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OCTOBER 2005

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THE JOURNAL OF DIGITAL TELEVISION

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Constructing the
work's IT backbone

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A PRIMEDIA PUBLICATION

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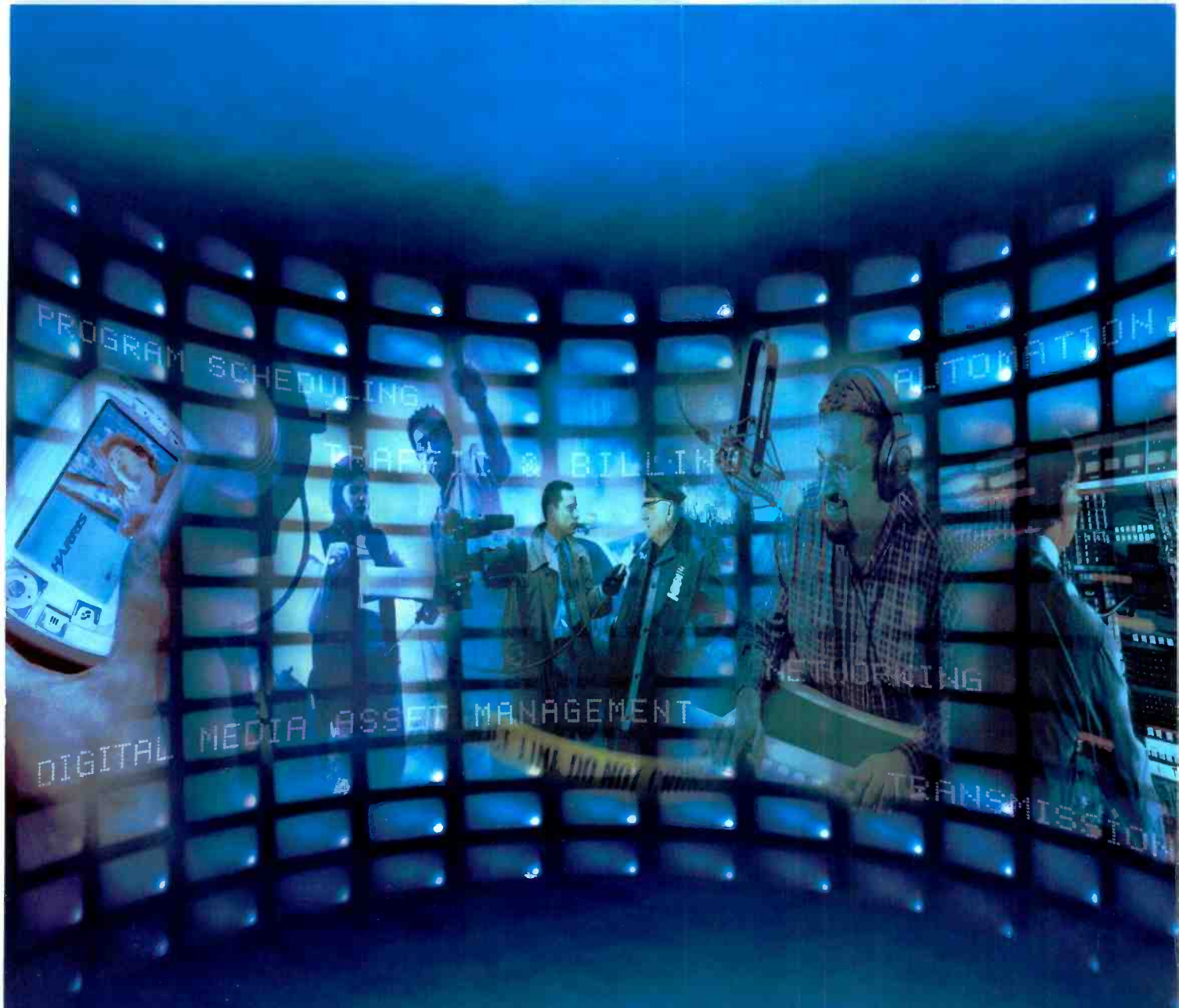

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THE JOURNAL OF DIGITAL TELEVISION

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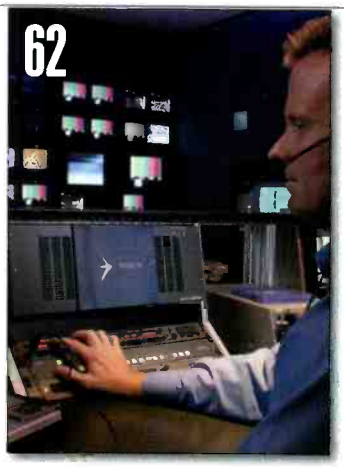
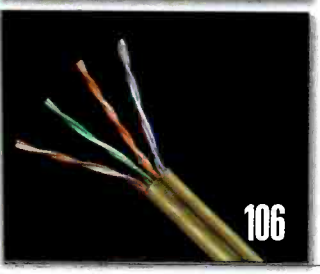


ON THE COVER:
An operator uses MXF-compliant equipment to transfer stored and live production files to a Leitch NEXIO server for playout. Photo courtesy Touring Video.



BEYOND THE HEADLINES

DIGITAL HANDBOOK

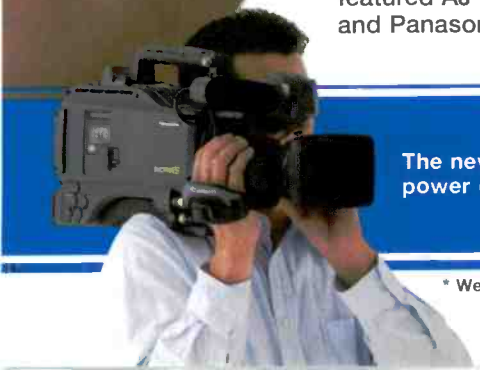
(continued on page 8)

all the news fits

Shoot more news more efficiently with Panasonic's new P2 Store drive. The AJ-PCS060 stores 60GB of DVCPRO footage on a one-pound*, ultra-rugged hard drive that simplifies ENG workflow. Plug in a P2 card, push the Start button and your DVCPRO content transfers to the P2 Store at faster-than-real time.

Crews need fewer reusable P2 cards in the field since the P2 Store holds the contents of up to 15 (4GB) P2 cards. P2-compatible edit systems connect to the P2 Store's USB 2.0 port for instant access to content.

The P2 line-up also includes the new, low-power AJ-SPC700 (pictured below) and the fully featured AJ-SPX800 DVCPRO50/25 P2 camcorders. To learn more about the new AJ-PCS060 and Panasonic's entire P2 family, visit **www.panasonic.com/p2** or call **1-800-528-8601**.



The new AJ-SPC700 DVCPRO50/25 P2 camcorder offers low power consumption and high cost efficiency for newsgathering.

Panasonic
ideas for life

* Weight of AJ-PCS060 is 1.4 pounds

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Systems Design & Integration

New Products & Reviews

Departments

Freezeframe

Which of the following NTSC test signals can be used to measure gain/frequency distortion?

- Color Multipulse
- FCC Multiburst
- Multiburst 60 or 100
- Multipulse 70 or 100
- NTC-7 Combination
- $\frac{\text{Sin X}}{\text{X}}$

Readers submitting winning entries will be entered into a drawing for *Broadcast Engineering* t-shirts. Enter by e-mail. Title your entry "Freezeframe-October" in the subject field and send it to: editor@primediabusiness.com. Correct answers received by Dec. 1, 2005, are eligible to win.

Question courtesy Tektronix 2005 Desktop calendar.

MARCY GILBERT ▶ BLOWN AWAY BY MAXELL

Marcy Gilbert, President & CEO of IDC (International Digital/Duplication Centre Inc.), is the ultimate Maxell Professional. IDC is America's premiere post production facility, utilizing a variety of Maxell professional products, including Digital Betacam, Betacam SP, Betacam SX, DVCPRO, HDCAM, D2 and D3. "I depend on Maxell to help achieve maximum video and audio quality with the highest levels of reliability and integrity." You can reach Marcy at Marcy@idcdigital.com. To learn more about Maxell Professional Media, call 1.800.533.2836 or visit maxellpromedia.com.

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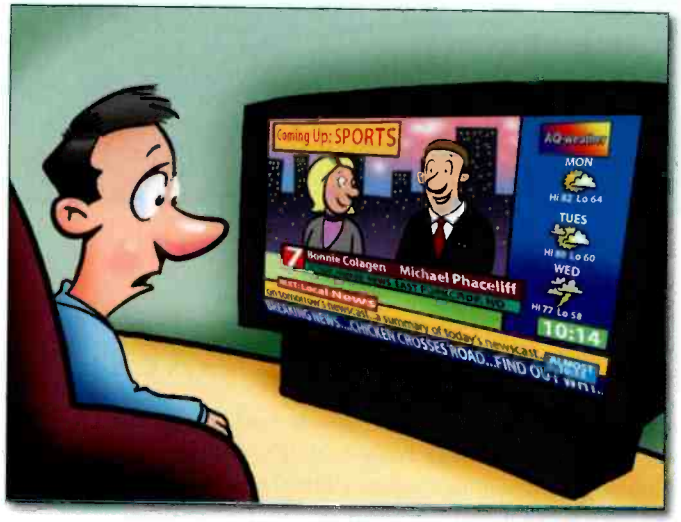
Lower
the visual volume

Have you ever been snipe hunting? Come on, fess up. Didn't you get fooled at camp when some older kid tricked you into a late night hunt for snipes? Did you ever see one? I have.

I was at the Inscriber booth at NAB. The Inscriber staff was demonstrating one of its new products. All of a sudden, in slips this little graphic from the side of the screen. It stayed for about five seconds and slipped right back out.



"What was that?" I asked.

"Oh, that was a snipe," the staff replied.

Okay, it took me five decades to finally see a snipe, but now I know what they look like.

Know what? I already hate 'em!

A week later, while watching the Discovery or History channel, in pops a snipe. The graphic was an intrusion into the visual experience.

"Hey! Get out of there," I wanted to yell. It would have done little good. TV is still a one-way experience.

Watching the FOX NEWS channel, I've realized just how much extraneous crap — excuse me, *information* — is being crammed onto our TV screens. While watching the talking head and listening to the often out-of-sync audio, along the bottom of the screen is a crawl, telling me the end of the world is coming. Plus, there's a flipping box telling me that there are four time zones in the continental United States, each separated by one hour. Duh! Then there's the semi-transparent, and moving, American flag.

Hang on, here comes another splash — "FOX NEWS Alert" — across the top of the screen with accompanying dramatic audio zinger.

Not to be outdone, the channel that shouts visually the loudest is the Bloomberg News channel. It has more discrete pieces of graphic noise blasting away than you can count.

In addition to stocks, multiple channels of text feeds and crawls, are the ever-present button ads.

And don't forget the pretty talking head. He or she is squeezed into the remaining space (about 25 percent of the screen). Authority and credibility are two things the head doesn't bring, but hey, the person looks good and can read the copy someone else wrote. Besides, good looks and the ability to read lousy copy with a straight face are all the qualifications you need to be a TV anchor today. Experienced journalists need not apply.

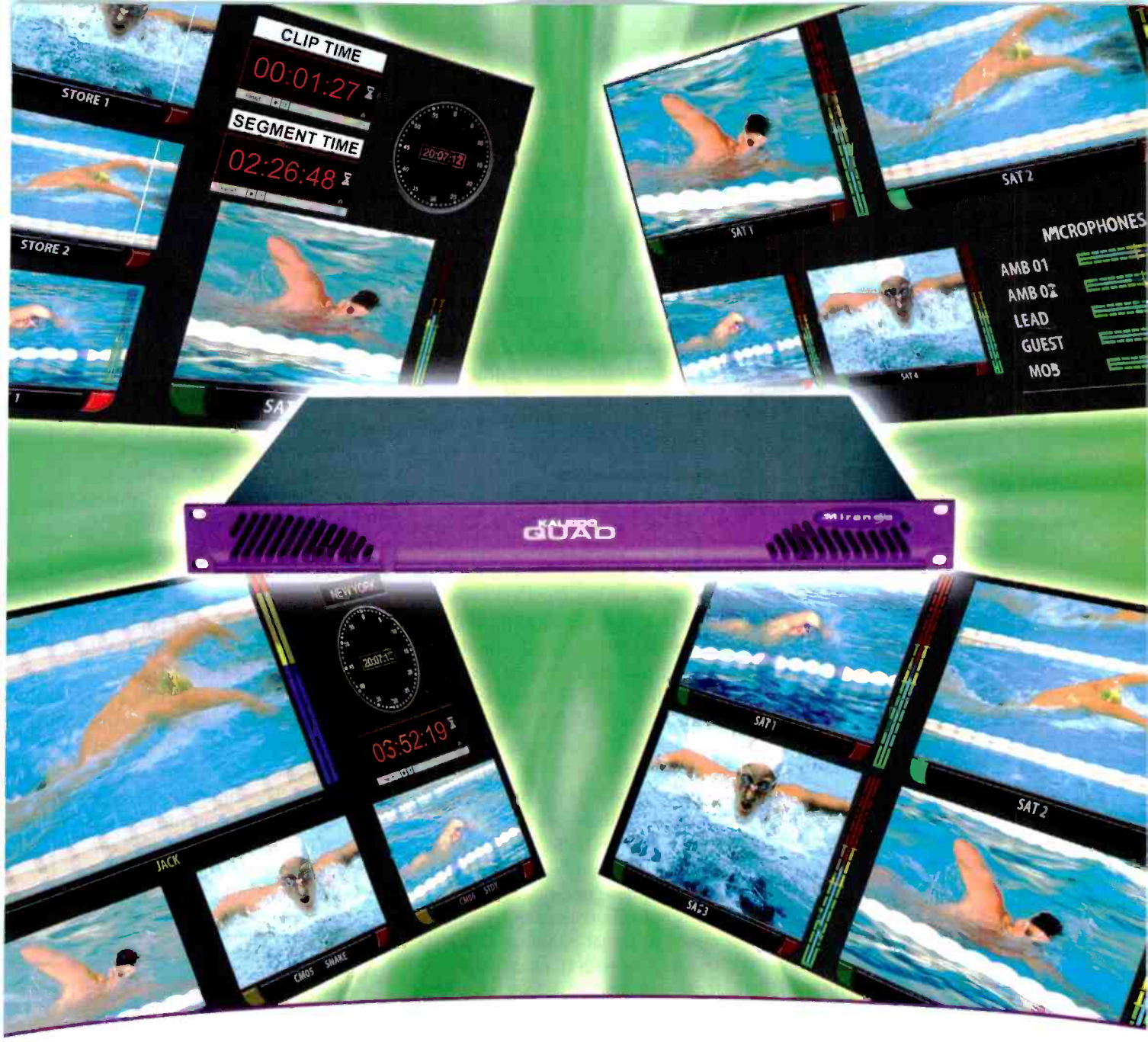
Maybe it's because I'm well past the 25-year-old demographic, but I don't like all that information being shoved at me all at once.

And that extends to the Internet. I've even begun using the Mozilla Firefox browser just to help stop the popup and popunder ads I was getting with Microsoft's Internet Explorer. To further my quiet time, I always click the "block images from this site" tab on every ad I see so they never appear more than once. Sometimes, I'll even turn off Java script so I don't have to endure all the imitation video ads that get through Mozilla's blocker.

All my efforts are to simply to turn down the visual volume.

This isn't to say that I long for the days of simplistic television, black and white, Walter Cronkite and film. But the next time FOX or any other network tries to get my attention with a snipe, I'm going to hit the TV — the TV off button, I mean.

Brad Dick
editorial director



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HDTV: MAKING IT HAPPEN

Monopoly

Editor:

Before broadcast stations became a Wall Street game of monopoly pieces to be bought and sold, most radio and TV stations were locally owned or comprised a small group of stations. Even the local Rev. Whomever could get a license to broadcast. But today, you have to have big bucks to afford the frequency and license auctions, comparative hearings, etc., making existing stations even more expensive. Therefore, the cost of becoming a "diverse" voice is too high for many.

As public policy, the FCC should be looking out for the ravages of the eventual melting of ownership into a few hands, just as it fostered the growth of new networks and media so we can watch more than the political bias of CBS, ABC, NBC and PBS.

HENRY RUHWIEDEL
CROWN POINT, IN

No more hum bars

Paul McGoldrick:

I have just read your "No more hum bars" article on the *Broadcast Engineering* Web site. While I completely sympathize with your world compatibilty viewpoint (and particularly that Hollywood is still using the antiquated 24fps!), the reason I was given for Europe not changing to 60fps was production lighting. Yes, TV monitors have better power supplies these days, but with studios using tens, if not hundreds, of kilowatts for lighting, mains power is the only reasonable source for that, and avoiding a 10-cycle flicker on the camera outputs would be difficult.

PETER VINCE
SENIOR ENGINEER
BBC TELEVISION

Paul McGoldrick responds:

I heard the same story about hum bars at Wood Norton during my "C" course 40 years ago. It was totally disproven when we went, by necessity, to crystal lock on the SPGs at TC in the late '60s. With the SPGs unlocked from the mains, there was absolutely, and still is, no slow hum bar on the camera outputs that should have been there if there was any kind of "beating" effect.

It was a myth to promote 625/50 PAL against those who were proposing we go with NTSC (at 625/59.94). Even at that time, we knew that the receiver phase benefits of PAL were going to be short-lived with improvements in signal handling and UHF transmitters with IF modulation. But those who pushed NTSC, and demonstrated incredible picture quality at Studio H in Lime Grove, found their careers grinding to a rapid halt. It was a pretty nasty time in the corporation's engineering history.

CBC PPM scale

Michael Robin:

In the July issue of *Broadcast Engineering*, I am confused regarding the Figure 2 upper scale details. You state that the meters are all showing a corresponding steady-state signal level, but the difference shown in the CBC PPM and the CBC VU do not match (assuming that the VU is calibrated to +4dBu). The Sony digital Betacam meter is showing a -20dBfs scale, which should equal +4PPM and 0 on the CBC PPM and VU meters. Could you expand please?

GARY GORNIK
CBC

Michael Robin responds:

The CBC PPM concept was developed when the standard alignment level (SOL) in the TV studios was +8dBm. For historical reasons, the radio studios were using a +4dBm SOL. So in my drawing, the +8 on the CBC PPM scale (+8dBu) corresponds to 0VU (+8dBm) on the CBC VU scale.

The CBC, in an effort to popularize the PPM concept, was circulating to its major production centers a 3RU panel where a CBC VU meter and a CBC PPM were mounted side by side and fed with the same audio signal to allow operators to familiarize themselves with the new concept. The Sony digital Betacam scale, as designed, implemented and delivered to the CBC, had -20dBFS corresponding to +8dBu and 0dBFS corresponding to +28dBu. Welcome to the audio level monitoring controversy! BE

June Freezeframe:

Q. What was the official attendance at this year's NAB convention?
A. 104,427

Winners:

Rich Brockman, Michael Leonard, Jonathan Smith, Dave Bittner, Karl Sargent, Andrew Levine

Test Your Knowledge!

See the Freezeframe question of the month on page 8 and enter to win a *Broadcast Engineering* T-shirt.

Send answers to bdick@primediabusiness.com

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Viewers:
The new program directors

BY CRAIG BIRKMAIER

Continuity, noun, 1. an uninterrupted connection or union [ant: discontinuity] 2. a detailed script used in making a film in order to avoid discontinuities from shot to shot 3. the property of a continuous and connected period of time [syn: persistence].

For decades, the broadcast television business has operated under the assumption that the primary business of a television station is to deliver a continuous programming stream. The goal is to capture the interest of a viewer, and then to hold that interest across the discontinuities that are inevitable with both advertiser-supported and non-commercial television. Those discontinuities may include: commercials and promotional announcements, fund-raising drives, the changing menu of programs throughout the broadcast day, and unscheduled interruptions for breaking news and emergency warnings.

