporting and schedule changes. Other BXF capabilities include near-real-time dub orders, missing spots reports and content management.

In the past, a phone call to/from traffic was the norm. Seeing a traffic department representative in master control to make changes to the paper schedule is usually a daily event. In today's world, business departments need to know exactly when a program or interstitial has aired and if it aired correctly, and they need to know it as soon as possible.

Revenue optimization

One of the most important factors about BXF-based applications is that they allow the decision-making aspects of master control schedule changes to be made in the traffic department. Traffic personnel can maximize revenue opportunities by providing lucrative replacements to any missing spot scenario. Or, when lucrative missing "copy" finally arrives and is ingested into playout video servers, traffic can make decisions on which interstitials/programs to drop and replace. Traffic has advertiser contract information giving them the ability to switch programs and interstitials to more lucrative advertisers.

The sales department also benefits from BXF-based applications.

Because of the automated near-real-time fashion of the BXF messaging schema, the sales department can make last-minute, higher-revenue interstitial or program additions to the on-air schedule. So while BXF schemas lower costs through standardizing, streamlined processes and minimized manual changes/inputting, they also generate more revenue through revenue optimization.

Comprehensive event structure

In creating playout schedules, the goal is to create a schedule with the minimum and most efficient amount of effort. BXF-based applications simplify the creation of complex multiline event situations by automating the creation of multiple event lines within a playout schedule. In the most efficient configuration, traffic does little to activate a complex playout scenario like a live news break for example. For traffic personnel, it may be as simple as creating a one-line traffic schedule with a predefined identification number. A BXF-based application and the master control automation system take that one-line traffic schedule and convert it into a complex multiline playout schedule with all the needed secondary events. If BXF-based applications are properly configured with predefined conversion rules, master control personnel are not saddled with creating or fixing complex multiline event structures.

Latest applications

News production automation is the latest craze in broadcast automation. A handful of manufacturers have developed systems to automate live newscast productions. The more advanced news production automation systems repurpose content for distribution via Internet, mobile devices, VOD and syndication. A key aspect of these systems is the ability to monetize content assets. Interfacing with traffic and billing systems, via BXF-based applications, helps to maximize advertising avails to other platforms. BXF-based applications automate the heavy lifting of scheduling, changing and verifying ads in live on-air and live streaming productions.

Content metadata management

Beyond schedules and as-runs, access and distribution of database metadata is another of BXF's benefits. Business systems such as sales, programming and rights management use BXF-based schemas and applications to automatically populate centralized data warehouses with cost and scheduling data. The master control automation database can be

populated with extensive and accurate metadata from traffic systems. Media asset management (MAM) and digital asset management (DAM) systems use database information from business systems also. News production systems use BXF-based applications to automate schedule changes and verify information for on-air, VOD, mobile and IPTV schedules. BXF-based applications and features can allow for the exchange of metadata among systems that may not have direct access to content.

Content movement instructions

As rich media content moves from place to place, the metadata associated with this content moves also. This usually is a manual process or one with error-prone work-arounds such as hot-folders. Today, there are BXF-based applications that can automate the transfer of metadata that originates from advertising agencies and business systems to master control, nearline and archive MAM/DAM systems.

For example, let's say traffic makes a change request via a BXF schema message to master control, and a new interstitial is added to the master control playout schedule. Once the message is accepted by master control and the event is added to the schedule, the master control system will begin searching for that rich media within its automation database. If the rich media is located on a nearline and/or archive system, the master control automation or MAM/DAM system will activate a transfer request for that rich media. Metadata from the business systems will populate the master control and media asset management systems database. BXF-based applications can create move-instruction messages to activate a system's physical transfer of content from source to destination.

The spotlight moves to business systems

As BXF-based applications become more popular, we can see business systems playing a larger role in the control and monitoring of broadcast production systems such as master control automation, MAM, DAM, etc. It's clear that improving and advancing operations, procedures and workflows that are upstream of master control is now more important than ever for broadcasters. The spotlight will shift to the traffic, programming, sales and rights management systems. For example, it makes sense for traffic to be responsible for master control metadata and schedule changes. With advertiser

contracts in hand, the traffic department has the information to make the best possible decisions.

Cost versus benefit

We've mentioned many times during this report that BXF-based applications and their open-standard schema save on costs. To factor how much, you must first define cost and values to each aspect of the workflow and operation, multiply personnel and wage costs by the hours it takes to transfer files, manually update databases, manually correct schedules, manually enter and correct data in databases, plus e-mails, phone calls, meetings, etc. Define the costs of how much time and effort is being exerted by functioning in a manual mode.

Value is the next factor. What is the average value of your interstitials and programs? How much revenue would be lost if an interstitial or program did not air or it aired incorrectly, requiring a make-good? Value can also mean potential revenue. By offering automated processes, last-minute changes can incur additional revenue. Near-real-time updating is constantly showing commercial avails. These benefits have value. Value can also be given to your on-air look. How do we compare to the competition? Automated systems by definition give you a higher up-time percentage and better on-air look than stations without automation.

Implementation

Implementing BXF-based applications involves hardware, software and a good amount of workflow changes. The majority of a BXF implementation is reorganizing and revamping your workflow process. In fact, you'll spend more time on redefining duties and tasks than you will with the physical implementation of hardware and software. In physical terms, the BXF-based applications and their schemas run best on server-class hardware with modern network accessibility to all parties involved.

To implement BXF in your facility, you must first understand the needs. Then, understand how BXF will benefit your system. You must also understand the manufacturer and its integration of BXF schema standards in its products. Once you've pinpointed the areas where BXF-based applications can be used, devise a plan. Creating a diagram and documenting is always a good first step.

Even though automating simplifies an operation, it's only smart to have accurate documentation. The main reasons for documentation include the training of new staff, for troubleshooting issues and for future configuration changes or enhancements.

Test offline and verify the results. Train staff on how the new processes and procedure will work, and then activate your BXF-based applications.

BXF 2.0

The SMPTE BXF standard and schema is alive and constantly changing and updating. SMPTE representatives note there are big advances coming in the next version of BXF. SMPTE balloting and voting are still required, but there are a few new advances worth noting. If voting passes, the next BXF version standard will soon provide support for simultaneous program events in master control.

A simultaneous program event scenario occurs when there is a closing credits DVE squeeze while simultaneously starting the next program. BXF will properly report timestamps and durations for programing and interstitials. Previously, secondary automation events such as DVE, logos, crawls, animation keys, etc. were considered nonprogram events. In BXF 2.0, the plan is that secondary events can be identified as program events for proper automation as-run reporting.

Multilanguage support is also planned for BXF Version 2.0. If committee voting passes, the BXF schema will be enhanced to allow for multiline, noncontrol program titles that can be places on the schedule in multiple languages. The noncontrol information lines are used by program managers to properly schedule and verify, via as-run, multilanguage programming. Master control operators will also benefit by knowing if a program will run on other output channels in another language or that the program has multilanguage audio channels.

The future

There are many enhancements coming in future releases of the BXF schema standard. Most notably is how the BXF schema will be used in application to interface with rich media MXF files. BXF-based applications will someday have the ability to map and extract metadata information from MXF files. For example, if a station or network receives an MXF file from a distributor, a BXF schema-based application can extract the metadata from the MXF file without having to wait for a hard copy sent separate via paper timesheet or e-mail.

Combining metadata with rich media is a common operation in many applications for European broadcaster. For example, metadata extraction is automatically entered into the master control automation system for playout. Databases in master control and traffic for spot or programming metadata is not common like it is in the U.S.

The EBU, Advanced Media Workflow Association (AMWA) and their Framework for Interoperability Media Services (FIMS) initiative are working to improve how metadata and rich media are managed in a service-oriented architecture environment. It is hoped that the output of this initiative will soon be brought to SMPTE for due process standardization.

We can also expect more rights management support in the future. As our industry is quickly moving from multichannel to multichannel/multimedia operations, rights management is more important than ever. Both broadcasters and content owners will benefit by accessing near-real-time information regarding their content. BXF schema-based application manufacturers are working to make these options and features a reality.

Thus far, advertising agencies have not used BXF. SMPTE representatives hope that one day ad agencies will also be able to benefit from BXF. National advertising and content metadata begins with advertisers and ad agencies. By adding ad agencies to the broadcasting workflow, metadata accuracy can be improved and operations can be more streamlined. For example, today interstitials have unique agency identification code. If they used BXF-based schema and applications, this agency identification code would stay with the metadata throughout the entire end-to-end workflow. The metadata would begin at content creation, then stay through advertising buys, content distribution, playout, as-run, business reconciliation and finally to verification, affidavit creation and billing.

Why BXF?

Many manufacturers think the adoption of the BXF schema standard shows a commitment to and support of a broadcaster's right to choose the best systems available. Inventory and revenue optimization work extremely well with the BXF standard in the mix. Competition is a good thing for the industry, and it raises the bar of functionality. Manufacturers are eager to compete to ensure broadcasters remain competitive in a fast-changing multichannel, multimedia digital world. Standards such as BXF are the best way to ensure that happens.

BXF schema-based applications are becoming an essential component of highly automated broadcast operations. The notion of both eliminating cumbersome manual file exchange and having a near-real-time exchange of data between production and business systems is a good example of how today's broadcast technology provides more functionality and requires less time to manage. BE

Sid Guel is the president and founder of Broadcast Automation Consulting.

PERFECT FIT

FORM

Wheatstone's television audio consoles are designed to fit where you really need them – in VERY tight spaces. All our surfaces open from the front for complete access to the inner workings. All of the audio, I/O and logic functions are located outside the control surface in rack-mount cages that can be located anywhere in your network. This is a huge plus when planning a new facility or retrofitting an existing one.

It also means these are a natural for production or on-air use in remote broadcast trucks.

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FUNCTION

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DIMENSION ONE

D-8

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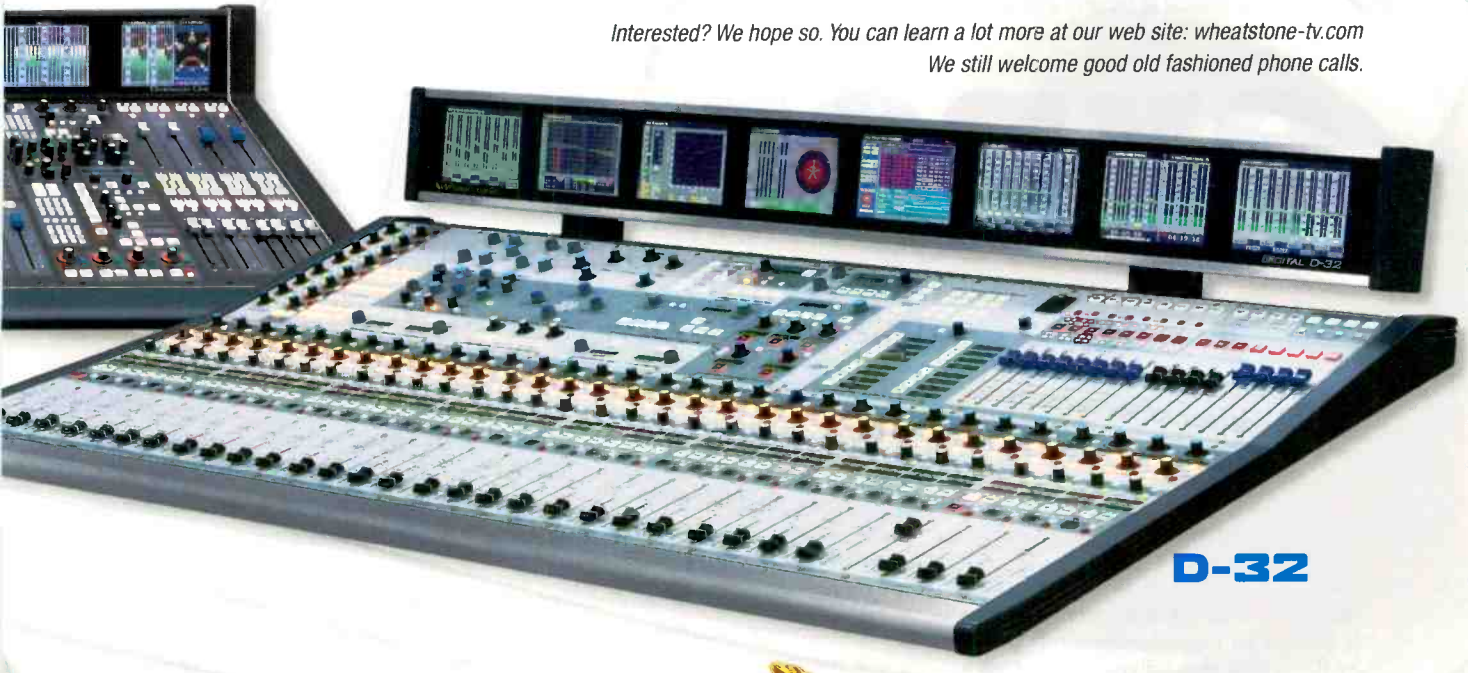

