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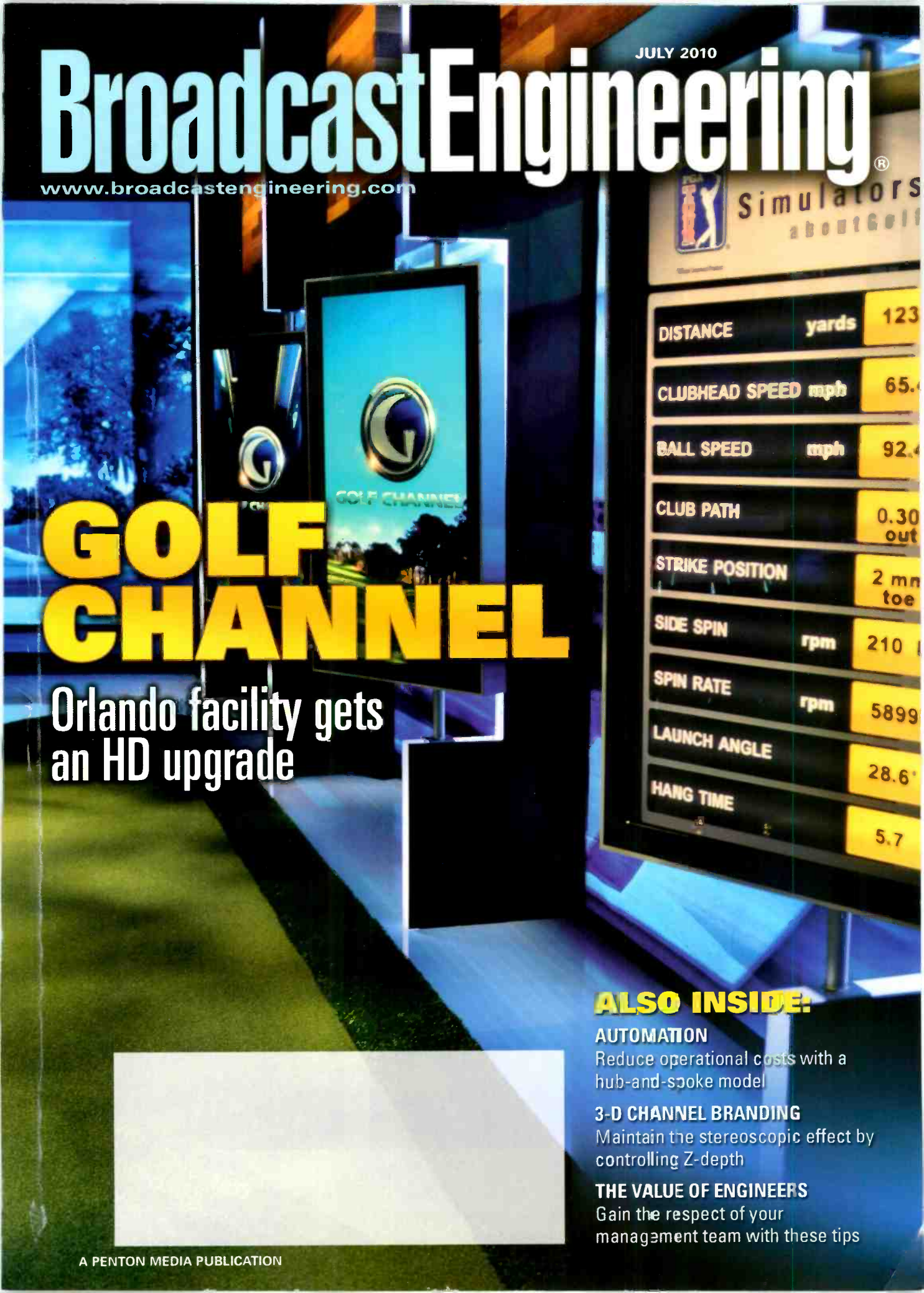

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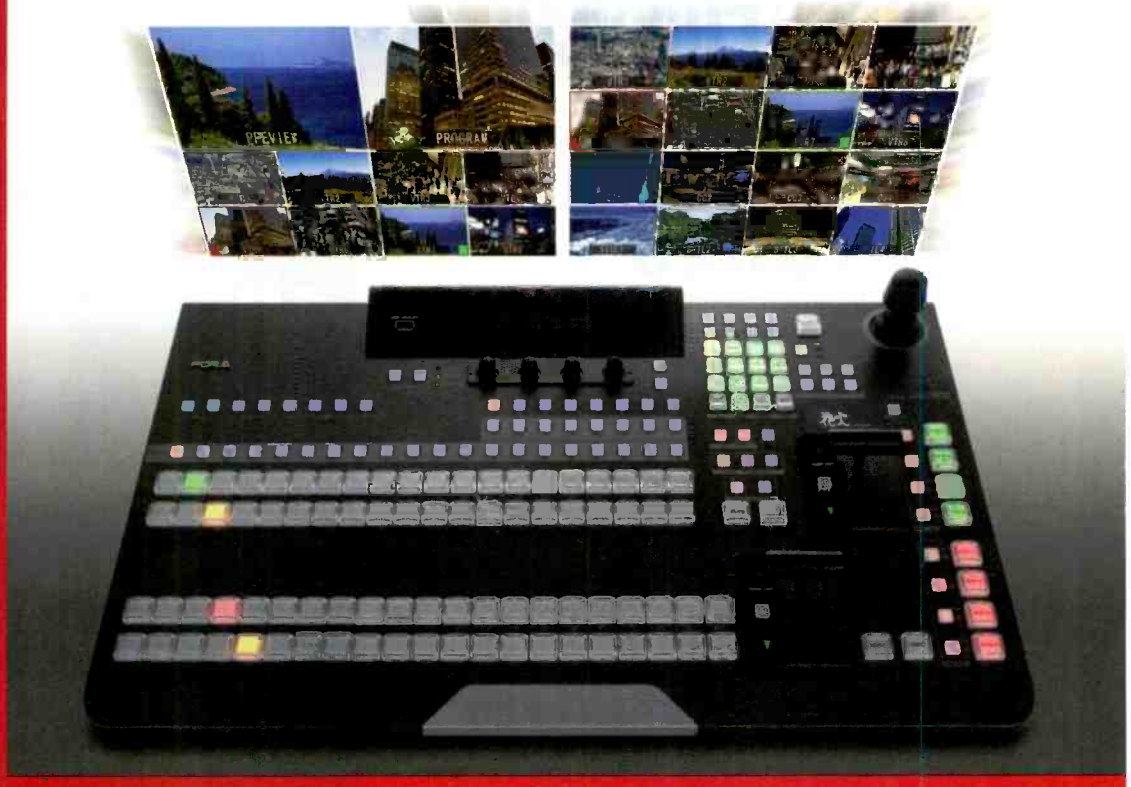

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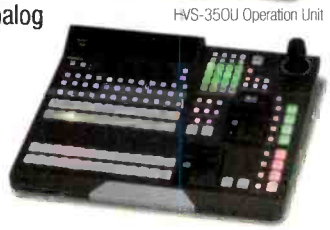

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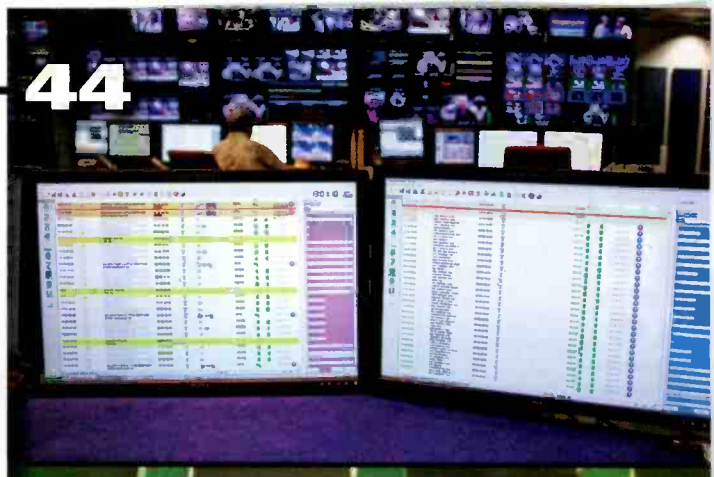

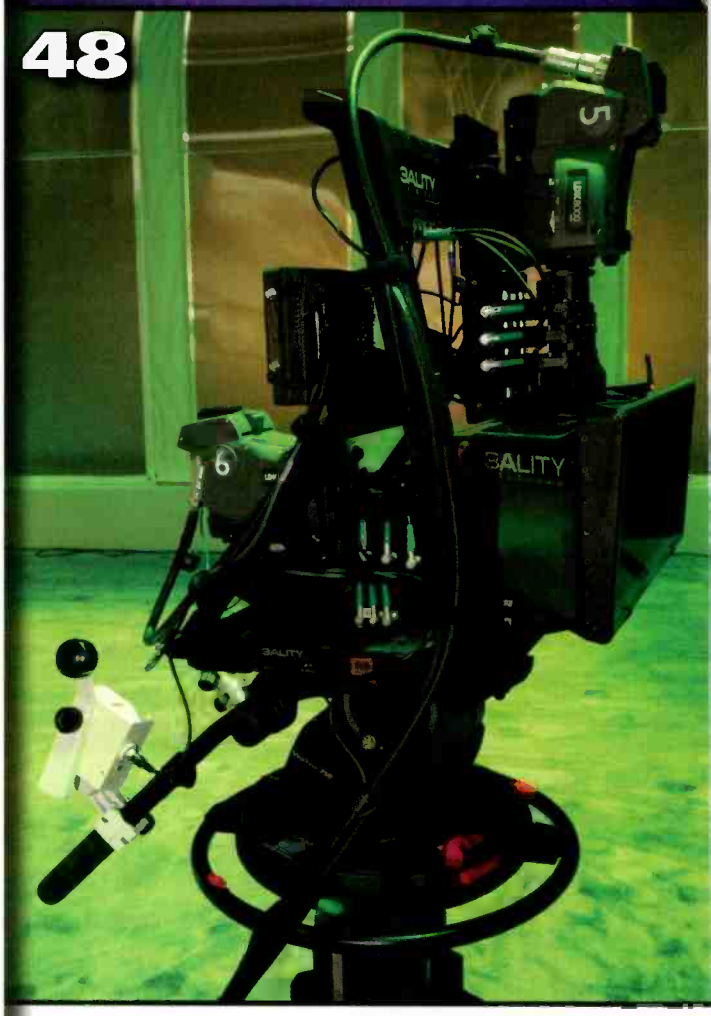

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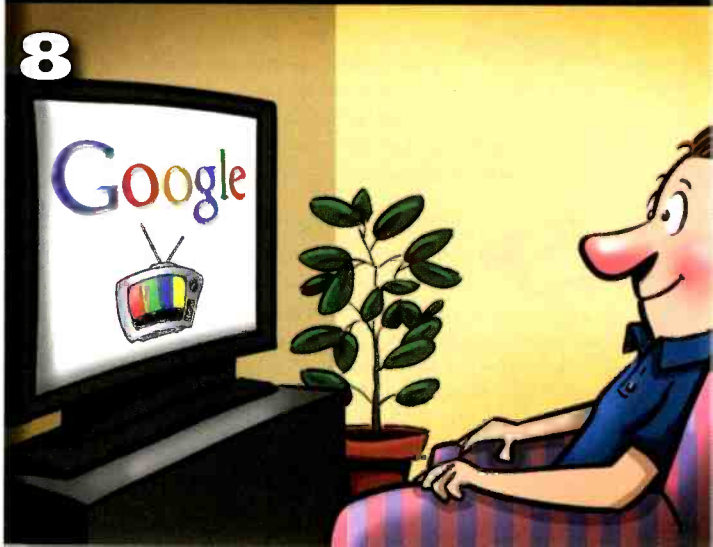
NEW PRODUCTS

DEPARTMENTS

ON THE COVER:
The Golf Channel's new 4700sq-ft Studio A includes six production areas.



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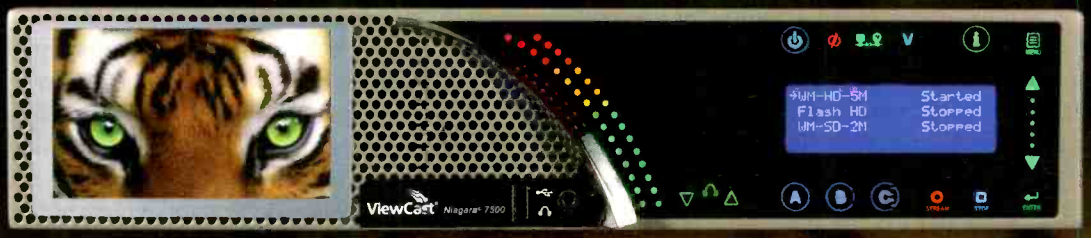

It's easy to be enticed by the alluring good looks of the Niagara® 7500 – the newest HD streaming solution from ViewCast. On the outside, its sleek, innovative design and responsive touch-control interface will excite you. Its brilliant high-resolution HD display will dazzle you. But on the inside, it's a beast.

The Niagara 7500 devours your HD video and easily transforms it into high-quality streams for delivery to IP and mobile networks. Its powerful video pre-processing features streamline and simplify your workflow. Inverse telecine, closed caption extraction and rendering, de-interlacing, scaling, cropping and bitmap overlay are just a few of its standard features.

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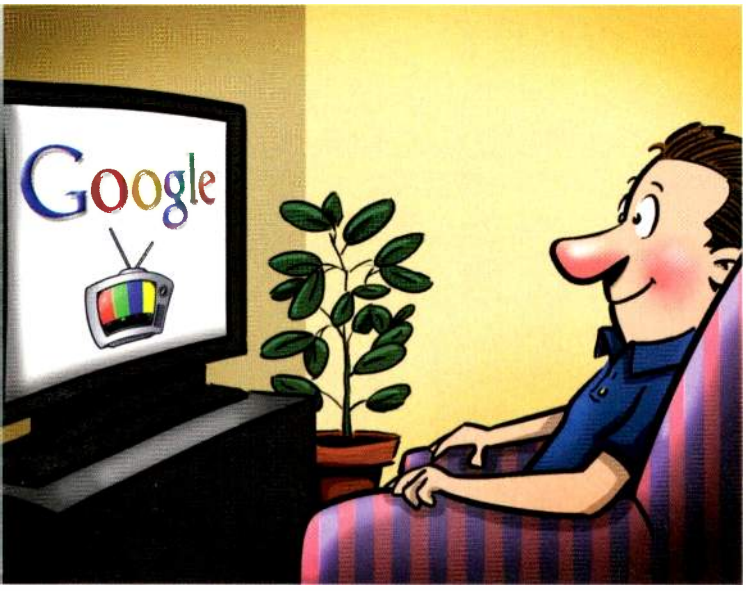
Google TV

I've previously been of the opinion that TV viewers would never settle for watching TV programming on computers because it required a *lean-forward* experience. Watching from your easy chair, on the other hand, is a *lean-back* experience. There is a significant difference both in the comfort and ease of use factors; I now may have to change my opinion.

At its May I/O conference, Google revealed its highly anticipated Google TV product. Google TV is a combination of software and hardware that merges the Internet and TV. Google's solution combines its new Android 2.2 software, called Froyro, with a Sony TV.



Trying to read e-mail or surf the Internet on a TV has previously proven to be neither easy nor satisfying. Balancing a keyboard and mouse from an easy chair is difficult, at best, and Internet sites often display improperly on a TV screen; however, Google's new approach promises to be an easy experience.

Google has taken its search expertise and added user-friendly control in a lean-back environment. With Google TV, an Android phone can be used to enable voice control. Simply say, "'Simpsons' TV show," and your Google TV would display the options for such tagged content. How about e-mail? Forget that now-ancient AOL phrase, "You've got mail." With Google TV, you'll be able read e-mail just by saying, "Open my e-mail."

Because the platform is Android-based, thousands of developers may bring new features, control and applications to the TV set. Google claims that 100,000 Android devices are activated every day, and the platform is supported by 50,000 Android applications. Imagine what TV sets might be able to do when armed with third-party apps?

One might ask why Google wants to enter the TV market. It's not because the company wants to sell applications; it's because there are 4 billion TV sets around the world, and $70 billion is spent annually on TV advertising in the United States alone. Google wants a piece of this revenue.

Advertisers also could benefit from this new TV functionality. While today's advertising messages are passive, Google TV will enable a two-way dialog. When the viewer sees an interesting product on a TV program, he will be able to quickly access more information about it, find a local dealer and even contact the vendor. Combined with home and viewer demographics, Google TV could become Madison Avenue's next hurrah.

Why should broadcasters even care about Google TV?

Any technology that further enhances the viewer experience is good for broadcasters. Yes, the technology means a variety of competition will be displayed along with your station on any EPG or listing. But with context search capability, station content will be equally visible with other choices. This means local programming will stand out even more, unlike now when your station or network is just one of 500 other channels.

Today's viewers don't know or care whether the programs come from satellite, cable, over the air, Internet or by water pipe. What viewers want is to be able to easily find the desired content and then view it in a comfortable environment. Does Google TV effectively provide all these functions and features? Perhaps not yet, but it does appear Google is closer to an effective solution than anyone else. **BE**

Brad Dick
EDITORIAL DIRECTOR
Send comments to: editor@broadcastengineering.com

Rethink multi-viewer energy efficiency

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The 700MHz issue

Dear editor:

I have a question regarding wireless microphones in stage, PA and film work. Have you any comment about the FCC's take on "revisions?" Do you see a trend either sweeping unlicensed devices out of the way or perhaps just leaving them alone? I received an e-mail message from FCC.gov early this month stating a "position" pertaining to microphones in the 700MHz band. Have you any sense of updates?

John D. Harmer
Harmer Associates

Mitchell Lazarus responds:

As of June 12, operation of wireless microphones in the 698MHz-806MHz band is prohibited.

The FCC has proposed new rules that would allow legal, unlicensed operation of TV-band wireless microphones by anyone at powers below 50mW. There are also proposals to expand eligibility for licensed microphones above 50mW beyond the present group of broadcast, cable and film producers. We are not likely to see these rules adopted for several months.

In the meantime, the FCC is allowing operation of wireless microphones below 50mW by anyone on an unlicensed basis, under temporary waivers.

Mitchell Lazarus
Fletcher, Heald & Hildreth, PLC

The FCC's spectrum plan report and auction

Here are a few responses to the recent flurry of activity regarding the FCC's spectrum plan, a proposed spectrum auction and the potential loss of must carry.

Dear editor:

Without having read the report, which I suspect would more accurately be described as a con job or verbal sleight of hand, I'd bet a week's pay (being almost retired makes that a safe bet) there are no facts regarding skyrocketing cable rates. No facts about cable bundling versus à la carte pricing. No facts regarding much of the population in the United States not knowing that programming can be received off-air let alone à la carte and for free!

It would not surprise me if the report is based more on assumptions than facts.

Hopefully broadcast and engineer associations — NAB, SBE, etc. — will wake up and start addressing the impending loss of broadcast spectrum!

Robin Adair-Weber

Dear editor:

This proves the European method of DTV transition (multichannel multiplexes containing at least four channels and operated by a third party) is simply more economical and makes better use of available resources. Also moving to AVC/H.264 would be smart. If ATSC had a system like DVB-CI, then pocket-size MPEG-4-to-MPEG-2 transcoders could upgrade any compatible set, easing the transition.

Mike Petersen

Dear editor:

Handing the OTA free-to-watch spectrum over to the pay-as-you-go corporations is akin to allowing fiefdoms along the nation's highways to set up their own system of toll bridges. Follow the money to see where this line of logic originates. It is not with the end users, I can tell you that.