Three decades ago, TV remote controls were uncommon. Channel surfing required getting up off the sofa and turning a mechanical tuner to choose from a handful of stations. This was the golden age of network television, when families gathered in front of the TV and watched one station all evening based on the popularity of an anchor program.

Decades later, the primary program stream is still king, and continuity is as important as ever, at least to those who manage TV operations. Many stations have made the operational transition from analog to digital, virtually ignoring the fact that the new digital world has little in common with the analog world they once dominated.

Today, most broadcasters manage their stations as if they were still broadcasting to that captured '70s audience. But channel surfing is now an uncontrollable epidemic. The discontinuity of a commercial makes those remote controls light up, with no guarantee that the viewer will come back after the break. And dare I even mention TiVo?

With DVDs, NVOD, VOD and Personal Video Recorders (PVRs), the viewers are becoming the program directors, watching what they want, when they want, with no regard for continuity.

Baseband or splicing?

With digital television, the equivalent of an analog vertical interval switch becomes a complex compression management task. Gone are the days of virtually instant channel change. With DTV, a channel change can take several seconds depending on the design of the decoder.

The reality of MPEG-2, MPEG-4/AVC and other interframe encoding techniques is that one cannot simply switch between two MPEG elementary streams at random points. I-frame access points may only occur every 15 to 30 frames. Two operational philosophies now exist to manage digital operations and continuity.

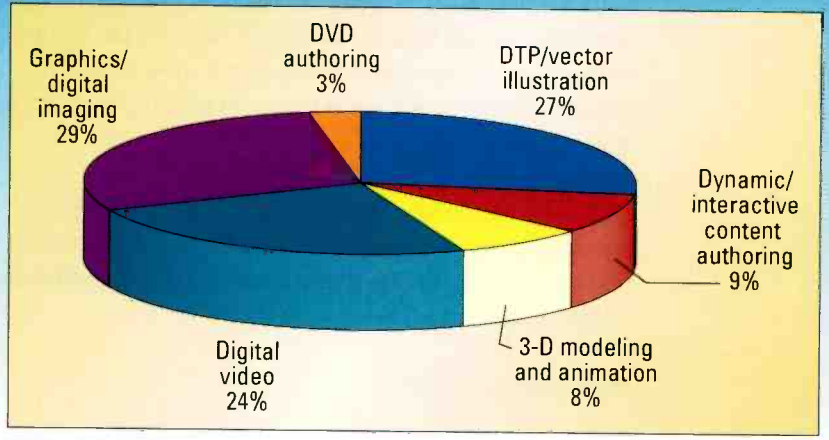
One approach is to handle master control operations using baseband (uncompressed) digital streams. Continuity is managed in exactly the same manner as in the good old days, as vertical interval switching is still possible with baseband digital signals. The output of the digital master control switcher is then fed to a real-time MPEG-2 encoder.

The other approach is based on the splicing of MPEG streams to maintain continuity. Splicing is possible as long as the streams use the same format and access points are managed properly. It is important to note that when the video format changes — for example, when an SD program is followed by an HD program — continuity is lost using both of these approaches, as consumer decoders must lock up to the new format.

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

Digital content creation is growing

Graphics and digital imaging hold largest share of the market



Source: Jon Peddie Research

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Set-top master control

Both of these approaches are patches that are unfortunately necessary because the most desirable solution was not economically practical with first-generation implementations of digital decoders and set-top boxes. The proper place to handle traditional master control functions is in the consumer decoder/set-top box, which is rapidly becoming a miniaturized TV station, complete with video server, mixer and downstream keyer.

I recently subscribed to the digital HD tier of Cox Cable, opting for a set-top box with HD PVR capabilities. The Scientific-Atlanta Explorer 8300 HD box includes a large-capacity hard disk drive, two HD-capable MPEG-2 decoders, an SD-quality MPEG-2 encoder to convert analog tier programs to digital for recording and sophisticated local image processing capabilities. The box handles a wide range of interformat conversions, allowing it to simultaneously output both SD and HD in a choice of formats. It offers picture-in-picture, a variety of aspect ratio accommodation modes and generates high-quality on-screen graphics, keying them properly over any video format.

This box, and many others with integrated PVR functionality, has virtually everything needed to become a miniature TV station. Standards, such as MPEG-4, already define everything that is needed to handle multistream processing and video composition in a compliant decoder.

Let's consider the enhanced functionality that would result by turning the decoder into the master control switcher:

1. *Cross dissolves and fades.* A fade can easily be handled in a decoder by signaling the box to mix the decoded stream and locally generated black. A dissolve can be handled by using a decoder for each stream, with the mixing taking place after decompressing the sources.
2. *Switching between multiple events.* If a station decides to put several programs in its multiplex, there is no way to switch between subchannels without discontinuities as the decoder acquires a new stream. But, with two decoders, the desired new stream can be opened and switched to with a vertical interval cut or a fade through black. A station could run several commercials during a break and let metadata, such as the decoder location (e.g., zip code), determine which commercial to display. Or during a newscast, the decoder could be instructed to choose the appropriate sub-stream for localized news segments targeted as a station's sub markets.
3. *Localized video overlay.* Local ad tags and other information can be sent as efficient vector graphics and inserted over the video stream in the proper location. A logo bug can be inserted locally in the proper position for both 4:3 and 16:9 displays independent of the source format.

Perhaps the time has come for broadcasters to deal with the future — future where managing discontinuities will be placed in the hands of consumers. Worrying about maintaining the continuity of your primary program may be meaningless, in a world where the name of the game will be convincing the program director — sitting in his or her recliner — to program the TV to capture *some* of your programming for both live and asynchronous consumption. BE

Craig Birkmaier is a technology consultant at Pcube labs, and he hosts and moderates the OpenDTV forum.

SEND Send questions and comments to: craig_birkmaier@primediabusiness.com

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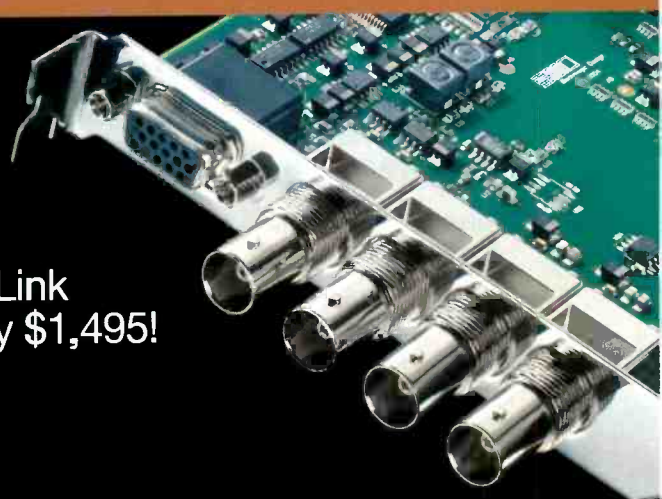

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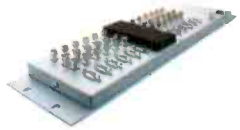
New Single Link 4:2:2 model of DeckLink HD Pro available! Only RRP US$995

Workgroup Videohub

Workgroup Videohub eliminates manual cable patching by connecting everyone together into a fully featured professional routing switcher. Also includes independent monitoring outputs so you can instantly see any deck or editing system in your facility. Workgroup Videohub has 12 fully independent dual rate SDI inputs and 24 independent SDI outputs that auto switch between HD-SDI and Standard Definition SDI.



RRP US$4,995

HDLink

HDLink connects SDI video to any supported DVI-D based LCD computer monitor for true HDTV resolution video monitoring. Featuring Dual Link 4:4:4 HD-SDI, 4:2:2 SD-SDI and a fast USB 2.0 input with de-embedded analog RCA audio outputs. Because every single pixel in the SDI video standard is mapped digitally onto the pixels of a 1920 x 1200 resolution LCD display, you get a perfect digital pixel for pixel HDTV image quality. There's simply no higher resolution HDTV monitoring possible! Now features SD anamorphic mode for 16:9 display.

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DeckLink Extreme

This amazing video card features 10 and 8 bit SD-SDI, HD-SDI down conversion, analog composite and component I/O, balanced analog audio I/O, DV, JPEG, internal keyer, genlock and so much more.

RRP US$895

Blackmagicdesign

Visit our website **www.blackmagic-design.com** or call your local DeckLink dealer for more information

BEYOND THE HEADLINES

Significantly viewed signals

BY HARRY C. MARTIN

Following Congress' direction in the Satellite Home Viewer Extension and Reauthorization Act of 2004 (SHVERA), the FCC ruled that satellite carriers may carry distant signals that are "significantly viewed" in specified communities. In the Notice of Proposed Rule Making (NPRM) to implement SHVERA, the FCC said satellite companies must give all in-market stations at least 60 days prior written notice before importing significantly viewed distant stations. Both DirecTV and Echostar have begun sending such notices in several markets.

Many in-market stations are wondering what, if anything, they can do to block the importation of signals that would violate their network non-duplication and syndicated program exclusivity rights.

Dateline

December 1 is the deadline for TV stations in Colorado, Minnesota, Montana, North Dakota and South Dakota to file their 2005 renewal applications, biennial ownership reports and EEO program reports. December 1 also is the renewal application-filing deadline for TV translators, Class A TV stations and LPTV stations in those states.

December 1 is the start date for pre-filing renewal announcements for TV stations in Kansas, Nebraska and Oklahoma, which will be looking forward to a Feb. 1, 2006, renewal filing date.

December 1 is the deadline for TV stations in Connecticut, Massachusetts, Maine, New Hampshire, Vermont and Rhode Island to file their 2005 biennial ownership reports. Stations in those states will be required to file another such report on Dec. 1, 2006, with their renewal applications, but no filing fee will be imposed.

December 1 is the deadline for TV stations in Alabama, Colorado, Connecticut, Georgia, Maine, Massachusetts, Minnesota, Montana, New Hampshire, North Dakota, Rhode Island, South Dakota and Vermont to place their 2005 EEO public file reports in their public files and on their Web sites.

Many in-market stations are wondering what, if anything, they can do to block the importation of signals that would violate their network non-duplication and syndicated program exclusivity rights.

Stations facing incursions into the exclusivity rights may file a petition for a waiver of the significantly viewed exception to the exclusivity rules. A station seeking such a waiver must demonstrate that the significantly viewed station has fallen below the threshold viewer standard over at least a two-year period. For network stations, the threshold viewer standard is at least a 3-percent share of total viewing hours and a net weekly circulation of 25 percent in non-cable households. For the purposes of this test, only ABC, CBS and NBC are considered networks.

The commission proposed to extend to satellite the same exclusivity rules, exceptions and procedures currently applied to cable.

In the NPRM, the commission proposed to extend to satellite the same exclusivity rules, exceptions and procedures currently applied to cable. The NPRM also published the list of stations determined to be significantly viewed, a list that had not been officially distributed since 1972. If and when the FCC's proposed rules are adopted and put into effect, the rights and remedies of in-market stations with respect to imported significantly viewed stations will be roughly the same for both cable and satellite.

In the cable context, television stations that are designated as significantly viewed have a limited exemption from the application of the FCC's network non-duplication and syndicated exclusivity rules. Cable companies may carry the signal of out-of-market significantly viewed stations in the communities in which they are significantly viewed without deleting the network or syndicated programming of such stations, even if those communities are within the protected geographic zone of the in-market network affiliate or program rights holder.

Although stations seeking to be added to the significantly viewed list may conduct surveys on a county-by-county basis, stations seeking a waiver of the significantly viewed status of another station must have surveys conducted on a community-by-community basis. This can make the data collection process more difficult. Although Nielsen may have community-by-community data available in some markets, it does not routinely collect data in all markets. Therefore, interested stations seeking protection would need to commission their own surveys, which is costly and time-consuming. BE

Harry C. Martin is the immediate-past president of the Federal Communications Bar Association and a member of Fletcher, Heald and Hildreth.

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The analog-digital hybrid

BY MICHAEL ROBIN

When the basics of television were developed in the 1930s, the chosen picture aspect ratio was 1.33:1 (4:3) to match the contemporary film aspect ratio. This choice resolved the picture format compatibility with the dominant film technology of the time. The film picture repetition rate is 24 images per second. This satisfies the eye requirements with respect to recreating the illusion of movement.

To satisfy a related eye requirement, critical flicker, each stationary picture of the sequence is projected twice, resulting in a refresh rate of 48 cycles per second. This is a compromise between the human vision system requirements and financial constraints related to film length.

The chosen television picture repetition rate is aimed at satisfying different requirements. On both sides of the Atlantic, the need was felt to relate the refresh rate, or picture repetition frequency, to the power line frequency. For historical reasons, this was 50Hz in Europe and 60Hz in North America.

Film to video transfer

The 1941 NTSC television standard was the result of 10 years of experiments. It featured such novelties as 525 scanning lines interlaced into 60 fields per second (or 30 frames per second), negative amplitude modulation with vestigial lower sideband and FM audio modulation all packed into a 6MHz transmission channel. Some VHF channel allocations changes occurred at the end of the 1940s, resulting in the disappearance of Channel 1, but no other major changes were made.

In 1953, color information was added using a frequency division multiplexing of luminance and chrominance information. A slight change in vertical scanning frequency (from 60Hz to 59.94Hz) and horizontal scanning frequency (from 15,750Hz to 15,734.25Hz) was implemented, but it did not affect the perfect forward compatibility (monochrome to color) and back compatibility (to the 15 million home monochrome receivers in use).

Transferring film to video is relatively easy in PAL and SECAM because the film is run at 25 frames per second, a relatively unnoticeable increase. NTSC

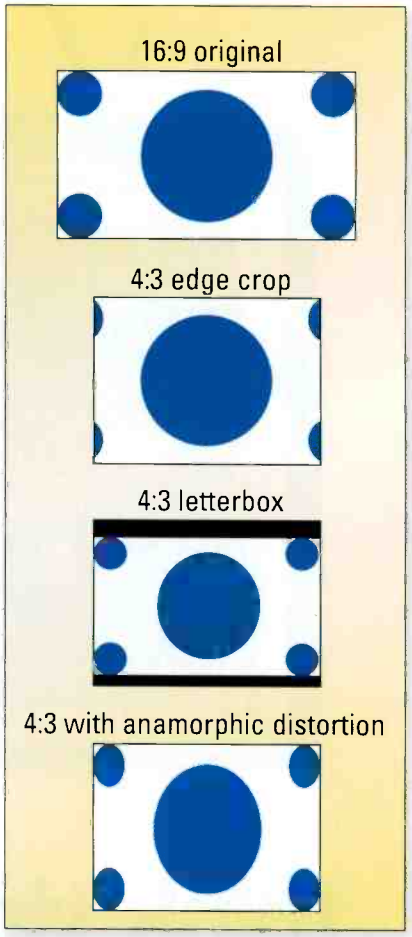

Figure 1. Downconversion of the 16:9 aspect ratio to 4:3 screens.

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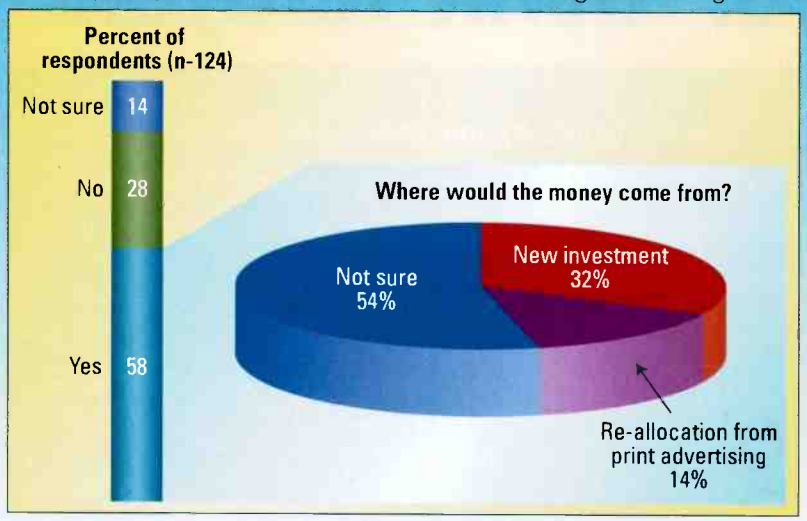

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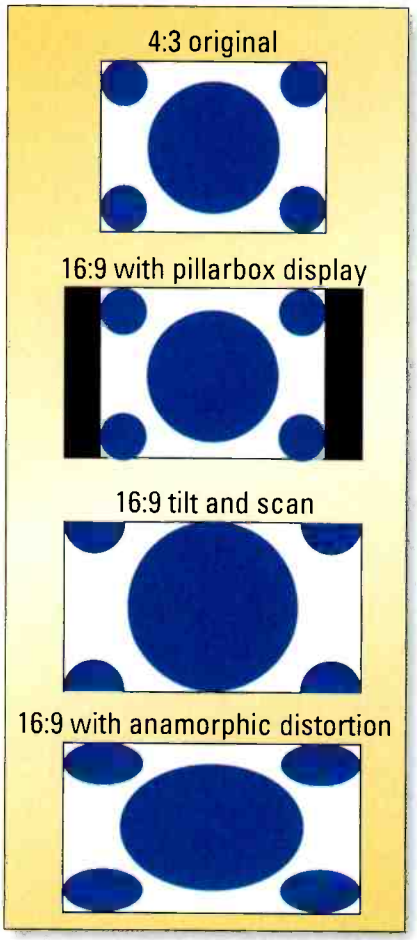

Figure 2. Upconversion of the 4:3 aspect ratio to 16:9 screens.

video required a different approach. It is evident that it would be totally unacceptable to run film at 30 (or 29.97) frames per second. The adopted solution is the so-called 2:3 pull down. The image is scanned completely five times while four film frames are passing through the projector.

The methods described above worked well until the early 1950s. By then, there were about 15 million television receivers in use in North America. This created apathy among the potential moviegoers who preferred to stay home and watch television. The movie industry reacted by enhancing the movie-watching experience visually by using various widescreen and color formats as well as aurally by using multichannel sound.

This resulted in a variety of aspect ratios requiring the widening of the screen. While the variety of available formats is impressive, equally impressive is the fact that there are currently some 250 million NTSC television receivers in North America, all with a 4:3 (1.33:1) aspect ratio picture tube. To obtain an acceptable widescreen display on a 4:3 screen, broadcasters have relatively few and generally unsatisfactory choices, as shown in Figure 1 on page 20 and listed below:

- *The horizontal edge cropping method.* The 16:9 aspect ratio picture is cropped on both sides to extract a central window that fits into a 4:3 raster. In the pan-and-scan mode, if available, the operator moves the central window in the horizontal direction to follow the main action. This is the most often used approach in North America.
- *The letterbox method.* The 16:9 aspect ratio picture is reduced vertically and horizontally to fit inside a 4:3 aspect ratio window. The process generates black bars at the top and the bottom of the picture.
- *The anamorphic distortion method.* The 16:9 aspect ratio picture is squeezed horizontally to fit inside a 4:3 aspect ratio raster. This method results in a 25 percent anamorphic distortion.

To obtain an acceptable widescreen display on a 4:3 screen, broadcasters have relatively few and generally unsatisfactory choices.

ATSC implications

Section 5 of the A/54A Recommended Practice: Guide to the Use of the ATSC Digital Television Standard deals with the characteristics of the ATSC video systems. Table 1 (ATSC Table 5.1), shown below, lists the four basic ATSC digital video formats. Table 2 (ATSC Table 5.2), on page 24, lists the standardized possible studio digital video input formats.