D-32

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In-game experience

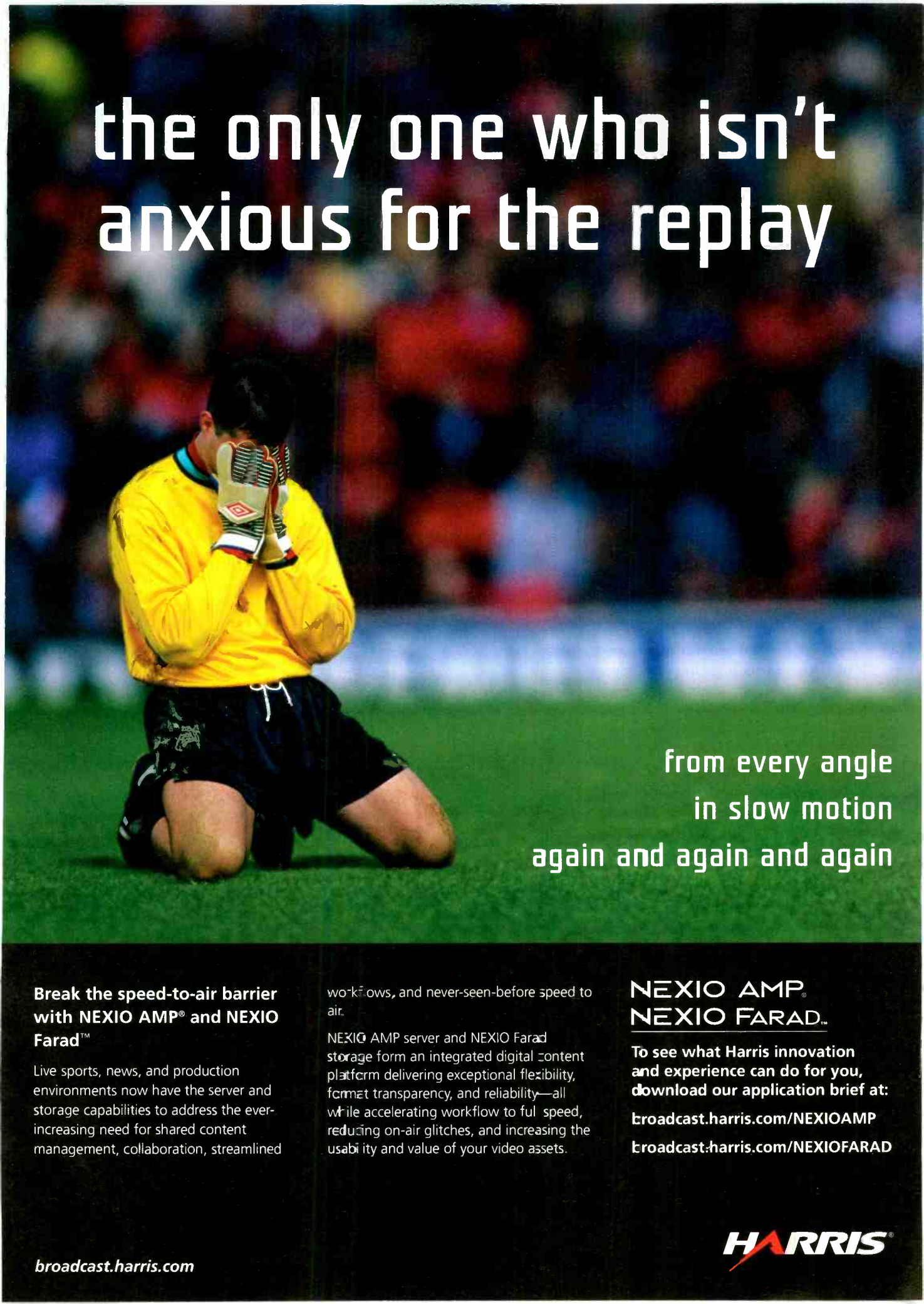
Oregon's Matthew Knight Arena boasts HD production for fans.

BY DON ROONEY

Matthew Knight Arena's control room is part of an overall project integrated by Burst that also brings Oregon fans a replay system in HD.

For nearly a century, MacArthur Court served as home to the Oregon Ducks. A school legacy, "The Pit" or "Mac Court" was voted "best gym in America" in 2001 by *The Sporting News* and listed in 1995 as one of the 12 toughest places in the country to play at the collegiate level by Sports Illustrated.

Over the decades, the multipurpose arena for sporting and entertainment events underwent numerous modifications and upgrades, but it was time to replace the much-loved arena with a modern facility designed to give spectators a more engaging experience.



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Three stories tall and weighing 20 tons, the scoreboard is one of the largest installed in a college sports arena.

So, in January 2011, the Ducks migrated into the state-of-the-art Matthew Knight Arena. The history-making move has provided a memorable game-day experience using new technology and multimedia components, including: live coverage, instant replays, behind-the-scenes action, fan shots, and promotional messages to capture action on the court and in the stands.

Located on the Eugene, OR, campus, the 12,364-seat arena, completed at a cost of $227 million, is already making a name for itself. One of the most expensive college arenas constructed to date, "The Matt" is in the running for LEED Gold certification (which will make it among the first LEED-certified sports facilities in the nation) and boasts one of the largest college sports facility scoreboards ever installed — standing three stories tall, 36ft wide and weighing more than 60,000lbs.

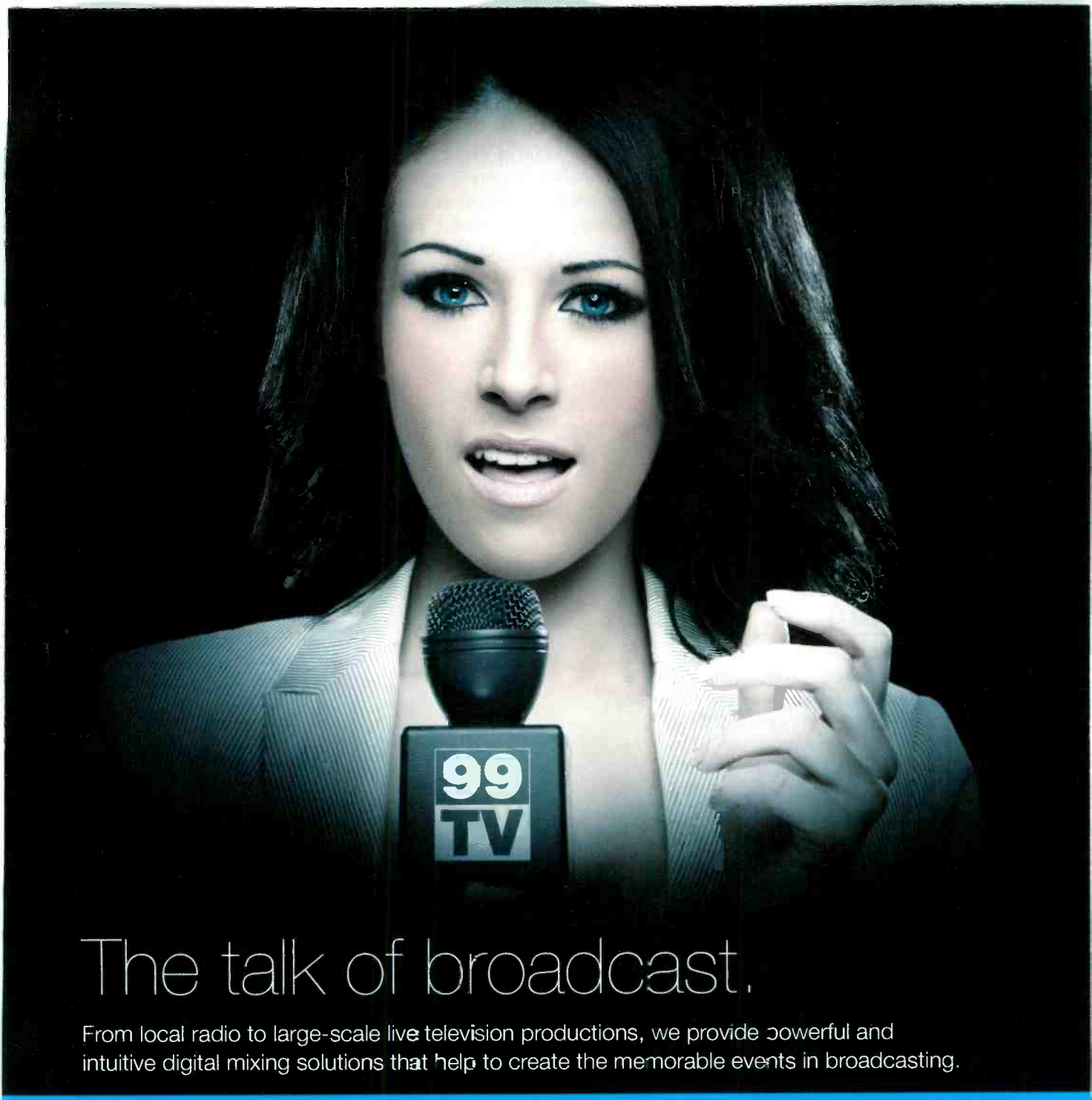
Burst, a Denver-based systems integrator, worked with consultants Anthony James Partners (AJP) and Wrightson, Johnson, Haddon & Williams (WJHW) to provide detailed design and integration of the HD video replay system and control room. Several other parties were involved with the project as well, including: Ellerbe Becket, TVA Architects, Hoffman Construction, JMI Sports and IMG College.

The University of Oregon needed a versatile and robust system that could multi-task to handle a wide variety of sport and entertainment needs. The new arena meets those needs with a high-definition system that brings the spectator experience to a whole new level.

The video replay system is made up of a central equipment room, a main control room and an auxiliary

The 12,364-seat arena, finished at a cost of $227 million, is one of the most expensive college arenas constructed to date.

Camera shading, tape operations and patching to the truck dock, for all events including games and concerts, will take place inside the main equipment room.



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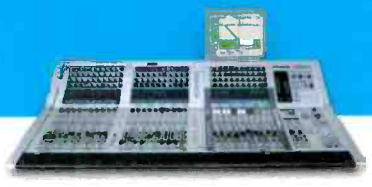

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by HARMAN

control room. The facility supports five dedicated, high-definition cameras via patching at numerous JBT panels throughout the arena. Based on the camera location, an operator can shoot in a studio or with a handheld configuration. A camera at center follow position, another at slash and handheld cameras under each basket capture action on the court. A floating handheld camera provides images of the fans in the stands and behind the scenes.

Connectivity to the truck dock is available for sending and receiving feeds to and from visiting trucks. The system also accommodates live broadcasts and provides replays to the in-house audience.

The video production system generates video signals for the large center-hung displays and the in-house MATV system.

On the event level, a main control room houses a full production crew. An auxiliary control room — with a second Ross Video Vision control panel in the scoreboard/PA room — on the upper concourse is available for use during smaller scale productions. The main control room has numerous audio, video and intercom paths to and from the main PA room on the upper concourse, as well as triax, audio, video and intercom tie lines to the truck dock to facilitate resource sharing between in-house arena production and visiting production trucks.

Connectivity to the truck dock is available in order to facilitate resource sharing between arena production and visiting trucks.

The overall project schedule was tight, making logistics important. Considerable communication and coordination with other contractors was essential to ensure that all contractors were able to complete work on time, even when services weren't always available or reliable. For example, when electricians needed to kill site power to test various systems, it placed an additional burden on the schedule for completion.