ARCSTV

Not impressed

The story "ABC's 'Jimmy Kimmel Live' and 'Nightline' use Apple products for broadcast-quality production" story on June 25 got this reaction from a viewer. To recap, when a power failure struck the studio of Jimmy Kimmel's late night ABC show, the host used his Apple Macbook's webcam to shoot the show. ABC aired it the next night, giving Kimmel a huge boost of publicity.

Dear editor:

If that was "broadcast quality" then Fisher-Price needs to start relabeling its video recorders (the ones that use an audio cassette tape) as SD cams! The audio was horrible, and the video was so loaded with artifacts, it looked like it came from YouTube.

Brassscrounger

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File-based workflow

Human factors affect the adoption of new technologies.

BY JOHN LUFF

In this second installment on aspects of file-based workflow, the topic turns to the human factors affecting implementation and how to implement software systems in hardware-based broadcast solutions. (Check out the first part of this article series, "File-based workflow: Bits and bytes made into programs," in the April issue of *Broadcast Engineering*.) Make no mistake, the differences are substantial, and the learning curve is steep.

There are aspects of file-based workflow that make it quite different from analog or tape-based workflows.

There are aspects of file-based workflow that make it quite different from analog or tape-based workflows at the every level. It is important to note that the business itself is also affected directly by the decision to move to new technology. But in this case, the business systems, which previously could often work with paper-based approaches, can no longer avoid being tightly integrated with the new technology.

PBS solution

A case in point is the implementation of "NRT," non-real-time transfers of content from Alexandria, VA, to affiliated stations, now under way at PBS. (See Figure 1.) Files are "pitched" to the stations over an IT-based satellite file transfer system. Once received, the files are cached on IT servers, a process that is part of PBS' Station Services Platform (SSP), before they are moved to the station's video servers. The more interesting part of the technology is the movement of metadata. The metadata — including accurate start of message (SOM), duration and program details like series and episode number — are distributed with the content and then parsed directly to the local traffic system from the SSP. Upon receiving the metadata, traffic has the choice of marking the content for movement to the air server and then sending a "dub list" directly to the SSP, which executes an FTP transfer of the content to the station's video server. All this happens without any time spent in MCR to find and mark the content because the metadata flows with the content.

It is important to note that the SSP contains a critical bit of technology that allows seamless interoperation between PBS and all of the stations. The SSP contains a transcoding engine that takes the AMWA AS-03-compliant files and makes them compatible with the station's local video server. No action is required by the station, and no special versions are needed for each station. This tight integration of several processes — transmission of the file, local cache, transcoding and FTP — constitutes an automated workflow that immediately affects PBS' business operation in a material way. It saves labor and will eventually enable PBS to cut the amount of satellite bandwidth needed to move real-time content by shifting distribution to non-real-time file transfers.

A consortium including Warner Brothers, CBS and Ascent Media is doing something similar for long-form commercial content in a system it calls "Pitch Blue." Though different in the details, the operation is mostly the same. Content is sent as real-time MPEG streams to a local cache server. No record list is needed. Content destined for each station is simply delivered. This is similar to various commercial delivery services except that the end-to-end workflow was taken into account and no ingest operation is required.

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

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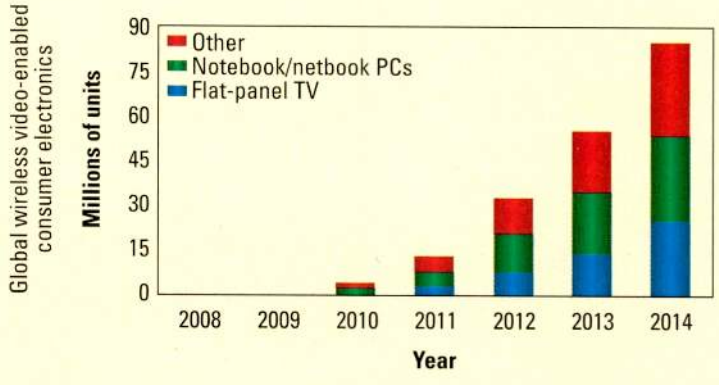

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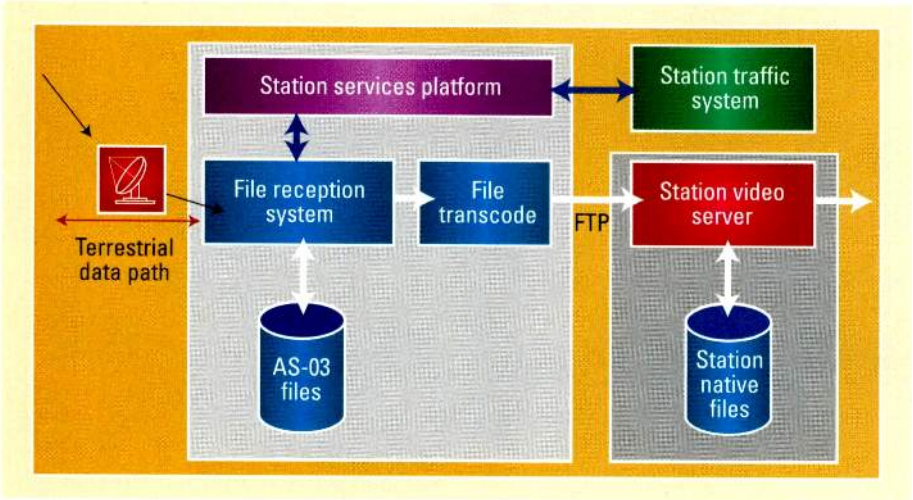

Figure 1. In PBS' Station Services Platform (SSP), files are "pitched" to stations over an IT-based satellite file transfer system. The SSP uses a transcoding engine to deliver the files in a format compatible with a station's local video server.

Pitch Blue uses transport stream recorders where PBS is using true file transfer hardware. Both have self-healing capabilities should packets be lost in transmission, and both use terrestrial data paths to make requests for lost packets and allow the distant operators to check the status of content and the health of the transmission system. In both cases, FEC is used to allow some packet errors to be corrected without retransmission requests. Both systems are ultimately backed up by the ability to send the content in real time, live or for local recording by existing methods.

This kind of holistic integration of the file-based approach with existing business operations is important. As the number of streams transmitted increases, it will become harder to run efficient operations using old methods. Adoption of file-based methods is inevitable, in part because the hardware used for tape-based approaches is beginning to disappear slowly. At NAB this year, there was a recorder shown that uses LTO-4 tapes and an internal MPEG-2 encoder to record files directly on tapes which may be directly usable in some archive implementations.

One thing should be clear: File-based workflow is quite distinct from tape-based approaches because it uses an IT infrastructure. This means designing, operating and maintaining the system is an IT issue, with constraints real-time video puts on network topology, bandwidth and security. For instance, a single uncompressed SMPTE 292 (1.485Gb/s) signal requires at least 10GigE. Because television files seldom need more than 440Mb/s, common GigE hardware suffices for faster-than-real-time transfers of files. Because broadcast files are considerably skinnier, the overhead available is more than adequate to move files several times faster than several times real time or to move multiple files over one link at the same time.

Securing content is critical. Systems connected to outside networks, especially ones not locked down tightly, are dangerous at best and should be avoided. It is important to explain to IT designers that all aspects of topology and security need to be vetted before starting a complex file-based workflow system design to avoid discussions about common IT security tactics that don't work well with real-time video services. In an ideal world, the storage system would be infinite in size and speed and never require upgrading. In reality, economics require tiered storage.

Video server storage systems are expensive because they need to support many simultaneous I/O ports at high bandwidth. A better approach is to use nearline storage (spinning disks of a less expensive, lower performance type) and deeper archive with removable media such as LTO tapes. While this approach lowers costs, it also introduces storage management issues and complexity. The result is a need to have a system that manages the tiered storage, including offline storage of content on shelves or in remote locations. An archive manager product becomes a critical element of file-based workflow implementation.

An important part of file management is managing the metadata. The system must keep track of the content itself, the metadata describing it and its heritage, and also when and how it has been used and the expiration dates for the rights. Modifying the content in one database often requires changes to another related database. Keeping them all in sync requires good planning at the time of implementation and a locked-down approach to details in operation.

Though these systems are complex, they have become more affordable. Indeed, it is inappropriate not to protect the content and the metadata equally. The Advanced Media Workflow Association (AMWA) is working to add standardized data protection to files. The protection would be added to the essence, the metadata and the entire file wrapper. (See Figure 2.)

Let's assume you are tasked with investigating and implementing a file-based workflow. Common sense should prevail, but first one should admit that implementing software systems is not like hanging gear in a rack and running a bunch of coax. It requires meticulous planning in the systems and in understanding what needs to be done. Defining a new system as a replacement for an old system may lead to the conclusion that you have to find a file-based approach for each step in a tape-based workflow. The first task should be to understand the steps in the existing workflow and what drives them. Using the PBS example from earlier, it is clear that the old workflow was to issue a record log, record a show from a satellite receiver, ingest the tape in the server (or at least mark it for playback

by automation) and report back to traffic on paper any errors. In a file-based workflow, the equivalent may happen entirely in traffic.

The people factor

It is likely that any new implementation plans will include changes in how people work. Make no mistake; the management of people's expectations is a critical part of any system plan. People resist change. Any significant new process, especially one not easily understood, is hard to accomplish without conflict. It is critical to involve everyone who has a stake in the outcome early in defining what the system should do in complete detail.

Equally important is the need to involve potential partners supplying software to the project. Set up a clear and direct line of communication with the people who will actually be doing the implementation. Assemble them all in a room and review the plans in detail. Articulate not how you want it wired, but rather how you need it to work. Use clear language to discover all of the interface points between software systems. Get everyone to understand what communications pass across every interface, especially security and topology issues. Each problem needs to be assigned to someone to solve. The entire team, including vendors, needs to communicate regularly and adhere to a schedule for completion.

One project I have been involved in recently included moving content from an old server system to a new one. The complications seemed easy to overcome, but issues such as updating the automation database on the new system and interfaces to traffic and archive management (both old and new systems) had to be detailed. Most importantly, the essence and metadata needed to be moved seamlessly from one system to the other. Every step turned out to be complicated, with multiple vendors interfacing at several critical points to be sure the content moved efficiently and was transcoded into MXF. We were fortunate to have an SQL database expert on staff during the project, and we had the luxury of a test system on which we could test transcoded essence as we tried different settings in the transcode process.

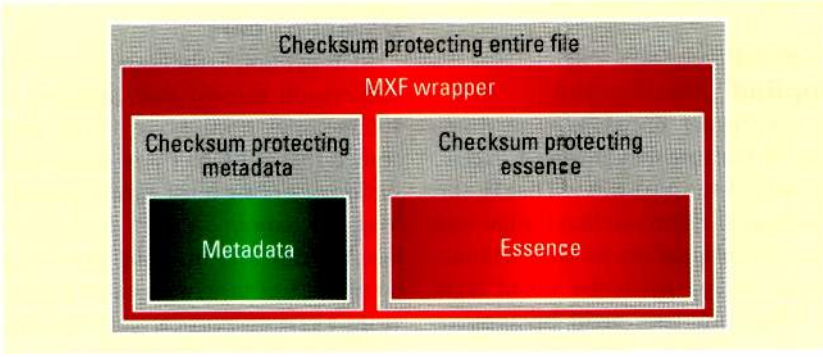

Figure 2: The Advanced Media Workflow Association (AMWA) is working to add standardized data protection to files. The protection would be added to the essence, metadata and wrapper of the file.

SOA

IT technology has also offered us a tool that is particularly well-suited to developing workflows. Service-oriented architecture (SOA) is not itself a workflow; rather, it allows individual processes to be "plugged in" using Web services interfaces. Tasks and metadata are passed over standardized protocols from one process to the next. An SOA management plane allows process monitoring and defining the workflow across multiple applications. For instance, content may need to be moved from an archive, analyzed for file structure, moved to the appropriate transcoder drop folder, transcoded to iPhone format and delivered to a Web server for consumer access. One might manage all of the steps manually or define the workflow in SOA and allow the content to move from one application to the next without intervention, reporting back at each step any errors to the SOA system while modifying metadata in relevant databases along the way.

The AMWA and the EBU recently issued a Request for Technology to standardize the essence and metadata interfaces between components in a workflow system. The project, "Joint EBU – AMWA Task Force on Frameworks for Interoperable Media Services (FIMS)" seeks not to redefine basic SOA technology, but rather to define how messages are passed so that common APIs can be used by vendors, simplifying the implementation of SOA in many facilities.

New channels

One of the strongest drivers for file-based workflow is the explosion in content delivery methods and formats. If a station has to deliver to multiple destinations, it is much more complicated if content is not moved as files. Transcoding content to many output formats can be done in one holistic workflow, rather than as separate serial processes. Consider for a moment the problem of deleting media and all of the relevant metadata or keeping proxy files up to date when new versions are created. Metadata must link to all of the relevant content without error. Complex file-based workflow systems require careful planning and implementation to ensure the integrity of the whole system is not compromised. Reconstructing the correct relationships later can be difficult.

Broadcasters recognize the need to move to file-based workflows. They represent effective and cost-efficient ways of doing business. It just requires good planning, flawless execution and great attention to detail in operation. BE

John Luft is a broadcast technology consultant.

Must carry survives

The Supreme Court denied Cablevision's appeal to must carry.

BY HARRY C. MARTIN

The Supreme Court has decided not to hear an appeal filed by Cablevision relative to last year's decision by the U.S. Court of Appeals for the Second Circuit upholding a must-carry "market modification" ruling by the FCC.

Background

The must-carry rules have long been a thorn in the side of the cable industry. Those rules compel cable companies to carry local stations in their markets for free. Of course, recent developments on the retransmission consent front might indicate that local station carriage may in fact have considerable value to cable operators. Even so, the concept of the government ordering any company to give away services has been a source of consternation among cable interests for decades.

Turner decisions

In 1994 and again in 1997, the cable industry launched full-scale attacks on must carry and came close to getting it declared unconstitutional in the Supreme Court's Turner Broadcast v. FCC decisions. In those cases, a divided court upheld the FCC's must-carry rules and the Communications Act provisions that gave rise to them.

"Facial" versus "as applied" challenges

The Turner decisions were noteworthy because they involved "facial" challenges to must carry. That is, the challengers' claim was that the law was unconstitutional on its face, without regard to any particular set of facts to which the law might be applied. A bare majority of the court, apparently convinced that the law might be constitutional in at least some settings, was not inclined to go that far. However, they reserved judgment as to whether must carry would survive an "as applied" attack, i.e., a challenge based on a specific factual setting.

The Cablevision petition

Cablevision thought that it had an excellent candidate for an "as applied" challenge when WRNN-TV, a station in Kingston, NY, about 100mi north of New York City, asserted must-carry rights on some Cablevision systems in Long Island. The station's signal had been entitled to must carry on those systems in the early 1990s, but Cablevision had convinced the commission to exclude those systems from that obligation, relying in particular on the reach (or lack thereof) of the station's Grade B contour. In response, the station moved its transmitter about 50mi closer to NYC, thereby correcting the Grade B shortfall. The station then asked the commission to reinstate its previous must-carry rights on the Long Island systems. The commission granted the request. Cablevision appealed to the full commission, was unsuccessful and then appealed to the Second Circuit. It then filed a petition for certiorari with the Supreme Court.

Denial of cert

In its petition to the Supreme Court, Cablevision showed that Kingston is 100mi away from Long Island and argued that WRNN-TV is not a local station deserving must-carry rights. In May, the Supreme Court declined to take the case and in doing so offered no opinion or insight on either Cablevision's case or must carry. Such summary dismissals are customary when the court decides not to hear a case.

One theory about the reason for the denial is that the court did not see this "as applied" case as raising a policy issue of sufficient importance for Supreme Court disposition. A less fact-specific facial attack, such as was mounted in the Turner decisions, on must carry might have had more appeal because the resulting decision, whether it was in Cablevision's favor, would potentially have had broad First Amendment implications. This is speculation, however. The court simply may have determined that it is premature to revisit must carry when the second Turner decision is only 13 years old. BE

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

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

Dateline

- Noncommercial TV stations in California, North Carolina and South Carolina must file their biennial ownership reports by Aug. 2.
- By Aug. 2, TV and Class A TV stations in the following states must place their EEO public file reports in their files and post them on their websites: California, Illinois, North Carolina, South Carolina and Wisconsin.
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Broadcast monitors

OLED and 3-D monitors are becoming practical for professional use.

BY ALDO CUGNINI

Video monitoring technology continues to evolve at an amazing pace. Just consider the variety of new broadcast and production monitors that were announced and demonstrated at NAB this year, including the debut of a number of 3-D products. It's no surprise that 3-D was among the top themes at the show. "Avatar" is now the highest-grossing film of all time, several new 3-D consumer HDTVs were introduced this spring, and analysts are predicting that up to 80 million 3-D TV sets could be sold by 2015. Coverage of 3-D at the conference involved all aspects of 3-D, including cameras, post production, distribution and displays.

LCD monitors have now displaced CRTs as replacement (and new) products in video facilities; some even exceed CRT capabilities. Plasma panels have found a home meeting the requirements for large displays. New technologies continue to advance performance. This month, we'll examine new technologies available in video displays.

OLED becomes a reality

OLED displays, only recently a laboratory curiosity, are now practical, and they are becoming available for professional use. The displays use organic LEDs as the light-emitting pixel elements, and they are different from ordinary LEDs in that they are composed of layers of organic semiconducting material, i.e., they are based on carbon rather than silicon.

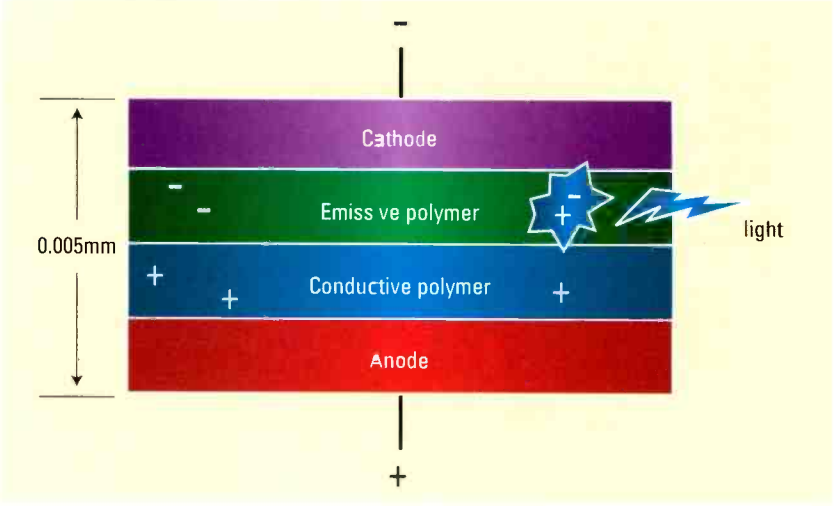


Figure 1. OLED technology.

(Some OLED display backplanes are built from silicon as well.) In OLED screens, an applied voltage transports electrons and electron holes into the emissive layer. (See Figure 1.) Light is produced when the electrons and holes recombine.