The standard picture aspect ratio is 16:9. A conversion from the ATSC format to ITU-R BT.601-5 would be required during the transition period when NTSC transmitters will duplicate the 16:9 aspect ratio HDTV transmissions. It is expected that vintage (legacy) 4:3 aspect ratio NTSC television programs will occasionally be transmitted. This will require an upconversion. As shown in Figure 2, there are three methods of 4:3 to 16:9 format conversion (upconversion). They are:

- *The pillarbox mode.* The original 4:3 aspect ratio picture is inserted in a 16:9 window, resulting in black

Vertical lines	Pixels	Aspect ratio	Picture rate
1080	1920	16:9	60i, 30p, 24p
720	1280	16:9	60p, 30p, 24p
480	704	16:9, 4:3	60p, 60i, 30p, 24p
480	640	4:3	60p, 60i, 30p, 24p

Table 1. Digital television standard video formats. Vertical lines refer to the active scanning lines in the picture. Pixels refer to the number of Y samples during the active line. Aspect ratio refers to the picture aspect ratio. Picture rate refers to the number of frames or fields per second. In the values for picture rate, "p" refers to progressive scanning, and "i" refers to interlaced scanning. Both 60Hz and 59.94Hz (60x1000/1001) picture rates are allowed.

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Video standard	Active lines	Active samples/line	Picture rate
SMPTE 274M-1998	1080	1920	24p, 30p, 60i
SMPTE 296M-2001	720	1280	24p, 30p, 60p
SMPTE 293M-2003	483	720	60p
ITU-R BT.601-5	483	720	60i

Table 2. Standardized video inputs. Active samples/line refers to the number of Y samples during the active line. Picture rate refers to the number of frames or fields per second. In the values for picture rate, "p" refers to progressive scanning and "i" refers to interlace scanning. Both 60Hz and 59.94Hz picture rates are allowed.

side panels. The side panels occupy 25 percent of the horizontal space.

- *The tilt-and-scan mode.* The 4:3 aspect ratio picture is stretched in the horizontal and vertical direction to fill a 16:9 aspect ratio screen, resulting in a 25-percent loss of vertical resolution. The viewing window can be preset, or a tilt-and-scan approach can be used. Here the operator moves the window in the vertical direction to follow the action.
- *The anamorphic distortion mode.* The 4:3 aspect ratio picture is stretched horizontally to fill a 16:9 aspect ratio screen, resulting in a 33-percent anamorphic distortion.

None of these methods are ideal. Experiments indicate that a 5-percent anamorphic distortion is undetectable, and a 7-percent anamorphic distortion is not objectionable.

In addition to single pass letterbox and pillarbox effects, a concatenation of upconversions and downconversion will result in doublebox displays, as shown in Figure 3 on page 26.

Legacy programs and equipment implications

TV facilities have a tremendous amount of legacy programs in analog and digital tape formats. The commonly used formats are 2in, 1in, Betacam SP, MII, D-1, D-2, D-3, D-5, DCT-700 and digital Betacam videotape recorders, providing different picture quality performance in playback. Any upconversion must, therefore, be carefully considered to generate an acceptable

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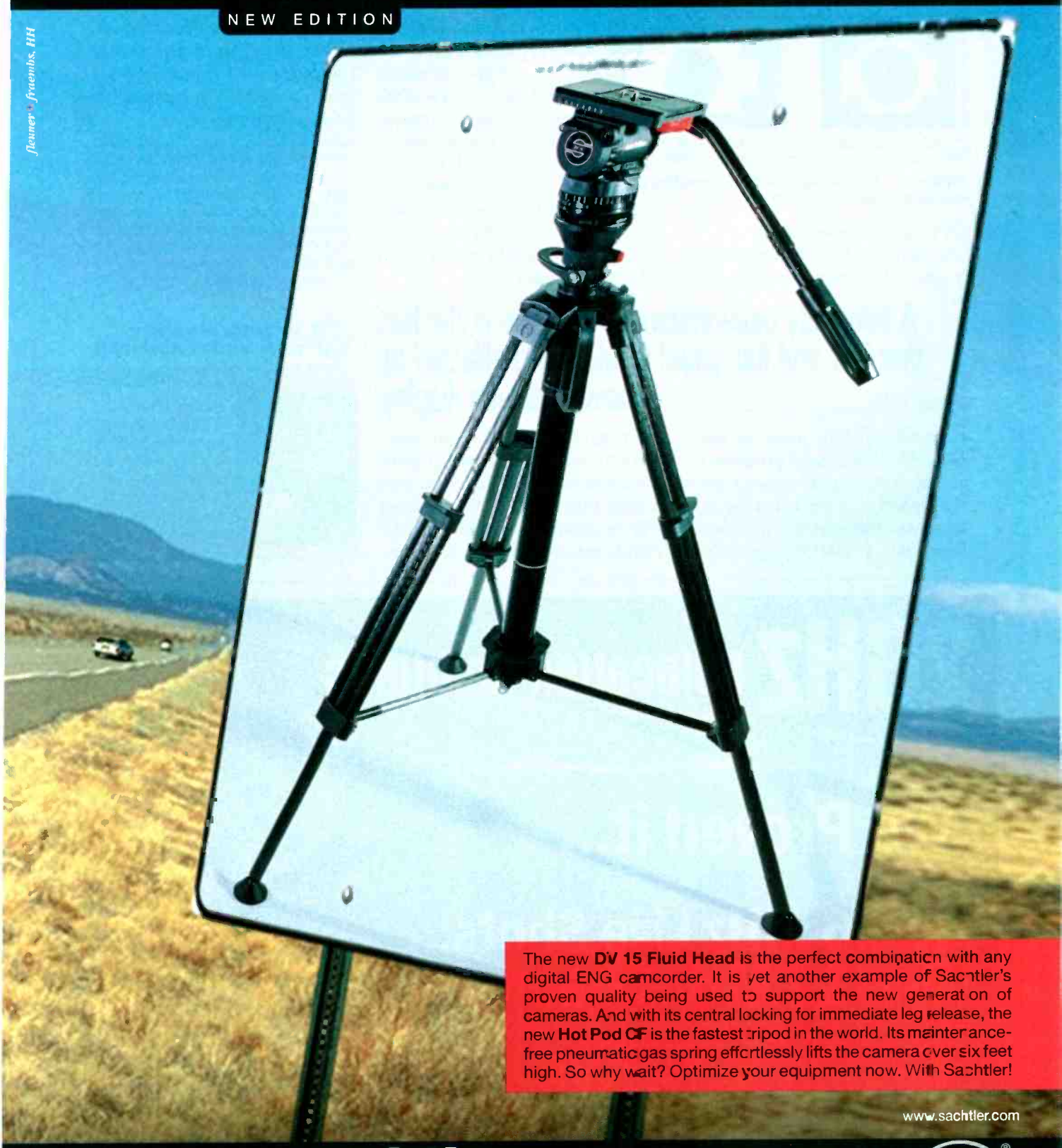

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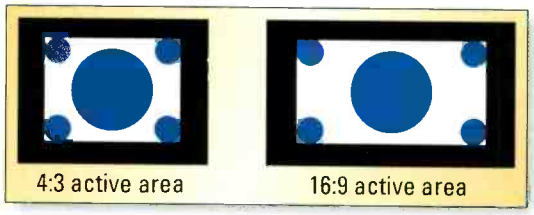


Figure 3. Doublebox displays resulting from multiple format conversions

DTV signal for broadcasting.

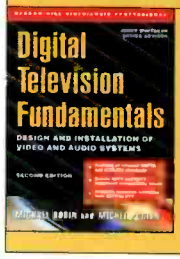
Similarly, analog NTSC production is going to continue for some time. Currently, the four major networks offer HDTV originated programs on a daily basis at peak viewing times (10 percent to 22 percent of the daily schedule). Occasionally, commercial inserts into an HDTV program have pillarbox effects. They are obviously originated in NTSC and upconverted to 16:9 HDTV. The rest of the day, the networks transmit NTSC programs upconverted to 16:9 HDTV with an assortment of letterbox, pillarbox and doublebox effects. In time, the NTSC production equipment will be replaced with HDTV equipment.

A relatively underestimated problem is the fact that CRT and flat-panel displays are affected by uneven screen display.

A relatively underestimated problem is the fact that CRT and flat-panel displays are affected by uneven screen display. Essentially, black panel areas will age much slower than the active picture area, which, in time, will become darker. This should be an incentive for equipment manufacturers, broadcasters and standards bodies to agree on methods to eliminate these unwanted effects. BE

Michael Robin, fellow of the SMPTE and former engineer with the Canadian Broadcasting Corp.'s engineering headquarters, is an independent broadcast consultant located in Montreal. He is co-author of Digital Television Fundamentals, published by McGraw-Hill and translated into Chinese and Japanese.

SEND Send questions and comments to: michael_robin@primediabusiness.com



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Fiber
for broadcast

BY BRAD GILMER

Building your first fiber network, whether for broadcast or computer applications, can be a bit daunting, but there is no reason for the task to make you apprehensive. A few simple guidelines will make the task enjoyable and a true learning experience.

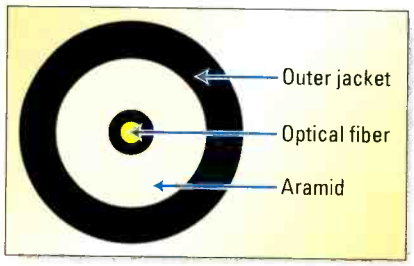

Figure 1. Belden M97112, single-fiber indoor-use cable

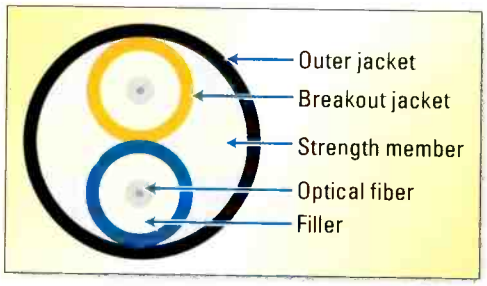

Figure 2. Belden M9A029, multi-fiber indoor-use cable

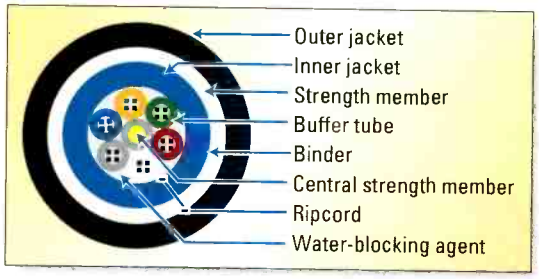

Figure 3. Belden M9A840, multi-fiber outdoor-use cable

There are several options open to you as you build your new fiber network. While decisions about connector type and fiber mode may have already been made for you by the equipment manufacturer, you can still select the type of cable you will use, number of strands, brand of connector and whether you will use ducting or other protective cable raceways. All of these decisions will contribute to the quality and maintainability of your fiber installation.

Choosing a fiber-optic cable

If you are a product engineer, there are several choices you need to make regarding fiber diameter, mode, laser frequency and so on.

If you are an end user, the equipment designer will have made these choices for you. Matching the cable to its intended use is the next step.

Generally, cable is divided into two groups: multi-fiber cable, which is optimized for outdoor use between buildings or other exterior applications, and cable designed for indoor distribution. There are other cables available for inter-city and long-haul applications, but the broadcaster typically does not install and maintain this type of fiber-optic network.

Comparing cross sections of indoor and outdoor cables tell a lot about their construction and intended use. Figure 1 shows a single-fiber cable suitable for indoor use. Note that it contains a single fiber strand with a tight buffer surrounding it. The result is a robust cable that can be terminated directly without any special considerations. A broadcaster may employ a cable like this as a jumper cable between a desktop graphics device and a wall plate.

Figure 2 illustrates a multi-fiber indoor use cable. This design contains two or more tight buffer cables surrounded by a common outer jacket. An important difference between this cable and a cable intended for outdoor use is that the outer jacket can be stripped away to reveal two fiber cables that are ready to be terminated. A cable such as this one may be larger in a multi-fiber configuration than its outdoor counterpart, but it will not require a breakout kit for termination. (More on breakout kits later.)

Figure 3 is a cross section of a cable designed for outdoor use. Note that there are several significant differences between this cable and the one in Figure 2. The first difference is that the cable contains a number of fibers

Building your first fiber network can be a bit daunting.

separated by a loose buffer tube. The tube slides over the fibers, lubricated by a gel. Several fibers are contained in each buffer tube.

Second, note that the individual fiber strands are not surrounded by a protective jacket. This saves space in the cable but means that you must use a breakout kit to terminate the cable.

Third, the cable incorporates a water-blocking agent. Finally, note that the jacket on the cable is much thicker than the jacket used on indoor cable. It is treated to resist water and ultraviolet radiation.

Usually when going from outdoors to indoors, a transition of some sort is required. This involves breaking out the loose-tube individual fiber strands and connecting them to a

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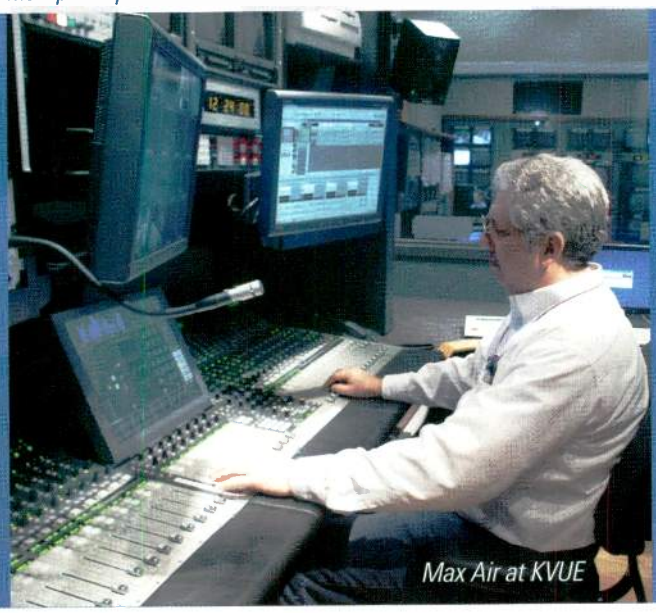
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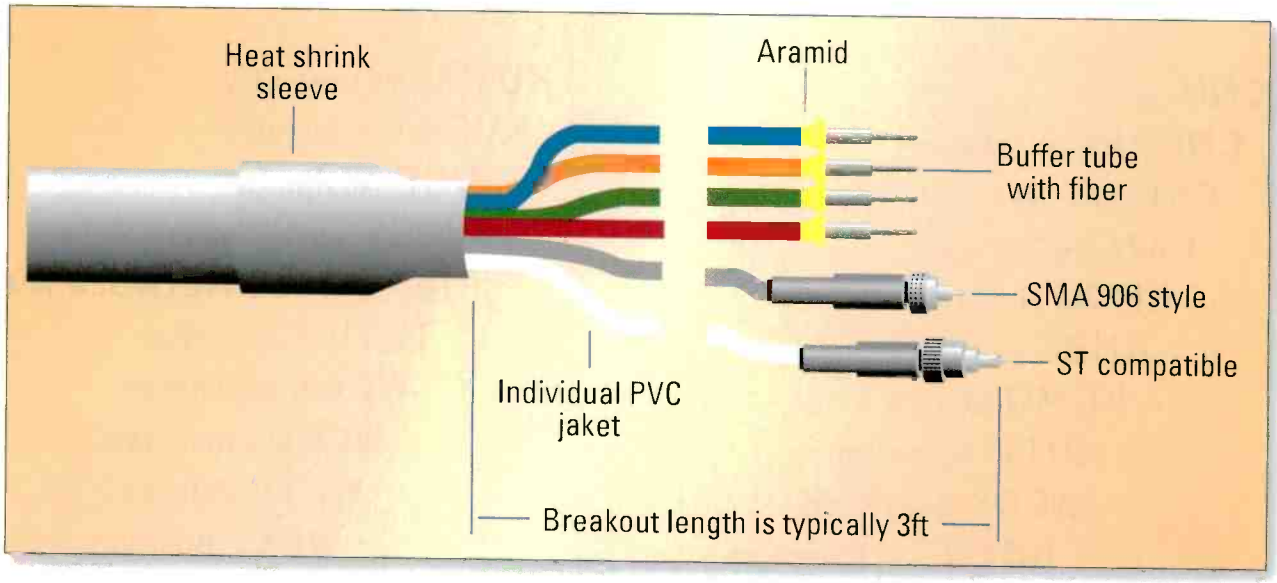

Figure 4. Fiber-optic breakout kit

panel. The other side of the panel is connected using indoor cable.

Figure 4 shows a typical breakout kit. The kit converts the loose-tube multi-fiber cable to several tight buffer individual fiber cables that can be terminated with the appropriate connector. The tight buffer cables are much more rugged and will withstand the environment of a broadcast facility much better than the individual strands of a loose-tube cable.

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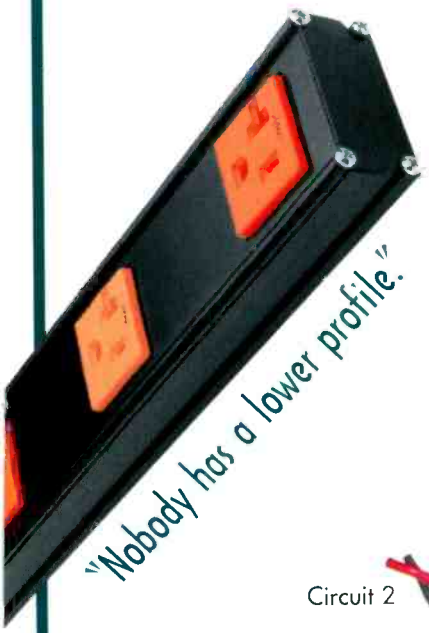

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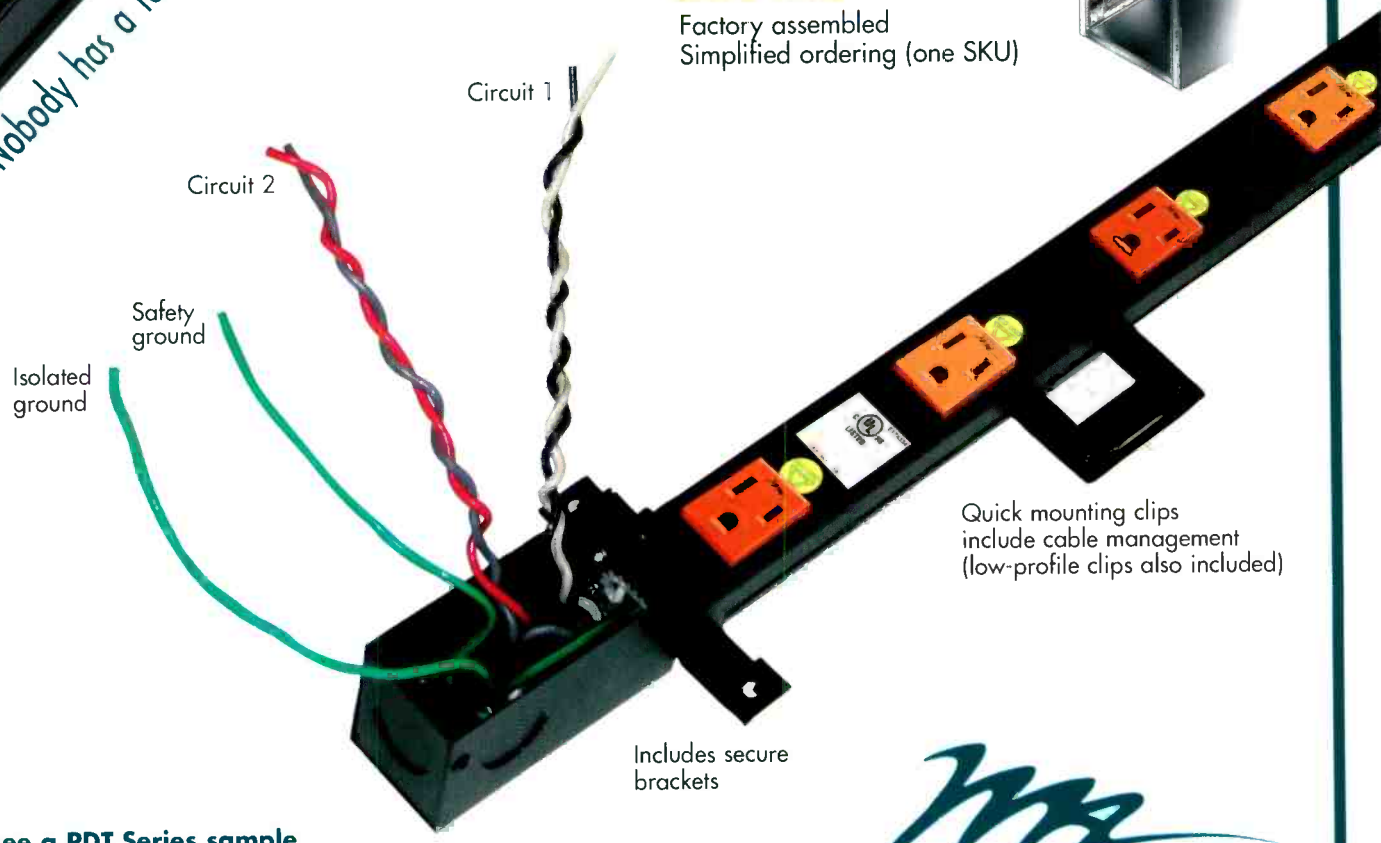

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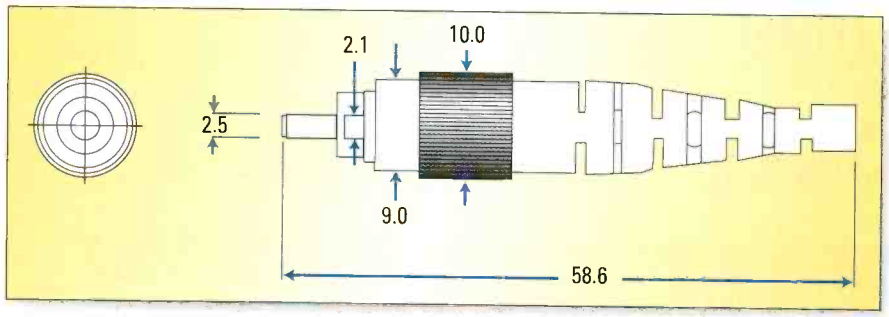

Figure 5. Ceramic FC connector

Connector selection

If you are concerned about terminating fiber cables yourself, there is good news. Terminating cables is much easier than it used to be.