Design Team

Burst:
Tom Norman, senior design engineer
Don Rooney, VP engineering
Dave Stengel, senior project manager
Letha Koepp, project administrator
Christian Freeman, lead installer
Anthony James Partners (AJP): Larry Lucas
Wrightson, Johnson, Haddon & Williams: Todd Semple
JMI Sports: Dave Daterman

Technology at work

ADC: Video patch
Adobe: Creative Suite 5 graphic design software
AJA Video Systems: Frame syncs and conversion
Anton Bauer: Batteries and accessories
APC: UPS
Audio Accessories: Audio patch
Avocent: KVM extenders
Belden: Audio, video, control and data cabling
Blackmagic Design: DeckLink Studio 2
Chyron: LEX^3 character generator
Clear-Com: Four-channel partyline and Tempest wireless intercom
Ensemble Designs: Conversion
Evertz: HD2014 PassPort processors
Fujinon: 50X and 23X lenses
Gepco: Cabling and triax patch
Grass Valley: K2 Dyno replay system
Harris/Videotek: Sync generator and signal analyzer
Henry Engineering: Audio conversion
Hewlett-Packard: Edit workstation
Hitachi: Z-HD5000 triax cameras
JBL: Audio monitors
JVC: Blu-ray recorder
Marshall: Monitoring
Middle Atlantic: Racks
Miranda: Multiviewer
Ross Video: Vision 2 switcher with two control panels, distribution and conversion
Snell: A/V routing
Sony: XDCAM, PMW-320K cameras and 47in LCD monitors
TBC: Consoles
Telecast: Rattler fiber TX/RX
Vinten: Tripods and heads
Wohler: Audio monitoring
Yamaha: Digital mixing console

Last-minute additions to the original plan called for the installation of two additional cameras, a second switcher control panel and frame synchronizers to allow operators more flexibility to run a show from the main control room or from the upper-concourse PA room. Regardless, all work was completed on time.

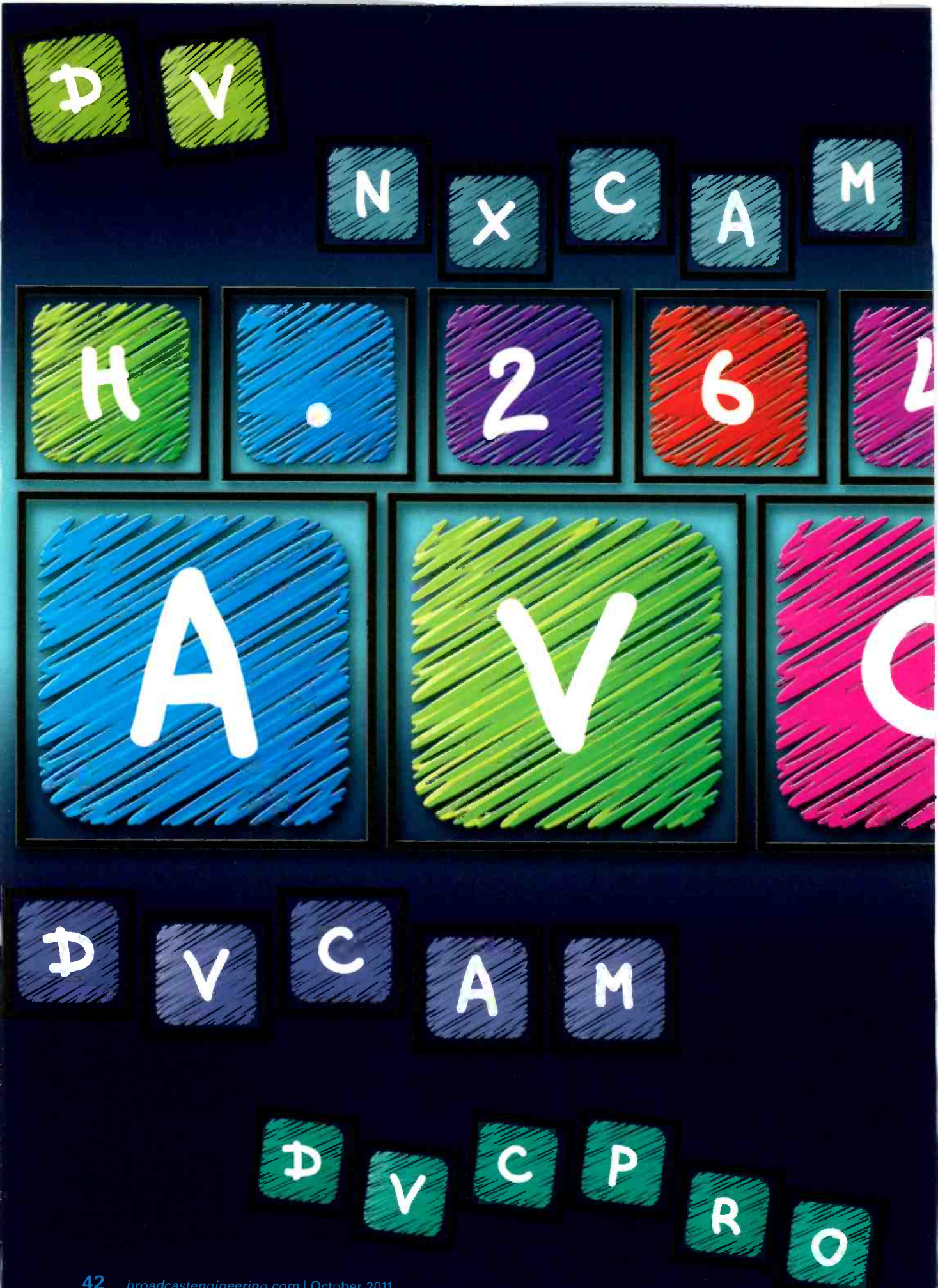
Equipment selection for the arena was carefully considered in order to provide the best images at a cost-effective price. This was a turnkey project, and all equipment was brand new.

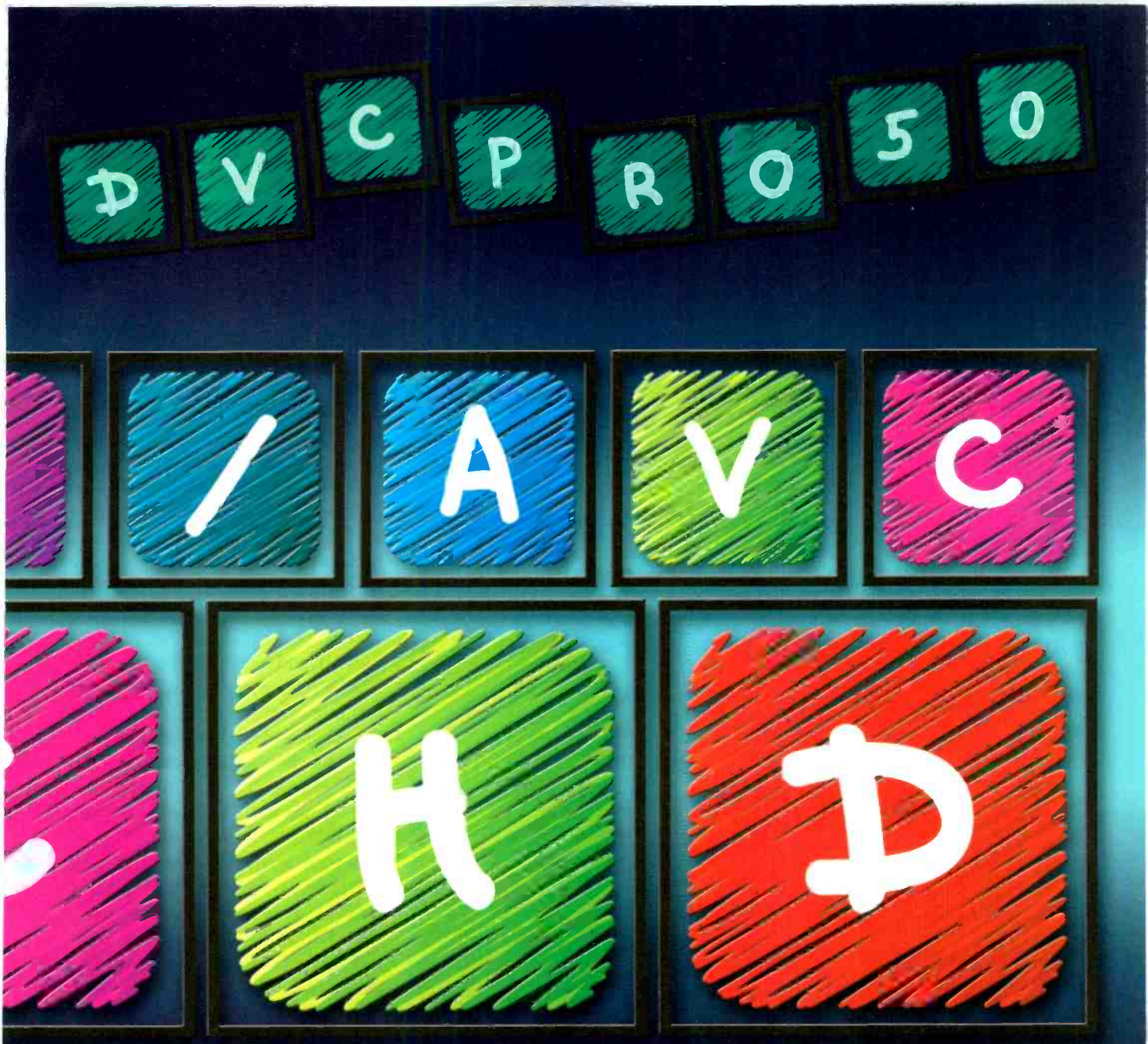
Key equipment includes: Hitachi and Sony cameras, Fujinon lenses, a Ross Video production switcher, a Grass Valley K2 Dyno replay system, a Chyron character generator, a Miranda multiviewer, a Clear-Com intercom and a Snell routing switcher. Terminal equipment is dominantly from Ross Video, with additional conversion gear by AJA Video Systems and sync generation by Harris. Audio interface equipment is from Henry Engineering.

Despite last-minute additions to the original plan, including two more cameras, a second switcher control panel and frame synchronizers, all work was completed on time.

The Matt features a production system built to enhance fans' experience, regardless of the entertainment. Whether for basketball, volleyball, concerts or other functions, spectators get "front row" seats to the court, the stage and in the stands. The enormous screens fed by the HD system provide outstanding viewing for every fan, so there's not a bad seat in the house. BE

Don Rooney is vice president, engineering for Burst.


DV
NXCAM
H.264
AVC
DVCAM
DVCPRO



Understanding AVCHD

BY STEVE MULLEN

The codec differs from H.264/AVC in several ways.

When DVCAM, DVCPRO and DVCPRO50 were introduced, manufacturers positioned these proprietary formats as "professional" compared to the "consumer" DV format. After working with all four formats, it became clear that differences were confined to their tape recording system. DV, DVCAM, DVCPRO and DVCPRO50 all use the same video codec. (DVCPRO50 employs dual 25Mb/s DV codecs.)

Baseline Profile					
Level 3.1	H.264/AVC	720p25 720p30	Up to 14Mb/s	CAVLC	No B slices
Level 3.2	H.264/AVC	720p50 720p60	Up to 20Mb/s		
Level 4.0	H.264/AVC	720p59.94/720p60 1080p29.97/1080p30	Up to 20Mb/s		4 x 4 only
Level 4.1	H.264/AVC	720p59.94/720p60 1080p29.97/1080p30	Up to 50Mb/s		
Main Profile					
Level 4.0	AVCHD	720p25 720p59.94 1080p23.976 1080p25 1080p29.97 1080i50 1080i59.94	Up to 20Mb/s	CAVLC and CABAC	B slices
Level 4.1	AVCHD		Up to 50Mb/s		4 x 4 only
High Profile					
Level 4.0	AVCHD	720p25 720p59.94 1080p23.976 1080p25 1080p29.97 1080i50 1080i59.94	Up to 20Mb/s	CAVLC and CABAC	B slices
Level 4.1	AVCHD NXCAM AVCCAM BD		Up to 50Mb/s		4 x 4 or 8 x 8
Level 4.2	AVCHD 2.0	1080p50 1080p59.94	Up to 50Mb/s		

Figure 1. HD H.264/AVC profiles and levels

Although AVCCAM and NXCAM are marketed as professional formats, both use the same AVCHD High Profile codec.

AVCHD, developed jointly by Panasonic and Sony, is a proprietary version of H.264/AVC. Specifically, AVCHD employs both the H.264 Main Profile (MP) and High Profile (HP). (See Figure 1.) The HP codec provides important image quality advantages over the MP codec. Thus, although AVCHD is marketed as a single codec, it uses a pair of codec profiles. (The HP codec is downward compatible with the MP codec.) Moreover, although AVCCAM and NXCAM are marketed as professional formats, both use the same AVCHD HP codec. As you can see, understanding AVCHD, AVCCAM and NXCAM is more complex than understanding DVCAM, DVCPRO and DVCPRO50.