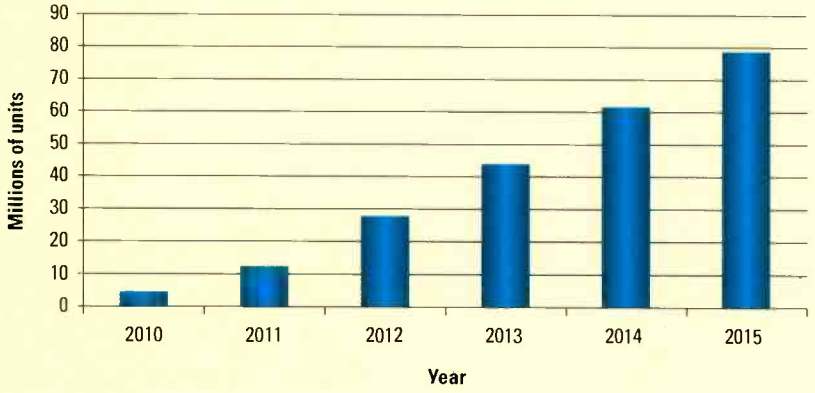
The advantages of OLEDs include fast response times, broad color reproduction, high brightness, high contrast levels and deep black levels; contrast ratios of over 1,000,000:1 have been achieved. The displays obviate the need for a cold cathode fluorescent lamp (CCFL) or LED backlight unit, can have a lower costs in mass production (due to a simpler manufacturing process with fewer components) and offer a more "green" manufacturing process;

FRAME GRAB

A look at tomorrow's technology

Worldwide 3-DTV shipment forecast

Shipments will rise from 4.2 million in 2010 to 12.9 million in 2011.



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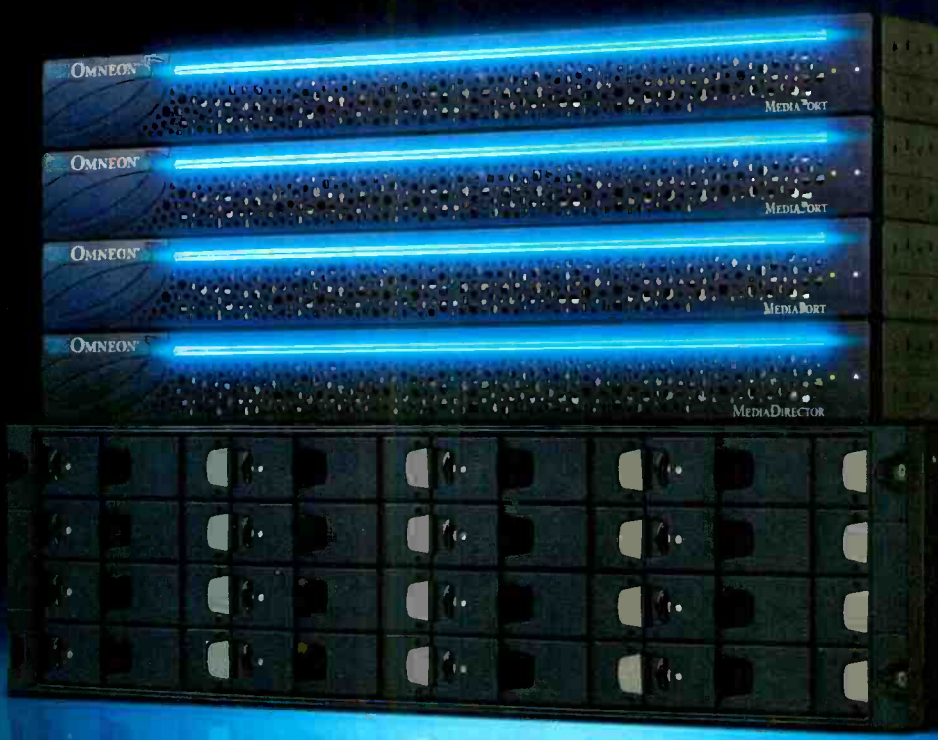

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While OLEDs historically have had lower lifetimes than LCD/CCFL or plasma panels (typically 60,000 hours for 50 percent brightness of a blue OLED device), power reduction strategies and "pixel orbiting" options can offset the risk of burn-in. Meanwhile, the lifetime and efficiency of the devices continue to improve to the point where we can expect practical 42in to 60in displays in the next five years.

3-D displays are now entering professional service as well. In consumer electronics and theatrical applications, displays generally use one of three technologies: filtering, shuttering or autostereoscopy. With filtering, the left and right images are orthogonally filtered with corresponding passive eye wear. Filtering comes in two varieties: polarization (either linear or circular) and narrowband color separation (not to be confused with the two-color anaglyph process). With shuttering, the left and right images are time-multiplexed and viewed through active synchronized eyewear. Autostereo applications remove the need for glasses and are usually realized with a diffuser/lenticular screen or a "parallax barrier" system using a series of vertical slits. For professional applications, 3-D monitors usually incorporate either polarization or shuttering.

A sampling of products seen at NAB

In addition to OLED and 3-D technologies, manufacturers continue to improve the performance of LCD displays. For example, Dolby may have just crossed the performance barrier of CRTs. At NAB, the company unveiled a 42in LCD reference monitor that accurately reveals true and deep black levels with higher contrast across the entire color spectrum. The Grade 1 monitor uses an RGB backlight unit with LEDs that are modulated individually on a frame-by-frame basis. The LCD panel is also modulated in real time as part of a dual-modulation process. The combination of technologies produces an extremely deep black level for an LCD panel. The unit can be used in darkened and well-lit rooms, and screen brightness can reach 600nits.

Other key features of the monitor include extended dynamic range, such as that of digital cinema cameras; DCI/P3 (digital cinema) color gamut support; color accuracy across all luminance levels; and the ability to emulate various display devices. Applications include high-end post-production houses and broadcast quality control.

TVLogic showed two 15in OLED monitors, one of which provides 3-D monitoring by means of a shutter glass display. Designed for color-critical visualization for film and broadcast production, the monitors feature 1366 x 768 resolution, 3G-SDI 1080p 4:2:2 10-bit support, SDI/HDMI 10-bit support, dual-link 4:4:4 mode, waveform monitors and 1:1 pixel mapping modes for SD/HD. The 3-D monitor also features 3-D left/right channel blocking.

TAMUZ introduced two OLED rack monitors at NAB. One is a multiscreen monitor equipped with four 4.3in (16:9) OLED displays built into a 2RU monitor bridge. These OLED monitors offer CRT-like viewing angles, direct 3G/SD/HD-SDI inputs and 1080p60/50 support. The products provide a stated contrast ratio of over 100,000:1 and support multiple color spaces. The panels are also said to offer more than 30,000 hours of life. The other product is an OLED audio/video monitor with analog and SDI inputs and outputs, and built-in speakers.

Sony showed an OLED display panel that delivers high-contrast, high-color images, even in ambient light. The 7.4in high-resolution (960 x 540) portable monitor can be used in 3-D camera rigs with its horizontal/vertical flip mode, and it can be outfitted with a viewing hood, carrying handle and connector protector. An anti-reflective coating provides protection from scratches and enables a high transmission of the OLED output, keeping picture brightness high while minimizing ambient light reflection. The monitor is equipped with a feedback system, which monitors the emitted light output and automatically adjusts the white balance. Sony also announced two new 3-D monitors featuring

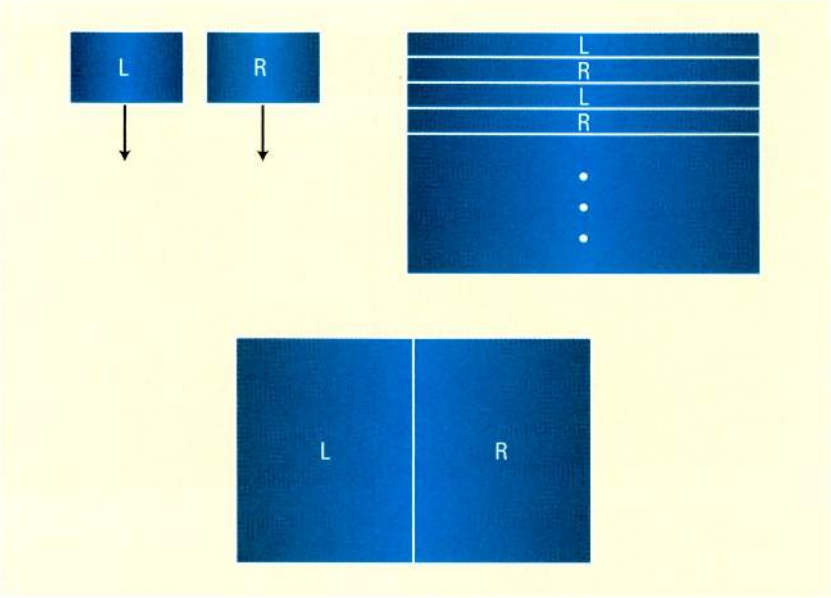

Figure 2. 3-D video can be interfaced in various ways, including clockwise, from top: simultaneous, line-by-line and side-by-side.

circular polarization in 42in and 24in sizes. These models offer proprietary color matching, full HD resolution and wide viewing angles. The monitors can be used to view 2-D content as well.

Panasonic also showed a new 3-D LCD video monitor. This monitor uses a 25.5in 1920 x 1200 LCD in-plane switching (IPS) panel that can display in 3-D using passive polarized glasses. To accommodate various 3-D signal formats, the unit supports dual SDI inputs and three types of 3-D video: simultaneous (dual SDI), line-by-line and side-by-side. These formats have emerged as ways of interfacing 3-D video signals. (See Figure 2.) In the first, two full-bandwidth pictures are relayed. In the second, each picture is decimated vertically, each successive line is alternately transmitted, and the two images are sent in one channel. In the third, each picture is downsampled horizontally, and the two images are sent in one channel.

New display technologies are appearing in combination monitor-processor units, too. Wohler showed a rack-mounted modular SDI-centric audio mixer and router at NAB that combines dual 4.3in OLED displays with loudness metering and control, and audio routing and mix controls. The use of OLEDs in such a unit brings the advantages of low cost and wide viewing angles to this type of application.

New display technologies are appearing in monitor-processor units, too.

With an increasing number of products from second- and third-tier manufacturers, the field will become filled with products ranging from the excellent to the mediocre. What's the solution? Set out your specifications, and then get your hands on a demo unit. You can always make a better decision after seeing it in operation in your particular application.

Editorial note: As this column does not engage in product reviews, those described here are intended to illustrate new emerging technologies. For that reason, model numbers and pricing are not discussed. The astute reader can get further information about the products from the manufacturers. BE

Aldo Cugnini is a consultant in the digital television industry.

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

Firewalls and VPNs

Two tools provide critical security for the media professional.

BY BRAD GILMER

Last month we looked at the important role a security policy can play in professional video networks. This month's column will examine two technologies — firewalls and virtual private networks (VPNs) — that can help keep your facilities safe when connected to the Internet.

Network security — a top-level view

Let's take a look at how different security technologies fit into an overall security strategy. As Figure 1 illustrates, a firewall sits at the perimeter of your network, acting as a gatekeeper for information entering and leaving the facility. For security reasons, firewalls are typically configured to block many different protocols, including User Datagram Protocol (UDP), a key technology that is the basis for the efficient transfer of large files. A VPN can be configured to pass UDP traffic through the firewall for specific remote users.

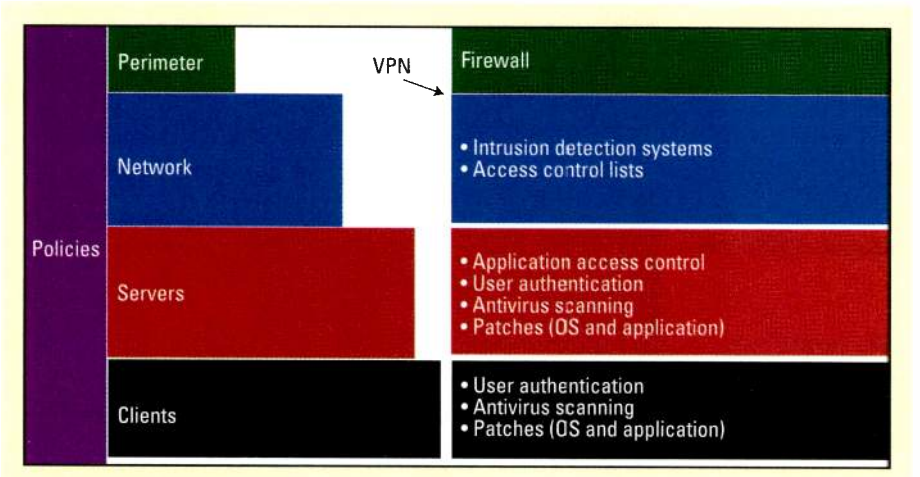

Figure 1. The right column shows many different layers of security that can be put in place to control access to critical network resources. Note that a VPN may be configured to allow certain kinds of traffic from specific users to pass through the firewall. Courtesy Avid Technology and Cisco Systems.

Firewall basics

In a car, a firewall is the wall between the engine and passenger compartment. Its purpose is to protect passengers in case of an engine fire. In networking, a firewall is used to protect a local computer network from whatever may be happening on the Internet. But a car could not function without allowing a few cables to pass through the firewall. In the same way, local networks could not provide the functionality users need without allowing certain signals to pass through the firewall.

What is a firewall? At its base level, a firewall is simply a computer containing two network cards. The computer is initially configured to not allow any traffic to pass from one card to another. One network card is connected to the wide area network (WAN) or Internet; the other network card is connected to the local area network (LAN) inside a facility.

Typically, the configuration of a new firewall intended for commercial service is not useful. The device sits between the WAN and LAN and blocks all traffic trying to go between the two. (I make the distinction between a commercial firewall and one that's intended for consumer use because consumer firewalls come preconfigured to pass certain common protocols.) A network engineer configures the commercial firewall to allow certain traffic to pass between the two network cards on a limited basis. The network engineer has many different choices in how he decides which traffic to allow or deny. In Cisco equipment, this information is frequently contained in access control lists (ACLs). Traffic may be allowed or denied based on origination IP address, destination IP address, traffic type or port number, to name just a few methods.

Firewalls can also check to see if traffic crossing the firewall makes sense in relation to other traffic on the network. This is called stateful packet inspection. For example, if a local client requests a Web page from a remote server, it makes sense for the firewall to see a server on the Internet responding to this request. But if no user internally requested a Web page, then traffic generated by a server on the Internet directed to a computer behind the firewall would make no sense and would be blocked by this check.

Of course, this type of checking goes far beyond checking for unrequested Web pages. However, stateful packet inspection works by inspecting headers on packets and thus may miss malicious information buried within a packet. To find malware (harmful information contained in packets), a firewall must perform deep packet inspection. This kind of checking can

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detect and block malicious content, but deep packet inspection may introduce delays that are not tolerable in professional media applications.

Virtual private networks

As the name implies, a virtual private network allows a network administrator to create a virtual network that is actually comprised of several separate networks, some of which may be located remotely. This allows a single computer or even an entire facility to appear to be connected to the local network even though the remote facility may be hundreds or thousands of miles away. The VPN can be configured to allow users to bypass restrictions put in place by the firewall. For example, using VPN technology, a network engineer can permit UDP traffic to flow between two facilities without having to allow UDP traffic to flow unrestricted through the firewall.

To the firewall, the VPN appears as a separate network within the local facility. Typically all traffic is blocked from flowing from the VPN network to or from the local network. Using ACLs, the network engineer can allow or restrict traffic from the VPN, just as he can allow or restrict traffic from the Internet. This allows the network engineer to develop two sets of criteria: one more restrictive set for the Internet and another less restrictive set for VPN users.

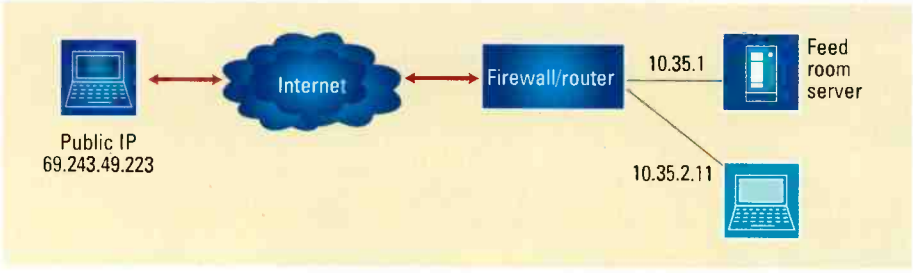


Figure 2. Establishing a VPN connection

To establish the VPN, the remote system must authenticate itself to the local firewall using one of several methods that are generally accepted by the IT and financial communities as being secure. Once the VPN is established, all communications across the VPN are strongly encrypted to keep an attacker from monitoring the VPN traffic. (See Figure 2.)

In this example, we will assume that a reporter at a remote location wants to send a video file from his laptop back to the station using UDP. UDP is blocked by the firewall, so he must first access the VPN to send the file.

At the start of the VPN session, the reporter's laptop is connected to the Internet. The laptop's IP address is 69.243.49.223. When the reporter starts the VPN client and begins the VPN log-in process, several important steps occur. (Note: This is a simplified description.) First, the VPN client verifies that the VPN-capable router is available at the station. Second, the VPN client asks the reporter to log in, preventing unauthorized access to the VPN if the laptop is stolen. Third, the VPN client and router communicate, verifying the log-in data is correct and then applying any policies for the VPN link that have been established by the network engineer. Finally, the VPN client connects to the LAN using the policies established by ACLs.

When the process is complete, several changes have taken place. All

communications between the laptop and the station are now encrypted. Also, the laptop has been assigned a second IP address within the station's VPN pool. The reporter's laptop is now attached to a network behind the station's firewall (illustrated by the grayed-out laptop in Figure 2). In this example, the network address assigned to the laptop is 10.35.2.11. The reporter wants to send his file to a feed room server on another network within the station — 10.35.1.0.

During the VPN log-in process, security policies were applied to the connection. Parts of these policies determine which routes are established between various networks. In this case, when the laptop connects to the VPN, a predefined route is established between the 10.35.2 network and the 10.35.1 network. These policies permit UDP traffic to flow from the laptop to the feed room server network. This connectivity is not an all or nothing approach. The network engineer has many possibilities in determining what traffic is allowed to pass from the VPN onto the local network. With the VPN connection up and running, the reporter may now feed his story to the station using a UDP-based file transfer acceleration program. The station remains secure from UDP-based attacks because the station firewall blocks UDP traffic.

Other security technologies

Firewalls and VPNs are but two of many security approaches available. Space prevents me from going into detail, but Table 1 gives a quick summary of some other methods that may be employed to keep your media networks secure. BE

Intrusion detection systems (IDS)	Monitor activity on a network, looking for behavior that is unusual and may indicate that an attack is taking place
Application access control	Permits or denies access to specific applications
User authentication	Verifies the identity of users, grants subsequent permission to resources on the server or network
Antivirus scanning	Scans for malware on servers and in e-mails
OS and application patches	Contain updates that frequently fix security holes in operating systems or applications

Table 1. A partial list of security approaches that may be employed to reduce risk on media networks

Brad Gilmer is president of Gilmer & Associates and executive director of the Advanced Media Workflow Association.

? Send questions and comments to: brad.gilmer@penton.com

Bag of tricks

Unlikely additions to your kit can make all the difference.

BY KEVIN JOHNSON

The job of acquiring beautiful moving images often requires more than just a camera, and television photographers are a resourceful bunch. To solve a myriad of challenges on the fly, you need a collection of small tools and tricks that come from years of experience. The trusted run-bag can hold many of these time-tested appliances.

With that in mind, I assembled a list of the core gear that should be in every good photog's run-bag. Elements such as gaffer's tape, sun reflectors, multipurpose tools and cable adapters go into that indispensable bag that never leaves your side. But there are also the unusual, and sometimes downright wacky, tools you'd never think would be used in the field of TV production.