If you have tried terminating fiber cables in the past, you probably still have nightmares about epoxy ovens and sanding little figure eights while repeating some magic incantation. That has changed. 3M, Siecor and other companies now make crimp connectors and splices that allow you to terminate fiber easily and at a low cost. (See Figure 6 on page 34.)

If you were not all that great at making splices in the past, you can probably do better with these. Your losses will be 1/2dB to 1dB per connector.

Gone are the days of the old bi-conic fiber connectors where alignment was a real problem. The FC connectors mate correctly with little problem. With a little practice, you should be able to terminate a fiber in less than a minute.

With a little practice, you should be able to terminate a fiber in less than a minute.

Ducting

If you ever have the opportunity, take a tour of a large fiber installation. When you look at the equipment racks, one of the first things you notice is a large number of ducts running all over the building.

Fiber-optic ducts are specially designed to carry fiber-optic cables and protect them from damage. They have carefully designed curves and openings that protect the cable from stress and excessive bending that could degrade the performance of the cable or possibly break it. Your decision to use ducting will be based on the amount of fiber you are installing and whether the fiber is concentrated in a central area.

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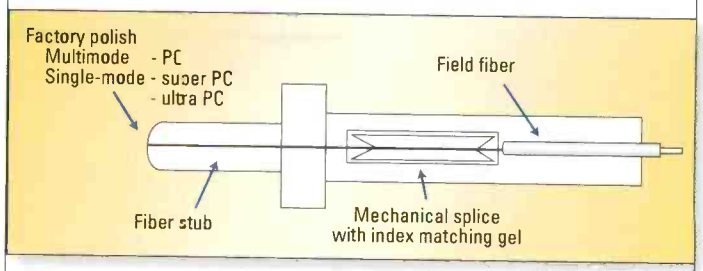

Figure 6. Fiber mechanical splice

Fiber building guidelines

Here are some guidelines to consider as you build your fiber network:

- *Use the right cable.* Broadcast installations are not typical telco or cable system installations; our needs are specific. For example, using a loose tube cable when a tight buffer cable is required can cause maintenance headaches down the road.
- *Use breakout kits and termination panels to avoid cable damage and down time.*
- *Keep clean.* Dirt is a serious problem in fiber installations. If you are building a network but the termination equipment is not yet installed, be sure to use dust caps to cover the ends of the cables.
- *Avoid unnecessary transitions.* Each transition introduces from 1/2dB to 1dB of loss per connector. If you are in an indoor and outdoor application, investigate some of the hybrid products available that will keep you from adding a transition at each building entry point.
- *Run more fiber than you need.* The labor cost of installing fiber is much more expensive than the fiber itself. Figure out how many fibers you need and then multiply the number by three. I used to say multiply by two, but experience has proven that this is inadequate.
- *Run multiple fiber types.* If your equipment uses multimode fiber, pull in some single mode fiber along with it. Use of multi-mode fiber is on the decline. You may avoid a costly cable pull later if you install cable now.
- *Talk to your equipment manufacturer.* You can learn a lot about fiber-optic technology from these experts. BE

Brad Gilmer is president of Gilmer & Associates, executive director of the AAF Association and executive director of the Video Services Forum.

SEND Send questions and comments to: brad_gilmer@primediabusiness.com

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Engineering with Vision

KAHUNA - THE PRODUCTION SWITCHER THAT DEFIES DEFINITION

Standard definition? High definition? With Kahuna you don't have to worry. It can handle either of them - separately or at the same time. It can even incorporate SD sources into HD productions without upconversion.

Kahuna is the most versatile switcher on the market. And the most economical. Kahuna lets you take control of your transition to HD without having to re-equip with all-HD sources - and without having to put an upconverter on every SD input.

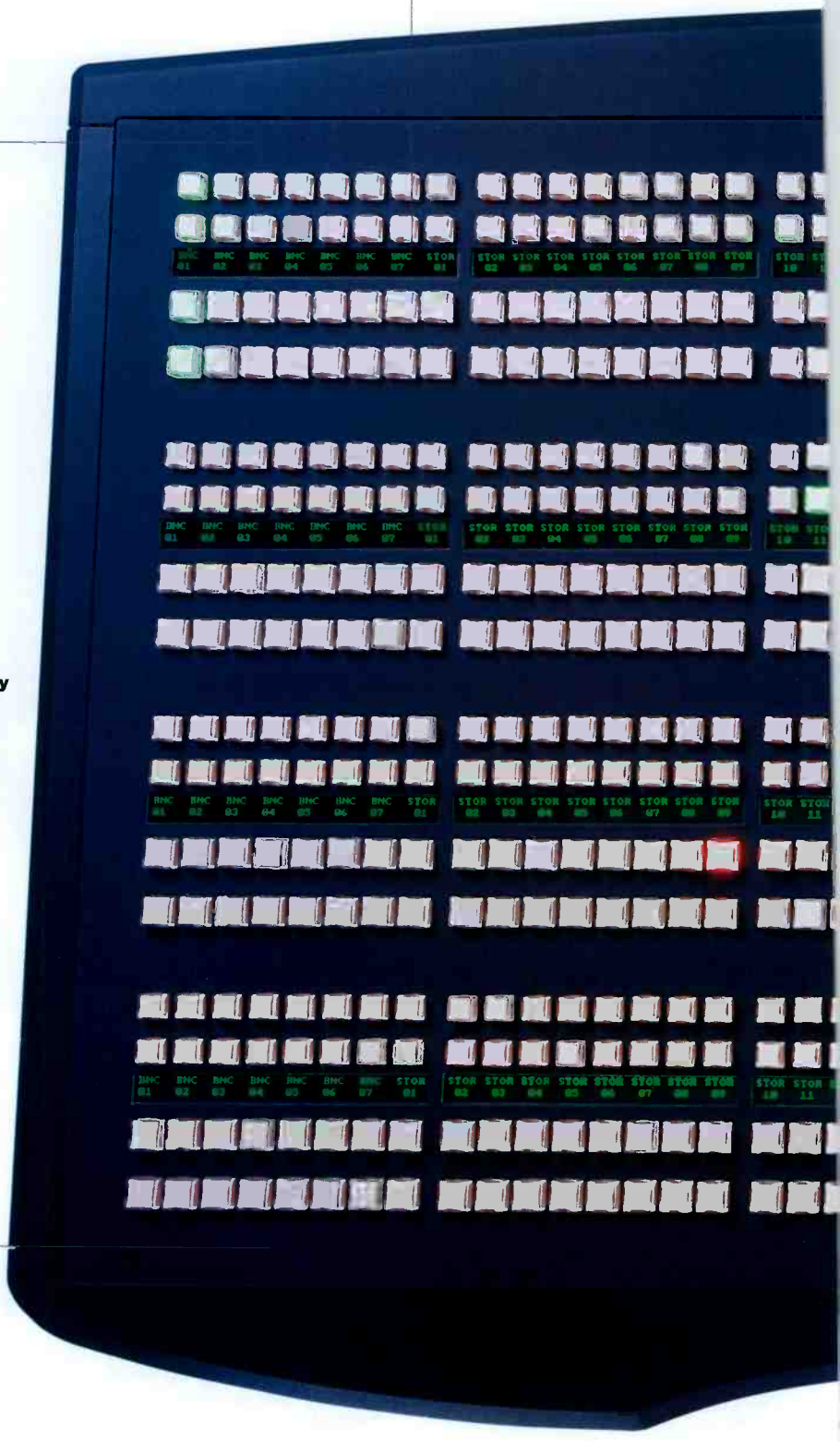
Even if you have no plans to go HD just yet, you can install Kahuna in SD only. Then when you are good and ready, upgrade to full multi-format SD/HD operation, with no operational disruption.

KAHUNA

HD TRANSITION
YOU'RE IN CONTROL

HD TRANSITION YOU'RE IN CONTROL

Every source has its own user-configurable mnemonic identification



Each of the four comprehensive M/E banks has:

- **Four keyers able to perform luma, linear, and chroma keying**
- **Five transition wipe generators**
- **Still store and clipstore**
- **RGB color correction**
- **Four utility buses**
- **Timeline, DMEM and Macro capability**

Each keyer has its own re-size capability with effects:

- **3D DVE send-and-return architecture enables images to be manipulated**

Integration of SD and HD sources is carried out by FormatFusion engines (four per M/E):

- **FormatFusion engines can float between background A/B buses and keyer buses**

KAHUNA

1 M/E Control Panel

2 M/E Control Panel

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KAHUNA INTEGRATES SD SOURCES INTO HD PROGRAMS WITHOUT UPCONVERSION

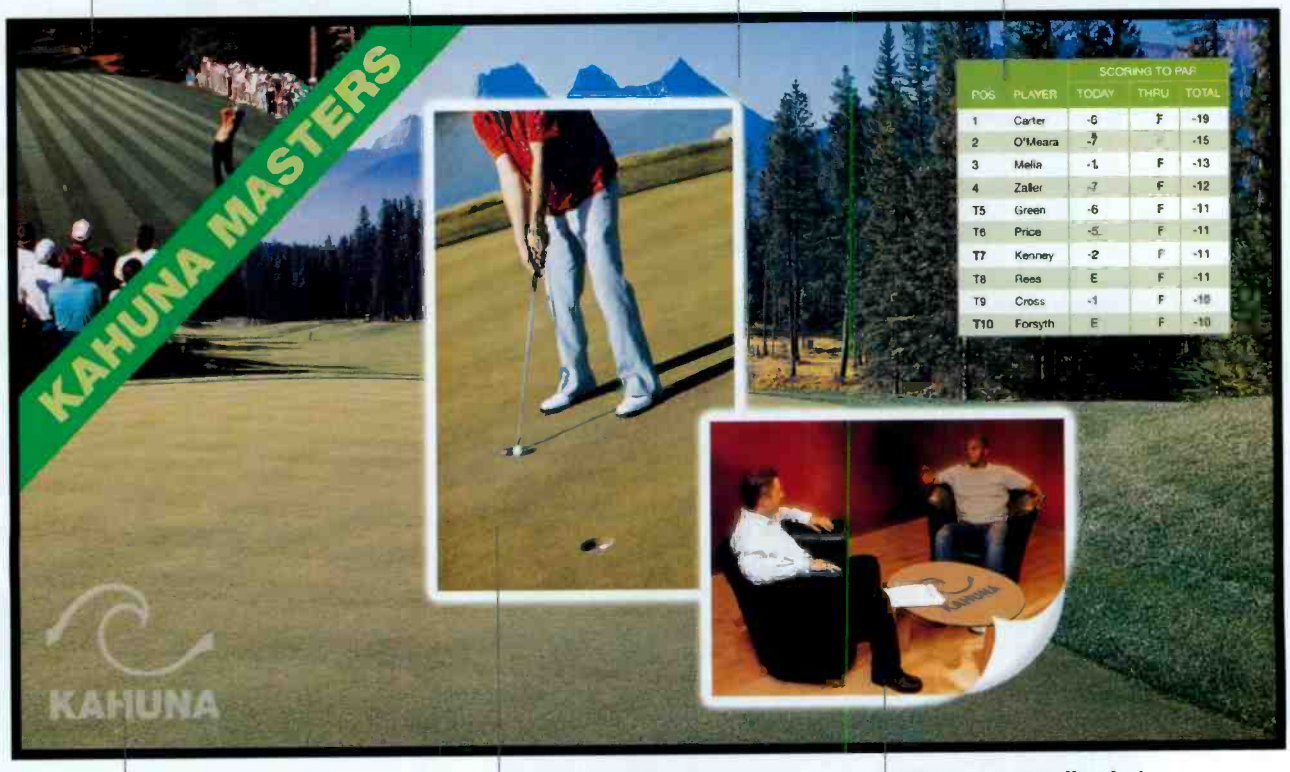
Example of HD Output from a Single M/E Using Mixed SD/HD Inputs

HD background B

Wipe bar provided by Utility Bus

HD background A

SD character generator output using FormatFusion and resize engine



Animation via one of the internal clip stores

SD hand held camera shot using FormatFusion and resize engine

HD camera studio shot 'squeezed back' using picture resize engine and HD 3D DVE page turn effect

Kahuna is the first production switcher system in the world to offer simultaneous standard definition and high definition operation in the same mainframe with the same control panel.

Even more remarkably, thanks to a new technology called FormatFusion, it enables you to integrate any SD material, such as camera feeds, graphics or archives into live HD productions, seamlessly, without the need for upconversion.

The most advanced production switcher in the world deserves the best support. That's why we've designed Kahuna Care. It's a package of service options designed to ensure that Kahuna continues to meet your operational requirements at all times.

KAHUNA

FORMATFUSION

Shedding light
on camera support

BY BARRY BRAVERMAN

When it comes to investing in lighting and support gear, it usually doesn't pay to scrimp. Unlike your camera, which you'll likely upgrade every two to three years, you'll probably be using the same lighting kit, fluid head and tripod legs decades from now.

Capturing compelling images with your camera demands rigorous frame support. Like the great painters of centuries ago, you are offering your viewers a unique window to the world, a stage through which you expose, compose and otherwise implement the many rudiments of your finely tuned craft.

If you shake the frame and weaken its walls, you better have a good reason. Shakycam has been with us for more than two decades now, and we've all had quite enough, thank you.

Appropriate support of the camera and frame is imperative and — in a more perfect world — reflects the impetus of your story. Is the frame anchored solidly in reality as in most establishing shots or landscapes, or does the handheld camera more accurately reflect the point of view, say, of a deranged serial killer?

Strong compositions built on solid support work in tandem with other aspects of good craft, such as logical, well-modeled lighting; adept use of focus (and follow focus); and effective depth of field control. In most cases, you want to foster intimacy with your viewers — drawing their eyes into the canvas by helping them identify frame elements critical to the story.

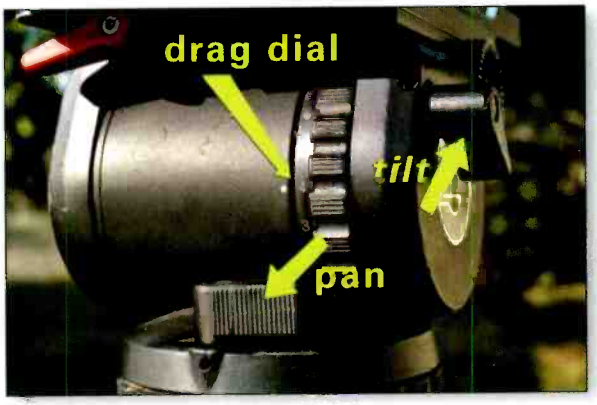
Attracting unwarranted attention to the edges of the frame (as in the case of these ants-in-the-pants shooters) is counterproductive. The smart shooter knows that appropriate camera support is, therefore, imperative to maintain the integrity of the frame and the story housed in it.

The smart shooter knows that appropriate camera support is ... imperative to maintain the integrity of the frame and the story housed in it.

Getting ahead in support

If you're a serious shooter, you'll need to invest in a pro-level tripod and the most rugged fluid head you can find. Fluid heads typically use a silicon dampening system to enable smooth pans and tilts. The viscous liquid is forced through a series of drillings like the oil through an automatic transmission — the intent being to provide a predictable amount of resistance, regardless of ambient temperature. The incremental drag dials on some models vary the resistance — the precise amount of drag being selectable and repeatable. In this way, the shooter can gain confidence in his

Establishing shots like this London night scene usually benefit from a well-supported camera.



A well-designed fluid head is worth its weight in gold. Smooth with large operating surfaces, the investment in high-quality support gear will pay you dividends for years.

For winter shooting, a thin pair of polypropylene gloves is indispensable. These gloves offer protection from direct contact with a tripod's frigid metal surfaces, while preserving the tactile sensitivity necessary to operate most cameras' less than robust controls.

or her ability to execute consistently smooth moves. Like the clutch action on a car, the feel from vehicle to vehicle may vary, but once you are accustomed to the clutch on your car, the driving experience quickly becomes seamless and second nature.

While a low-cost friction-type head may seem like a good option, the well-designed fluid head is the professional camera operator's best choice. Its low weight and robust construction are critical for it to withstand the rigors of real-life conditions. The action should be glitch-free, impervious to the elements and with no perceivable backlash — that is, the tendency of some heads to bounce back slightly when handle pressure is relieved. Pan and tilt locks should be the lever-type with large surfaces to facilitate single-handed operation, even in winter with thick gloves.

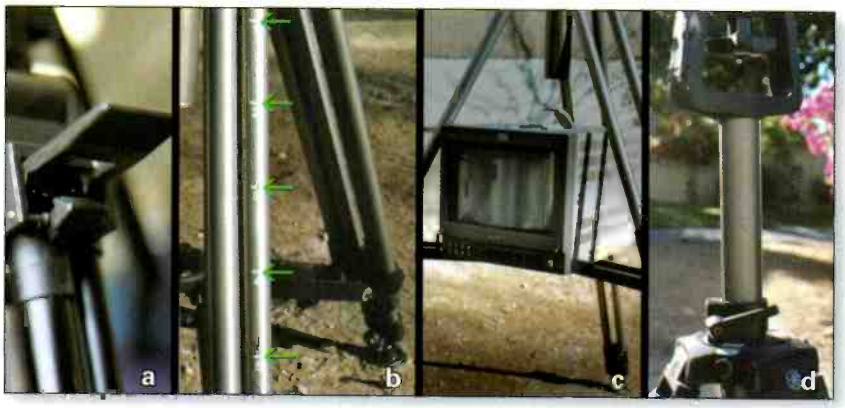
Throughout your career as a shooter, you will likely only need one fluid head if you make the right investment. In my 25 years as a National Geographic cameraman, I've really only owned two. The first, a Sachtler 3+3 Panorama model, was lost at Mount Saint Helens in 1980 — a victim of volcanic ash and pulverized granite that penetrated the drag dials and destroyed the fine German action. The second, a replacement 7+7 model, I still use regularly to this day. That's well more than two decades of the most grueling punishment imaginable, from tropical rain forests to Arctic tundra and everything in between. Not bad for (what seemed at the time) a ludicrously expensive $1900 investment. Of course, it was worth that sum many times over. I built my career literally on that one fluid head.