Baseline Profile

The lowest profile used by an HD camera is BP. BP supports only the less efficient context-adaptive variable-length coding (CAVLC). Level 3.1 supports 720p30 at up to 14Mb/s, while Level 3.2 and Level 4.0 support 720p60 at up to 20Mb/s — although at such a low data rate, only 720p30 would be visually acceptable. Level 4.1 supports 720p60 at up to 50Mb/s. (See the H.264/AVC I- and P-slice encoding sidebar on page 46 to learn about H.264/AVC encoding.)

Main Profile

MP offers the next performance level. MP supports both CAVLC and the more efficient context-adaptive binary-arithmetic coding (CABAC). MP also supports B-slices in addition to I- and P-slices. Because B data packets provide H.264 with its greatest encoding efficiency, MP decreases the probability of compression artifacts upon rapid motion. AVCHD uses MP and higher profiles.

A B-reference is generated when two motion vectors are defined from the displacement between the Current Block and Reference Blocks. With H.264, "bi" means two vectors — not two directions as it does for MPEG-2.

Several levels may be used with MP. Level 4.0 supports 720p59.94 and 1080i59.94 up to 20Mb/s (17Mb/s), while Level 4.1 supports data rates up to 50Mb/s (22Mb/s to 24Mb/s). The ability of Levels 4.0 and 4.1 to support 1080i59.94 means that 23.976fps can be recorded after applying 2:3 pulldown. This capability also means that 1080p29.97 can be recorded as 1080i59.94/29.97PsF because its frame rate is equal to the 29.97fps used by 1080i59.94.

High Profile

HP offers all the capabilities of MP (CABAC coding and B-slices) plus an optional capability that greatly improves codec efficiency — the ability to dynamically switch between 8 x 8 and 4 x 4 submacroblocks during compression. Image areas with high detail are compressed using 4 x 4 pixel blocks, while areas with low detail are compressed using 8 x 8 pixel blocks. The latter generates less data; therefore, more bandwidth is available for

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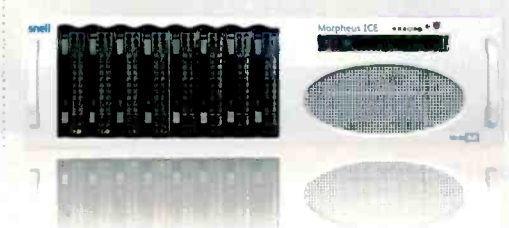

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H.264/AVC I- and P-slice encoding

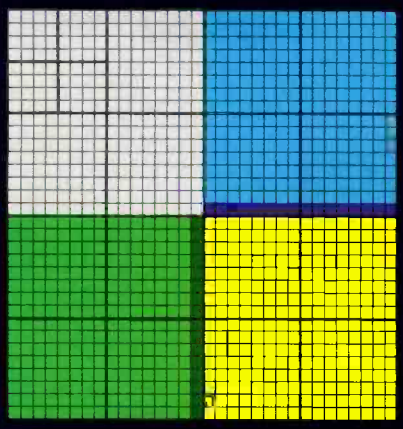


Figure 2. 16 x 16 pixel macroblocks each with four 8 x 8 subblocks

One of the many characteristics of H.264/AVC that makes it difficult to understand is its use of terms similar to those used when discussing MPEG-2 — for example, "I," "P" and "B." An H.264 I-slice is a portion of a picture composed of macroblocks, all of which are based upon macroblocks within the same picture. Thus, H.264 introduces a new concept called slices — segments of a picture bigger than macroblocks but smaller than a frame. Just as there are I-slices, there are P- and B-slices. P- and B-slices are portions of a picture composed of macroblocks that are not dependent on macroblocks in the same picture.

H.264 encoding begins by chroma downsampling to 4:2:0. Next, each incoming picture is divided into macroblocks. (When interlaced video is encoded, both fields are compressed together.) Many of the same techniques used to compress an MPEG-2 I-frame are used to compress macroblocks making up an I-slice. Each 16 x 16 pixel macroblock is further partitioned into four 8 x 8 submacroblocks. (See Figure 2.) The encoder can switch between working with 16 x 16 blocks and 8 x 8 blocks.

Blocks, of course, are located next to other blocks. For example, the Current Block (yellow) in the Figure 2 frame to be encoded has a block to the left (green) and a block above (blue). The latter two blocks are Previous Blocks. Reference Pixels are located at the left (dark green) and lower (dark blue) boundaries between Previous Blocks and the Current Block. Four different types of prediction methods (modes) are used with 16 x 16 macroblocks. (See Figure 3.)

When predictions are made for 8 x 8 submacroblocks, nine modes are used. (See Figure 4.)

In all cases, the mode that best predicts the content of the Current Block is selected as the Current Prediction Mode. The Current Prediction Mode is linked to the Current Block. Each Predicted Block (from the column and row of Reference Pixels) is "subtracted" from the Current block, thereby generating a Residual (difference) Block. Each Residual Block is compressed, linked to the Current Block, and during decoding used as a picture "correction" block.

Once an I-slice has been encoded, P-slices are encoded. Motion estimation is methodically performed, and macroblocks in other frames are searched for the contents of the Current Block. H.264 supports searching within up to five pictures before or after the current picture. (AVCHD supports searching within four pictures.) Obviously, the greater the number of reference pictures used, the greater the memory that must be in an encoder. For this reason, AVCHD cameras typically only support one or two reference frames.

The block with the best measured content match becomes a Reference Block. A P-reference is generated when only a single motion vector is defined by the displacement between Current and Reference Blocks. Each motion vector and each P-slice compressed Residual Block are linked to a P-slice.

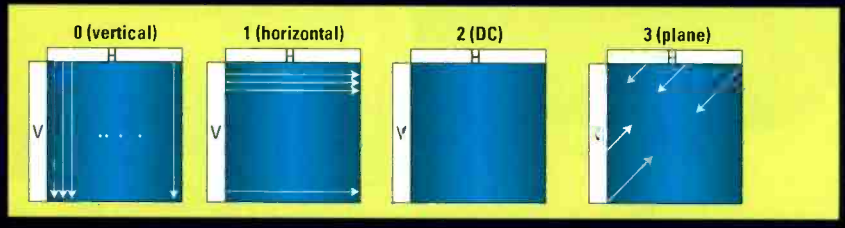


Figure 3. Four prediction modes for 16 x 16 luma blocks

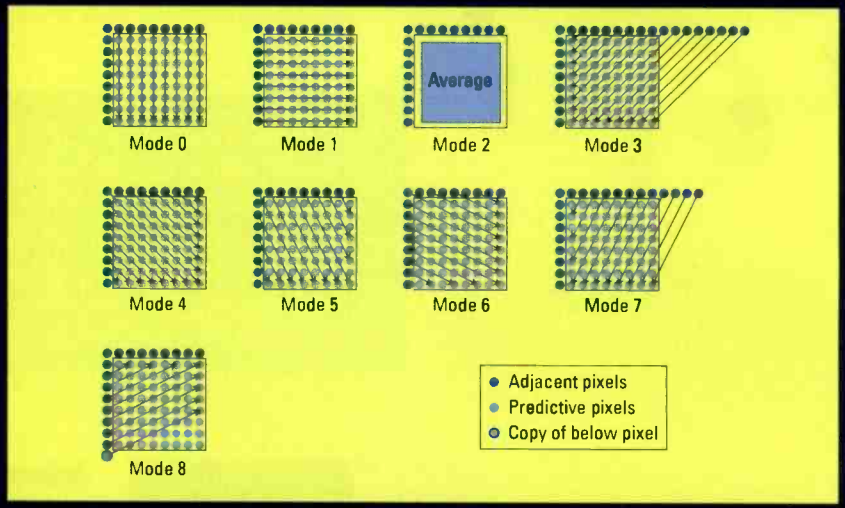


Figure 4. Nine prediction modes for 8 x 8 submacroblocks

data from areas with fine detail.

During encoding, each 16 x 16 pixel macroblock is partitioned into four 8 x 8 submacroblocks and 16 4 x 4 submacroblocks. (See Figure 2.) The encoder can switch among working with 16 x 16 blocks, 8 x 8 blocks and 4 x 4 blocks. When predictions are made for 16 x 16 macroblocks, four modes are used. (See Figure 3.) When predictions are made for 8 x 8 submacroblocks, nine modes are used. (See Figure 4.) Canon AVCHD camcorders were the first to use HP H.264. Shooters quickly found MP software decoders were unable to decode Canon recordings.

An HP encoder supports 720p59.94 and 1080i59.94 using multiple levels. Level 4.0 supports data rates up to 20Mb/s (17Mb/s). Level 4.1, used by AVCHD, AVCCAM and NXCAM, supports data rates up to 50Mb/s (22Mb/s to 24Mb/s). Blu-ray employs Level 4.1 using a video data rate up to 40Mb/s.

Level 4.2, available in camcorders using AVCHD 2.0, supports a data rate up to 50Mb/s (28Mb/s) for 1080p59.94. When AVCHD is recorded on a DVD, the disc's maximum spin speed limits the data rate to 17Mb/s. Therefore, when you shoot either MP or HP Level 4.1, or HP Level 4.2, you will not be able to archive to a DVD.

H.264/AVC encodes stereo audio using ACC or LPCM audio. AVCHD audio is restricted to AC-3 Dolby Digital 2.0 stereo or 5.1 surround.

GOP structure

Each frame is encoded as one or more I-, P- and B-slices. Typically, every half-second, an H.264 encoder outputs an I-frame — a picture with all intra-encoded slices.

Audio encoding

H.264/AVC encodes stereo audio using ACC or LPCM audio. AVCHD audio is restricted to AC-3 Dolby Digital 2.0 stereo or 5.1 surround. (NXCAM camcorders record uncompressed audio using PCM audio sampled at 48kHz.) BE

Steve Mullen is the owner of Digital Video Consulting.

Production

Dundas Square, one of the new sites within the Rogers Network in Canada, employs an Autocue newsroom system.

Smaller broadcasters have different needs than their larger counterparts.

BY RICHARD SATCHELL

It is the accepted norm for many large broadcasters to base their entire production workflows around a large centralized work hub, and it is often hard to argue against this approach. It allows all of the elements of the workflow to have common access to the appropriate media at any given point and enables collaboration between users.

Traditional best-of-breed vendors have also built out their solutions to cover large elements of the workflow under one roof, removing a number of integration issues. However, for smaller broadcasters, while their fundamental production requirements and aspirations are the same, it is not always appropriate or possible to simply scale down the same solution to meet their needs, let alone budgets.

A centralized production hub

The concept of a centralized production hub, using a large SAN or NAS device as the conduit through which all production data flows, is hardly new, and the sharing of media across a network is now an accepted part of the broadcast and production cycle. With the addition of client interfaces to storage systems, file level sharing from a centralized and networked location is now readily available. This allows users to access media and work on it from any workstation, to subsequently share media across different functions more easily, and

workflows

ultimately to collaborate by working on the same file at the same time.

Beyond the theory, this model, and its associated technology, has adapted well to the constantly changing reality of the broadcast world. The move to HD (and now stereoscopic) has driven the need for larger and faster storage, increasingly complex workflows and quicker turnaround times. And the sheer scale of production environments now requires dedicated video networks, often isolated from the regular corporate networks required for the everyday operation of the business — all of which fits well with the concept of centralized work hubs.

To deliver the desired workflow around this hub, best-of-breed vendors have historically supplied different parts of the production chain. However, over the past 10 years, the market has seen significant consolidation, workflow has become king, and companies have developed or acquired much broader solutions to provide ingest, storage, editing and playout all under one roof. This approach clearly makes a lot of sense in terms of integration, workflow and support, albeit that many specialists catering for specific elements of the workflow will still argue the merits of their best-of-breed solution.

Scaling the size of this model upwards, or applying it to a broadcaster above a certain size, is simple and makes sense for all involved. Manufacturers are obviously only too happy to design systems in a way that can be grown over time or are well suited to large installs, and they often see spending on infrastructure solutions as a strong indicator of future investment. For the broadcaster, this often creates a platform for growth, acquiring technology that is either expanding or complementing their core investment. It therefore makes sense for technicians, engineers, consultants and integrators who are looking to grow the infrastructure of an existing site, or even specify and install a new site from scratch, to look at what's come before and scale or replicate as appropriate.

Scaling down

But, scaling these solutions down to a smaller operation is another story. The large number of smaller broadcasters and production facilities may have the same production values

and aspirations as their larger counterparts, but certainly don't have the budget or the resources to implement the same workflows, nor do they require the complexity inherent in these larger systems.