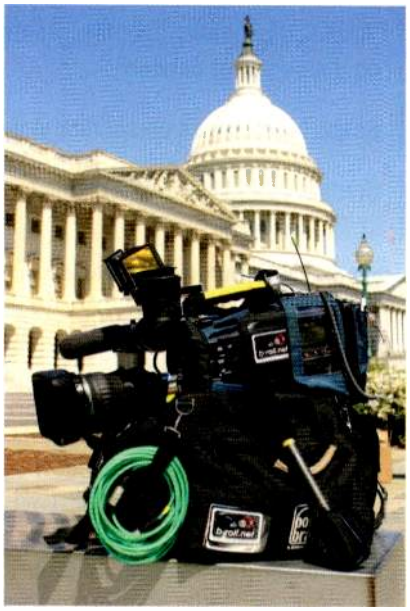
"Hey, you, hand me a CP50"

If you're like me, your introduction to the unique lexicon of the television production world occurred when you were on the set of your first production and a grizzled veteran asked you for a "CP50." As a newbie, you have no idea what they're referring to until the punch line is revealed. CP50 is the high-tech term for "clothespin, 50 count."

Whether the lowly clothespin needs a sexier name is up for debate, but its value cannot be overstated.

Whether the lowly clothespin needs a sexier name is up for debate, but the value of the little wooden spring clip cannot be overstated.

You can hold up backdrops without damaging the fabric, affix gels to lights and readjust them without burning yourself, and hold a reporter's clothing together in the wind.



A good run-bag contains the basics, such as gaffer's tape and cable adapters, as well as some slightly odd additions, such as clothespins and doorstops.

The finest stegosaurus impression I have ever witnessed was courtesy of an unwitting reporter with a spiky spine of clothespins keeping his loose jacket from flapping in the wind.

If you can't beat them, join them

Basic color temperature rules dictate that daylight is around 5600K and incandescent light is around 3200K. What these rules don't tell you is that the little table lamp in your shot will never be able to overpower the sunlight coming in from the window.

In times like these, it's always good to carry small squares of color temperature blue (CTB) gel. These thin plastic sheets are used to convert the light you have into the light you want — for example, turning a standard tungsten light into daylight balanced light.

Put your clothespins to good use, and clip the gel in front of your lights. White balance for the outdoor light, and let Mother Nature be your lighting director.

I've only had one instance in which I didn't have to wait for the passage of time to move the sun across the sky. While trying to set up an interview with a U.S. Navy captain on the bridge of a mammoth aircraft carrier, I was scowling because I couldn't get in the right spot with the sun. The captain asked me what the problem was, and I explained the sun was in the wrong spot.

"30 degrees to starboard," he said to the crew. The entire ship turned to the right, and the sun was out of my shot. It's good to be the captain.

About your expense report

I've filled out a lot of expense reports in my career, but the strangest receipt I've presented to the boss was for a box of unlubricated condoms. After a brief explanation, it was clear the purchase was for business purposes.

Pulled over a microphone, an unlubricated condom can protect your audio implements during foul weather or poolside interviews. Your mic is virtually waterproof, but you can still get decent audio through the latex.

A couple of tips: Avoid lubricated condoms, as the oils could damage your electronics. You also may want to add a windscreen over the prophylactic microphone to mask the reservoir tip.

"Stop" that

Who would think to keep a rubber doorstop in their gear bag? I hadn't considered that idea until it was

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Often the visuals of a story call for a low-angle shot from ground level, and a rubber doorstop can do the trick. You can easily vary your angle of attack as needed, and the rubberized surface gives a little grip.

Carrying a low-wattage light bulb allows you to quickly change the practical bulbs on-location to prevent bright lamps from ruining your shots.

suggested to me by another camera operator.

Often the visuals of a story call for a low-angle shot from ground level, but placing the camera flat on the ground doesn't give the right composition. You need something to prop up the front of the camera. Improvised solutions include throwing your wallet or a battery on the ground as a lift, which invariably results in a soggy,

dirty or missing wallet or a shorted-out battery.

A rubber wedge doorstop does the trick. You can easily vary your angle of attack as needed, and the rubberized surface gives a little grip.

The doorstop can also be helpful in its true capacity: holding the door open while you run cables or load gear.

I've got an idea!

Carrying a low-wattage light bulb in your gear bag is not meant to be a metaphor for a less-than-bright idea. Rather, this allows you to quickly change the practical bulbs on-location to prevent bright lamps from ruining your shots. You don't have to bring out the heavy artillery in your light kit to balance a bright table lamp.

Another great option is a simple lamp dimmer. Adding one of these will allow you to bring down the brightness.

While you're in the electrical supply section of your favorite hardware store, be sure to pick up a two-prong to three-prong AC adapter. Your beautiful lights won't do a thing if you find yourself in an old house that doesn't have grounded electrical outlets.

Go fish!

The world of television photography often boils down to hours of waiting punctuated by moments of pure adrenaline. A few simple mental distractions are important additions to your kit to get you through the waiting. A good book, a few sudoku puzzles or a deck of cards can keep you alert during those long, tedious stakeouts and keep you from having to explain to your boss how you missed a shot because you were catching z's.

Your own little convenience store

Add a few comforts of home to your run-bag. Some granola bars and bottles of water may be your salvation when you're stuck miles from the nearest drive-through window. A small stash of standard over-the-counter medications and first-aid items is a good idea as well. Aspirin, Imodium, Pepto-Bismol, hand sanitizer and bandages can increase your comfort or even save your life.

Where did I put that?

In the end, having all this gear in your bag doesn't do you any good if you can't find anything. Be sure to keep a small LED flashlight on your keychain. You can signal S-O-S for safety, level your tripod or find that lost RCA-to-BNC adapter in the woods during a pitch-black new moon.

Adding some of these items to your bag may not make you MacGyver, but you'll be geared up for a much better shoot. BE

Kevin Johnson is the founder of b-roll.net and a cameraman for Cox Television News Bureau in Washington, D.C.

Router control systems

Router systems should minimize interruptions and maximize flexibility.

BY SCOTT BOSEN

Nearly all modern TV facilities are built around a central routing switcher, and in recent years, these routers have been growing in size. Where just a few years ago a normal routing system would have been 128 inputs and 128 outputs, routers now are commonly 256 x 256 and larger. Specialized systems in large production facilities, uplink facilities and mobile production units often use routers that are at least 528 x 528, and systems of 1000 x 1000 and up are becoming more common.

As routing systems become larger, the design of the control system becomes more important. Large routers often require more frequent reprogramming, and the task of presenting source and destination labels to the operators in a useful and helpful way becomes quite challenging when thousands of labels are involved.

Well-designed control systems are crucial for another reason. Unlike other types of broadcast equipment, routing systems have a long service life. A typical routing system is expected to be in service for at least 10 years and often longer. This means that the router will serve multiple generations of source and destination equipment, a fact that makes it crucial that the router is readily upgradable to suit the working environment as it evolves.

The complexity of contemporary broadcast requires that today's routers, regardless of size, offer a wide range of features for improved signal-handling flexibility and greatly enhanced operational reliability. Features that are considered essential include 3G operation; control, crosspoint and power supply redundancy; a compact, space-saving physical design; and low power consumption for reduced heat loading and prolonged service life. (See Figure 1.)

As facilities' needs continue to evolve, equipment is added and removed from the routing system, and

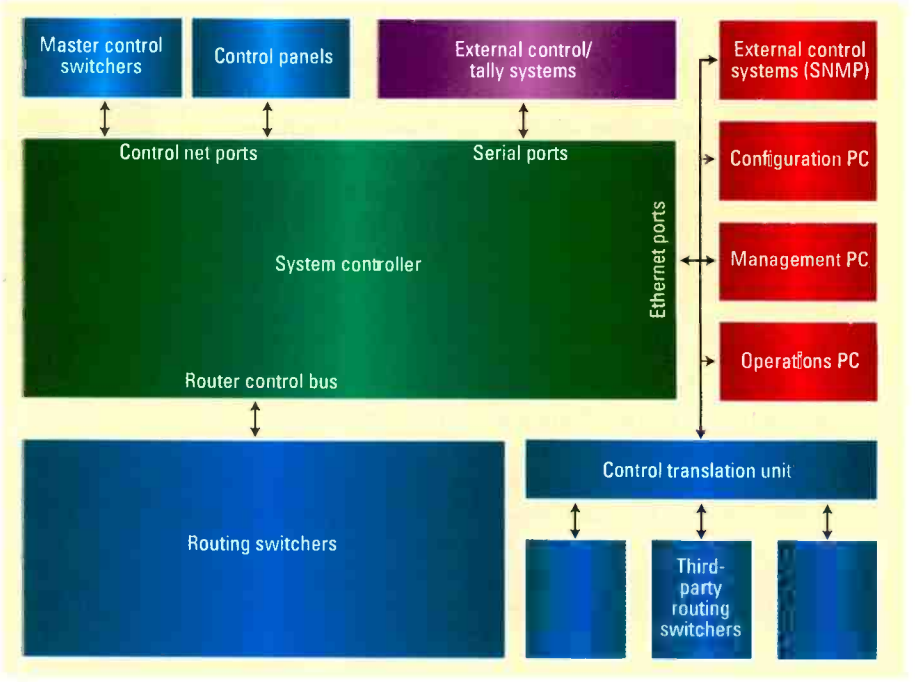

Figure 1. Shown here is a typical routing system block diagram.

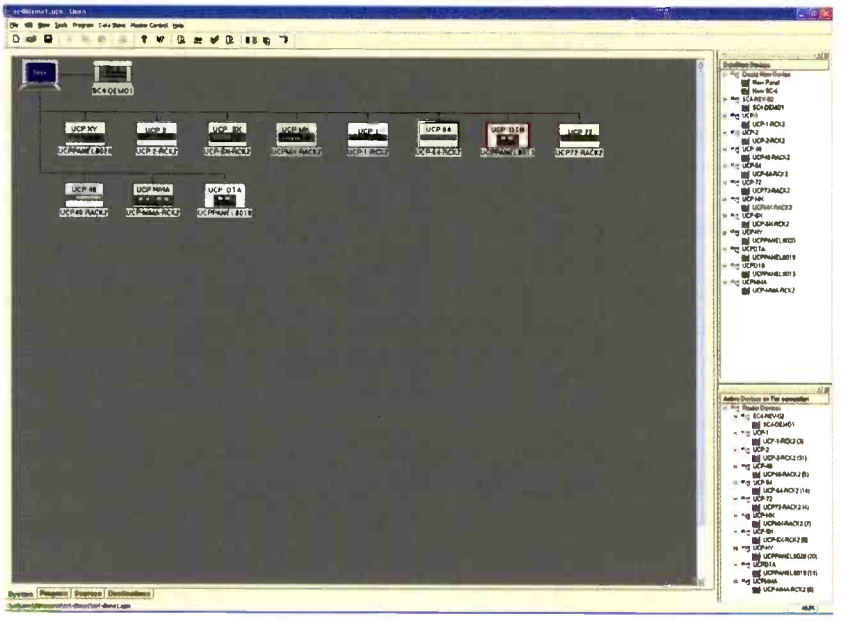

Figure 2. Equipment additions to a control system require router reconfiguration.

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the technical crew must reconfigure it — usually while it remains online. Each configuration change requires sources and destinations to be relabeled or reconfigured, and control panels in all areas of the system have to be reprogrammed. (See Figure 2 on page 30.)

Size, complexity and evolution combine to make a well-designed control system a key component of the routing system and for the technical staff, which keeps the overall operation running smoothly. Such a control system automates repeated steps and performs error checking to ensure, for example, that a typing error doesn't have disproportionate consequences. The following control system features will make router setup and operation easier.

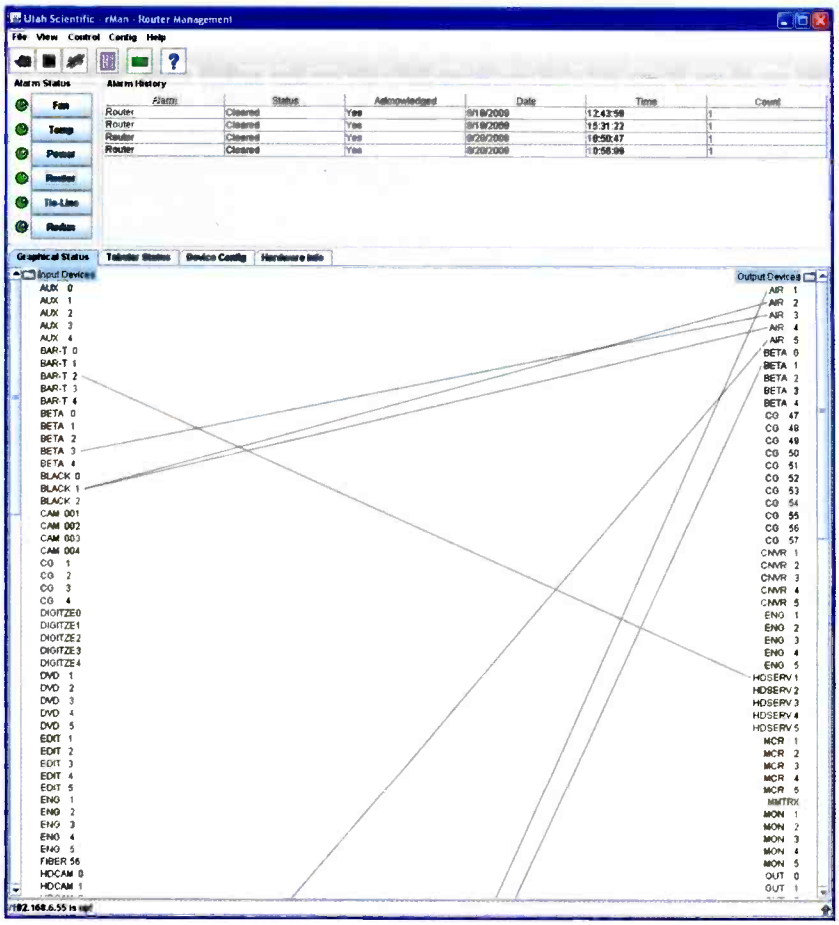

Figure 3. A router control system should be able to reliably save and recall various preset configurations.

Offline configuration

In most cases, the technical crew receives advance notice of changes to be made to the system. If the router control system allows for offline editing of configuration files, the entire system configuration can be prepared in advance and installed at the time of the changeover. This will not, of course, prevent the last-minute changes that will always occur, but it will give the technical crew a basis for testing the new configuration.

Minimizing interruptions

In every router control system, normal operation is interrupted when the system must be reprogrammed. In some systems, this process is quick enough that operators are not inconvenienced by the interruption. In other systems, the full reprogramming cycle means an interruption of several minutes. One way to reduce system downtime is to remove control-panel reprogramming from the system configuration process. The best systems do this by making it possible to reprogram individual panels or groups of panels, while the rest of the operation hums along unaffected. This is a big plus in reducing complaints from the production crew.

Customizable GUI

The most time-consuming part of setup is reprogramming dozens of control panels to reflect the new system configuration. This is where the design of the router control system is potentially helpful. Most control systems offer a GUI for panel programming, and the best ones allow the GUI to be customized, for example, to allow separate views of certain parts of the system, reducing on-screen clutter so the operator can focus on specific devices.

Cloning panels

Another useful control system design feature is the ability to clone panels, i.e., to create a master panel of each type with all programming changes automatically reflected in each panel that is copied from the master. When the cloning feature is impracticable, a good system allows all or part of a panel's configuration to be used as a starting point when configuring other panels of that type. This can be a tremendous help when the system has multiple panels that require specific configuration for that operator's position.

Configuration management tools

During the setup of a complex routing system, there may be dozens of iterations of the control system configuration. A good control system must feature a full set of tools

to reliably save and recall these various configurations and provide a fail-safe system to back them up. (See Figure 3 on page 32.)

Rigors of mobile production

A particularly demanding environment for router systems is mobile production. Whereas a TV station's router may be reconfigured or updated a few times per year, mobile systems typically are completely reprogrammed for every show. Over the years, this has provided plenty of challenges for the designers of these systems, but the improvements and enhancements that come out of mobile system applications have proven to be useful to all routing switcher users.

Monitoring system operation

In addition to the system configuration software, the router control system must provide a comprehensive toolbox to monitor the operation of the system. Alarm indicators such as power supply failure and temperature alerts must be presented in a clear and easily understandable form to the maintenance crew so corrective action can be taken.

In a growing number of facilities, the routing switcher is tied into an overall network management system.

The monitoring/maintenance utility is also the logical place to provide tools for operational supervision of the system, giving access to high-level functions such as tie-line management, releasing locks, and identifying and trouble-shooting hardware faults.

In a growing number of facilities, the routing switcher is tied into an overall network management system. These systems monitor the health of the overall operation by receiving messages from the individual subsystems via SNMP communications. The routing system must be able to provide alarm information via SNMP trap messages. Additional functionality such as loss of signal alarms on critical inputs and outputs can help the network management system trace the root cause of a service interruption through the various devices in the system.

Virtual control panels

Another category of software that is becoming increasingly important in today's facilities is a system to

provide virtual control panels, which are GUI representations of router control panels displayed on the computer screens.

A good control panel system GUI will enable the design of an unlimited range of on-screen panels, from simple button-per-source panels to panels that support the setup of complex monitor walls. The ability to support multiple operating system platforms as well as browser-based panels can greatly extend the usefulness of the virtual control panel system.

Likewise, the ability to apply the panels throughout a network with specific access rights for users or groups of users can make the system much more useful. If the panel design process is closely linked to the control system configuration files, it will be possible to input source and destination labels with mouse clicks, eliminating the tedium and potential errors associated with typed entries.

External device interfaces

The final control system feature requiring consideration is its ability to interface with external devices. External control of the router by automation, scheduling systems, editors and production switchers is critically important when it comes to integrating the router into the overall system.

Equally important is the ability of the router control system to communicate router status to external systems such as tally management, under-monitor display devices and, in this day of the expanding use of flat-panel-based monitor walls, multiview image processors.

Traditionally, communication from the router control system to these external devices has been by a simple numeric interface. The router status was sent as a message that output XX is connected to input YY. This meant that the external system's programming needed to be reconfigured to match the router's labeling configuration every time the router was updated. In modern systems, it is possible to download the router's programming information directly to the external device, allowing the complete system to be automatically updated when changes are made to the router's configuration.

The increasing sophistication of router control systems has kept pace with the amazing growth of routers over the past few years. Modern systems are infinitely easier to configure, manage and maintain than their predecessors, making it increasingly practical to design systems based around a large central routing switcher. BE

Scott Bosen is director of marketing and international sales for Utah Scientific.

The new 4700sq-ft Studio A, designed by Jack Morton of PDG New York, went live Jan. 4. It includes six production areas.

Golf Channel shoots high (def) for newly upgraded facility

The channel moved to a file-based workflow.

BY MICHAEL GROTTICELLI

The live coverage of golf tournaments has always been distinguished by the numerous camera angles used and the pristine quality of the televised signal. Viewers like looking at beautiful golf courses, and there's no denying that the sport in HD — and more recently in 3-D — looks stunning.

Understanding this, Golf Channel, owned by Comcast, has upgraded its main production facility in Orlando, FL, in a multistage move to HD operations. The entire facility is now HD though the channel continues to deliver HD and SD signals to distributors.