Pretty legs

You should learn to love your legs. They support everything you do.

Here are a few features to consider when shopping for tripod legs:

- They should be lightweight yet able to stand up to substantial abuse.
- The leg locks should be simple in design to facilitate setup with minimal fuss.
- Leveling should be accomplished via a ball-mount and large knob that can be grabbed easily, even in winter with heavy mittens. I recommend leg adjusters with inscribed height increments, a useful feature when leveling the camera by eye or with the help of an overtaxed assistant.



Key tripod features include (a) secure leg locks, (b) incremental leg markings to facilitate level setup, (c) a raised spider that stays clean and can serve as a monitor platform, and (d) a center column that permits easy raising of the camera in tight spaces.

Lighting less is more

With the advent of extreme low-light sensitive cameras, the big bang approach to lighting is no longer the only or preferred way to go. Shooters with the latest digital tools have a new credo: Less is more. Using less light means fewer and smaller instruments on location with less tweaking and futzing. It means fewer cutters, C-stands and gobo arms to control spill, which in turn saves money on crew and setup time.

Low-wattage 150W/300W fresnels are highly controllable with four-way barn doors that can often obviate the need for a multitude of flags, cutters and cumbersome grip gear.

In my own work, I usually prefer small focusable fresnels to less expensive open-face instruments that produce lots of light with far less control. I recall one History Channel documentary that I shot a few years back with a single four-head 150W fresnel kit, and it looked great! You don't need much to capture compelling images.

The savvy shooter recognizes the substantial craft required to apply appropriate fill light to a scene. Too little fill produces dark shadows and a potential increase in noise. Too much fill can wash out a scene and impart a lifeless, artificial look.

The fill requirement for today's digital camcorders is something of an Achilles' heel, as some frontal fill is almost always desirable when shooting close-ups or interviews. A passive fill from a bounce card may

Some tripod legs can cause serious injury. Make sure the people you work with are aware of the potential harm.

fischer broadcast connectors

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be all you need to return a portion of the key light to the shadows. A low-contrast/diffusion filter can also help by transferring surplus values from the highlights into the underlit areas, thus helping to preserve critical detail at both ends of the characteristic curve.

An active fill is often more practical and easily controlled. A small fresnel through diffusion or a traveling China Ball on the end of a fish pole can work fine. An on-camera solution may be preferable for ENG folks, and there are several options ranging from the traditional tungsten-balanced sungun to a potent daylight-balanced LED or miniature 10W HMI. A fluorescent ring light affixed to the camera lens can be an effective low-power solution, though the necessary support may be a bit too involved for some users.

Whatever solution you choose, you'll want a camera fill that packs enough punch to produce a natural wash, even through a layer or two of diffusion. Depending on the ambient light, a 25W tungsten unit might work okay. Most shooters will want considerably more power and versatility than that — and with daylight balance.

Professional support

Professional lighting and support gear may cost more than the flimsy consumer stuff, but the dividends such equipment pays in performance and piece of mind is worth it many times over. Lasting for many decades, top-flight gear is a lifetime investment that will be with you long after your various cameras du jour are relegated to doorstops. Given the obstacles professional shooters face every day, from climatic conditions and rough handling to ornery producers who push beyond any rhyme or reason, high-quality, well-designed lighting and support gear is one of the best investments you can make. BE

Top-flight gear is a lifetime investment that will be with you long after your various cameras du jour are relegated to doorstops.

Though lacking in control and subtlety, this on-board tungsten-based unit has been a popular choice for years.

LEDs provide a smooth daylight source that is frugal on power yet packs a surprising punch. The Israeli Arm's single knob permits easy positioning of the light to eliminate eyeglass reflections or the shadow from a matte box.

Barry Braverman is a veteran cinematographer based in Studio City, CA, with more than 20 years experience. He is director of DVD Training at Video Symphony in Burbank and is serving as a consultant and convergence producer for major studios.

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SYSTEMS DESIGN SHOWCASE

LMG's HD-1 truck-in-a-box

The HD-1 took engineers six weeks to design and a month to build. The system enables the use of multiple formats using one processing frame.

BY KEVIN MCCABE

LMG, a national provider of video, audio, lighting, staging and presentation support headquartered in Orlando, FL, took on the challenge to design a multiformat, high-definition truck-in-a-box — designated the HD-1. This would greatly increase show capabilities and enable manipulation of multiple formats using only one processing mainframe — a technique that doesn't compromise image quality.

Snell & Wilcox's 1-ME Kahuna sidecar enables operators to do a separate line cut.

The technology

The concept behind the project was intermixing HD and SD sources within the same switching system. This gives clients flexibility by enabling them to use HD and SD sources simultaneously, without internal or external signal conversion equipment, and output the information to multiple destinations.

In the past, two different switchers were used, and sources were upconverted or downconverted to achieve

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the same appearance, which altered aspect ratios and ultimately sacrificed quality. Upconverting video signals to match high-resolution graphic images made the video images appear soft and out of focus. Alternatively, downconverting computer graphics to match video sources resulted in a loss of resolution. The HD-1 eliminated these issues.

Of course, new technology comes with new obstacles and challenges. The major hurdle with the HD-1 system was designing a one-unit processing system that could convert both HD and SD internally. The fewer steps involved in processing, the less chance that the equipment could manipulate the output quality.

LMG ordered all components, including cameras, harnesses and terminal gear, from outside vendors. To combat compatibility issues, the company worked closely with many manufacturers, including Evertz, Snell & Wilcox and Grass Valley, to ensure that all of the designs would conform to the requirements.

There were several systems that were new to LMG, such as the Snell & Wilcox Kahuna switcher, which was one of the first delivered to the United States, and the Grass Valley LDK 6000 Worldcam cameras.

The electronics rack (shown back and front) is the heart of the HD-1 system.

Design team

Kevin McCabe, chief engineer
Adam Hunley, engineering supervisor
Robert Murdock, video services manager
Tim Wiley, vice president of show services
Installation by LMG staff

Equipment list

Evertz
- MVP multi-image display
- 7700 multi frames
- 7710DCDA-HD downconverter and distribution amplifier
- 5010 time code generator
- 5300 time code analyzer

Grass Valley
- Concerto 128x128 multiformat router
- Encore controller
- LDK 6000 Worldcams

Howman Controls
- Tally4 system
- Tally router

Marshall Electronics V-R171P-HD 17in multiformat HD LCD monitor

Snell & Wilcox
- Kahuna 4 ME HD/SD switcher
- 3 ME control panel and 1 ME control panel (sidecar)

Sony BVM-D14H1U multiformat monitor

Tektronix
- TG700 multiformat video generator
- WVR7100 HD/SD rasterizer

Wireworks AV2000 multi-harnesses

The design of the system required an intensive, six-week process in which a core group of four engineers worked 12- to 14-hour days, seven days a week. Building the entire system took close to a month.

The installation procedure

Taking all of these individual pieces and configuring them into a five-tiered enclosed system was a daunting task. The goal was to place multiple pieces of equipment within close proximity without overheating them. At the same time, the rack layouts were designed for ease of use for operators and serviceability for the maintenance team.

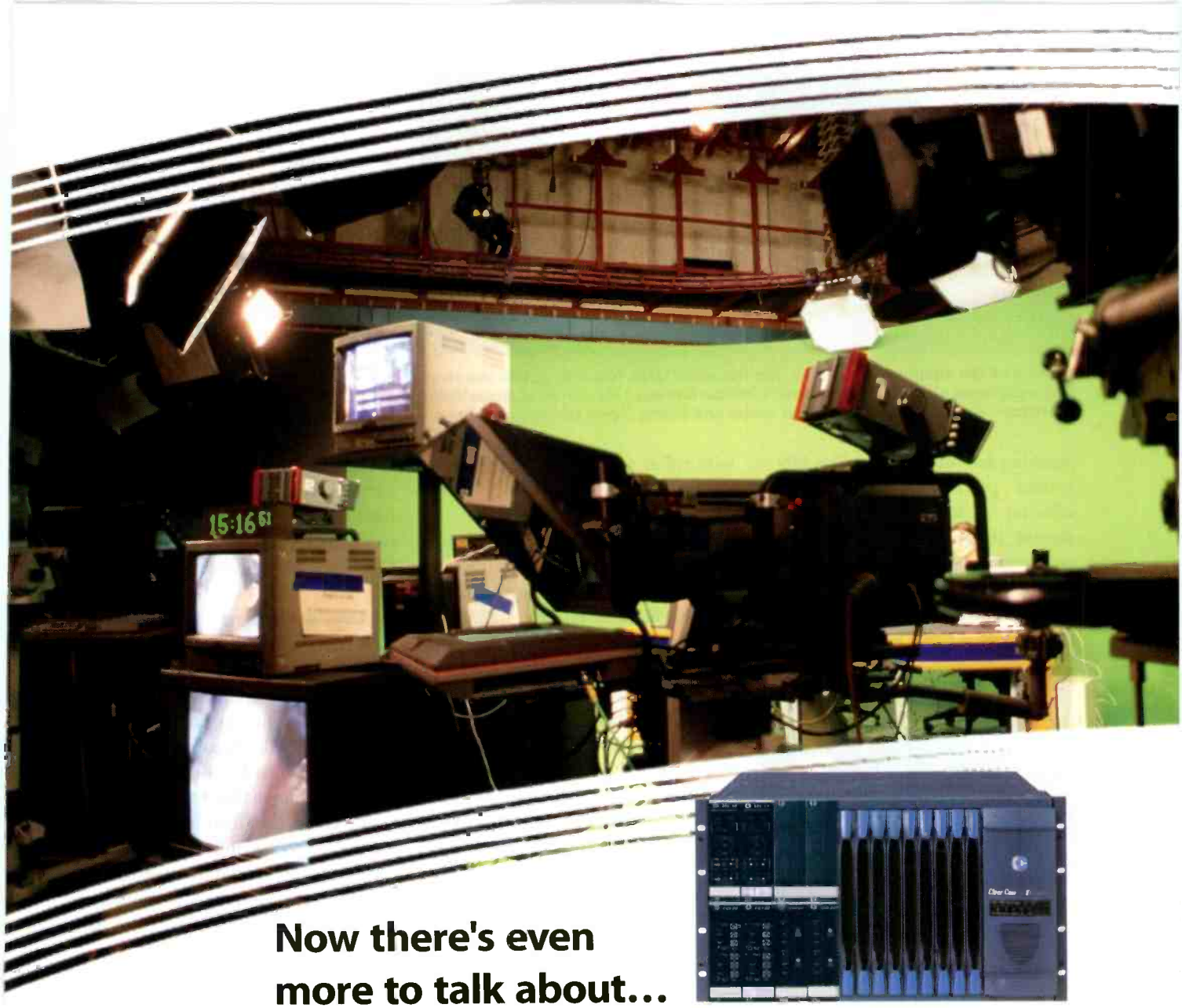
Issues surfaced when LMG needed to reconfigure the design on the spot to accommodate the varying sizes of the equipment when it arrived. The individual units were awkward shapes and sizes — sometimes larger than the rack unit specified sizes.

In particular, one of the electronic mainframe units was larger than expected. LMG then had to reconfigure the entire rack to accommodate the unit. This resulted in a three- to four-day redesign of the system.

Otherwise, the rest of the procedure took place as planned with no additional delays. All equipment and cable placements went smoothly. The company cut pre-determined lengths of cable and terminated one end with either video or audio connectors so that engineers could lace that end and cut it to its actual desired length, aiding the installation process.

Effect on the industry

Benefits of this technology are far-



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Introducing the new **Eclipse Median** - the latest in cutting edge intercom technology designed specifically for the broadcast market.

Ideally suited for systems where space is restricted, such as OB vans, the **Eclipse Median** has been developed to incorporate 8 interface slots and still provide 112 ports in a small 6RU frame!

Drag-and-drop system configuration changes are fast and easy with Eclipse's intuitive software.

Other Eclipse benefits include:

- Based on the award-winning Eclipse Median technology
- Dual redundant CPU and power with distributed crosspoints
- Uses Eclipse & Matrix Plus standard interfaces: CCI-22, FOR-22, TEL-14
- Uses the same cards as the Eclipse Omega
- Highly intuitive configuration software - ECS
- Clear and dynamic audio using 24-bit sampling at 48Khz
- Intelligently link to other Eclipse systems using fibre or trunks

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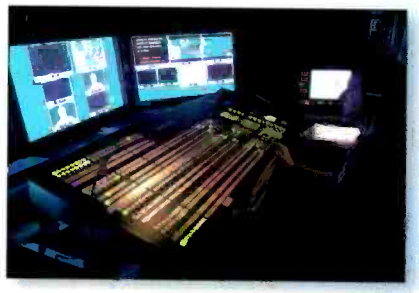
Getting all the equipment mounted into five short racks required careful planning. The equipment above includes a Snell & Wilcox Kahuna 3 ME switcher, Grass Valley Worldcam and Concerto multiformat router and Evertz signal conversion frames.

reaching for the industry. The HD-1 system pushes the boundary by offering a single, internal multiformat switching system. With this equipment, users can switch, route, wire and record multiple formats simultaneously. For example, users can present a 1080i format on screen with either a 720p or a 480i and have a standard-definition record on display at the same time.



The Snell & Wilcox Kahuna 4 ME HD/SD switcher features FormatFusion, which allows users to integrate any SD material seamlessly into HD productions.

From the client's perspective, the HD-1 gives designers more creative room to enhance the presentation because SD and HD are within the same frame, providing greater flexibility. Typically, clients bring sources of all different formats to a show. It was LMG's responsibility to standardize the signal output. The HD-1 streamlines the switching procedure into a one-step internalized process. The system itself is also flexible, as its configuration can be customized to meet individual show specifications.

As it often does, this new technology could take some time to become an industry standard. Until then, LMG will provide knowledgeable staff engineers assigned to the HD-1 when it is delivered to a show site. These experts handle routing issues and combat technical challenges that may occur in the field. And the same team of engineers who helped design the system will be available to troubleshoot.

LMG factored convenience into the design of the HD-1 system by installing a managed switch. This switch is the control device that allows communication with a central computer wired to every device in the package — from cameras to routers, to the switcher to terminal monitoring gear. Users can configure all of these pieces wirelessly from one laptop in a remote location.

A new standard

Those who have embraced the new multiformat, HD truck-in-a-box are working to incorporate it into more shows and events, in hopes that this technology will become the new industry standard. Companies who make investing in this new technology an integral part of their business plans are poised to become invaluable industry leaders, providing their clients with the latest equipment and an edge in the presentation business. BE

Kevin McCabe is chief engineer at LMG.

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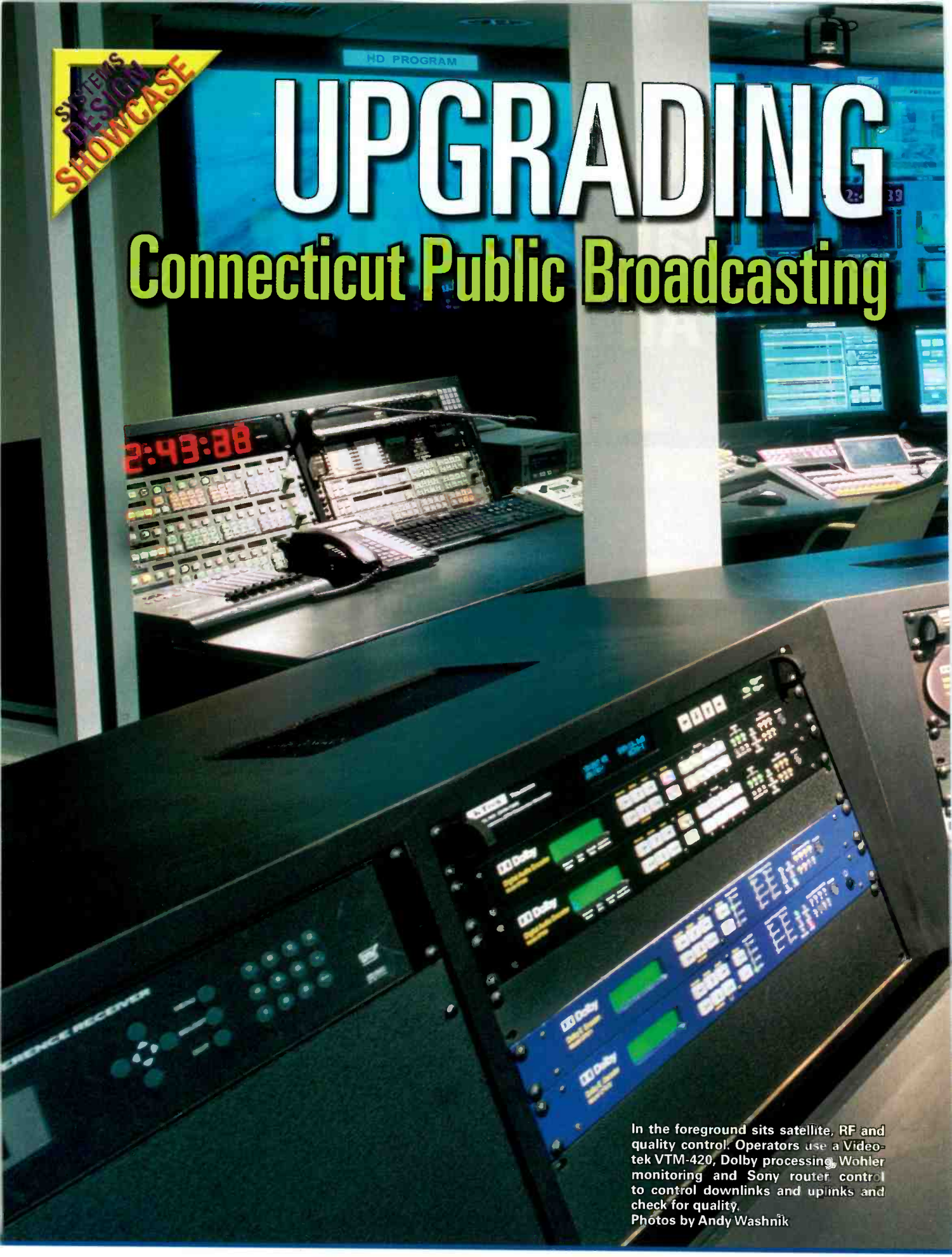
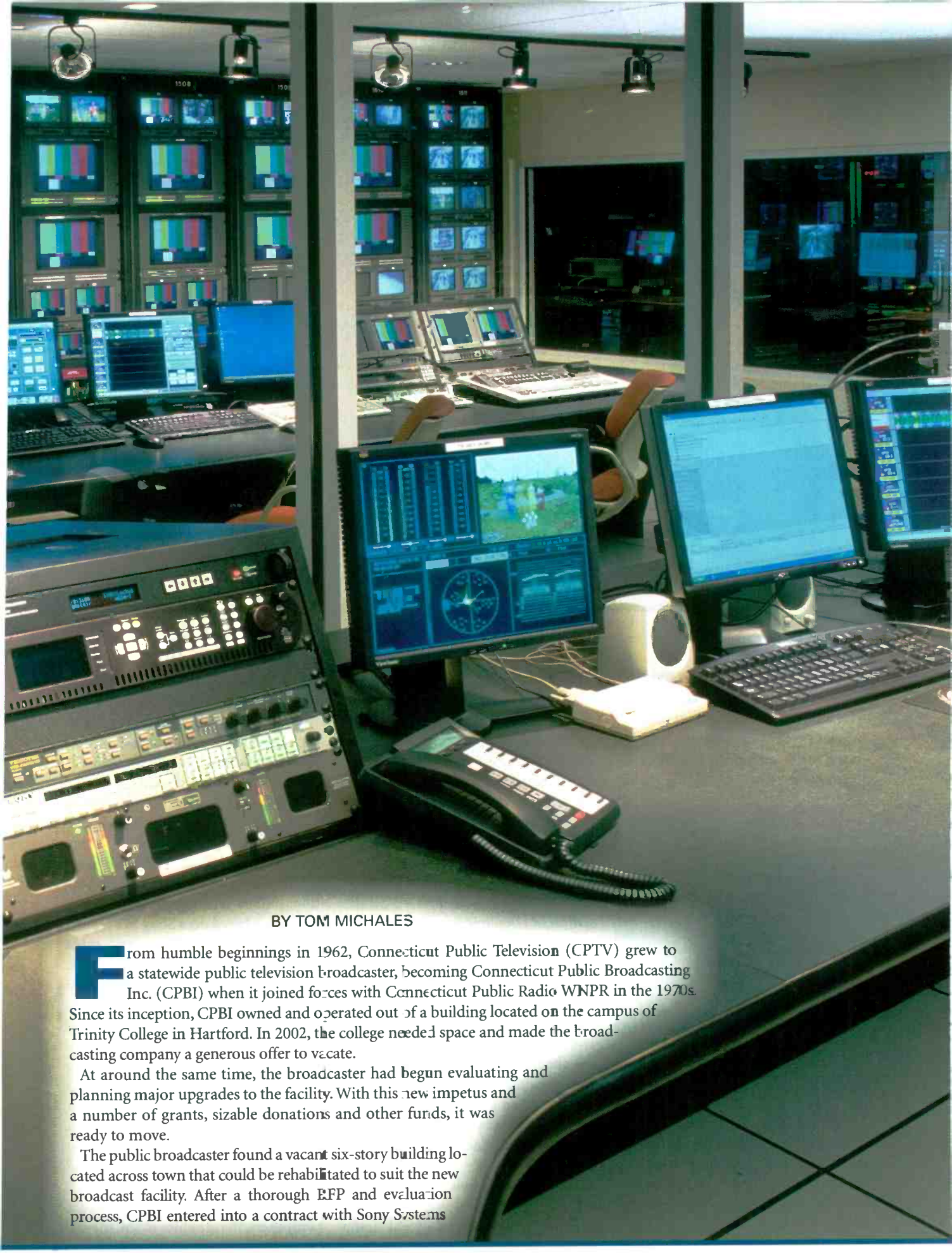
SYSTEMS DESIGN SHOWCASE