For smaller broadcasters, a single integrated end-to-end solution is a must. It is simply too expensive and overly complex to have various components of the ingest, central storage, playout and nearchive/archive workflow represented by individual

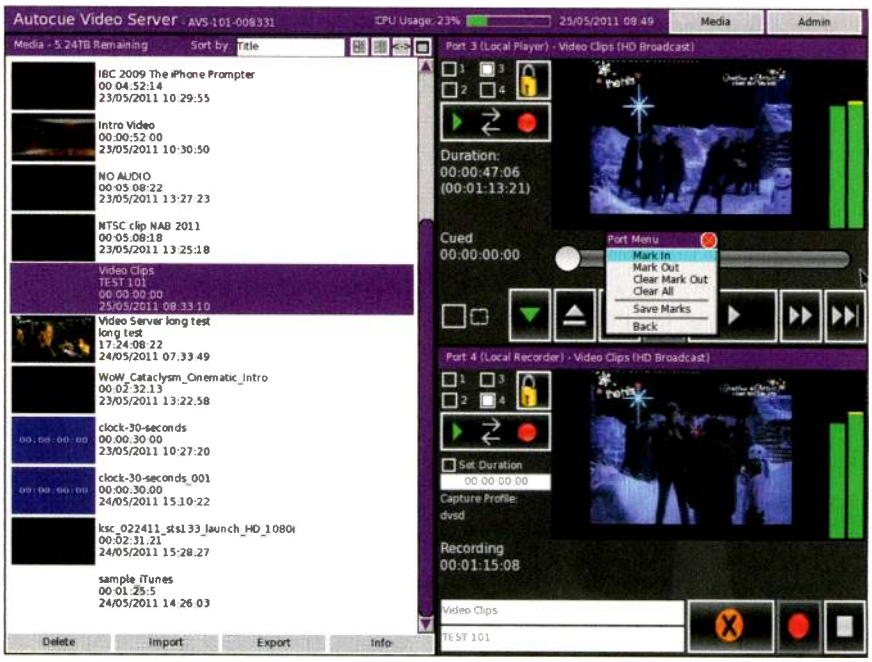
Autocue's complete end-to-end newsroom and production workflow can be based around a single video server and scaled upward as required.

systems that interface to each other. This end-to-end approach often provides a simple, scalable and modular solution that is much more appropriate for the scale of operation, both now and in the future. However, even the brands that can offer the breadth of solution required are often cost-prohibitive due to the high level of initial investment required. So the question remains: How can we, as technology architects, reduce the cost for smaller broadcasters while maintaining or even improving the desired workflow and scalability?

If we accept that the concept of a central hub and an end-to-end solution is the best direction to take, then the next step is to consider what can be done to scale this up or down infinitum as required. Due to the inherent structure and building blocks of the larger systems, even if you drastically reduce its size, each function still needs to be split across several different servers, often including proprietary hardware, and each element of the workflow still needs to be separated by several client interfaces and associated licenses. For a smaller operation, this is clearly too expensive, but also unnecessarily complex. If your workflow dictates that a single user is fulfilling multiple functions, then the idea of that individual having to operate across a number of separate clients from a single workstation is no longer fit for purpose.

Central storage as the engine

Today some vendors have developed solutions that use the central storage not only as the hub but also as the engine. This structure enables



The Autocue video server GUI is simple and intuitive for large and small broadcasters alike.

many of the functions to be done in just one or two servers, or for larger operations, to split and apply the same functionality across multiple servers as required. This also combines all the tools in to a single interface that can be split across any number of workstations depending on the workflow. This, combined with the scalable infrastructure, makes scaling up much easier than scaling down the inherently larger systems.

And, finally, it makes the management, editing and sharing of files much quicker as access to those files is direct from the central hub. The resultant system is, therefore, reliant on fewer constituent servers to deliver the same fundamental workflow, providing a system that is not only cheaper in the first instance but also has considerably lower running costs. The user also maintains the benefits of having a single vendor covering all elements of the workflow, and being able to access content from any location on the network.

Larger broadcasters might argue that the obvious trade-off in such a system is the depth of functionality and level of redundancy it can provide. However, when dealing with a fraction of the budget and resources, smaller broadcast and production facilities will welcome the news that they can recreate the same workflow and systems of the big boys in a more affordable way. BE

For smaller broadcasters, a single integrated end-to-end solution is a must.

Richard Satchell is business development director for Autocue.

Openet SDM

A new Subscriber Data Management software designed for TVE flexibility could mean more profits.

BY MICHAEL MANZO

Crafting successful business models for TV Everywhere (TVE) requires a true operational shift away from traditionally siloed information into true data interoperability with regard to entitlements. At Openet, we've found that a Subscriber Data Management (SDM) system, in conjunction with an operator's policy and charging architectures, enables this critical change.

The system is critical given its ability to process more granular types of potentially disparate viewer data and then provide valuable analysis to the operator. For entitlements, the system is taken a step further, integrating with other systems to present the maximum return for every piece of the value chain.

The authentication and authorization layer regulates access to particular content based on a subscriber's entitlement profile (what the user has paid for or is permitted to use). This relates to the software's ability to recognize who the customer is regardless of how he or she accesses the service, overlaying his or her entitlement profile, and then monitoring and tracking behavior for billing and research purposes. For example, restrictions can include individual pieces or bundles of content (such as TV channels or premium films), or according to time-of-day, physical location, device, quality of service or multiple access by the same customer.

A premium entitlements and content monetization layer acts as the operator's own salesman, allowing the subscriber to go beyond a basic package and purchase premium content on a one-time basis (purchasing a single episode or full season of HBO's "Boardwalk Empire" would be one example) along with tying individual pieces of content to predetermined viewing periods like one-time stream versus unlimited views. In this instance, charging, policy and SDM all work seamlessly to provide flexibility.

This portion of the architecture requires more extensive content rights agreements with providers. This allows operators to sell subscription content in a TVE environment in exchange for a percentage of the resulting revenue.

After that comes the necessary safeguard of parental controls, which provides a subscriber-initiated buffer to certain content based on age appropriateness, time of day, cost or other factors. Policy management is at the forefront, but user-set charging restrictions also help operators better cater to families. This level of control can only be achieved through access to content metadata that feeds into the software and manages access based on these parameters.

Last comes fraud protection, of which identity management is a key element. This function may be embedded in the software or exist as an independent component. This ensures log-ins from one account are being used only by household members and not by outside parties.

Openet's system looked to incorporate this tiered system of entitlements into a largely subscriber-controlled architecture enhanced with operator inputs. What follows is an outline of the start-to-finish experience designed for North American MSOs. While the included parameters are just examples, each could be customized, dependent upon the preferences and current billing structure of the individual operator.

Step 1: User registration and preferences

An existing customer of a multichannel video operator logs into a content portal for the first time. The user is the designated administrator and can add other users to the account.

In this example, a user adds his wife as another administrator and his son.

The user has set parental controls for the child to ensure age appropriate content is available to him as well as setting a monthly spending limit. If the user wants further customization of controls, such as time of day restrictions and customized usage reports, he is offered the ability to purchase a Parental Controls Bundle add-on.

As an administrator, the user can set his own preferences as well as for the entire household

Step 2: Content entitlement

As discussed above, the content to which a user is entitled can be based on parameters including service plan, settings, profile, usage activity, demographics and location. For this example, the user is on a basic TV Plan, so while some content is free to him, he also has the option to purchase and view premium content on an ad-hoc basis. Suggestions that appear are rooted in the system, while the policy management function appropriately provisions the content based on subscriber profile parameters. The charging software then handles the billing queries.

When the child logs in, the content he views is different since he is only allowed access to content rated G or TV-Y. While the content-restricting portion of this operation is based in policy management, parental controls using charging capabilities also help

avoid "bill shock" scenarios resulting from children inadvertently running up large bills or rapidly depreciating their prepaid account.

Step 3: Purchase of premium content

This system allows a variety of on-demand purchase options to existing and new customers. If a user wishes to view premium content not included in his or her basic package, he or she is offered several options, including a 24-hour view of all premium content — an option that needs to be stipulated in content rights agreements with providers. Payment options would be based on a user's profile.

After the user selects a payment option and authorizes charges, 24-hour access is granted. The charging system tracks this timed period and is able to send notifications when that period is about to expire.

SDM, policy and charging controls can enable operators to offer personalized, dynamic, subscriber-aware promotions to up-sell and cross-sell services. The infrastructure makes it easy to link past-viewing behavior with recommendations and methods of fulfillment. In this example, imagine an operator immediately offering a discounted soundtrack for a film following its conclusion or enacting promotions that provide a user with a free film once he or she has watched five selections at full price.

This model rivals, if not beats, popular over-the-top (OTT) offerings in many areas. For operators losing their perceived importance in the value chain, this and similarly built TVE architectures provide a way to showcase value on a daily basis to consumers by integrating functional, intuitive interfaces and purchasing options.

This interface, however, is rooted in network software systems that can service the level of variable behavior and preferences outlined above. These systems are already in place at the vast majority of MSOs, but a TVE system that interfaces with each represents a true operational advantage that catapults operators ahead of low-cost, low-overhead OTT players.

At Openet, the TVE solution focused on having strong subscriber awareness capabilities that make services much more dynamic. This enables the greater degrees of personalization outlined above and the ability to deliver further monetization scenarios for operators. The result is a software integration that helps consumers enjoy a more customizable and personalized experience, while operators are better positioned to generate new revenues out of TVE. **BE**

Michael Manzo is chief marketing officer for Openet.

T-VIPS' IP transport

WGBH delivers its programming in real time over the public Internet.

BY MICHAEL FOTI

As a PBS member station and the single largest producer of PBS television — including "NOVA," "Antiques Roadshow," "Frontline" and "Masterpiece Theatre" — and Web content, WGBH in Boston produces a variety of programming for our viewership throughout New England. While we transmit a strong HD/SD signal over the air, we also rely upon cable and satellite providers, such as Thames Valley Communications in Groton, CT, to deliver our channel to regional viewers, especially to those outside of our coverage area.

The challenge

Thames Valley, a provider of digital cable, Internet and digital phone services, previously received our signal from a satellite service operated by Shaw Media, which uplinked major Boston channels for rebroadcast to its Canadian viewers.

In the spring of 2010, Shaw Media discontinued its satellite service. Thames needed to quickly find an affordable, reliable alternative means of receiving our signal.

With only a one-month lead time and little budget to work with, WGBH engineers began searching for an easily accessible, affordable, real-time, broadcast-quality transport system. We initially thought we would just secure dedicated telco circuits between our Boston plant and Thames Valley's headend, but that proved to be beyond our budgetary means.

The tests

I then remembered a demo I'd seen at NAB of the T-VIPS TVG420 ASI-to-IP video gateway, which sends a real-time ASI transport stream over IP networks. I called the manufacturer's U.S. office in Millburn, NJ, and they immediately loaned us two gateways that we could use for two months to conduct a test.

One gateway, which was installed in the equipment racks in our station's machine room, was set up to take a 6Mb/s MPEG-2 feed of our SD signal. It encapsulated that signal into IP packets and sent it over the Internet to Thames' headend. The other gateway, installed in Thames' headend, received that MPEG-2 stream and fed it to an MPEG-2 decoder that converted it back to baseband video and audio for rebroadcast.

Since WGBH needed to filter out its secondary services, we soon replaced our gateway with a different T-VIPS device, the CP510 transport stream processor. The processor automatically identifies and filters the specific PID component for WGBH-SD from our SMPTE-310 ASI transport stream and outputs an IP signal for real-time transport over IP networks including the Internet. This additional signal processing — filtering a specific PID from our ASI multiplex — spared us from having to dedicate an expensive ATSC encoder to solve this problem. The processor filters select

With only a one-month lead time and little budget to work with, WGBH engineers began searching for an easily accessible, affordable, real-time, broadcast-quality transport system.

PBS member station WGBH in Boston uses a T-VIPS TVG420 ASI-to-IP video gateway and a CP510 transport stream processor to send its 6Mb/s MPEG-2 SD feed to Thames Valley Communcations' headend for wider distribution.

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services from the WGBH-DT transport stream for delivery to Thames Valley and enables flexible adaptation and filtering of MPEG transport streams and component filtering, as well as PSI/SI/PSIP table updates.

The results

For both transport tests — the gateway to gateway and processor to gateway — we found that Thames Valley successfully received broadcast-quality video and audio suitable for rebroadcast in real-time. Problems occurred at times between 8 p.m. and midnight when the IP-delivered WGBH signal showed signs of intermittent problems, such as black flashes and audio dropouts. During this time, Thames' data customers were heavily using their PCs to access the Internet, consuming significant bandwidth on the Thames circuit to the Internet. The problem was resolved when engineers increased the bandwidth allocated to the device.