Seen by more than 120 million households worldwide, Golf Channel produces more than 1000 hours of original golf entertainment programming as well as live coverage of golf

Technology at work

- Apple Final Cut Pro workstations
- Avid
  - iNEWS newsroom computer system
  - Interplay asset management
  - ISIS shared storage
  - Nitris HD offline and finishing systems
- Canon HJ22X7.5 and J11X4.5 HD studio lenses
- Chyron HyperX3 graphics
- Dixon Sports logging software
- Evertz
  - 7700 and 7800 series infrastructure products
  - EMR 288 audio router
  - EQX video router
  - HD/SD frame syncs
  - MVP multiviewer software
  - QMC master control switchers
  - VIP multiviewer
- EVS XT[2]+ HD servers
- Florical automation
- Front Porch Digital DIVArchive
- Harris
  - Net 300 MPEG-2 HD receivers
  - Nexio 3601 servers
  - Nexio SAN
- ION Lighting Console
- NL Technology AutoIngest software
- Panasonic 42in to 85in plasma monitors
- SAMMA Systems robot
- Softel closed captioning
- Solid State Logic
  - C100 HD-S broadcast consoles
  - MORSE router
- Sony
  - Bravia 26in monitors
  - HDC-1500 HD studio cameras
  - MVS-8000G production switchers
  - LMD and BVM professional LCD monitors
  - PDW-F800 source decks
  - PetaSite storage system
  - XDCAM HD PDW-700 and PDW-F800 camcorders
  - XDCAM HD PDW-HD1500 and
  - XDCAM cart system
  - XDCAM EX camcorders
- Sportsmedia Telestrators
- Tektronix waveform monitors and spectrum analyzers
- TVLogic LCD monitors
- Vizrt Trio graphics
- Wohler Amp2-E8 test equipment
- Yamaha DM-1000 audio mixer

(PGA Tour, European Tour, LPGA Tour, Champions Tour and Nationwide Tour) and "Golf Central," a daily half-hour news program. Highlights are often turned around within three minutes or less from when they actually happen on the golf course. The facility also supports Golf Channel's Web and mobile video services.

The newly upgraded Orlando facility includes three full HD production control rooms, a digital media center (which houses most of the channel's XDCAM HD and legacy formats, as well as two EVS workstations and an Avid ingest system), a technical operations center, four HD/SD master control facilities, a digital transfer center and ingest along with a digital media asset management center.

Making the move

In overseeing the move from SD to HD, Ken Botelho, senior director of engineering, said he wanted to improve image quality, but he was also tasked with moving the network's production activities away from a predominantly tape-based workflow (from the Betacam SP to DigiBeta, IMX and HDCAM formats) to an environment that takes advantage of digital video and audio as files that can be easily handled and shared among the production staff. There was also a huge legacy of existing videotapes that had to be leveraged in the most efficient way.

Before 2009, the year Botelho joined the channel, the facility's workflow was convoluted, he said, but it now has a consistent, cohesive engineering and production strategy within one of the most sophisticated HD facilities in the country. The facility is now "truly tapeless," from acquisition to deep archive and the many steps in between.

Now that a file-based architecture has been implemented — which proved to be a challenge to streamline operations by getting systems to work together and recognize XDCAM 50Mb/s HD files natively — the staff is capable of producing more content in much higher quality and getting it to air faster than ever before. Thanks to the latest networking tools, they are also much more efficient in how resources are used on a daily basis.

Golf Channel operations executives have committed to the Sony XDCAM HD platform because they think it's easy to drag and drop HD files, and the physical optical disc format lends itself to better organization in the near term. If it's on your desk, you know where the footage is.

The XDCAM HD codec's file-based capabilities help Golf Channel crews deal with the massive amount of footage gathered during a particular event. For example, when a crew is out covering a tour on a given weekend, it may come back with upwards of 600 XDCAM HD discs full of footage that not only needs to be edited and aired, but also ingested, stored and archived. Several XDCAM EX recorders are also used in a pinch.

They use more than 65 Sony XDCAM HD optical decks for program mastering and archiving. When XDCAM HD camera operators come in from the field, they hand a disc

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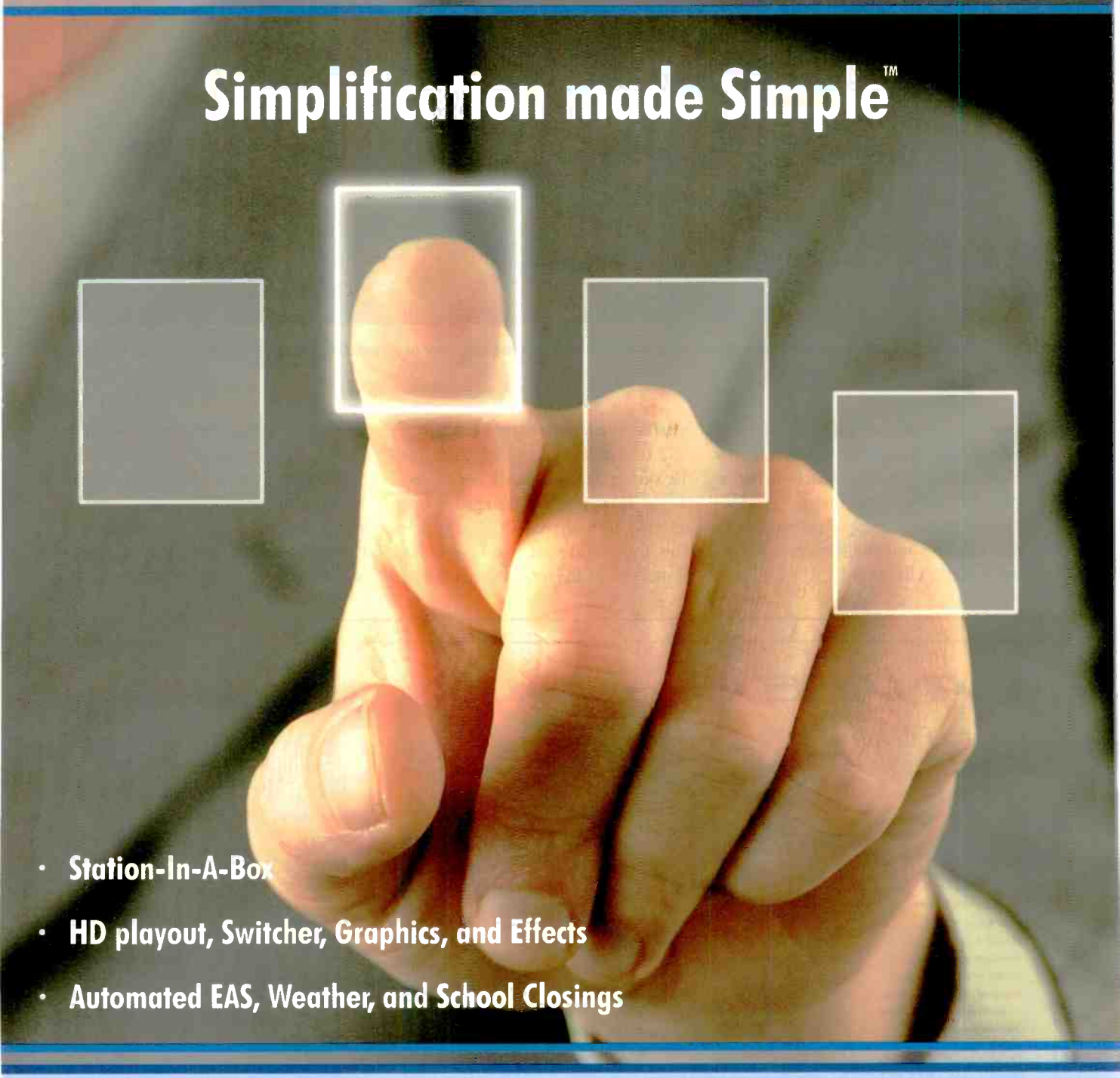

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The Golf Channel's transmission operations center maintains and adjusts the integrity of all satellite and fiber feeds, whether inbound or outbound.

over to a producer for ingest (using Dixon Sports logging software), and that disc is then held nearby when a program is being produced. In addition, at 50Mb/s, the picture quality is outstanding and the file size is manageable, Botelho said.

Multilevel storage strategy

Once material is ingested into the system, editors work on 13 Avid Nitris HD systems, pulling clips from an Avid ISIS shared storage system. The integration of Avid Interplay, Transfer Manager, Archive and iNEWS systems provide flexibility in the movement of content. (The facility also has about 20 Apple Final Cut Pro systems in the creative services department, which also use the ISIS.) This allows them to search and retrieve the most desired clips of

the day and then move the finished clips over to workstations running NL Technology AutoIngest software.

This software acts as a traffic cop and automatically sends files to where they have to go without human intervention. This destination could be the Sony PetaSite archive or XDCAM automated multidisc cart system for long-term storage. It could also be a Front Porch Digital DIVArchive system, which is being used with a SAMMA Systems robot system to help transfer the material on videotape to the PetaSite digital archive.

Overall, the streamlined HD post-production environment gives journalists and producers full access to the same clips from their desktops, which has fostered strong collaboration.

Archiving and repurposing

The third aspect to the Golf Channel's HD upgrade was to begin the process of digitizing more than 100,000 hours of videotape material and moving it to a centralized storage library ("deep archive"), in this case the PetaSite library system with about 12PB of capacity stored on LTO data tape. This was critically important as the Golf Channel repurposes a lot of material, so having footage readily available saves a lot of time and frustration.

An Evertz EQX 576 x 576 HD video router handles all of the incoming digital signals and distributes them as necessary. Audio is routed as embedded signals with an Evertz EMR 288 x 288 audio router. There is some 5.1 surround sound audio mixed at the facility, but all of the Golf Channel programming is delivered in stereo.

Outgoing signals are sent via a massive digital teleport on the Orlando campus, as well as a dedicated Level 3 fiber Ethernet private line service. The current capacity is 600Mb/s, and it is connected to the Comcast Digital Media Center in Denver. The Level 3 fiber is currently being upgraded to a GigE virtual private line that will provide the campus with complete redundancy. The teleport is capable of sending and receiving signals all over the world.

HD studio production

There are three new HD control rooms, and the larger production control rooms, PCR1 and PCR2, are identical. Both have Sony MVS-8000G video production switchers and several Panasonic plasma and TVLogic LCD monitors on the front wall running Evertz MVP multiviewer and VIP multiviewer. EVS XT[2]+ HD servers and Chyron HyperX3 and Vizrt Trio graphics systems are also employed for live-to-tape and other broadcasts. The rooms can be

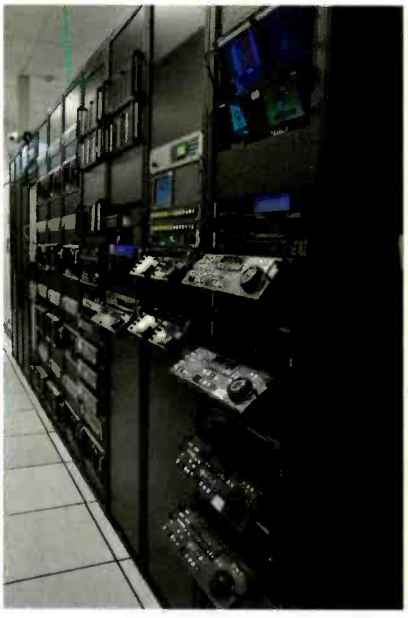
Design team

Golf Channel:
Ken Botelho, senior director of engineering
Greg Fox, project engineer
Dan Overleese, VP network operations
Robert Majors, senior engineering manager
Brian Slusarz, manager of broadcast IT
Jason Miller, broadcast engineer
Patrick Jones, broadcast engineer

operated independently or used in tandem for larger projects. Recently, the channel was able to simultaneously handle both a "Grey Goose 19th Hole" show live from PCR2 and "Golf Central" live, as well as "The Golf Fix" with Michael Breed live from PCR1.

PCR2 has an adjacent audio mixing room with a 32-fader Solid State Logic C100 HD-S console. The facility operates two SSL boards, which can serve the main control rooms or be routed to other post-production areas within the building. An SSL MORSE router was purchased with the new console to enhance the C100 HD-S console's compatibility with this studio design and to further integrate the existing MORSE Stagebox. The MORSE Stagebox is fitted with 14 HD-SDI I/O cards that can be configured for

This HD/SD MC (one of four) at the Golf Channel uses an Evertz QMC switcher and MVP multiviewer software.



The multiformat ingest center handles the massive amount of footage that comes into the facility on a daily basis.

The technical operations center houses an Evertz EQX 576 x 576 HD video router.

use as embedders, de-embedders or various combinations of embedding and de-embedding. Audio is carried by MADI to the router.

PCR3 is a smaller control room that includes a Yamaha DM-1000 audio mixing board but still features a Sony MVS-8000G switcher and most of the HD-compatible equipment found in the other two control rooms.

A new 4700sq-ft Studio A, designed by Jack Morton of PDG New York, went live Jan. 4 and includes six different production areas. Both Studios A and B feature Sony HDC-1500 HD cameras, Canon HD lenses and LED lighting to create different atmospheres for the various shows produced there. Nearly 40 Panasonic plasma and Sony LCD monitors adorn the walls at strategic locations for the best on-camera views.

The video and camera control area contains the operations control panels for the Sony HD studio cameras. The cameras can be remotely adjusted, and the camera signals can be evaluated before going to air.

The clean difference

Botelho said the staff went the extra mile to make sure that the new facility is the cleanest anyone will ever see. The broadcast team integrated 45mi of video, 18mi of audio and 13mi of Cat 5 cable into its new HD facility. A remarkable achievement of the new HD studio facility is that even with all of the miles of broadcast and IP cabling and intercom communications links, it is all hidden and installed under the studio floors. The talent can report a story from literally anywhere, and you won't see a piece of cable on-air. There are eight bulkheads throughout the facility that provide SMPTE fiber connectivity for cameras and other equipment. Every monitor cable is carefully built and routed into a set piece.

Perhaps the biggest achievement at Golf Channel is that all of the systems integration work and the physical installation of the equipment was completed by in-house staff and some freelancers. The staff is particularly proud of the way the equipment has been implemented so that they could do their jobs better and faster. It was a chance for them to build their dream facility and, according to Botelho, they did. BE

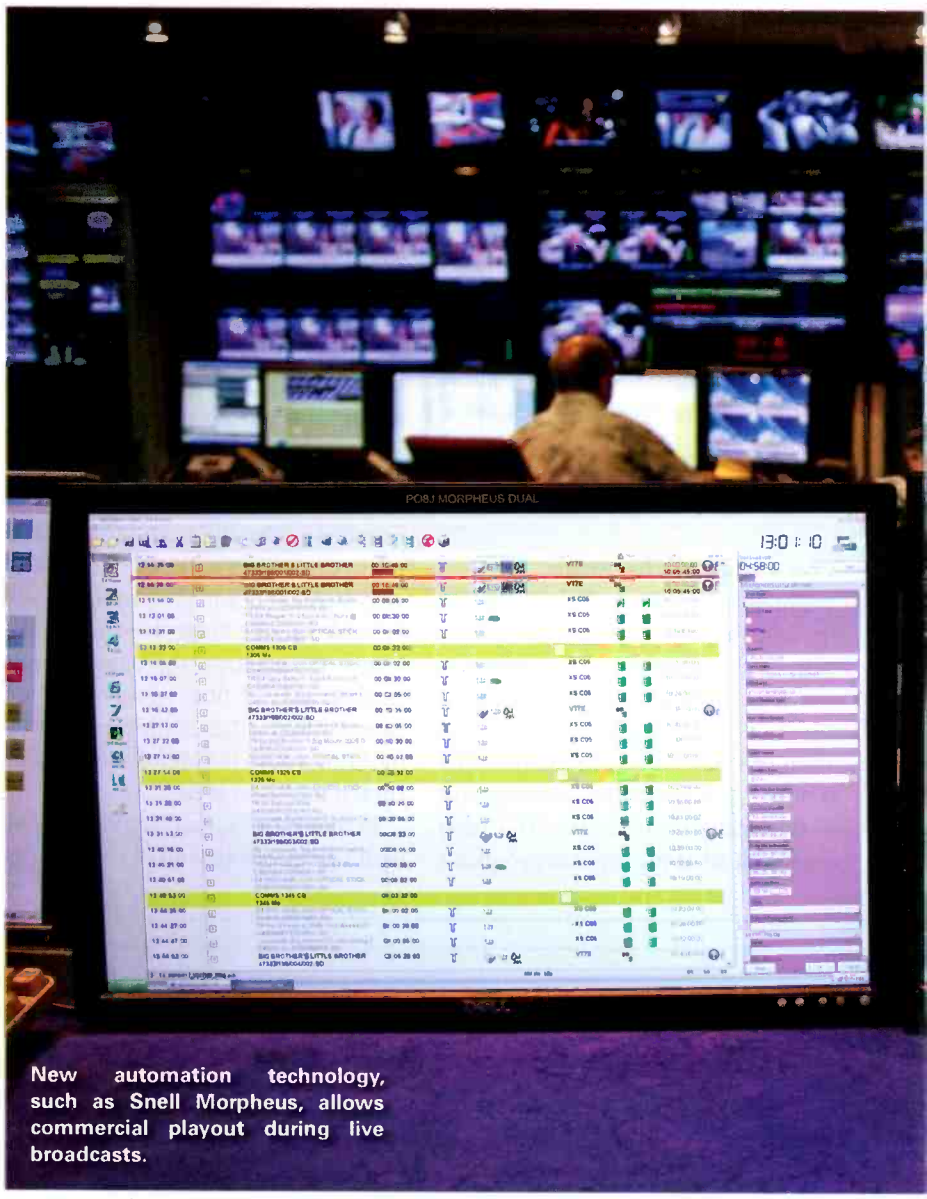
Michael Grotticelli regularly reports on the professional video and broadcast technology industries.

Automation trends: Key developments for

BY PHIL WILTON

Though file-based transmission playout has been fundamental to the majority of broadcast platforms for years now, content aggregators that run such platforms are looking to achieve even greater efficiency in consolidating and operating multichannel playout operations. The demand for process improvement has been pushing automation technologies to new limits as broadcasters seek to leverage technology in more complex ways to meet their changing business, commercial and program-related needs. Automation vendors have responded through continual product enhancement and developments targeting broadcasters' increasingly complicated operational requirements as they take on multiregion, multichannel broadcasting; preparation for 3-D broadcasting; and implementation of centralcasting models with hub-and-spoke sites.

Content providers worldwide are finding that their operational flexibility is being stretched daily, leading to a demand for more clever solutions that provide needed versatility in playout. This is particularly true when automated playout is combined with playout of live content. Commercial playout during live broadcasts is one key area in which broadcasters and their viewers are asking more of the automation system.