UPGRADING

Connecticut Public Broadcasting



In the foreground sits satellite, RF and quality control. Operators use a Videotek VTM-420, Dolby processing, Wohler monitoring and Sony router control to control downlinks and uplinks and check for quality.
Photos by Andy Washnik



BY TOM MICHALES

From humble beginnings in 1962, Connecticut Public Television (CPTV) grew to a statewide public television broadcaster, becoming Connecticut Public Broadcasting Inc. (CPBI) when it joined forces with Connecticut Public Radio WNPR in the 1970s. Since its inception, CPBI owned and operated out of a building located on the campus of Trinity College in Hartford. In 2002, the college needed space and made the broadcasting company a generous offer to vacate.

At around the same time, the broadcaster had begun evaluating and planning major upgrades to the facility. With this new impetus and a number of grants, sizable donations and other funds, it was ready to move.

The public broadcaster found a vacant six-story building located across town that could be rehabilitated to suit the new broadcast facility. After a thorough RFP and evaluation process, CPBI entered into a contract with Sony Systems

All video productions for CPTV are produced in this room with a Sony MVS-8000 switcher and video monitoring, Pixel Power CG display and RTS intercom panels.

Integration Center to design and build a new technical infrastructure for the television and radio divisions of CPBI, bringing both organizations into the digital realm, and in the case of CPTV, fully into the world of HDTV. During the design phase of the project, Sony Systems Integration Center was acquired by A.F. Associates (now Ascent Media Systems & Technology Services). As a result, A.F. Associates completed the design phase with the original design team and implemented the project from its East Coast base in nearby northern New Jersey.

Master control houses a Miranda Presmaster and OmniBus automation workstations.

System description

CPTV runs as a multicast operation, originating its analog service, up to four SD channels, one HD channel and CPTV2 from broadcast headquarters in Hartford's historic Asylum Hill neighborhood. The signals are fed to four transmitter sites located around Connecticut. WNPR has a single air stream fed to four separate transmitter sites to provide similar coverage. Connectivity between sites is a combination of fiber, microwave and (in the case of radio) telephone links.

On the television side of the system, a new HD/SD SDI routing system was implemented, and new systems were designed and built for production control, master control, ingest, camera shading, studios, feed record and transmission. Editing and post-production were already based on Avid nonlinear editors, so that equipment was migrated, and a new HD Avid system was added.

In the radio division, almost an entire new system was designed and built. This included a digital audio delivery system from D.A.V.I.D., a Sierra Audio Systems digital audio router and mixing system, four production studios and control rooms, and a newsroom. All systems were interconnected using the CAT-5 wiring technology of Radio Systems.

On the first floor of the new building, four offline edit rooms house legacy Avid Xpress systems. In a newly constructed first floor annex, two production studios and production control rooms are based on a Sony MVS-8000 HD/SD switcher system and three Sony HDC-930 HD studio cameras. An additional three Sony HDW-750 field camcorders are available to augment the studio cameras or for separate productions in the second studio. A CRT-based monitor wall with Sony displays cost-effectively shows SD and HD content during productions. An adjacent audio control room, based on a Sony DMX-R1000 digital audio mixer, is capable of producing stereo and 5.1 surround mixes.

The online Avid rooms, all media composers, the graphics room, master

control, camera shading, transmission control, ingest and the central equipment rooms are on the second floor. The transmission rack room has 40 racks containing the transmission and satellite modulation equipment and is a separate room from the network operations center equipment space. The main equipment center supports both the CPTV baseband processing as well as the technical core for WNPR's radio operations.

Master control and ingest operations are based on OmniBus automation with an Omneon Spectrum series video server and a MassTech MassStore archive management system controlling a StorageTek L700 tape library. The MassTech system was selected for its library management and its low-res proxy features.

A Miranda Pressmaster master control switcher using SD and HD Imagestores provides on-air signal processing and switching. A pair of Miranda K2 multi-window display processors and a pair of Clarity Lion DLP-based rear-projection displays support HD and SD outbound signal monitoring. Adjacent to the Clarity displays are five racks of conventional CRT monitors for inbound feed and off-air signal monitoring.

Three ingest workstations, designed to accommodate both SD and HD material, are located in one area of the network operations center. Each workstation has an OmniBus computer, video monitoring and Videotek VTM series test and measurement QC equipment. Behind the operators is a row of racks containing VTRs of various formats to handle all of CPTV's ingest and dubbing needs. The SD standard tape format is Digital Betacam and the HD standard is HDCAM, running at 1080i.

CPTV's main routing system is a Sony HDSX-5800 SD/HD SDI router with embedded AES, and a separate RS-422 router provides a separate layer. Sony's router control panels interface with the S-bus interface. These are connected to and controlled by OmniBus automation. To access the multitude of servers, workstations and various computers, a 64x16 KVM router from Raritan was installed, enabling operators to control the system from various locations throughout the facility.

Inbound feeds are connected from various satellite dishes mounted on the roof to receivers from Standard Communications, Motorola (for SD) and Digital Vision Bitlink (for HD). These are connected to Miranda frame sync cards and audio embedders to the main router. Outbound ATSC processing is handled by a legacy TANDBERG Television encoder solution. For separate PBS services and as a revenue

source, CPTV also operates a satellite uplink system with an 8m dish mounted on the roof.

The third floor of the building is for the WNPR radio staff. A separate newsroom with D.A.V.I.D. workstations allows production staff members to write their stories, record clips and store them on the digital audio server. Three production control rooms and one master control room are linked to four separate studios, with tie lines from the largest studio to the CPTV video systems. This allow it to be used as an auxiliary production studio.

Transition planning

With any facility move, transition planning is a vital part of project success. Building a new technical infrastructure simplified CPBI's move, but still required forethought. CPTV uses a fiber switch in Hartford as a distribution point to connect with local cable head ends and several of their transmitter sites. By building the new system and then forward feeding it from the old building, transmission continuity was assured. With little of the old facility being re-purposed, this allowed the signal to be switched over to the new system with no signal downtime. CPTV actually switched to the new system in the middle of a program segment — seamlessly.

WNPR's radio operation transition was accomplished in much the same way. The new D.A.V.I.D. system and Sierra Audio Systems audio router/mixer almost completely replaced the old system, and studios were back-

Design team

Connecticut Public Broadcasting
- Meg Sakellarides, CFO
- Haig Papasian, VP of engineering and operations
- Joe Zareski, director of engineering
- Kim Grehn, general manager for WNPR
- Gene Amatruda, director of operations for WNPR

A.F. Associates (Ascent Media Systems & Technology Services)
- Tom Michales, project manager
- Bert Swackhamer, project engineer
- Chris Crummett and Jerry Stalder, design engineers
- Chris Finn, project leader and installation supervisor

Program content is recorded in one of three radio production control rooms and prepared with D.A.V.I.D. automation for scheduled playout. The room can also be used for live-to-air program content origination.

filled with legacy equipment when show schedule shifts occurred.

CPTV also had to consider the migration of its video assets to the new playout system. With several thousand hours of content on outdated archive systems, various scenarios were considered. Ultimately, with all the data migration methods involving data transcoding, heavy LAN bandwidth requirements between buildings and archive library database conversion, CPTV elected to re-encode the library as needed to fill the programming grid and start with a clean slate with new automation and archive management systems.

All told, the project took about a year from conceptual design to final systems implementation and testing. CPTV and WNPR now have a fully digital infrastructure that should meet their needs for years to come. BE

Tom Michales is senior project manager for Ascent Media Systems & Technology Services.

Photography by Andy Washnik, Corpricom.

Equipment list

Avid Xpress legacy systems
Cisco broadcast LAN
Clarity Lion DLP rear projection displays
D.A.V.I.D. radio automation
Dell broadcast LAN
Eastboard consoles
Imagestores
MassTech MassStore archive interface
Miranda
- K2 multi-window display processors
- Presmaster master control switcher

OmniBus Spectrum series video server
Pixel Power CG display
Radio Systems CAT-5 wiring
Raritan 64x16 KVM router
RTS/Telex intercom
Sierra Audio Systems radio routing and mixing
Sony
- DMX-R1000 digital audio mixer
- HDC-930 HD studio cameras
- HDSX-5800 SD/HD SDI router
- HDW-750 field camcorders
- MVS-8000 HD/SD switcher system
- RS-422 router

StorageTek L700 data archive
TANDBERG Television legacy encoder
Videotek VTM series test and measurement QC equipment

Centralized broadcasting

BY JOHN LUFF

Broadcasting margins have become razor thin. Cash flow is king, and the management at many group broadcasters struggles to find ways to lower costs.

Lowering labor costs likely means eliminating or combining jobs. The obvious model of how to increase cash flow is consolidation, which has happened in radio. Hundreds of radio stations that used to operate independently, with staff working around the clock, now operate as part of a centralized operations model, often unattended with local commercial insertion by automation.

Television suffers from different parameters, which govern the practicality of centralized operations. Bandwidth costs money. Radio interconnection can be done with only 5 percent of the bandwidth that broadcast-quality video takes. The struggle is to balance the increased interconnection cost against the reduction in labor, which should accrue by moving many jobs in many sites to a centralized operations center. The concept is to use a reduced number of people to monitor and control multiple stations.

Early approaches to centralized operations had interconnection to a master site using DS-3 circuits. A facility in LA provided central assembly of the output streams for more than a dozen stations located as far away as the East Coast. They planned to provide diversely routed redundant interconnection. The math is not easy. Multiple DS-3s cost a small fortune every month, especially the ones that run coast to coast. A master control operator might cost about the same as the local connection on one end of a DS-3 per month. Add the long line cost and the second local loop cost, and you must save several people to make it worthwhile to install the lines. Add to that the cost of building the centralized facility, which replaces local hardware, and it is clear there is a large hurdle to overcome — unless creative engineering is applied.

Canadian-TV uses a Leitch centralized broadcast system in its control room.

Modern technology has facilitated the possibility in many potential models, varying from simple remote control to sophisticated approaches, such as distributed broadcasting.

Remote control

The NY Times stations started using the remote control approach several years ago. Simply put, the stations retain all of their infrastructure. The hub site simply takes control of the automation and returns a monitoring feed to the hub. At low bit rates and modest quality, the hub can see nearly live return video. It can switch to backup paths, control the transmitter and complete many other necessary tasks.

A T-1, or even fractional T-1, is all that is needed, which cuts the data interconnection cost dramatically, by perhaps 90 percent. Bought on a national contract for multiple circuits, T-1 can easily be reduced to less than $500 per month for each circuit. Distance costs may increase the total.

The technical systems amount to something as simple as remote control of the automation PC from the hub and a simple monitoring station. One group broadcaster has operated several stations from a room less than 400sq ft, with a hardware implementation that cost less than $1 million for all systems combined.

FRAME GRAB

A look at the consumer side of DTV

Consumer spending per person, per year

Spending on cable and satellite TV grew 21.7 percent in 2004

Year	Broadcast TV	Basic cable and satellite networks	Premium cable and satellite services	Total cable and satellite TV	Total TV	Home consumer video	Internet
1998	$0.00	$123.26	$40.78	$164.04	$164.04	$90.82	$26.89
1999	0.00	132.60	45.08	177.67	177.67	93.35	40.55
2000	0.00	144.24	43.70	187.93	187.93	100.01	49.64
2001	0.00	155.16	47.57	202.73	202.73	114.26	68.94
2002	0.00	169.73	51.79	221.52	221.52	135.02	84.76
2003	0.00	181.09	53.56	234.65	234.65	151.94	96.35
2004	0.00	192.56	55.47	248.02	248.02	172.04	107.02
2005	0.00	203.11	57.36	261.47	261.47	188.86	117.72
2006	0.00	215.63	59.44	275.06	275.06	205.17	127.76
2007	0.00	227.74	61.36	289.09	289.09	225.51	140.15
2008	0.00	240.58	62.91	303.49	303.49	241.08	154.29

Source: Veronis Suhler Stevenson www.vss.com

Take the case of a group operation for five stations. Let's assume for sake of argument that it takes 10 people to run five stations full-time. If a master control operator costs about $40,000 annually, it is easy to see that if you can reduce the staff by five people, the net labor savings can be substantial. (See Table 1.)

The net savings are enough to make a clear business case over the life of the depreciation; the net savings makes the ROI a scrape more than 100 percent. However, there are risks. For instance, you may not be able to produce as clean and crisp on-air look and might lose some viewers. There may be more make-goods, reducing the net savings. But to reverse the decision, the risks would have to cost a lot of money.

	MCR operators	Annual cost	Total cost
Hub labor	10	$40,000	$400,000
Station labor	20	40,000	800,000
Savings			(400,000)
Interconnect cost	5	12,000	60,000
Hub depreciation (based on $250,000)			50,000
Station depreciation (based on $90,000 each)			90,000
Net savings			(200,000)

Table 1. Potential cost savings of remote control broadcast

This has been an effective operations model for McGraw-Hill, NY Times and others. But it is not likely to work well in Manhattan or LA, where the risk of loss of spots is high. In those cases, distributed broadcasting might work better.

Distributed broadcasting

Distributed broadcasting is intended to scale up to large size and produce a more reliable technical infrastructure. The concept is simple: Leave the existing station largely in tact if it is digital and can be remote-controlled. If it's not, put in the minimum amount of new hardware that is possible, but keep the network feeds that are locally received exactly as they are.

Commonly syndicated programming is received and ingested into a server at the hub and is timed and prepped for air. That content is then pushed to servers at all of the stations. The station operates with local automation, remotely monitored as with the remote-control model. Because there is no need to locally ingest syndicated programming, the only local content that must be acquired are local spots. These could be sent directly from the stations to the hub over low-speed data links using video e-mail appliances, which are readily available and could be operated from the traffic department at the station.

This model is capable of further reducing the local station staffing. The capital cost is higher for servers and other interconnection hardware. The bandwidth requirements are potentially higher depending on the amount of programming to be transferred over the data infrastructure from the hub to the stations. But still, the programming runs from local servers, not from a remote site. By eliminating the need for any local recording, there is better control over ingest of material, likely resulting in fewer make goods.

Although not a commercial station, PBS has championed a version of this approach called ACE. It allows affiliates to be unmanned, even outsourcing the monitoring and control to PBS in Alexandria, VA. Several stations have agreed to implement exactly this approach, which uses nearly identical systems at all stations to allow monitoring and remote troubleshooting to be done in the most efficient manner. A simplification of the same approach, which also uses store-and-forward techniques, is under consideration by PBS for replacement of their real-time network with non-real-time delivery to all affiliates. The technology is much the same, though high-speed data would be transferred in an IP multicast from Alexandria to all stations.

Other group broadcasters are considering a hybrid model using nearly the same hardware that this would require. At least one case consideration is being given to IP delivery over satellite, using the same DVB S2 modulation. By encapsulating the IP as MPEG and delivering this by using standardized MPEG delivery platforms, the complex design is simplified.

Centralizing business operations

In addition to the more sexy master control centralization often considered, it is important to look at the opportunities to centralize traffic, promotions and other portions of the operation that are not bandwidth hogs like video. More than one group has moved all traffic to corporate headquarters, with station traffic and sales personnel accessing the applications over thin clients. Marginal labor savings accumulate as fewer people are needed to manage a large multistation traffic operation than one at each site. Similarly, moving promotions production to a central location and delivering it with either traditional freight or file transfer technology can be attractive. The look and feel of promotions is standardized, and donuts produced from one station can be re-purposed for many more efficiently.

We may not like the dynamics of the economy we work in, but there is little on the horizon that will materially improve the problems with cash flow. As the regulatory environment and competition put more pressure on broadcasters, we will see an inexorable move to centralization, like it or not. BE

John Luff is the senior vice president of business development for AZCAR.

SEND Send questions and comments to: john_luff@primediabusiness.com

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MXF interchange: A progress report

BY TODD ROTH

MXF, the Material eXchange Format, is the industry's open file interchange format designed to improve interoperability between servers, NLEs and other devices that create and receive content. Developed under the Pro-MPEG Forum's leadership, the goal of MXF has been to create a professional and ubiquitous file format that optimizes workflows — given the complex mix of standard and proprietary file formats in use today. Because MXF files consist of both essence and metadata, the journey from content to an MXF file is highly complex, as illustrated in Figure 1, and the process must be reversed at the receiving device.

Photo: An operator uses MXF-compliant equipment to transfer stored and live production files to a Leitch NEXIO server for playout. Photo courtesy Touring Video.