Despite the fact that WGBH has more than 500Mb/s of bandwidth in and out of our plant, once that transport stream reaches the public Internet, it is subject to the vagaries of Internet traffic and packet routing. The processor and the gateway both solve this problem by applying advanced FEC to the signal to ensure a high quality of service. This results in a solid video picture and high-quality audio even over the public Internet in the presence of packet loss, latency and other defects caused by Internet routing.

Once that transport stream reaches the public Internet, it is subject to the vagaries of Internet traffic and packet routing. The CP510 and TVG420 both solve this problem by applying advanced FEC to the signal to ensure a high quality of service.

After one full year of operation, this T-VIPS system has proven to be extremely cost-effective and reliable. WGBH purchased the processor and gateway, and we are free from the recurring monthly charges common to other broadcast systems. Thames Valley now benefits from this real-time signal transport system for a significantly lesser monthly charge than it was paying for Shaw Media's satellite service, and for far less than the cost of dedicated fiber circuits.

We considered it critical to retain WGBH programming within Thames' TV package. The CP510 and TVG420 made it possible to do that cost-effectively, within our tight timeframe and without quality compromises. BE

Michael Foti is director of engineering, WGBH Educational Foundation.

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Plura monitors

Monitors such as the FTM-043 are designed to deliver efficient tools for mobile production.

BY NIC DUGGER

Testing and monitoring multiple video standards is an hourly occurrence on any of my television production projects. This is true for both the load-in and day-to-day changes that arise, as I find myself constantly needing to identify and critique signals of all types.

As a truck engineer-in-charge, I need to see and hear multiple standards with a minimal hardware footprint.

The Plura Broadcast FTM-043 field test monitor, which we recently installed on Aspiration, our new 40ft expanding side mobile production truck, provides an all-in-one solution for quickly identifying signals, associated standards and other data embedded on the digital signal — and otherwise.

I live in an HD/SDI world but am still surrounded by legacy composite signals, which can be some of the most difficult to process. From teleprompter feeds to downconversions for a venue television or streaming server, composite video is one of the hardest standards to deal with today.

Simply put, the industry is far less equipped for analog video in the modern broadcast and production environment. Humbuckers and terminators are harder to find, for example. The FTM-043, with its on-board LCD screen for testing and monitoring incoming signals, allows me to visually confirm a possible problem before going through repair steps.

Test signal generation

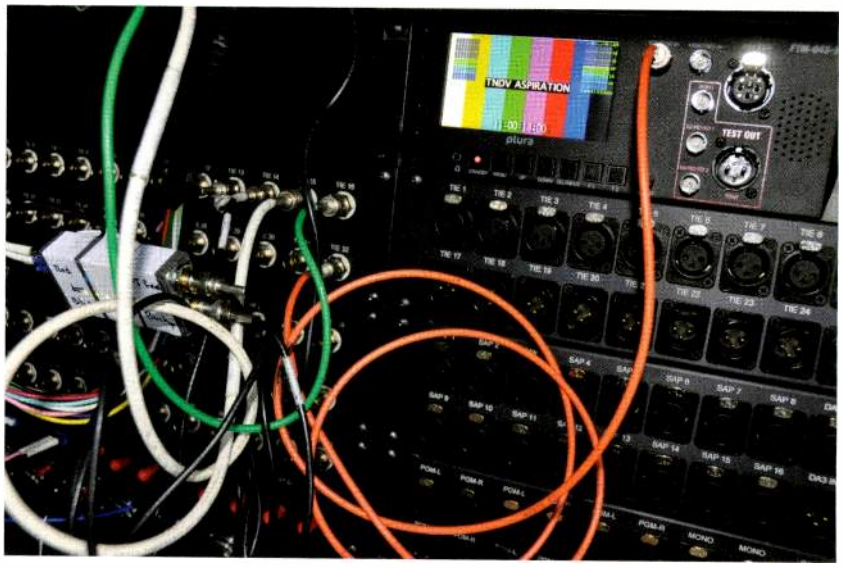
The field test monitor is also an excellent test signal generator. We feed projectors, web servers, LED screens and many other devices from the TV trucks and fly packs. The device allows me to confirm signal presence quickly and accurately, while simultaneously allowing generation of test signals for comparison, alignment and troubleshooting. And, this is not a standard color bar genny. All patterns have an option for motion, and the list of patterns is ideal for any engineer.

The on-board audio capabilities also eliminate Q-box requirements for quick audio testing applications. With both audio-in and audio-out via the embedder/de-embedder or the on-board XLR connections, the tester supports almost any field audio testing application. I can quickly check mic level, line level or embedded audio coming from the venue or from the truck. Being able to generate tone to quickly fix speakers and tape machine inputs also saves a large amount of time.

There are a number of user features and benefits that stand out. The compact size of the package is the leading benefit, as it easily fits into an equipment rack or my tool bag.

The front-facing connectors are also an improvement over test devices that assume gear will always be racked. The on-screen overlay of embedded information saves a lot of time, and the combination of both multi-standard digital and analog input options is an excellent feature.

Andrew Humphries, TNDV senior engineer, recently noted that it would be next to impossible for him to be an effective engineer in the truck, at the I/O panel and at multiple



The FTM-043's on-board LCD screen tests and monitors incoming signals, allowing engineers to visually confirm potential problems before going through repair steps.

The FTM-043's compact size allows it to fit easily into an equipment rack or tool bag.

locations inside a venue without access to an FTM. This is because he and other TNDV engineers are now accustomed to reaching for the device when there is a problem to address. It's hard to imagine being able to troubleshoot and solve a problem as quickly without it.

The FTM has centralized into a single device what previously took three devices to achieve. Previously, I had to carry both separate handheld SD and HD testing products along with the Q-box for audio applications. I frequently carried a full-sized monitor to jobs as well. This is no longer the case.

Instead, the test monitor offers a clean and efficient means of going from the patchbay to the I/O panel to the venue with a single device for testing both incoming and outgoing signals. The ability to see and confirm the signal and the format, and then transmit a test pattern in multiple

TNDV senior engineer Andrew Humphries points to one of his truck's Plura HD monitors. Being an effective engineer would be almost impossible without FTM access, he said.

standards and multiple formats, is a huge benefit to performing my engineering duties in mobile production environments. I plan to have an FTM-043 in my patch bay, my I/O panel and my tool bag for every show moving forward.

Capable monitors

In addition to the field and test applications that Plura has added to the TNDV tool box, I have additionally been impressed with the medium format high-resolution monitors. We use both the 17in PBM-217S as well as the PBM-217-3G on all three of our multiformat trucks.

The multiple inputs on the 17in monitors have been ideal, with the trend of workstations within production trucks requiring both HD/SDI monitoring, as well as DVI or VGA monitoring. These monitors offer fast switching of inputs, which is important for a ProTools operator or a graphics operator needing to see both configuration PCs and video signals. They also offer a clear picture-in-picture option that allows me to monitor one signal while working on the other.

Some of the field applications that stand out include the strong tabletop stand and the integrated carry handle. The rugged design also enables stronger confidence in sending these monitors into a venue or off to a booth.

The ability to see and confirm the signal and the format, and transmit a test pattern in multiple formats, is a huge benefit.

The prosumer feature that stands out most is the addition of an HDMI input. This has proven to be convenient as a large number of packages and b-roll today are shot today on DSLR. Rack-mounting is also a snap, with the internal power adapter quickening the setup process. Beyond all this, the monitors are visually attractive.

Based on the flexibility of these varied products, Plura continues to impress with a flexible set of tools and monitoring systems that are ideal for engineering in mobile production. **BE**

Nic Dugger is owner and president of TNDV: Television.

Content exchanges

Content supply chain management software makes secure, file-based B2B exchanges a reality.

BY RICK CLARKSON

The global economic crisis has had some interesting effects on the media business, one of which is the continuing decentralization of many production and post-production processes that have traditionally been handled in-house. Driven to reduce costs and empowered by newly digital, file-based workflows, large media companies are increasingly outsourcing functions such as editing and language dubbing/subtitling to freelancers and small "mom-and-pop" outfits — many of whom are highly specialized and geographically dispersed. The ability to exchange high-value media assets securely and efficiently with business partners outside the enterprise has always been important, but the task has become more complicated as these boutique enterprises join the workflow.

A complex world

In the old days of international distribution, conversion from NTSC to PAL or some other video format might have been all that was required for international playout, and language was not a large consideration. Today, media companies must not only contend with international video standards conversions but also the requirement to distribute the content in many different languages, in HD and (in some cases) 3-D as well as SD, and in formats to support a dizzying array of new platforms and services such as mobile devices and pad computers, video on demand, etc.

In order to prep so many different flavors of a single title, content owners must involve larger numbers of outside partners and vendors, many of whom might be working with their own subcontractors. Because so many more people have to touch this highly valuable intellectual property to get it into its final form, security becomes a much larger and more complex proposition.

Content exchanges are further complicated by the increased size of the files required to traverse the network, with "super HD" formats such as 1080p50/60 and 3-D becoming more common. Working in these new formats often requires moving files that are two to 10 times the size of SD, a prospect that can bring traditional corporate networks and FTP systems to their knees. With multiple, tight distribution windows to meet in order to maximize profits for a new title, content owners can't afford the delays and missed deadlines that might result from having to restart a download over from the beginning, or a transfer that slows the network to a crawl and jeopardizes other communications.

So they fall back on their comfort zone: tape. As hard as large media companies and major studios are trying to move to completely file-based, tapeless operations, many still rely on videotape to move content to and from vendors and subcontractors. There are two great problems with this continued dependence on physical media. First is the requirement to build extra time into the workflow for the customs hassles, inevitable delays and potential for loss that is inherent in any overseas shipment. The second problem, as ironic as it seems, is security. Thanks to a spate of highly publicized network security breaches, many organizations have well-justified concerns about trusting their valuable assets to an unsecured network. But the reality is that valuable video assets are far safer in an electronic exchange than they are when shipped on physical media that can be easily hijacked in transit.

A content supply chain management system (CSCM) designed for ad-hoc file exchanges between media organizations and their outsourcing partners should be browser-based and enable users to exchange content with other users, systems and applications regardless of location or the size of the digital assets.

Towards content exchange Nirvana

The good news is the latest developments in content supply chain management (CSCM) software designed

specifically for connecting large enterprises with smaller workgroups or vendors. The most advanced CSCM systems specifically address all of the inherent challenges of file-based, business-to-business content exchanges by providing a highly managed infrastructure for rapid and reliable content transfers, with enterprise-class security based on a B2B content peering model. These systems offer all of the benefits, and none of the expense, of a private dedicated network — but use the public Internet.

A CSCM system designed for ad-hoc file exchanges between media organizations and their outsourcing partners should be browser-based and enable users to exchange content with other users, systems and applications regardless of location or the size of the digital assets. Also — and important for small, boutique service providers with no IT department — the system should offer a simple Web user interface with minimal client software or server software at all to install and maintain. In addition, it should offer network flexibility to accommodate a mobile work style. For example, a contractor working from one location can begin a download, then pause it and move to another wireless location. Instead of having to start the download all over, the system picks up where it left off even if the computer is now connected to a different network. The transfer is seamless and secure, regardless of file size.

Finally, the ideal CSCM system should offer the ability to add some degree of automation to the exchange, for maximum security and efficiency. For example, the media company could specify that all files coming in from 39 vendors be virus scanned and QC'd before going into the server, or that certain vendors' output be transcoded to specified formats.

To summarize, CSCM enables media companies to electronically send files of any size at light speed to their vendors and get the amended versions back without causing so much as a hiccup in the production schedule. Companies can do these exchanges with even their smallest, least technically sophisticated vendors, and they have the assurance that their files will arrive safely without any risk of piracy or other digital security breaches. BE

Rick Clarkson is vice president, product management for Signiant.

Video processing

GPUs could make advanced graphics effects attainable by all.

BY JOHN LUFF

As in many areas of technology, we are entering a time of particularly strong change in how video is processed. It is transparent that analog processing is a dead issue, or at least mostly. I am obliquely referring to processing that happens in a camera of course, when analog signals (light) are processed into varying voltage as the sensor is read out. In addition to properly handling the high-bandwidth analog signals that result, analog optical filters are typically employed to manage aliasing in the sampled output of the sensor. But beyond this stage, little analog processing is still done, and it is a good thing since few engineers are trained these days in the subtleties of analog video signal management and degradation. Even in cameras, most of the processing is done digitally.