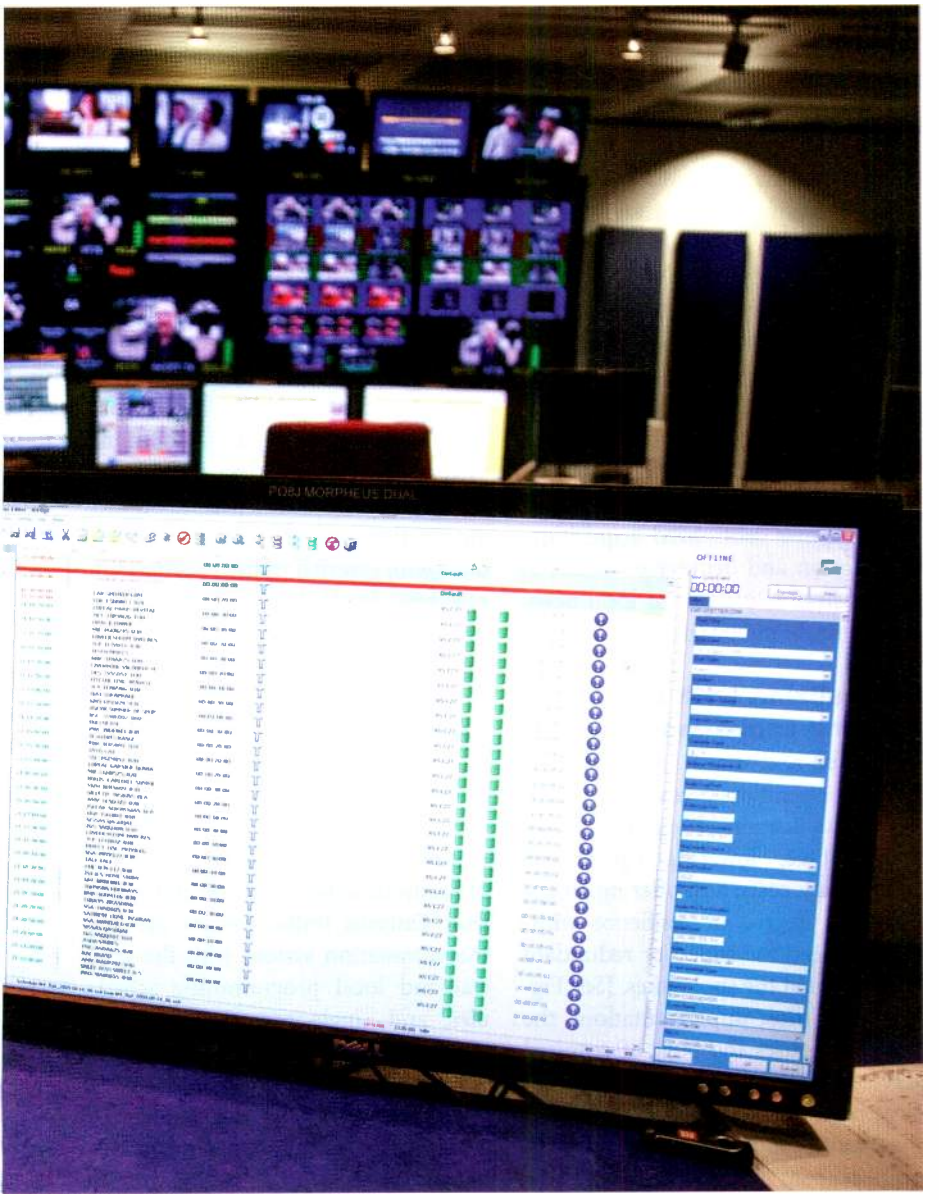
New automation technology, such as Snell Morpheus, allows commercial playout during live broadcasts.

Optimizing manual intervention

As a rule, an automation system should be able to operate on its own 100 percent of the time. When manual operation is required, a good automation system supports rather than fights the operator. Broadcasters providing a significant amount of live programming should look for expanded automation feature sets that include commercial hot lists, which in turn give operators the ability to run select ad spots depending on the progress of a live broadcast event. In other words, an easily accessed GUI allows the operator to match ads to content on the fly. In the case of a football game or soccer match, this feature allows, for example, the operator to run the ad of a team sponsor in the break immediately following a touchdown or goal by that team.

Improvements to automation are also helping to simplify join-in-progress transitions from a live event that has overrun its time slot into a program already in progress. If a live game is running long and a film is set to start as part of a network feed, the broadcaster needs a way to preserve timing for all scheduled ad breaks. When broadcasts are spread across different

today and tomorrow



regions and time zones, the management of this information becomes quite complicated. Understanding that broadcasters need a means of handling issues such as on-the-fly ad playout and management of program overruns in a multichannel, multiregion broadcast mode, automation vendors have focused on providing maximum flexibility and the optimal use of automation with the fewest operators.

Simplifying and saving with virtualization

Select up-to-date automation systems that are relevant with the latest IT technology can be hosted and operated in a virtualized environment in which the execution of applications is performed by virtual host servers using fewer machines. A traditionally architected automation solution can become quite hungry for server resources, requiring racks and racks of servers running just one application per machine. The virtualization model offers broadcasters significant benefits including much simpler updating and less costly maintenance; lower real estate, cooling and power requirements; and less hardware and fewer connections to manage. In addition to increasing efficiency across the board, virtualization supports the broadcaster's "green" credentials, which are of growing importance in today's business climate.

Virtualization software is engineered to provide a fully resilient architecture, with automated processes allowing the redundant part of the system to take over when and as needed. This characteristic ensures that there is no single point of failure and, in turn, no downtime that can lead to loss of revenue. As a software-based solution that is commercially available off the shelf, virtualization software is less expensive and easier to configure than hardware-hungry systems. Furthermore, virtualization is a technique that is not unique to the broadcast environment; it's a proven IT concept that the latest automation systems are now applying to simplify operations and reduce operational costs.

Improving interoperability

Taking advantage of newer open standards, including the Broadcast Exchange Format (BXF), advanced automation systems now enable smoother interoperability across playout operations. (See Figure 1 on page 46.) The BXF open standard allows devices to exchange messages about media and metadata. With this capability, content management, traffic, scheduling, MAM databases and other critical workflow components use a shared standard for communications rather than a number of proprietary formats

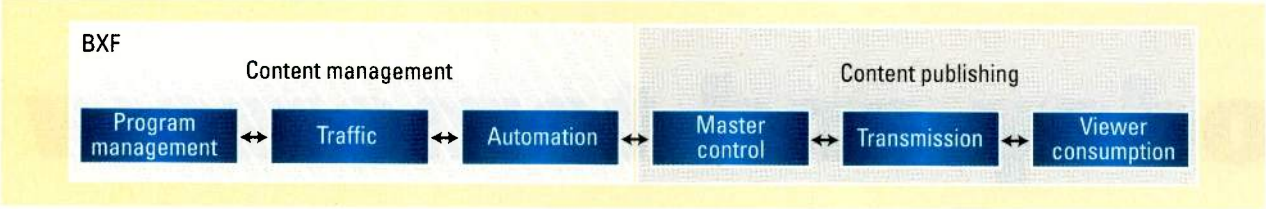


Figure 1. Relationship and use of BXF in the broadcast environment

that must be translated, often in ways that limit system interoperability. Use of a native format gives broadcasters the ability to make changes in one system and see those changes reflected in an upstream or downstream system.

In the case of automation with BXF support, the system can dynamically accept changes to the schedule as they are made in the traffic system. Likewise, changes made in playout can be reflected back to traffic. While these areas traditionally have operated separately, simpler communication with BXF messages brings key processes together and gives the broadcaster the agility to make better commercial and business decisions about content closer to air time and even to sell ad content right up until air time.

Preparing for 3-D

Automation also has grown to address broadcasters' interest in being ready to distribute 3-D content. A hot topic at this year's CES and NAB shows, 3-D presents broadcasters with a host of new challenges. While 3-D production remains cumbersome, the automation system's ability to offer tools for managing 3-D transmission with relative ease is key for future development.

For broadcasters that choose to deliver 3-D in single-multiplexed files, which include data for both the left and right eye, there are no special implications for the automation system, which simply treats the file as a file. (The media asset management system, however, does need to be aware that it is a file that includes 3-D content.) For those broadcasters that work with discreet files, one for each eye, the automation system must be able to link these files and ensure that for any operation — move, play, delete, etc. — the two files maintain their relationship and get treated in the same way. With one file serving as a reference and the other treated accordingly, operators can still manage playout as if they were managing a single file.

All of these functional advances in automation solutions are helping broadcasters to meet challenges presented by a changing marketplace. The architecture of automation implementations also makes it easier for broadcasters to conserve costs and improve efficiency, largely through consolidation and centralization of key elements of their operations. Implementation of a hub-and-spoke broadcast architecture supports centralized acquisition, distribution and delivery of assets, as well as flexible playout of local news, commercials and programming.

Centralizing with a hub-and-spoke model

A hub-and-spoke infrastructure reduces operational costs by eliminating duplication of ingest processes and storage; lowering operational and staffing costs; and offering an appropriate degree of resilience without the need for added or redundant investment at the spoke sites. (See Figure 2.) In most implementations, the hub site houses the bulk of required servers, storage systems and other large hardware systems, and performs the majority of the operations that require manual operation. As large media organizations, broadcasters with distributed sites naturally work with enormous volumes of content. Both tape- and file-based ingest, as well as metadata markup, are typically performed centrally through a combination of manual operation and automated processes such as file transport, technical QC, subtitling, and even confirmation of rights and licensing.

Once content is ingested, the hub-and-spoke model provides for file-based distribution of content to spoke sites. A rather large volume of channels, in the neighborhood of 10 to 60, are delivered to geographically distributed stations and often in a number of different time zones. The main long-form material is distributed from the hub to the spoke sites two to three days in advance and stored on local playout servers based on the scheduled playlist. This transfer requires significant infrastructure, including playout servers, graphics engines, subtitling systems, routing matrixes and master control devices — all operating under automation control — as well as interfaces with external traffic systems with schedule load/edit capabilities and back-office functions such as as-run logs, billing and rights payments.

The size and complexity of this model requires an enterprise-level playout automation system equipped with tools that minimize media movement and the overall burden on operations staff while making the most of hardware at both the hub and spoke sites. External traffic systems provide the automation system with the central and local programming schedules, and single operators typically can manage several channels from one workstation. When live programming is distributed across the network, the automation system should be able to ensure frame-accurate regional content insertion across select sites, triggered from a single central system.

File-based content is delivered from the hub, where centralized storage of high-value assets and the processing or repurposing of content for multiple sites both reduce redundancy and add to cost savings. The content transfer capabilities, archive and management systems, and alternate playout platforms built into the hub can be leveraged by local spoke

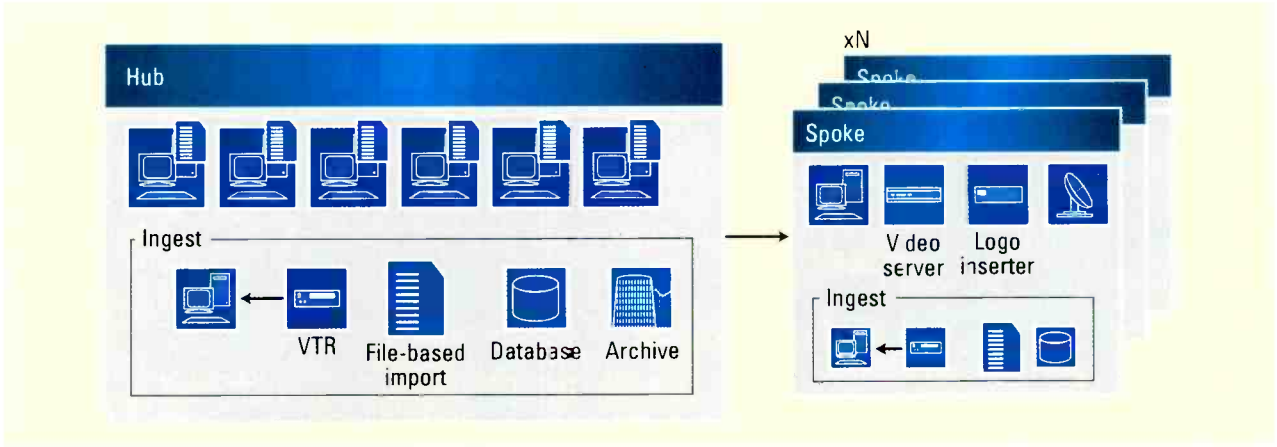


Figure 2. Centralcasting hub-and-spoke architecture

sites. Often equipped with a complete but lean stand-alone automation and media management system including local ingest, individual stations can assume control over their own broadcasts and local content, or even manage playout for another station in the event of a disaster. With this flexibility, the hub can hand over control for those programming hours featuring local news and content, and then take back control for nonpeak or overnight control and scheduling. At less busy times, this model allows a handful of operators to control dozens of sites from the hub facility.

Deployed in centralized hub-and-spoke architectures or at single stations, advanced automation systems today give broadcasters the powerful tools and expansive functionality they need to manage intricate playout workflows with maximum efficiency and flexibility. With a versatile and reliable automation system in place, broadcasters can focus on providing viewers with the type and quality of content they demand. **BE**

Phil Wilton is product manager, automation and media management, for Snell.

3-D channel

Adjusting the Z-depth of a channel branding graphic is an important part of broadcasting in 3-D. An error could lead to loss of the effect.

Controlling Z-depth is important in maintaining the stereoscopic effect.

BY MICHEL PROULX

Adjusting Z-depth during a live broadcast calls for manual control and depth presets.

In the future, advances in 3-D metadata may allow sophisticated automated control of channel branding depth.

branding

The emergence of stereoscopic 3-D TV as a practical option for broadcasters has opened up a whole new set of issues in relation to best practices for channel branding graphics. Key issues include where to place the 3-D graphics in terms of the perspective, or Z-depth, for optimal viewing and how to control the Z-depth of graphics during playout to compensate for changes to the program perspective.

Getting the Z-depth right

To illustrate this Z-depth issue and some of the associated challenges, it's worth considering a simple case of logo insertion for a stereoscopic 3-D program with a changing 3-D perspective. (See Figure 1.) When the program has a near (negative) depth, with the 3-D effect appearing to come out of the screen toward the viewer, there is a requirement to have the logo positioned in front of the action to maintain a natural perspective (Case 1). During a sequence with a flat perspective, or a far depth (with the perspective effect going into the distance), the branding graphics need to be just in front of the action (Cases 2 and 3). If the Z-depth positioning of the graphic is incorrect at any point, the channel branding may lose its 3-D effect or, worse, the presence of the logo or graphic may interfere with the 3-D effect of the program itself.

Adjusting the graphics Z-depth

The Z-depth of a channel branding graphic can be changed to suit a program sequence by adjusting the horizontal separation of the left and right branding graphics, which are required to create a stereoscopic 3-D logo. This method of controlling the Z-depth of elements is often called horizontal image translation (HIT). By separating the right and left images of the graphics in one direction, the graphics will appear to come out of the screen. Conversely, when the left and right branding graphics are moved horizontally relative to each other in the other direction, they will appear to move into the screen. (See Figure 2.)

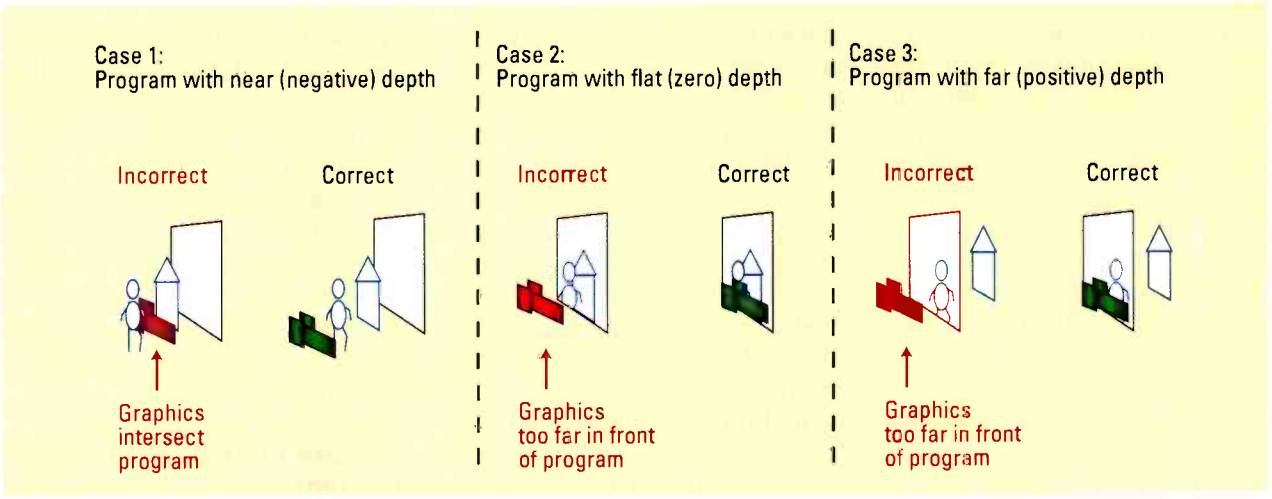


Figure 1. Different 3-D perspectives demand different positions for the channel branding graphics.

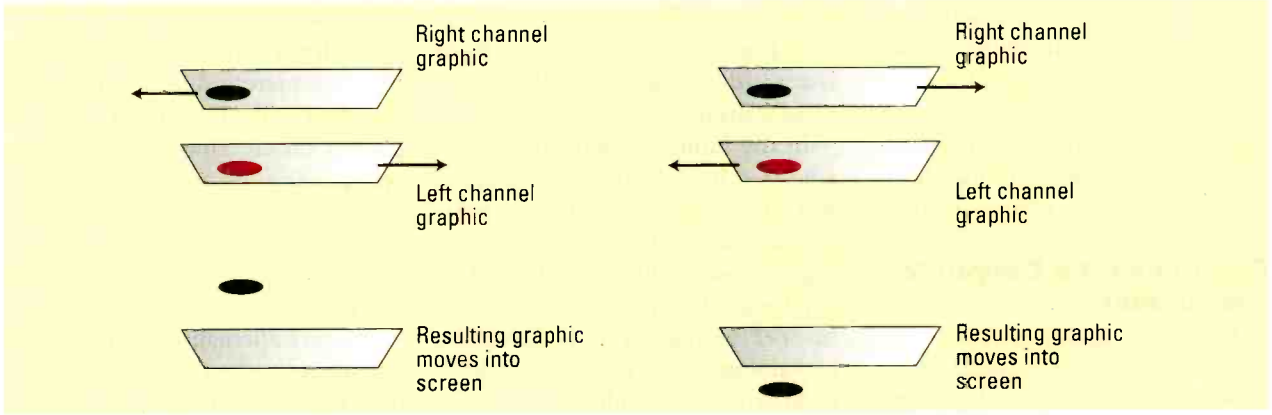


Figure 2. The Z-depth of channel branding graphics can be controlled by adjusting the horizontal separation of the left and right channel branding graphics.

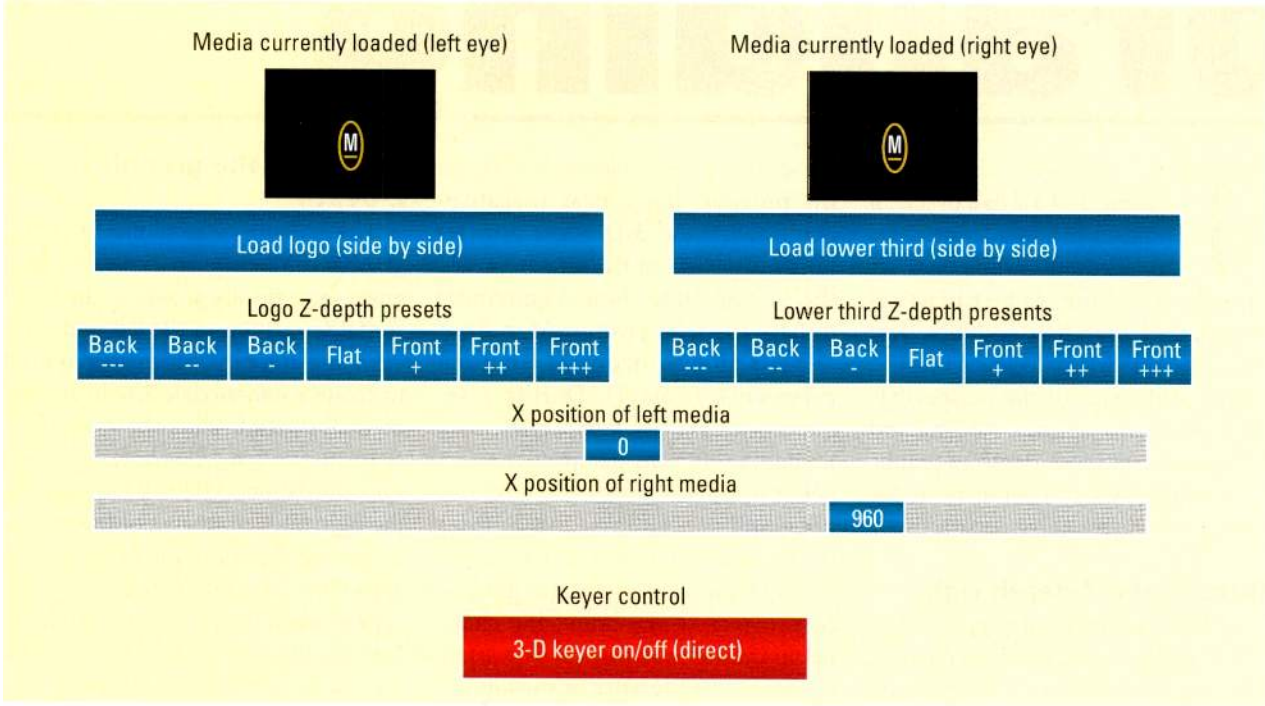


Figure 3. Shown here is a stereoscopic 3-D branding control panel with Z-depth control presets.