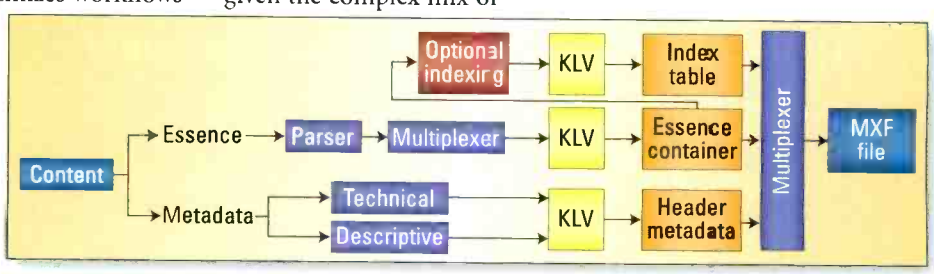

Figure 1. MXF file construction

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SMPTE document	Document title	Document status
Engineering guidelines (tutorial documents)		
EG 41	Engineering Guideline	Published 2004
EG 42	MXF Descriptive Metadata	Published 2004
Format		
SMPTE 377M	MXF File Format Specification	Published 2004
SMPTE 410M	Generic Stream Partition	Work in progress
Operational pattern		
SMPTE 378M	Operational Pattern 1a (Single Item, Single Package)	Published 2004
SMPTE 390M	OP "Atom" (Simplified Representation of a Single Item)	Published 2004
SMPTE 391M	Operational Pattern 1b (Single Item, Ganged Packages)	Published 2004
SMPTE 392M	Operational Pattern 2a (Play-List Items, Single Package)	Published 2004
SMPTE 393M	Operational Pattern 2b (Play-List Items, Ganged Packages)	Published 2004
SMPTE 407M	Operational Patterns 3a and 3b	Work in progress
SMPTE 408M	Operational Patterns 1c, 2c and 3c	Work in progress
Essence container		
SMPTE 379M	MXF Generic Container (GC)	Published 2004
SMPTE 385M	Mapping SDTI-CP Essence and Metadata into the MXF GC	Published 2004
SMPTE 389M	MXF Generic Container Reverse Play System Element	Published 2005
SMPTE 394M	System Item Scheme-1 for MXF Generic Container	Work in progress
SMPTE 381M	Mapping MPEG Streams into the MXF Generic Container	Published 2005
SMPTE 382M	Mapping AES3 and Broadcast Wave Audio into the MXF GC	Work in progress
SMPTE 383M	Mapping DV-DIF Data to the MXF Generic Container	Published 2004
SMPTE 384M	Mapping of Uncompressed Pictures into the Generic Container	Work in progress
SMPTE 386M	Mapping Type D-10 Essence Data to the MXF Generic Container	Published 2004
SMPTE 387M	Mapping Type D-11 Essence Data to the MXF Generic Container	Published 2004
SMPTE 388M	Mapping A-law Coded Audio into the MXF Generic Container	Published 2004
SMPTE 405M	Elements and Individual Data Items for the GC SI Scheme 1	Work in progress
SMPTE xxxM	Mapping JPEG 2000 Codestreams into the MXF Generic Container	Work in progress
Descriptive metadata		
SMPTE 380M	MXF Descriptive Metadata Scheme - 1 (Standard, Dynamic)	Published 2004
Dictionaries and registries		
RP 210	SMPTE Metadata Dictionary	Published, maintenance in progress
RP 224	Registry of SMPTE Universal Labels	Published, maintenance in progress
Product-specific documents		
RDD xxx	e-VTR MXF Interoperability Specification	Work in progress

Table 1. Accepted and pending SMPTE MXF standards

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From promise to standard

More than a year has passed since the official launch of MXF at NAB2004, and more than seven years have passed since actual work began. The scope of work remaining to be done in order to implement this complex standard is now becoming clear. Many manufacturers are just beginning to tackle the inter-vendor issues that will take MXF out of the laboratory, while other manufacturers' products, such as Sony's XDCAM and Panasonic's P2, are embracing the standard in acquisition products. Simultaneously, customers are beginning to understand the metadata and essence handling stages required for their MXF-centric workflows.

At this point, the adage "80 percent done, 80 percent to go" is underscored by the transition from a complete MXF specification to a usable standard in real-world production. Over the next year, one would expect to see islands of MXF interoperability slowly expand — and eventually form the infrastructure of universal file interchange as promised. Table 1 (on page 64) outlines accepted and pending SMPTE standards, and underscores the "80 percent to go" adage.

The implementation challenge

In development, the phrase "doesn't work until tested" truly applies when it comes to ensuring compatibility to a standard versus a device under test. In reality, a complex standard can't be considered complete until implementation work has proven its functionality.

In the real world, this leads from islands of interoperability to a growing web of compatible products. Customers must be careful in assuming that because A works with B and B works with C, then A will work with C.

Customer requirements will drive the standard's development, more so for compatibility between products within a competitive space. Manufacturers tend to develop compatibility with complementary products, and often, inter-vendor compatibility will be placed on the back burner until a specific customer opportunity forces the issue.

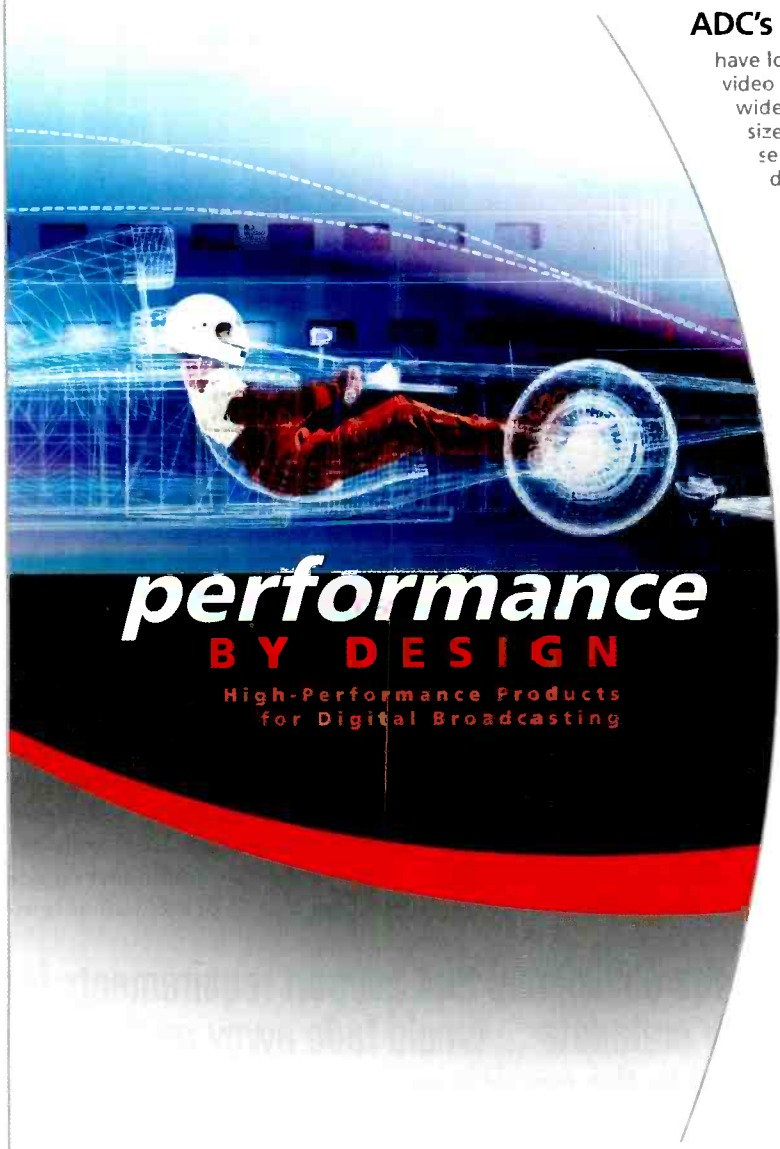
MXF is a hierarchical or layered standard, designed to support media of varying underlying complexity. Audio and video content (or essence) can be stored in multiple *file packages* (FP) within a single MXF file. The MXF file's *operational*

At this point, the adage '80 percent done, 80 percent to go' is underscored by the transition from a complete MXF specification to a usable standard in real-world production.

Additional resources

There are several professional organizations that help to foster an implementation-friendly environment:

- SMPTE, with its MXF Implementers Working Group (*www.smpte-mxf.org*)
- IRT, with an online MXF testing center (*www.irt.de/IRT/mxf*)
- MOG Solutions (*www.mog-solutions.com*) and Snell & Wilcox (*www.snellwilcox.com*), with additional development aids, MXF tools and SDKs
- The BBC, with an MXF code in the open source community (*www.freemxf.org*)



ADC's Pro Patch™ video panels

have long been recognized as the leader in video patching. Panels are available in a wide variety of configurations for rack sizes, jack types, and color options. The PPI series panels are the ideal choice for demanding professional environments:

- Durable welded-steel frames prevent bent, cracked and broken ears
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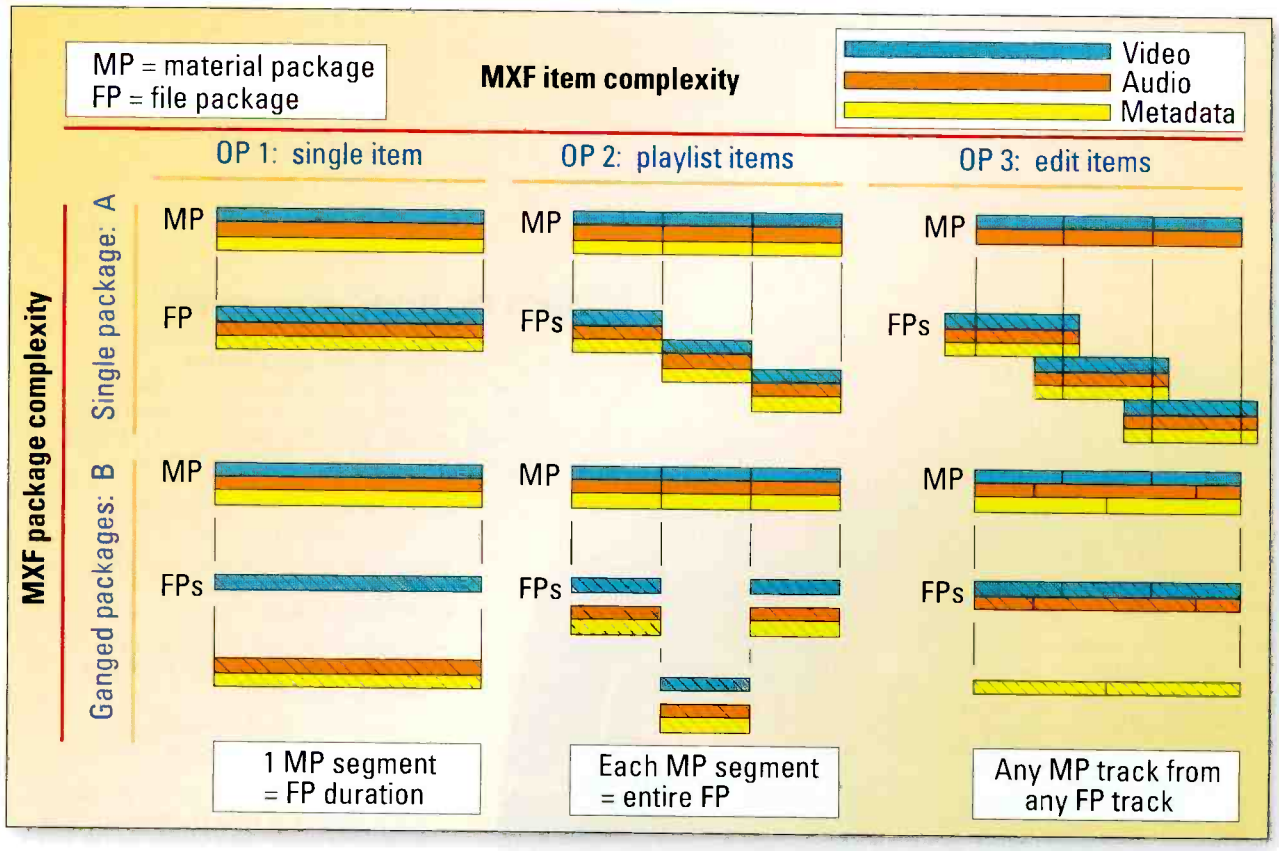


Figure 2. MXF operational patterns. The hash lines indicate source media within the file package, whereas the unshaded bars show the playback media represented by the material package. In OP1 and OP2 since all source media is included in the material package, there is a 1:1 correspondence. In the more advanced OPs, the material packaged is a subset of the source (file packages).

pattern (OP) determines how the underlying file packages are put together to form the *material package* (MP). The MP represents the playback of the file contents. Figure 2 illustrates a variety of MXF OPs and the allocations of FPs and MPs.

Within each file package, audio and video data can be interleaved, partitioned and indexed. Parameters for each of these operations can vary independently and need to be supported.

Further variety is created by the concept of OP Atom, as used in Panasonic's P2 format. OP Atom MXF files contain only separate audio or video essence and need to be associated and synchronized external to the MFX file structure itself.

Achieving MXF interchange that allows the recognition of media is only the first step.

MXF and essence

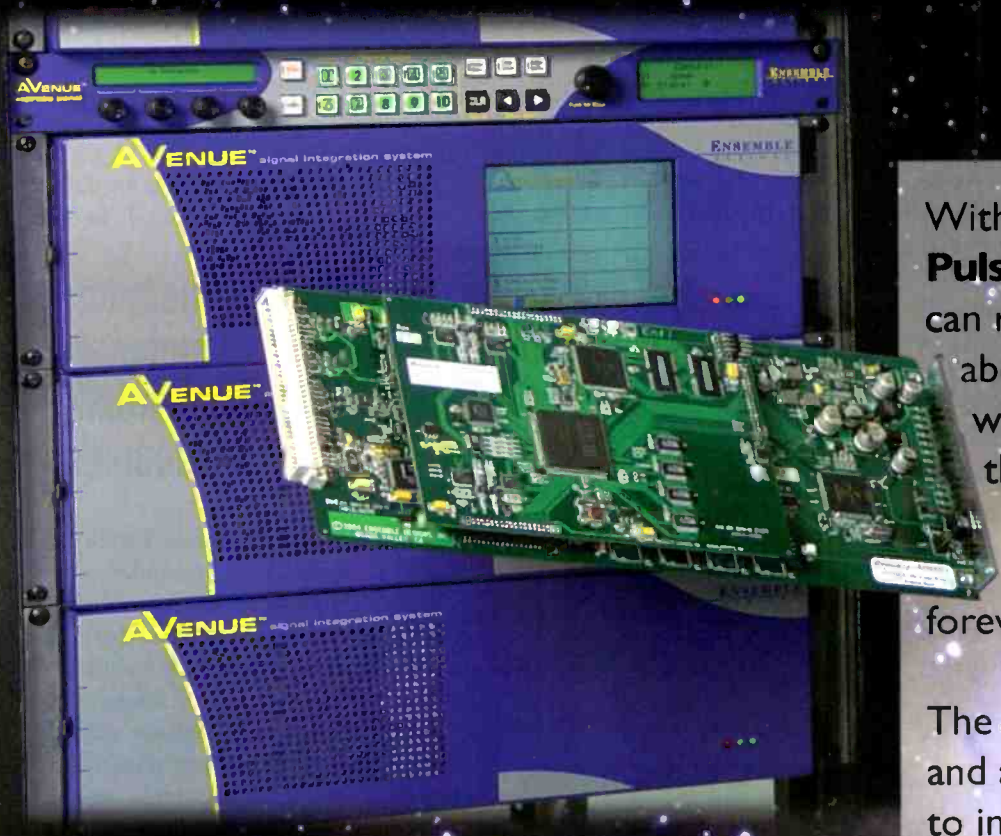
MXF does not ensure compatibility of video and audio essence — specifically, compressed essence types that require supporting codecs. As we move from hardware codecs to more flexible software codecs, the likelihood of essence compatibility increases, but even in situations where compliance has been tested, compatibility is not ensured.

From a customer standpoint, aside from MXF file compatibility, questions requiring answers abound. Is it MPEG? Are the profiles and levels supported? What is the GOP, raster size and frame rate? Is your file compatible with my device, given a particular set of criteria? Compressed audio increases complexity and further complicates timing-related concerns.

Compatibility of traditional vertical blanking data (VBI), as well as horizontal ancillary (Hanc) and vertical ancillary (Vanc) information is still being standardized within MXF — almost as an afterthought. It was envisioned that support requirements for legacy metadata, such as VBI, would fade away as this data moved to the

It was envisioned that support requirements for legacy metadata ... would fade away as this data moved to the provisioned metadata space within the MXF structure.

Don't Even Think About It



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provisioned metadata space within the MXF file structure. Again, reality meets theory — and reality prevails. Vendors are scrambling to address the issue of bundling up the entire VBI space and storing it as datablock within the MXF file.

In IMX, Sony addressed the issue of vertical blanking information by extending the active picture height (SMPTE RP202 MLMP 23f1-262 f2) of the MPEG encoded video to include the VBI in the compressed essence data. While this further violates the philosophy of separation of essence and metadata and introduces yet another variable, it does enable support for legacy VBI.

Metadata creation and data handling

MXF metadata consists of labels (keys) and values. Label sets and value units are defined in metadata dictionaries and registries, such as SMPTE RP210 and RP224; unregistered metadata labels are considered dark and potentially problematic.

The science of data handling is well-developed, and its relationship to computer-driven processes, such as searching and sorting, has been established in database programming languages. By considering all the metadata within an MXF file to be analogous to a database row, each label a column and each value a cell, rules and practices followed by database administrators are equally applicable to MXF metadata. Understanding concepts of data normalization, such as ensuring that each label can mean only one thing and contain only one value, are essential to successful implementation.

From standardized formats for date and time to actual metadata dictionaries, common sense data handling rules apply. Defining minimal and constrained metadata sets works best — too much unstructured data reduces efficiency. By automating metadata creation, efficiency can be improved, and where people are required, applications can provide template-driven interfaces and thus lower error rates.

Label sets and value units are defined in metadata dictionaries and registries ... unregistered metadata labels are considered dark and potentially problematic.

MXF metadata also lends itself well to XML representation, and SMPTE is in the process of defining a schema for its standardization. A small XML file containing just the metadata from an MXF media file will simplify many automated applications that have no need for essence.

MXF in a facility's workflow

With this background, how should a facility manager begin MXF implementation? Because considerable work remains to be done with the standard, it may be difficult to predict exactly what functionality and features might exist in a final version. Even so, that should not prevent one from taking advantage of its benefits today. The following points highlight steps that can be taken to help ensure success with an MXF installation:

- *Using unique material identifiers (UMIDs) or globally unique identifiers (GUIDs) creates a unique set of naming conventions at your facility, regardless of the data set you wish*

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L-Band Transmitter	OCCT-103000-1	10–3000 MHz
C-Band Receiver	OCCR-3442-1	3.4–4.2 GHz
Broadband Receiver	OCCR-95012750-1	0.95–12.75 GHz

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Model Number	Frequency
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OL-3442-1	3.4–4.2 GHz
OL-95012750-1	0.95–12.75 GHz

Fiber Optic Transmitter Models

Model Number	Frequency
ORT-103000-1	10–3000 MHz
ORT-3442-1	3.4–4.2 GHz
ORT-95012750-1	0.95–12.75 GHz

Fiber Optic Receiver Models

Model Number	Frequency
ORM-103000-1	10–3000 MHz
ORM-3442-1	3.4–4.2 GHz
ORM-95012750-1	0.95–12.75 GHz

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to track. Often, as is the case with a placeholder in a MOS rundown, the name is created *before* the media exists. Ensuring uniqueness in asset naming is essential to all subsequent operations.

- *Identify which portions of your workflows an MXF file transfer can replace.* Any operation that can be replaced by a file transfer bypasses generational losses and can be faster than real time. Other benefits depend on the task. For example, a file transfer directly from camera to NLE may ease logging and project organization, while MXF transfers to data archives can preserve accessibility.
- *Select the metadata that you wish to track initially, such as timecode, date and time, shooter and acquisition device.* As you refine the workflow, add additional (more comprehensive) sets, such as the media status within the workflow (e.g., original, edit, master) and a project linkage. Keep in mind what other non-direct media handling applications need to access metadata items. This could include playout automation, traffic and asset management. Be sure communication mechanisms are in place to handle this task.
- *Identify points at which metadata can be added automatically or via templates.* Examples include time and GPS location at the point of acquisition or user name via a media ingest program. Simply automatically adding a metadata item to track the device name (MAC address) that the file came from can provide value in future operations or troubleshooting. Avoid manual data entry wherever possible, as typos or failures to obey a naming convention can introduce errors and burden a search engine. Templates expedite data entry, ensure uniformity and remove error sources.
- *Because the delivered product is not likely to be an MXF file, with knowledge of the capabilities of digital receivers, determine the metadata that you want to preserve through playout or delivery ultimately to the viewer.* Metadata from earlier points in a workflow can trigger branding and graphic insertion, facilitate content protection and rights management or enable automatically embedded advertising links.