We have also arrived at a new point where the technology impacts video processing in the digital realm. To be clear, I consider general-purpose software processing to be quite different from that done in either hard-coded silicon or reprogrammable devices. I am also not focusing this article on the process of compression, as that is completed in yet another special purpose programmable device. One could argue that compression is video processing, but the other two choices — general-purpose platforms and special graphics processors — offer interesting possibilities, each with its own characteristics.

General-purpose platforms

General-purpose computing platforms can do a lot of video processing, as well as generation of video signals for character generation, weather graphics and art creation. That is nothing new of course, since general-purpose computers loaded with one or more video frame buffers have been available for a couple of decades now. Early Sun, SGI, Mac and PC platforms transformed portions of station workflow.

The computing power of GPUs could make "expensive" video processing accessible and common.

Twenty-five years ago, performing a 2-D rotation on a moving image and rescaling it to a different screen size would have been available only in digital effects systems that cost 50 to 100 times what a phone costs today.

But with the power of multiple-core, multiple-processor systems, we now see a plethora of real-time systems based on computers that are in most respects quite ordinary. That much speed makes generating and processing video much easier. Such garden variety computing platforms can be quite cost-effective and can serve as the basis of editing, transcoding, ingest and special effects systems, to name only a few. I do not mean to imply they are necessarily cheap, for, as in all things, performance comes at a price. One only need contrast a Yugo and a Porsche to see that there is no free lunch in technology. Both ends of the spectrum get you to the location, but they are oh so different.

Some video processing today is virtually free. Consider for a moment the resizing and processing that is done in smart phones and tablets. Twenty-five years ago, performing a 2-D rotation on a moving image and rescaling it to a different screen size would have been available only in digital effects systems that cost 50 to 100 times what a phone costs today. I sometimes watch rented movies on my tablet on airplanes; the quality is astounding, and I cannot help but smile when I rotate the device and the picture stays level to the floor. The resizing engine that is doing the processing has all the same requirements that the ADO of the '80s had, namely 2-D filtering of the image, resizing and smooth controls to make it feel and look "natural." Clue, nothing in nature can do this.

Carrying this thought a bit further, the processing in portable electronics is similar to that in virtually every display device you can buy for video today. Every monitor and TV receiver has video processing that can resize images with excellent results. Those of us with enough grey hair can amuse ourselves by thinking of early

standards converters, which occupied a couple of racks and did at most two conversions (525 to 625 and reverse). Modern resizing engines have to handle multiple frame rates and scanning standards, often including the ability to display computer outputs directly. To do that and be affordable as a solution in a CE device means high price-to-performance ratios.

It is more exciting to look under the hood of devices that use GPU power. Graphics processing units have been with us for a couple of decades, but it has only been recently that we have seen them used for general-purpose video processing.

Graphics processors

I think, though, it is more exciting to look under the hood of devices that use GPU power. Graphics processing units have been with us for a couple of decades, but it has only been recently that we have seen them used for general-purpose video processing. I did some consulting with a U.S.-based startup that wanted to do some fairly high-end processing, things like noise reduction, dust and grain removal, cadence repair, standards conversion and other complex processes. By using GPUs as the engine, it was able to significantly cut the development time and increase the capability well beyond what some of its competitors with long-established pedigrees were providing. Indeed, GPUs are a key element in many real-time graphics processes, like weather graphics.

Perhaps the most interesting part of this technology is that our use of it is in its most early stages of development. It is easy to see applications like virtual sets using GPU power, but what about master control station-in-a-box systems? With the kind of power GPUs can bring to bear on a processing problem, we might see rich 3-D graphics applications with fully configurable windows. Each station could create a unique look for its interstitials and transitions, making it unique in the marketplace.

By integrating GPU-enhanced devices in studio plants, processing that was once quite expensive might become just one more service called up as needed. Or sophisticated processes not generally affordable could be more common, for instance, preprocessing for improving the output of compression hardware for both ATSC and ATSC MH signals. Noisy ENG shots could be significantly cleaned up. Old movie packages can be scaled to HD and improved in quality at the same time while bit rates are optimized.

I have (intentionally) omitted discussion of processing that is more commonplace, though without the intent to minimize its importance in the industry. Frame synchronizers, for instance, are a class of video processing that most readers are thoroughly familiar with. Quite often, a frame sync will contain a resizing engine and use hard-coded software to make short work of many functions that at one time required many boxes, including audio track assignment manipulation, color gamut control and color space conversion, sync delay adjustment, and other important processing functions. BE

John Luff is a television technology consultant.

? Send questions and comments to: john.luff@penton.com

Harmonic — Electra 9000

Multicodec, multiformat video encoder for broadcast, satellite, telco and cable operators; simultaneously supports broadcast, mobile and Web formats; is built on a flexible, open, scalable architecture that integrates easily with existing broadcast infrastructure and enables new multiscreen services; delivers HD and SD video services using Harmonic's MPEG-4 AVC and MPEG-2 compression algorithms; provides up to four audio/video processing modules per chassis.

www.harmonicinc.com

Ikegami — Unicam HDK-97A

16-bit portable companion-camera employs new AIT CCD imagers and digital video processing system for superior picture detail and accurate rendition of color gradations; delivers a choice of 1080/50p 4:2:2 or 1080/50i 4:4:4 color sampling; is designed for traditional-style multicamera production applications; features a 3G fiber-transmission system from the camera head to its new CCU; transmission options include an HD-SDI QTV signal for teleprompter use and an HD-SDI trunk channel.

www.ikegami.com

Gefen — DisplayPort

Two new KVM (keyboard, video, mouse) switchers are designed to allow users to save space on the desktop and cut excessive hardware costs without sacrificing access to data; both the 4 x 1 and the 8 x 1 DisplayPort KVM switchers are well suited for professionals who want to avoid a networked situation; each gives a plug-and-play method of computer system integration while supporting high resolutions up to 2560 x 1600; the 4 x 1 DisplayPort KVM switcher provides access to four computers from the same monitor, using the same USB keyboard/mouse, while the 8 x 1 DisplayPort KVM switcher gives access to eight computers from the same monitor, using the same USB keyboard/mouse.

www.gefen.com

Panasonic — HDC-Z10000

Camcorder with integrated twin-lens is compatible with the AVCHD 3-D/Progressive standard; features the company's Double 3MOS system for recording high-quality full-HD 2D and 3-D images; mounts two 3MOS sensors for superb color and detail reproduction; the two large-diameter F1.5 lenses independently mounted on the left and right are treated with Nano Surface Coating, which reduces ghosting and flare to produce crisp, clear image rendering.

www.panasonic.net

Solid State Logic — V4

Software for the C100 HDS digital broadcast console offers new features and options designed to increase capability, productivity and connectivity; C-Play feature embeds a professional audio playout system into the console surface, delivering superior ergonomics for the operator and integrated recall of playlists with console projects; includes integration with Mosart Medialab newscast automation; adds existing support for Sony ELC and Ross Overdrive; full-duplex connectivity with Reidel RockNet audio networks expands compatibility with installed audio networks.

www.solidstatelogic.com

TVU Networks — TVUPack Mini

Small, lightweight portable live video transmission system uses one or more wireless data cards to broadcast live events in HD or SD from virtually any location direct to Web; weighs less than 2lbs; is designed to fit with a variety of camera setups; can be used as a standalone unit, in a belt or in a shoulder-mounted case; can also be mounted directly to a camera between the camera and its battery using industry-standard VMount or Gold Mount battery plates; offers low power consumption to extend battery life and is cloud-enabled.

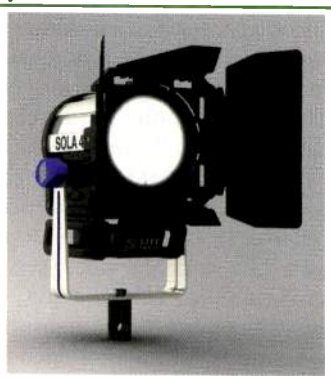
www.tvunetworks.com

Nevion — VS904-AIE-GE

Modular H.264 encoder enables broadcasters to deploy SD or HD video over bandwidth-limited infrastructures; part of VideoIPath's managed video services system and Nevion's Ventura family of standards-based solutions, the VS904 provides SMPTE 2022-2-compliant IP network interfacing or DVB-ASI outputs for deployment over traditional video networks; providing H.264 compression for SD/HD-SDI video, the encoder has configurable rates from 2Mb/s to 25Mb/s and supports High Profile @ Level 4.0 for HD applications and Main Profile @ Level 3.0 for SD applications.

www.nevion.com

Litepanels — Sola 4



DMX-controllable LED Fresnel fixture features a 4in Fresnel lens; uses a small fraction of the power consumed by conventional fixtures; employs Litepanels' proprietary LEDs to produce a soft light quality in 5600°K daylight color balance; based on the same Fresnel technology as the company's Sola 6, but in a smaller, more lightweight form factor; focuses from 70 to 10 degrees; can be dimmed from 100 percent to zero with no noticeable shift in color temperature.

www.litepanels.com

Marshall Electronics — ORCHID OR-70-3D

Autostereoscopic 3-D (glasses-free) 7in portable/camera-top monitor can be used as a camera viewfinder or portable 3-D production display; features parallax barrier and lenticular hybrid technology; designed to provide superior 3-D images with 1600 x 600 screen resolution; provides dual real-time waveform and vectorscope, along with various 3-D analysis features such as Check Box, Difference, Blending and Compare.

www.mars-cam.com

Ensemble Designs — 3-D support

Interface is designed for the Avenue Flexible Matrix Router; router has a new, special Pairing configuration that ties inputs or outputs together to support signals, such as Key & Fill, RGB444 Link A & B or 3D Left & Right; pairing associates a port to an existing Source or Destination assignment; router's real-time video thumbnails travel via Ethernet to the Router Control Panel, where they are displayed on a compact, high-resolution display; only ports configured as Sources and Destinations appear on the 1RU panel, an iPad or Web browser.

www.ensembledesigns.com

Sony — SBP-64A

SxS PRO 64GB card can read and write data at up to 1.2Gb/s through an ExpressCard slot without the need for an adapter; its 64GB capacity enables the card to capture 120 minutes of HD422 50Mb/s recording in the MXF mode; a fully recorded 64GB card can be ingested directly to a laptop in an estimated eight minutes; offers seamless functionality with the company's XDCAM HD and XDCAM EX series of solid state memory card camcorders.

www.sony.com

JVC — GY-HM150

Camcorder includes a new encoder and digital signal processor, adopted from JVC's 700 series cameras; adds improved HD recording and support for SD; with its 3-CCD imagers, the camcorder captures images in 1080p, 1080i and 720p HD — at a variety of frame and bit rates — using native .MOV compression to allow shooters to quickly edit on Apple Final Cut Pro or Adobe Premiere, as well as native .MP4 files for other NLE systems; records SD footage (480i) as standard DV files (.AVI or .MOV); records to standard SDHC media cards like other ProHD models, but also accepts new SDXC cards.

www.pro.jvc.com

Chyron — LEX$^{3.1}$

On-air graphics system now includes support for stereoscopic 3-D graphics projects; the system's template-based text and graphics enable instant updates from data feeds and databases; features include 2D and 3-D object import, advanced text and image effects, clip playout, and Chyron's Intelligent Interface and DB Link update; Double Advantage software bundle contains stereoscopic 3-D capabilities in addition to Lyric PRO graphics creation, and is available on all two-channel LEX$^{3.1}$ systems.

www.chyron.com

Rohde & Schwarz — R&S DVMS-B40 IP option

New option for the R&S DVMS family of compact monitoring systems is designed to help network operators achieve maximum operational reliability when feeding transport streams over IP networks; depending on the model, up to four signals can be measured simultaneously; monitors all relevant quality parameters in the IP transmission; if one of the transmitted transport streams is faulty, the new option can extract this stream and transmit it to the central monitoring station, also over IP.

www2.rohde-schwarz.com

Matrox — Matrox MC-100

Dual SDI to HDMI mini converter supports a wide range of display resolutions through 3G, dual link, HD and SD-SDI; the single portable unit can be used as an HD-SDI switcher, a distribution amplifier, a multiplexer and a 3-D processing unit; includes two SDI inputs and two SDI outputs for 3G, dual link, HD and SD/HDMI output for monitoring; additional features include on-screen display controlled by easily accessible hardware buttons for straightforward configuration on HDMI and/or SDI monitors, multiformat SDI signal distribution and SDI signal amplification.