Hence, one way to address a logo's Z-depth problem is to have multiple versions of the logo, each with different left and right horizontal separations. This is not difficult to accomplish, as stereoscopic 3-D graphics can be created using standard graphics tools such as Adobe's Premiere and After Effects, which are much easier to use than traditional 3-D news graphics (nonstereoscopic).

However, an obvious problem with this approach is that it demands more complex media management to cope with all the different depth positions required for a logo. Therefore, this approach has not been widely adopted, and the focus has been toward controlling the Z-depth by dynamically changing the separation of a single pair of left and right branding images. Moving the Z-position of the graphics is relatively simple; it's more difficult to decide when to move them.

Controlling the Z-depth for live content

There are multiple options for automated and manual control of the Z-depth of channel branding graphics. One factor that influences the approach is the type of content to be played out, in terms of whether it is live or prerecorded.

A significant number of the initial applications for stereoscopic 3-D TV are likely to be live events, such as sports. With this type of programming, playout automation can be used for driving graphics, such as bugs, on and off for different segments. However, it can't easily be used for Z-depth control because of the unpredictable nature of live programming.

In this case, it's often best to supplement the automated control of branding with manual Z-depth control, using a branding control panel with depth presets. (See Figure 3.) By using presets, the operator can quickly and easily rectify graphics Z-depth issues using smooth depth adjustment transitions.

In the future, it's anticipated that advances in 3-D metadata playout will enable more sophisticated automated control. The channel branding processors will be able to read Z-depth metadata, probably in a similar manner to reading AFD metadata, and automatically adjust the position of the channel branding to optimize the presentation. (See Figure 4.)

Another related automated control option is dynamic measurement of the Z-depth by the channel branding processor, or an associated signal processor, and performing on-the-fly adjustment of the branding graphics according to the depth data. This may represent a good back-up solution in the absence of Z-depth metadata. However, both of these advanced automated control techniques are still in the formative stages and are not fully proven to date.

Z-depth control of recorded content

Broadcasters that play out channels of recorded content, such as 3-D movies, have additional options for Z-depth control. One simple approach is prerecording of the channel branding with the content ahead of playout on-air. However, this is not very practical because the show content includes the branding graphics, which limits the reuse of the same copy of the content on different channels or with different branding.

Another alternative is to have the automation system control the Z-position of the logo inserter by recalling the position presets using either a serial command or general purpose input.

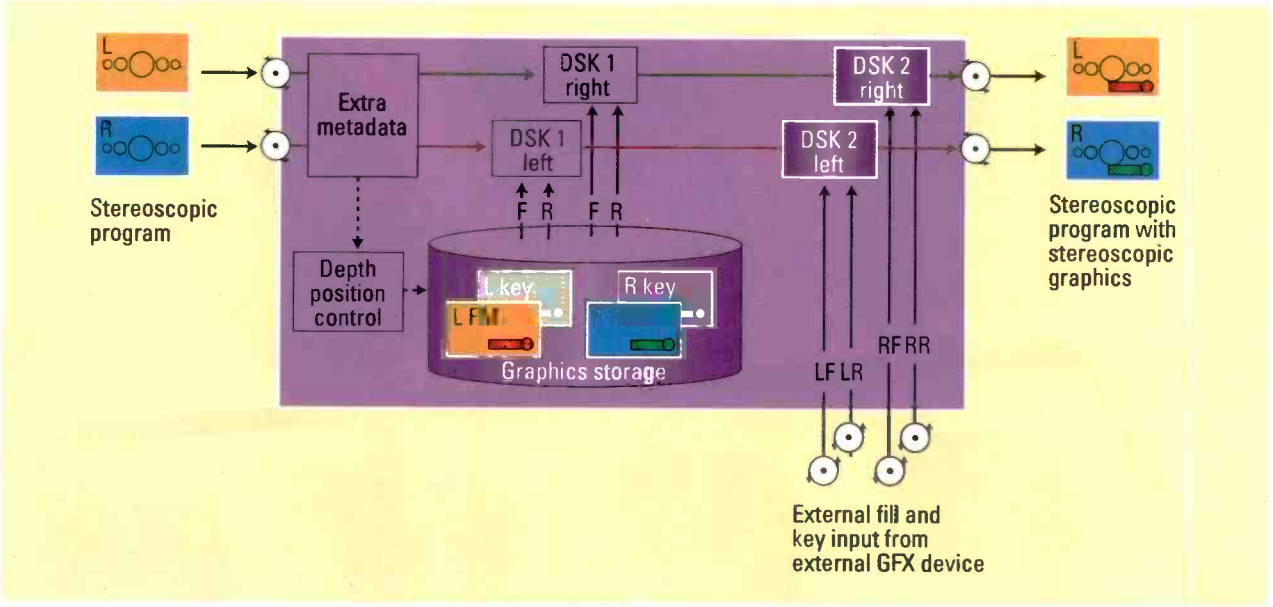


Figure 4. By extracting stereoscopic 3-D metadata, a channel branding processor can automatically adjust the Z-depth of the graphics to optimize viewing.

This is more flexible but requires an extra piece of information that has to be entered in the traffic or automation system, which is not possible or practical for many operators.

A third option is to have the content creator specify the position as the content is edited or reviewed, and to enter this information as metadata in the program. This is broadly similar to the approach currently used for presenting closed captions in 3-D Blu-ray productions. An operator manually adjusts the branding Z-depth using a fader while rerecording the content. This is a time-consuming process, but it offers the advantages of simplicity and consistent quality control. Standards committees are working diligently on Z-depth metadata standards to enable this simplified playout model.

Conclusion

In summary, we're still very much in the early adoption phase of 3-D TV, with the playout equipment still being developed and the associated workflow processes still being refined. There are some obvious parallels between the current state of channel branding for 3-D TV and the early phase of HDTV with its associated aspect ratio control issues. However, equipment vendors, broadcasters and organizations such as SMPTE are now working together closely to overcome the current obstacles, and more elegant and more efficient solutions to 3-D TV branding are already on the horizon. BE

Michel Proulx is CTO of Miranda Technologies.

Gain the respect of your management team with the following four tips.

BY TODD A. BOETTCHER

As broadcast engineers, we often sense that our training and our engineering skills and abilities do not receive the respect we would hope for — not that we thrive on our egos. More often than not, our greatest satisfaction comes from our unique ability at problem solving, especially under duress. The concern is that, far too often, we are perceived by management as workers plying a trade, seemingly as general handymen. The perceived value of engineering to station management is an ongoing challenge for many technical professionals, and station size or market importance has no bearing on these attitudes. Although the following ideas for improving your standing with your management are not guaranteed, this information will lead you in the right direction.

1) Maintain your technical abilities

To maintain your career as a broadcast engineer, you will need to keep pace with technology and technological changes. When I was a student years ago, a professor told our class that if we wanted to be effective broadcast engineers, we would need to technologically retrain ourselves four times throughout the span of our careers. Whether it be tube technology, transistors, integrated circuits, digital technology or any future innovations, you will need to be retrained to remain professionally competitive.

This can be accomplished through

formal class work, keeping up with manufacturing trends, attending trade shows to hear technical seminars and studying the exhibits, forced self-study, or voracious technical reading. Of course, SBE chapter programs and SBE seminars can enhance your continuing education as well. No one action of those listed here will be adequate by itself.

Some broadcast companies will reimburse part or all of your continuing formal education, usually requiring employee loyalty as part of the agreement. In other cases, you may need to pay your own educational expenses. In any event, continuing to improve your technical knowledge is a good way to increase your professionalism. Be sure to keep your management team posted on your increased skill level.

Also be sure to keep your management team posted when you become SBE certified (each time, if you achieve multiple certifications). This will open the door to further conversation about advancing yourself to provide added value for the good of the company.

2) Dress for success

If you carry a management title (DOE, CE, or even EIC or supervisor), you undoubtedly have routine meetings with your station's nontechnical management team (GM, PD, news director, sales manager, marketing manager, etc.). If you are not regularly attending their routine meetings (typically held weekly), start attending. Pay attention to everything they discuss, even if they seem to have no topics directly related to engineering. You might hear discussions about visions or goals that will require engineering assistance in the future. Also, you will gain a new appreciation for the mindset of management and thus be better prepared to deal with them on their terms.

Dress in a manner compatible with the rest of the management team. If they wear business suits, then you should also wear a business suit. Make sure your suit says that you are also a management professional — not a used car salesman. If you have not been dressing in this manner, and comments are made about your new style of dress, simply acknowledge the change by saying, "Thank you. I feel much more comfortable discussing station business and sharing ideas with you when dressed this way."

Without saying another word about your attire, you will intuitively be considered more professional. Of course, always wear your SBE certification pin on your jacket lapel to these meetings. If asked about it, the door will be opened to discuss how your SBE membership and certification improve your professional abilities, thus making you a more valuable asset to the management team.

Dress in a manner compatible with the rest of the management team. You will intuitively be considered more professional.

Along with professional attire, good grooming is also necessary for your overall professional appearance. This includes neat hair, a clean shave or neatly trimmed facial hair, clean hands and shined shoes. With professional attire and good grooming in place, you will not only be ready to take your place in management meetings, but also be ready to represent the station on any public occasion.

Although it may seem "old school," you may find it appropriate to normally wear a suit to work, and keep a change of clothes in a locker for any maintenance you may need to perform. Alternatively, keep a service "jump suit" in your locker to wear over your trousers and dress shirt for maintenance, or a simple lab jacket to cover your dress shirt for light maintenance. While different from today's trends of casual engineering attire, following this guideline will always position you as a professional engineering manager first, then as a broadcast engineer.

3) Document your work

The presumption is that you have some sort of regular schedule that you are expected to maintain. If you do not punch a time clock, keep a personal log book (separate from any official company records) indicating your daily start and end times. In this book, also log your daily activities during your regular work hours. List things like meetings, engineering planning time, talking with vendors, professional correspondence time, technical maintenance time, training time and time for any nontechnical actions taken at the request or direction of the management team.

Include more detailed notes when advising any members of your management team about actions they need to take regarding decisions on budgetary items or other items that may involve legal or licensing issues. If you recommend budgeting for or purchasing critical replacement parts, and you are denied, note that in your log as well. Include names in your personal log.

Remember, the FCC puts responsibility for operating within their rules squarely on station management, not on engineering. If you provide sound engineering-based advice to your management team, and it is documented, and they ignore your advice, then they must deal with the consequences — not you. If, for some reason, your management does not value your accurate documentation and sense of accountability, you will be able to refer to the thoroughness of your procedures to prove your high ethical standards,

character and professionalism to your next employer.

Also document any work that involves you — and the time spent — outside your normal work schedule. This might include anything from overnight transmitter maintenance to a call at 3 a.m. about a burned out pilot light to a stopped automation system. Compile a list of this additional work and submit a weekly report to your station management team.

If you are salaried, rather than an hourly employee, some employers believe that your contracted salary covers all your time. However, most states have wage-hour laws that require employers to pay overtime at overtime rates, even to salaried employees, for work in excess of 40 hours per week. Certain salaried employees that have primary authority over other employees may be assigned "exempt" status, precluding them from overtime pay. Overall, most salaried employees do not qualify as exempt employees. Your state's wage-hour office can clarify any specific inquiries.

Document, document, document. As an engineer, you are already used to dealing with details. Let these details help you to succeed.

Because you are responsible for installing and maintaining the station's technical equipment, the proper technical operation of that equipment should be an interest of yours as well. In the area of documentation, be a willing trainer of anyone assigned to operate any of the technical equipment. Document any training given, including time spent and the name of the person trained. Include that in your weekly report to the management team. This will also show that you are a team player and are providing value-added engineering service for the good of the station.

In addition, a properly trained nontechnical operator will be less likely to damage the equipment, thus reducing your maintenance requirements. If you notice someone you've trained handling the equipment in an inappropriate manner, a gentle reminder about proper procedures (while allowing them to maintain their dignity) will go much farther in reinforcing your professional leadership than berating them for their incompetence.

4) A nontechnical approach

In general, the nontechnical management team has a primary goal to make money for the station owners. In their meetings, you will find that all of their decisions will be based on that underlying goal. In today's highly competitive business climate, it's imperative that you learn the business and the business language of broadcast management.

For example, hiring a high-priced talent is fiscally responsible if that talent can generate additional revenue by increasing the ratings. Spending money in marketing and advertising is all designed to increase market share, which translates into the ability for the station to charge more for station advertising, thus increasing station revenue. On the other hand, engineering is generally seen as a department that only wants to spend money.

Years ago, broadcast engineers could tell management that a certain piece of (presumably expensive) equipment was needed to either maintain technical quality standards or improve technical quality. Engineers only needed to talk "engineering" language.

These days, a successful engineer must talk to the nontechnical management team as a salesman, selling the value of good engineering. The engineer must think in sales and marketing terms to convey the goals of engineering in words and with presentations that support the work that engineering can provide to achieve the goals of the nontechnical management team.

If engineering saves the day against near disaster, include specific examples of the support that was willingly given by engineering to enhance the value of engineering to the management team in your weekly reports. Prove to them how the efficiency and skill of the engineering staff can actually save money by reducing unplanned downtime and saving otherwise lost revenue. You are now marketing engineering expertise for operating and maintaining the technical plant, rather than quoting a dollar amount for a technical expenditure.

IT support falls into this category of full-service technical support. From an engineering point of view, it would be far better for engineering to assume technical oversight of all IT operations to allow coherent integration of technical computer systems with business computer systems. Typically, IT people with no broadcast engineering experience may know computer technology, but they will have no idea why it might be a bad idea to do a routine reboot of the on-air automation computer during afternoon drive time or during a local newscast. Help the management team understand why it is to their advantage to incorporate IT as an engineering responsibility.

Finally, if other departments place blame for their errors onto engineering, be prepared to discuss these challenges in your weekly management team meetings — openly and candidly — and with documentation you have maintained to support the high level of engineering service you have provided to give them every opportunity to succeed. While you cannot always guide nontechnical staff to

make wise decisions, you can report that the equipment they used was tested and was functioning perfectly. This is another opportunity to offer operator training for more value-added engineering support.

Summary

Keep current with technology any way you can. Your continuing education is mandatory to be successful as a broadcast engineer. Dress for success. If you dress like a tradesman or a janitor, you will receive the respect you deserve. If you dress like the manager that your title indicates, you will receive the respect you expect. Document, document, document. As an engineer, you are already used to dealing with details. Let these details help you to succeed. Finally, step out of your engineering hat to learn how to communicate with nontechnical managers in a professional way that they can understand.

A further way to exude your professionalism is to speak and write in an articulate manner, always using good grammar and correct spelling. Maintain a friendly but professional manner with all management and staff. Leave slang and inappropriate language in the back room.

Once you have gained the respect of the management team for your more professional appearance, attitude and ability to communicate, you will be able to gain influence in removing some of the nontechnical functions from your workload.

Once you have gained the respect of the management team, you will be able to gain influence in removing some of the nontechnical functions from your workload.

Because image is important, you might actually be able to convince management that hiring a lawn service will improve the appearance of the grounds, that hiring a plumber on retainer who actually stocks the needed parts will solve those problems more quickly and at less expense than using engineering time to run to the hardware store, and that hiring a janitorial service is prudent.

Remember, when factoring your expense as an engineer for doing menial nontechnical labor, take your salary and add 50 percent. When all the benefits are added, that is your actual cost to the company as an employee. Now compare that amount against the cost of the outside services listed above. You should be able to prove that this new course of action will save money.

Consider these ideas as a starting point. When you start thinking in management terms, you should be able to develop other ideas in which engineering can become a value-added resource for the good of the station. BE

Todd A. Boettcher, CPBE, is chair of SBE Chapter 28 in Milwaukee.

Tufin network security

SecureTrack and SecureChange Workflow control firewalls to meet security standards.

BY SHAUL EFRAIM

Providing network security for today's organizations has become an overwhelmingly complex operation involving numerous components often distributed across multiple sites and managed by more than one team. At the same time, government and industry regulations require organizations to implement much higher levels of transparency and accountability for their IT systems. In practical terms, aligning day-to-day operations with regulatory compliance and other business requirements can only be achieved by automating the manual, highly error-prone tasks associated with daily network security operations. The most critical areas are change management, process automation, security infrastructure optimization, auditing and compliance management.

Security life cycle management solutions enable organizations to cost-effectively implement, maintain and audit their security policy on firewalls and other network infrastructure. They use a combination of business process automation and sophisticated analysis and simulation algorithms to help organizations manage network security risks and ensure compliance with corporate and regulatory standards.

SecureTrack is essential in ensuring that a corporate security policy is being implemented consistently in an environment with multiple rule bases, geographies and teams.

Security life cycle management includes:

- Changing management to ensure that every change to firewall rule bases and related infrastructure is in accordance with corporate standards and can be fully explained and tracked;
- Processing automation to ensure compliance and accountability and to eliminate manual, repetitive, error-prone tasks;
- Risk and business continuity management to evaluate potential security hazards or performance issues before changes are implemented;
- Security infrastructure optimization to enhance security, provide high performance and a satisfactory user experience while containing infrastructure costs;
- Auditing and compliance management to ensure fulfillment of industry regulations and vendor best practices as well as corporate IT policies.

Tufin offers two systems that tackle operations challenges and help organizations get them under control.

Tufin offers two systems for managing network security. SecureTrack manages and audits firewalls, routers and switches. SecureChange Workflow automates the process of a security policy change request, from beginning to end.

SecureTrack

SecureTrack manages and audits firewalls, routers and switches. It provides a cohesive, unified view of all firewalls along with many other network devices. It is essential in ensuring that a corporate security policy is being implemented consistently in an environment with multiple rule bases, geographies and teams.

The system can view the rules

in different firewalls and understand the overall efficacy and compliance of each rule in the rule set. It then recommends different actions that enable operations teams to address the different firewall configuration issues. The system can automatically generate a variety of audit and compliance reports. This ability is a cost-reduction feature that saves organizations a large amount of time. Users report that deploying the system has resulted in a 50 percent reduction in the time and cost of firewall management.

SecureTrack can substantially reduce many of the costs related to creating auditing and compliance reports. Along with capabilities such as configuration change tracking, audit and risk reports, and rule base optimization, the system becomes a key cost reduction product that can benefit the organization in terms of security and efficiency as well.

SecureChange Workflow

The company's SecureChange Workflow automates the entire life cycle of a policy change request from submission through design, risk analysis, approval, implementation and auditing. It complements existing ticketing systems and makes them "security aware," so organizations can proactively enforce security policy, manage risk and comply with standards. Harnessing the ability of automation to cut back on repetitive manual tasks, it can substantially reduce the time and labor involved in firewall configuration while preventing security and compliance risks.

SecureChange Workflow gives organizations the ability to prevent noncompliant firewall configuration changes and to cut back on the manual, repetitive firewall management tasks that cost organizations so many man-hours. Using both products provides organizations with a complete life cycle system that keeps firewalls secure, compliant and cost-efficient. BE

Users report that deploying the system has resulted in a 50 percent reduction in the time and cost of firewall management.

Shaul Efraim is vice president, products, at Tufin Technologies.

A low-cost DVR for news

SiliconDust's HDHomeRun combined with Elgato's EyeTV results in an HD news recorder and logger.

BY DANIEL SLENTZ

With HD here, finding a way to record programming from broadcast (both cable and antenna) has posed a problem. Some cable companies and satellite providers either charge a significant amount or refuse to rent their HD PVR systems. Even when these PVRs are rented to broadcasters, often they are proprietary or just simply not the easiest to make compatible with our editing systems and servers.

The following is a solution I have found that works well and provides high-quality video. It uses consumer gear to stream HD across an IT network and records to commonly found Mac machines in the broadcast environment. With Final Cut Pro becoming so commonplace in the news environment and easily exported to servers, I found recording to a Mac G5 the easiest way to go.

The system consists of a SiliconDust HDHomeRun TV tuner for computers placed in a terminal room rack and fed an antenna input and a cable input. Elgato's EyeTV software is loaded on a Mac. The software reaches across the network to the TV tuner and scans channels (both ATSC from antenna and ClearQAM from cable). Using *TV Guide's* online programming schedule, it recognizes all possible recordable channels and loads the guide on the Elgato guide for recording. This allows a simple "click the box" to record one time or on every showing. A manual record function is also possible. When the recording activates, the Mac actually receives the streaming video over the network and records it.

WSFL Miami Studio, formerly the Sun Sentinel auditorium in Fort Lauderdale, combined SiliconDust's HDHomeRun and Elgato's EyeTV to create an HD DVR that uses existing Final Cut Pro systems as recorders via a network HD stream of off-air channels. This enables journalists to offline other network programming to edit and post to the station's server for their morning four-hour news/entertainment program.

Confidence monitoring is displayed if desired, and all programs to be recorded or already recorded are easy to see in the software GUI. Once recorded, the EyeTV software allows for semi-accurate (to the second, not frame) editing. This allows the file to remain native to the software and fast to render for Final Cut. The video can then be quickly "flipped" to your native editing format, cleaned up to the frame and posted into your server quickly.

The HDHomeRun hardware and EyeTV software were rock-solid, with no missed recordings during testing or actual use.

The typical one-hour Elgato-native file is about 5Mb per hour of HD video, and the quality of the video is nothing short of incredible. I found both the HDHomeRun hardware and EyeTV software to be rock-solid, with no missed recordings during testing or actual use. The software allows for auto-purging (based on a pre-determined number of days or shows recorded). In addition, auto-compress to a tight archive format (like MP4, QuickTime or DivX) is possible from within the software.

On a Mac G5 (set up as Final Cut Editor), there were ample resources to allow perfect recording of two channels simultaneously. Because the HDHomeRun has two tuners, you can record one off-air and one off-cable channel at the same time without killing machine resources. The result is great video with no lip-sync errors. BE

Daniel Slentz was formerly director of engineering at Tribune's WSFL Miami and is now vice president of technology and broadcast operations at KERA TV/FM - KXT FM Dallas/Fort Worth.

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TRAINING DOESN'T COST, IT PAYS!

TV synchronization

Timing and synchronization have progressed since the first live TV signal from the World's Fair.

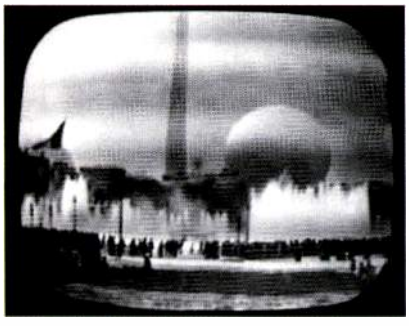
BY JOHN LUFF

In 1939, when General Sarnoff broadcast the first live television show at the World's Fair in New York, synchronization was critical to the ability to send signals to the home. The tube-type sync generators were notoriously finicky. The pulses (horizontal, vertical and blanking, along with composite sync) were used to ensure the cameras were making images in perfect synchronization. In fact, the entire system depended on a tight linkage between the scanning beam in the camera and the electron beam scanning the back of the display faceplate in perfect lock step. There were no electronic delays on videotape, which wasn't made practical until 1956, when Ampex made recorders that could mechanically lock rapidly spinning heads tightly enough to permit electronics to correct the signal to roughly the same time base accuracy as the sync generator provided for live sources. This absolute linkage between acquisition, transmission and display was a feature central to television for nearly 50 years.

Timing and sync progress

Think for a moment about the specifications for the NTSC (color) system to be practical. Every signal had to be lined up vertically, horizontally and even tightly timed to make the color subcarrier line up perfectly. The standard specifies 10 parts in 3.5 million as the tolerance for subcarrier frequency. However, at any one point in time, two signals needed to be within about two degrees of phase of the subcarrier running at 3,579,545.27MHz. That means that the real instantaneous accuracy is routinely about 1.5ns of phase difference, often much less in well-controlled facilities.

The world changed with the advent of digital systems with significant amounts of buffering built in, allowing those difficult specs to become a thing of the past. Today, a production switcher doesn't need to be timed to a single nanosecond, but rather to plus or



Synchronization was critical during the first live TV broadcast at the World's Fair in 1939.

minus half a line or so. This amounts to about 85,000 times the timing error permissible just a few years ago. But in the end, that alone is not more than a curiosity. By using compression and pixel-mapped displays, we have effectively delinked the two ends

The world changed with the advent of digital systems with significant amounts of buffering built in.

of the production/consumption chain. There is no longer any direct correlation between the two ends except in the statistical sense. At any one instant in time you cannot say how many frames per second are being transmitted, for the length of a frame depends on how many bits it needs for adequate reconstruction of the intended image. A good transmission system may change the number of frames per second when film material is sent instead of replicating the 3:2 pulldown required for 24-frame film material in a 30-frame video world. Just send the original 24 frames, and if the receiver needs 30 frames for the display, reconstruct them at the other end. This is much different than General Sarnoff's engineers would have thought possible.

But we live in a multiformat world today. First, the frame rate is really 30/1.001 to accommodate the need to be synchronous with remaining NTSC legacy hardware. In a perfect world, HD would have been precisely 30fps, but after lengthy discussions in the 1980s, SMPTE acknowledged the reality of building a facility with frame rates so close, yet so far apart. The hardware needed to create 30 frames out of 29.97 is expensive and was deemed to be an unreasonable burden on future systems. But we do have the need to accommodate frame rates locked to PAL systems and the need to lock digital audio at a multitude of different clock speeds.

We are still burdened with time measurement, which was invented before the 30/1.001 issue. The result is drop frame and nondrop frame time code, which by the way is of barely any use in systems like 720p59.94 because it cannot name frames beyond 30 uniquely. Now I am sure someone will point out the field flag in SMPTE 12M, but the point is that there has been a need for a time code that can correctly number (nominally) 60fps for many years. Existing analog, audio-based time code doesn't adequately specify the date or a reference to a globally supported time standard either. Out of adversity comes creativity and progress.

A new reference signal

A couple years ago, SMPTE and EBU started to create a new reference signal. Experts worldwide collaborated, and after much work, several critical elements of the next time and reference signal emerged.

First, the reference signal will be locked universally to the time signal used in GPS satellites, allowing precise information about time and date to be included.

Second, in a stroke of creative engineering, the committee determined that the references for all standards worldwide could be built from this single starting point in the following manner. If one started all signals at the same time, you could use the precise time of day to describe their current state anywhere, without having multiple references for multiple frame rates. For example, if line one of field one of an NTSC signal began at midnight GMT on Jan. 1, and you know the time precisely enough (enter GPS clocks), you could predict the phase of the color black signal at any time in the future with a little bit of math. Locking an oscillator locally to this time signal and calculating the startup conditions from the current local time creates a generator that you can trace back to the "big bang of sync signals." That time, or epoch as it is called, has been selected as 1/1 1958, per SMPTE 404M Draft:

The reference signal will be locked universally to the time signal used in GPS satellites.

"Time 00:00:00 of Wednesday, January 1, 1958, 00:00:00 being the midnight at the start of January 1). This corresponds to the origin for International Atomic Time (TAI) and Coordinated Universal Time (UTC). The corresponding Modified Julian Date (MJD) is 36204."

Thus, neatly, we can start clocks for AES, NTSC, PAL, MPEG or any other media-related signal using one convenient and well-known reference. The signal may be distributed a number of ways, including most significantly via computer networks of known latency, and as an overlay on color black. In the future, if someone determines that an 81Hz frame rate with 2678 lines is appropriate, we can quickly relate it to the "SMPTE epoch" and deliver a new sync signal. Done; and without breaking any existing signal. BE

John Luff is a broadcast technology consultant.

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

OmniBus — iTX

Automation and playout platform includes more than 130 new features, such as advanced aspect ratio control with AFD insertion, BXF schedule import, enhanced CG capability and closed-captioning functionality, support for copy guard data insertion, additional bit rate support for Dolby D, and schedule preview control; allows broadcasters to mix both media formats and resolutions in the same schedule; broadcast HD, SD and lower bit rates can be mixed within a single schedule and are automatically up- or down-converted by iTX; can be used for Internet TV and streaming delivery applications.

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Family of field-programmable gate arrays offers up to 1.6Tb/s of serial switching capability; provides up to 1.1 million logic elements, 53Mb embedded memory, 3680 18 x 18 multiplexers and integrated transceivers operating up to 28Gb/s; family includes four variants; V GT FPGA integrates 28Gb/s transceivers targeting 100G systems and beyond; V GX FPGA supports applications with 600Mb/s to 12.5Gb/s transceivers; V GS FPGA is optimized for high-performance DSP applications with 600Mb/s to 12.5Gb/s transceivers; V E FPGA is designed for ASIC prototyping, emulation or high-performance computing applications.

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866-931-5560; www.cache-a.com

Analog Way — Eikos

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212-269-1902; www.analogway.com

360 Systems — MAXX-2020HD

Reference recorder provides lossless recording and playback of many HD video formats, including paired channels for 3-D; accepts images in any color space with 8, 10 or 12 bits; doesn't compress the image; two channels can be used for independent HD-SDI streams, as a 3-D pair or as a single 3G channel, and two recorders can be synchronized for dual-3G operation; features HDMI monitor outputs, 16 channels of 24-bit audio, slow motion, nine-pin control, LTC time code, file trimming and playlisting.

818-735-8221; www.360systems.com

Marshall Electronics — 3DR-HDSDI

High-quality 3-D digital processor can be used with any size 3-D monitor or TV set with HDMI and DVI inputs; features four HD-SDI inputs, which enable the switching between two 3-D (left eye/right eye) HD-SDI signals; can support in-monitor display functions through RS-422/RS-485 connections; is rack-mountable.

800-800-6608; www.lcdracks.com

Archion Technologies — EditSTOR

Multiplatform, shared-storage product is a turnkey, self-contained, hardware RAID-based system that offers a streamlined workflow with the flexibility of multiwrite OSX, Windows and Linux across standard Ethernet networks; available in 8TB, 12TB, 16TB and 32TB configurations; supports demanding ProRes or DNX workflows with 300MB/s minimum in the standard configuration with an aggregate throughput of up to 650MB in the larger port configuration; upgradable to 10GigE.

818-840-0777; www.archion.com

Compix — QuickShot

CG solution provides fast access to multiple graphics on a remote system without requiring the user to log in to a PC; enables broadcast users to keep viewers up to date with the latest news regardless of the time of day or number of staff at the facility; templates can be customized for news, sports, weather or other types of information; features LCD keycaps with multiple colors and custom text labels to ensure accurate graphics playout.

949-585-0055; www.compix.tv

Band Pro — FGV 7D-PL

Standard Canon 7D camera is permanently retrofitted with a one-piece lens/sensor/base mounting element of steel; comes with a one-year limited warranty from FGV Schmidle; mirror and optical viewfinder are removed and original sensor block is reconnected with the one-piece 3/8in threaded steel mounting bracket and PL lens mount; features a three-pin Fischer connector to enable start/stop control when using a handgrip system or remote camera controls; uses an APS-C sensor; accepts most PL lenses.

818-841-9655; www.bandpro.com

P+S TECHNIK — Freestyle Rig

Part of the 3-D Stereo Rig product family; offers a professional solution for stereoscopic camera movement; features maximum stiffness and dimensional stability even under heat; has a lightweight, slim and compact design for mobility and portability, integrated motorization for optimal balance and complete adjustability; can carry a wide range of professional lenses and cameras up to 7kg per camera setup; can be equipped for shoulder, crane and dolly use with range of ergonomic mounting accessories.

+49 89 45 09 82 30
www.pstechnik.de

Concurrent — MediaHawk VX

Software solution for delivering multiscreen video enables service and content providers to deliver commercial video to any device over any network from a unified, hardware-agnostic platform; features include integrated streaming and download delivery, support for Web and wireless connected devices, origin server, content delivery and edge caching functionality, 3-D content support, and support for multiple hardware platforms.

877-978-7363; www.ccur.com

Digital Vision — Nucoda

Updated color grading and image enhancement solution includes toolset with advanced tracking and new keyer, color and editorial tools; features stereoscopic grading toolset, RED Rocket hardware accelerator card and Mysterium-X sensor support, full Avid workflow integration (including Unity ISIS and Interplay), native and nondestructive open EXR and high dynamic range grading, telecine machine and picture control, and native camera support for all major digital cameras.

818-769-8111;
www.digitalvision.se

Zaxcom — TRX900LT

Wireless digital audio transceiver combines wireless transmission, recording and remote-control receiving functions in a single cost-effective system; features a 100 percent digital, fully encrypted transmission and internal time code-referenced audio recorder that backs up all wireless transmissions on a removable microSD card; housed in a high-strength, impact-resistant nylon polymer casing that provides protection from corrosion and water damage.

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EditShare — Geevs 5.0

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www.editshare.com

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888-678-9427; www.comnet.net

Front Porch Digital — DIVAsymphony

Advanced service-oriented architecture framework for DIVArchive content storage management solution leverages best practices from IT enterprise architectural design to simplify DIVArchive's integration of third-party products for control and content exchange; built around an enterprise service bus; allows other service-based technologies to integrate into DIVArchive directly.

303-440-7930; www.fpdigital.com

Riedel Communications — RRCS 2.0

Router control software provides a universal XML interface to enable third-party router control systems to control Riedel Artist intercom systems; features an expanded set of XML commands for the software to allow for an even deeper integration of external third-party control systems and Artist; includes highly flexible control surfaces and intuitive shortcuts; provides a powerful assignment tool for conferences, panels, external four-wires, IFBs and program signals, including gain settings.

818-241-4696; www.riedel.net

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Improving workflow

The DVS Venice is a video server on steroids.

BY ANTHONY R. GARGANO

The supply chain of content from its initial acquisition to final delivery to the viewer has been revolutionized as a function of the digital era in which we live and work today. There was a time when manufacturers could measure the life cycles of their hardware-based analog product lines in terms of years. Today's digital technology has enabled the creation of software-based products and systems, reducing product cycle timeline measurements to months. Additionally, software-based technology has the advantage of creating processes and functions as programs, which can relatively quickly be embedded in firmware or released as software. The result, vis à vis previous requirements for hardware layout, multilevel board design and chip fab, has probably increased new product introductions tenfold.

A good thing in those days of analog hardware was that if you experienced a functional difficulty, it either went to the manufacturer or a field technician would be dispatched to repair the problem. Today, however, we have to use a work-around while awaiting a bug fix or the next version of a software release. The sheer abundance of today's new technology products presents a daunting challenge to simply stay on top of all the latest available tools and workflow solutions.

One new, interesting workflow tool is the Venice video server from German company DVS Digital Video Systems. (See Figure 1.) The server is a multichannel ingest, capture and playout device available with all the current Sony, Panasonic and Avid codecs, thus providing capabilities for everything from edit output to live camera capture and ingest of disk or tape content.

The system is available as a two- or four-channel device. With the variety of codecs available, it offers a multiplicity of system configurations. Systems can be stacked to provide additional channels if needed. For example, while there has been a recent trend with some of today's sitcoms to shoot using just a single camera, many shows are still shot in the traditional three-camera style. In that situation, an interesting workflow option for a three-camera video shoot might be a Venice system configured with four independent channels where the three cameras would each feed an input channel while the fourth channel could be configured to feed an Avid system for edit output. Need more inputs or outputs? Simply stack another system. Another benefit is you can retire or put to other use whatever decks the cameras would have been feeding.

Today's broadcaster is faced with a plethora of content in various video and file formats. Need a conversion? The system supports a range of video and file formats in anything from compressed SD to uncompressed 4K and can do on-the-fly conversions and playout in most of today's common formats. It has much to offer in production and play-to-air broadcast applications. There is a huge space in between in post production, and post has migrated largely to a file-based workflow. The system can serve to mediate between content that is being captured live or content ingested from tape or disc and that whole world of file-based content finishing.

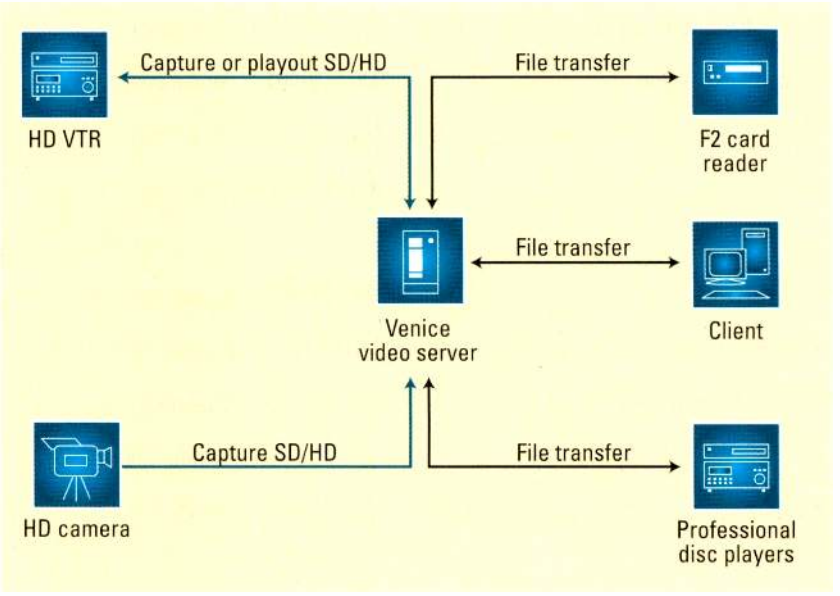

Figure 1. DVS' Venice video server was designed as a multichannel ingest, capture and playout device.

Other features and capabilities facilitate nonlinear editing workflow and enhance graphics and compositing workflow processes.

The German engineers responsible for the Venice must have looked to one of their neighbors to the south for inspiration. The result is the Swiss Army Knife of video servers. BE

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

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

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