www.matrox.com

Utah Scientific — UCP-LC

Family of menu-based router control panels feature high-resolution, full-color LCD displays and buttons to provide user-friendly operation for increasingly complex routing systems; panels offer 16 or 32 buttons in a compact 1RU package, as well as an innovative 3RU panel with dual-touch-screen LCD displays; all of the new panels are based on a completely new, user-definable menu system that provides a completely open platform for defining all panel functions — from basic operation to the most sophisticated router management functions — on a panel-by-panel basis.

www.utahscientific.com

Autocue — Two-port server

Two-port server with SDI inputs can be used standalone as an e-VTR or VTR replacement, as part of an Autocue automation system, or as part of other third-party transmission or automation systems; features more than 2TB of usable storage; 3U, rack-mountable Linux-based server includes a custom GUI that incorporates video and audio monitoring; supports a wide range of formats for record and playback.

www.autocue.com

Grass Valley — Karrera Video Production Center

10-bit, 4:2:2 switcher and production center offers flexible features and an intuitive user interface; a wide variety of system options provide the ability to grow the system as needs expand; features two frame sizes (4RU and 8RU) with frame configurations from 1 M/E to 4.5 M/Es; either frame can be combined with a choice of 2 M/E or 3 M/E control panels, as well as a 1 M/E soft-panel GUI.

www.grassvalley.com

EVS — Xedio Suite 4.00

Editing system is designed for field journalists and editors looking for faster and easier ways to manage real-timeline operations right after shooting; features media handling improvements for newscasters; offers new edit-in-place feature of the Xedio CleanEdit timeline editor, which allows any devices such as camcorders, drives or local storage to be linked up to the journalist's laptop for immediate media reviewing and editing.

www.evs.tv

Blackmagic Deisgn — Intensity Extreme

Low-cost, high-quality video capture and playback product for professional videographers with HDMI and analog video; combines the high quality of HDMI capture and playback with the wide compatibility of analog component, NTSC, PAL and S-Video, and analog audio capture and playback in a compact size that's completely powered from the Thunderbolt connection on the computer; enables users to capture directly from the HD camera's image sensor, bypassing the video compression chip for uncompressed video quality.

www.blackmagic-design.com

Telecast Fiber Systems — CopperHead Visa

Fiber-optic transceiver connects between remotely deployed HD newsgathering cameras and any third-party transmit/receive and audio embedder/de-embedder systems; designed for ENG microwave and satellite trucks outfitted with gear that performs video processing tasks such as audio embedding and de-embedding, up- and downconversion, frame synchronization, and fiber transmitting and receiving; requires no base station; provides a direct fiber-optic link between the HD camera and the video processing unit installed in the truck.

www.telecast-fiber.com

NewTek — TriCaster 450 series

Makes HD production available to live video producers in a more compact, cost-effective solution; enables anyone to simultaneously produce, live stream, broadcast, project and record HD and SD network-style productions; a single operator or small team can switch between multiple cameras, virtual inputs and live virtual sets, while inserting clips, titles and motion graphics with multichannel effects; TriCaster 450 EXTREME offers benefits such as NewTek's IsoCorder multitrack, multiformat video recording technology.

www.newtek.com

Miranda — Enterprise Suite

Streamlines content preparation for broadcast playout and VOD publishing; enables playout operators to review, normalize and approve file-based content before it goes to air, lowering risks during playout; simplifies the normalization of program and advertising content for iTX customers, using automated workflows for analysis, review and fixing of the most important file issues; this normalization offers support for AFD tagging, high-quality up/down video conversion, audio loudness correction, channel tagging and downmixing, as well as support for Closed Captions/OP47 subtitles.

www.miranda.com

Thomson Broadcast — Futhura Plus

Television transmitter is designed to offer broadcasters energy savings, with a 50-percent improvement in efficiency over current standard transmitters; for use in initial deployments or for extending existing digital networks; UHF wideband transmitter offers high-power capability suitable for HDTV and 3-D services with up to 35-percent transmitter efficiency and market-leading power density of up to 12.6kW OFDM; equipped for all OFDM standards in the UHF frequency band; features Thomson's latest software enhancements for the exciters and a range of passive components, including RF filters and new RF channel combiners.

www.thomson-broadcast.com

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is seeking an experienced television engineering management professional to join its staff as Chief Engineer. The successful candidate will need to be a hands-on leader possessing strong skills in all areas of digital broadcast maintenance, including transmitter operations, news/studio/master control functions, Internet/mobile platforms, station infrastructure and design as well as building management.
The Chief Engineer is responsible for scheduling, hiring, training, evaluating engineering and operations personnel as well as creating and maintaining technical operating, and capital budgets. Excellent communications and employee development skills combined with management experience are required. Minimum 5 years television engineering management experience in a news environment and ASEE or BSEE is preferred.

Please send cover letter and resume to:
Jim Wilcox, PO Box 3130, Albany, GA 31706 or fax to 229-446-4024 or e-mail Jim.Wilcox@walb.com

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WCIA-TV is looking for an IT/MAINTENANCE ENGINEER
with a background in IT networking, audio, video and RF maintenance. This position reports directly to the Chief Engineer and requires hands-on maintenance for all IT, audio, video, and RF systems in the WCIA main studio, remote news bureaus, and multiple tower sites to include Microsoft Server, XP, Windows 7, Microsoft Office, Mac, Harris Automation, Omneon video server, and Thales DTV transmitter.
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Please send resume,
Attn: Darren Martin, Chief Engineer, WCIA 509 S. Neil St., Champaign, IL 61820 OR to engposition@wcia.com.
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Are you fighting the spectrum grab?

If not, why not?

BY ANTHONY R. GARGANO

Is the broadcast community asleep at the switch? It certainly appears so. H-e-l-l-o-o?! Are you awake out there? Microsoft, Google, the Consumer Electronics Association (CEA), the International Association for the Wireless Telecommunications Industry (CTIA) and what seems like a cast of thousands all seemingly being aided and abetted by the FCC are on a mission. They want to evict you from your frequency, taking away your most valuable asset: your spectrum!

It is dumbfounding to see the lack of any meaningful effort at engaging the public about this threat to the broadcast community.

The Philadelphia market, which the A.C. Nielsen Company ranks as the nation's fourth-largest DMA, serves my local television. I've yet to hear any locals speak out. What's wrong with this picture? They have immediate access to an influential mass audience, yet I have seen not one station take an editorial position or attempt to inform and educate the public on this.

Certainly, there is a lot of activity behind the scenes, both directly and through lobbyists, by the NAB and via individual stations and group ownership legal departments. These efforts target Congressional committees, elected representatives and FCC commissioners, but we are missing the exponential effect those efforts could have when aided by a motivated public.

When the President speaks, the press refers to it as speaking from his "bully pulpit." They say this because when the President speaks, he essentially has a guaranteed audience. Broadcasters, by virtue of the business, have their own bully pulpit. Why not use it? Shouldn't viewers know that their over-the-air television option is at risk? Shouldn't viewers know that those third or fourth sets not hooked up to cable or satellite will no longer have signals available, or that those new inexpensive, portable DTV receivers they are buying at Radio Shack are at risk of becoming expensive paperweights? What about those who rely solely on off-air reception?

It is dumbfounding to see the lack of meaningful effort at engaging the public about this threat to the broadcast community.

We're in the midst of launching a major new over-the-air service: Mobile DTV. This is a great time to educate viewers about this coming on-the-go information and entertainment viewing alternative. But, shouldn't they know the loss of spectrum guarantees Mobile DTV will be stillborn?

Also, what about the tactics used by the spectrum usurpers? In a recent CEA Market Research Analysis Brief, in order to support the case for auctioning off broadcasters' spectrum, the CEA maintained that, in a poll it conducted, only 8 percent, or 9 million, of TV households now rely on over-the-air for their TV reception — a decrease from last year. Interestingly, independent consultancy Knowledge Networks (a professional research organization that provides services to the government, academia, pharmaceutical and retail sectors among others) released a study around the same time saying 15 percent, or 17 million, of TV households rely on over-the-air — up from 14 percent a year ago. Moreover, Knowledge Networks said those 17 million households represented 46 million actual viewers, the demographic breakdowns of which is especially interesting. Minorities and low-income households are generally more dependent on over-the-air reception. Twenty-five percent of Asian TV households, 17 percent of African-American households and 23 percent of Hispanic homes rely solely on over-the-air TV reception. In lower-income households, 23 percent of those with annual income less than $30,000 rely solely on off-air for signal reception.

So, we have two surveys: the CEA saying the number of TV households relying on off-air is 8 percent and shrinking; and Knowledge Networks, claiming that number is at 15 percent and rising.

Which one appears more credible?

There is a real story here. Broadcasters have much to lose. You have a bully pulpit. Use it. All you have to lose is the potential of an engaged viewership. There is no shame in copying what works. One wireless industry company that is part of this threat to your spectrum has a successful promotional catch phrase that broadcasters should not adopt but act on: "Rule the Air." BE

Anthony R. Gargano is a consultant and former industry executive.

? Send questions and comments to: anthony.gargano@penton.com

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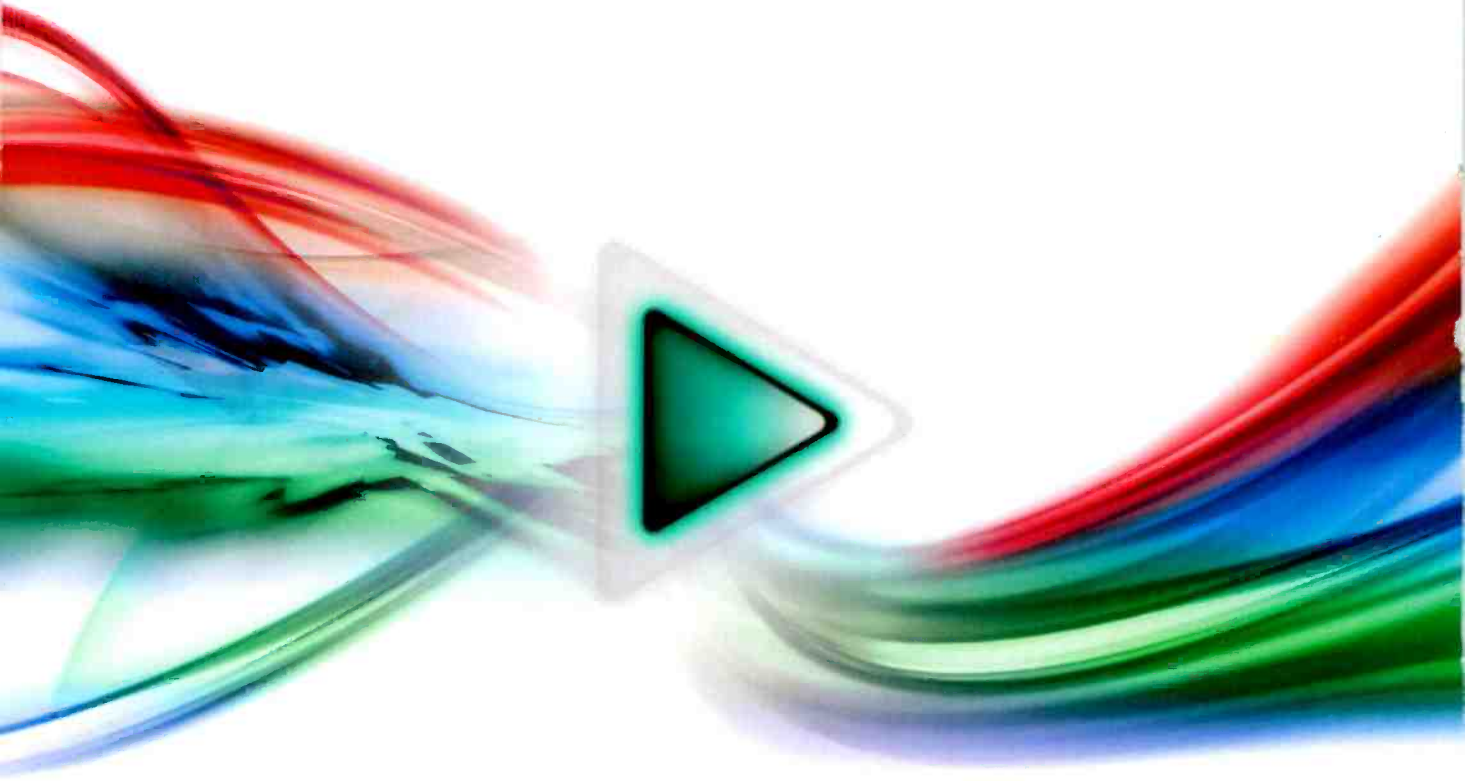

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