Avoid manual data entry wherever possible, as typos or failures to obey a naming convention can introduce errors and burden a search engine.

Conclusion

Given that partial MXF implementation is at hand, and full implementation among manufacturers is realistic towards the end of 2006, valuable decisions can be made at this point regarding workflows, metadata and the desired level of MXF implementation at your facility. Once you decide to implement MXF and the proper manufacturers are identified, your workflow must be modified accordingly to take advantage of vendor capabilities and limitations. With proper diligence, systematic understanding and documented requirements, an optimized workflow between ingest and storage, production and editing, as well as improved search capabilities, rights management and media tracking, can be realized. BE

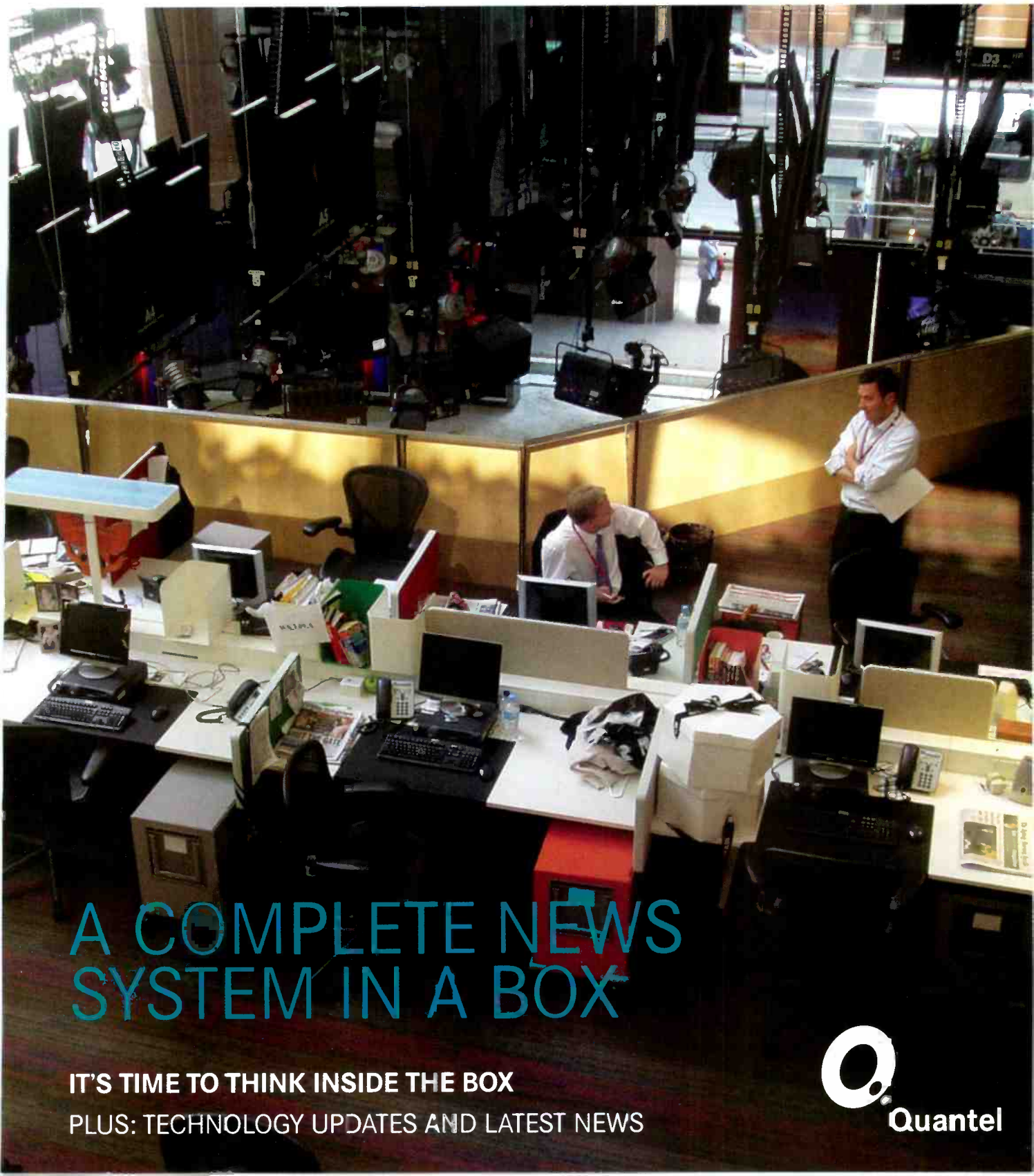
Todd Roth is vice president of technology at Leitch Technology.

INSIDE NEWSBOX

YOUR GUIDE TO INTEGRATED NEWS PRODUCTION

PICK HIT
BroadcastEngineering
IBC 2005

ISSUE 1



A COMPLETE NEWS SYSTEM IN A BOX

IT'S TIME TO THINK INSIDE THE BOX

PLUS: TECHNOLOGY UPDATES AND LATEST NEWS

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Newsbox – the big integrated news system in a little box ...from just $199K

Now every broadcaster can match the look and speed of even the largest stations. Newsbox is a complete pre-packaged system. It can be up, running and on air in just a few hours; oh yes, and every Newsbox comes with a 5 year QCare warranty. It's time to think inside the box, Newsbox.

Newsbox *is* News to Go™

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Cover image
Seven Network, Sydney, Australia

Norman Rouse

"NEWSBOX ENABLES EVERY BROADCASTER TO MATCH THE LOOK OF EVEN THE LARGEST STATIONS"

A REVOLUTION IS HAPPENING IN NEWS – NORMAN ROUSE LOOKS AT THE CHOICES

A COMPLETE NEWS SYSTEM IN A BOX

The benefits of integrated digital news production systems are now widely accepted. When designed and set up right, they get the news to air much faster, looking better and do it all more efficiently. In fact, they're every broadcaster's ticket to building ratings. But because of cost, complexity and the risk associated with customized systems, many broadcasters have yet to make the move to digital.

Products not projects

Now there's a way for broadcasters to make the move to digital a painless, fast and immediately rewarding process. Quantel has poured all its huge experience in digital news systems into the development of Newsbox. The result is a range of "out of the box" systems that are products, not projects.

Returns not risk

Newsbox is a complete, self-contained system that arrives tested and proven – ready to go on air within just a few hours straight out of the box. From ingest and playout automation to journalist and craft editing, Newsbox offers every facility of the largest customized systems. It's a risk free passport to all the benefits of integrated digital news production.

Workflow not wrangling

With five configurations in the range, there's a Newsbox that will very closely match your station's workflow aspirations. Going digital doesn't mean exactly emulating a tape-based set-up; with Newsbox you can have a smarter, more efficient workflow that enables you to maximize your resources – both human and technical. And all without the worries, delays and risks of customized technology.

So what's the catch?

There isn't one! All you have to do to get on board with Newsbox is just to think about your system design a little differently. You may well be surprised just how this compact system can deliver all the storage, editing and automation that you'll ever need. And with Newsbox, you start reaping all the benefits immediately – instant payback.

HOW BIG A SYSTEM DO YOU NEED?

THE ADVANCED QUANTEL TECHNOLOGY INSIDE NEWSBOX MEANS THE ANSWER'S PROBABLY MUCH SMALLER AND LESS COSTLY THAN YOU THOUGHT.

Try before you buy
Newsbox is so compact and simple to set up that we can bring a system right to your station and let your journalists and editors try its revolutionary workflow for themselves. You'll be amazed at just how much capability we've squeezed into such a cost-effective package.

Less than you think
Quantel has drawn on direct experience from its many news customers around the world to give you two simple surveys of your operational needs that you can carry out yourself. This way you can be confident that the system you've chosen will cover every situation you might face.

Ready to go
Now you're ready to take advantage of Newsbox's incredible low entry price tag and install sufficient technology to meet your production requirements. It's risk-free and it's working for stations across the globe.

TAKE THE SURVEYS AT quantel.com/Newsbox

Take the input survey to help you decide how many ingest ports you need at the busiest part of the day – probably not as many as you'd imagined.

And how many edit suites do you really need? Once again, it is probably less than you thought. Take our online editing survey to find the answer.

HIGHER RATINGS - LOWER COST - LESS RISK

BETTER NEWS

"WITH THE QUANTEL NEWS SYSTEM WE'VE BEGUN TO GROW OUR AUDIENCES AGAIN"

Rich Adams
KWTX General Manager

NEWSBOX IS THE KIND OF WIN-WIN BUSINESS PROPOSITION THAT BRINGS A SMILE TO EVERY TV STATION GM. NEWSBOX IS A PRE-PACKAGED, PROVEN SERVER BASED NEWS PRODUCTION SYSTEM THAT DRIVES DOWN COSTS AND RISK WHILE BOOSTING RATINGS, PRODUCTIVITY AND RETURNS.

Better returns
Looking better on air and getting more out of your resources with Newsbox means better returns – and versioning for the web and interactive TV is simplicity itself too.

Better ratings
Newsbox gets news to air faster and more reliably than ever before and keeps it looking fresh for each newscast.

Better resource deployment
Newsbox's ease of use and streamlined workflow mean better utilized, more efficient and happier staff.

Lower risk
Newsbox is based on proven Quantel technology that is powering the news operations of some of the world's greatest broadcasters. You get the benefits.

Lower overhead
Newsbox is a complete, self-contained system that eliminates most of the costs associated with the tape-based systems it replaces.

Lower cost
Starting at just $199K, the pre-packaged Newsbox ensures that server-based production need no longer be regarded as a major systems purchase.

REFRESHING NEWS

News is not only about breaking stories, it's also vital to keep stories fresh from bulletin to bulletin to your keep viewers interested – or they'll change channel.

All the tools
Newsbox has the tools, power and speed to enable broadcasters to finesse, update or simply re-tell stories quickly and efficiently, keeping audiences glued and ratings high. It's not unusual for Quantel users to re-version a typical story 20 times a day.

All the speed
And when really big news stories unfold, that number can rise dramatically. For instance, the UK's ITN produced 1280 different stories and versions in a day on their Quantel news system during the London bombings on 7/7/2005.

PROVEN WORLDWIDE

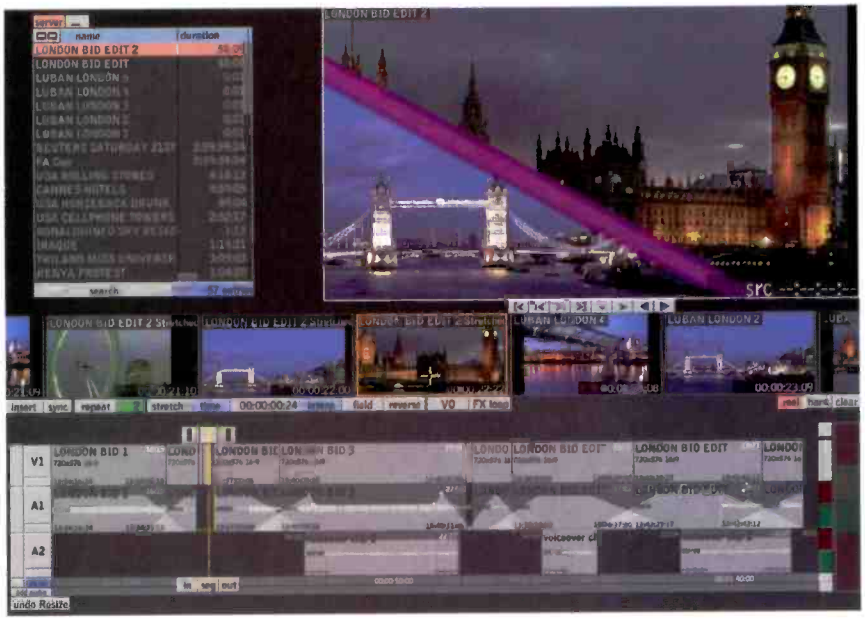
THERE ARE THOUSANDS OF JOURNALISTS, PRODUCERS, NEWS DIRECTORS AND CRAFT EDITORS AROUND THE WORLD WHO RELY ON QUANTEL INTEGRATED NEWS PRODUCTION SYSTEMS.

In the USA, customers range from ESPN (HD), Fox Digital and Fox News at a national level to local stations such as KWTX and KBTX in Texas or WFMZ in Pennsylvania.

In the UK, both national and local BBC stations as well as independent news service ITN rely on Quantel for news.

So too do many other stations around the world – from Norway's NRK and TV2, WDR, PSP and MTV in Germany, Sapporo TV in Japan (HD), CNBC in the UAE to Sky News and the Seven Network in Australia, to name just a few.

That's why when you buy Newsbox, you can be sure you're purchasing seriously reliable, capable technology – technology that has proven itself time and again in some of the most pressurized broadcast environments imaginable.



OUT OF THE BOX

WHEN YOU BUY NEWSBOX, YOU'RE GETTING A HIGHLY SOPHISTICATED PACKAGE THAT COMBINES MANY USUALLY SEPARATE CAPABILITIES THAT QUANTEL HAS PRODUCTIZED INTO A SINGLE, COMPLETE PACKAGE.

Ready to go

Newsbox arrives at your station pre-configured, tested and ready to go within hours of unpacking. Just the normal power, video & network connections and monitoring are all that are required.

Proven technology

Although Newsbox is a brand new concept from Quantel, the sQ technology upon which it is built is proven in many high pressure news and sports environments around the world. These range from local TV stations to supra-national broadcasters and everything in-between. It means that choosing Newsbox to transition your station into server based production not only takes the risk out of installing new technology; it also brings you the enormous benefit of the operational experience of thousands of Quantel users around the world – built in.

THE COMPLETE SYSTEM

IN DESIGNING NEWSBOX, QUANTEL HAS SOLVED THE BROADCASTER'S BIGGEST DILEMMA BY PRODUCING THE WORLD'S FIRST SELF-AUTOMATING SYSTEM.

Quantel has been able to do this because the underlying server technology is so smart that most of the complexity that external automation systems are usually asked to conquer is handled invisibly entirely within the Newsbox.

It's all in the box

All Newsboxes are complete, fully integrated systems that include ingest controllers, a mix of newsroom and craft editing workstations, and playout and media management. The package also includes all the necessary Quantel and PC hardware, the network switch and even the cables.

Straight out of the box

That's why Newsbox takes only hours to install and commission to get you up and running with all the benefits of integrated news production in the shortest possible time and with the least possible disruption.

FRAME MAGIC EXPLAINED

All Quantel server-based systems, including the Newsbox, use Quantel's patented Frame Magic technology to allow you to select only the clips and frames you want and to delete the rest with a simple click – no copying, no wasted time, no wasted storage. If frames are in use from a clip that is deleted, then those frames will remain on the server, guaranteed!

At its simplest level, Frame Magic means that when an edit is made between two clips of video, the edit is held as an instruction to play-out the original frames in a different order. This instruction can be given a clip name; it will then appear in a server library and can be accessed by editing workstations or played out to air.

A B C D E F	clip 1
U V W X Y Z	clip 2
X B Y C E Z	edited clip

Without Frame Magic

To place Frame Magic in context, look at servers which don't operate this system. In this example, we delete clip 1 which has been used in our edit and 'holes' appear – catastrophic in a live broadcast. Some systems protect against accidental deletion but only by keeping all master clips until the edit is deleted or by copying the edit.

	clip 1
U V W X Y Z	clip 2
X Y Z	edited clip

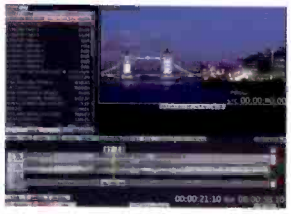
With Frame Magic

Only Quantel servers both protect dependant edited clips and instantly release unused disc space when a master clip is deleted. In this example, deleting clip 1 releases the storage used for frames A,D and F while retaining B,C and E. The edit is safe, and storage is immediately available. Sounds simple, but it's Frame Magic, unique to Quantel.

B C E	clip 1
U V W X Y Z	clip 2
X B Y C E Z	edited clip

INTUITIVE INTERFACE

NEWSBOX HAS A TOTALLY INTUITIVE USER INTERFACE – THE KEY TO UNLOCKING THE FULL POTENTIAL OF SERVER BASED NEWS PRODUCTION.



Easy to use

Newsbox uses the same progressive view/edit/craft software that is found in all Quantel sQ systems. The interface and toolset is widely regarded as the most user-friendly and easily mastered in the industry: a journalist can be confidently cutting stories with just a few days training and practise, while any craft editor who has worked with a non-linear system before will take to it immediately. Even those with only experience of linear editing systems quickly grasp its intuitive way of working.

Cross skilling

Better still, because all versions of the software build progressively on the same fundamental structure, cross skilling becomes a practical proposition. For example, a journalist can progress with ease from sQ Cut on the desktop into the craft edit room using sQ Edit Plus to exploit the greater range of creative tools available. For the same reason, training is also easy.

MEDIA MANAGEMENT MADE EASY

MEDIA MANAGEMENT CAN BE A REAL HEADACHE ON SERVER BASED SYSTEMS – BOTH IN KEEPING TRACK OF COPIES AND IN BEING ABLE TO CONFIDENTLY AND EASILY DELETE UNWANTED MATERIAL WITHOUT DAMAGING WORK IN PROGRESS.

No copies

Once again, Newsbox will put you way ahead of the game; its Frame Magic technology takes the sweat out of media management. Newsbox is a 'no copy' system – everyone works with the same original material, and the system only saves changes – not copies. That means very little media to manage for even the busiest newsroom!

No worries

'No copy' also means that users can simply identify the required sequences from recorded material and then just press the delete button, secure in the knowledge that Newsbox will automatically protect any frame that has been selected by any other user of the system.

Unlike many other systems, there is no need to re-record the selected frames or sequences first. In particular, this makes the management of timed wire service recordings a simple business, while also enabling the Newsbox owner to make maximum use of selected sections in the shortest possible time.

"IT ALL JUST WORKS, YOU ONLY NEED TO YELL IF THE BUILDING'S BURNING!"

Virgil Teter, KWTX, on the station's Quantel system

RISK-FREE NEWS IS HERE

WEB AND PDA VERSIONING

Quantel has solved the problem of multi-purposing content so that broadcasters can service more than just their broadcast news programs with Newsbox.

Every broadcaster has a news website that their viewers run on their desktops when at work etc. It's a vital part of the station's image – and outreach/service to its local community. Newsbox has the perfect toolset for quickly reversioning material and stories into a suitable format for the web – another powerful reason for choosing Newsbox.

NEWSBOX IS THE KIND OF TECHNOLOGY THAT REALLY APPEALS TO BUSY TV STATION ENGINEERS – PROVEN AND RELIABLE KIT THAT LETS CREATIVE STAFF GET ON WITH THEIR JOBS.

Newsbox is built with Quantel technology that's already being used in many broadcast stations around the world. But being a risk-free choice for engineers doesn't mean that Newsbox is outdated technology. Far from it – the Newsbox workflow is the most advanced available, anywhere, at any price.

Risk-free
Newsbox is proven technology that works right out of the box. A Newsbox system can be up and running within hours, and the easy to learn interface and controls make training a breeze.

Future proof
Newsbox can grow to accommodate HD whenever your station's ready for it; the technology is already proven in HD production.

Worry-free
Every Newsbox system comes with five years of Quantel's QCare support, so total peace of mind is included with every Newsbox system.

Connective
Newsbox has all the hooks a modern system needs, combining 'no wait' broadcast interfaces with full IT connectivity in a creative partnership that delivers the best of both worlds.

TOTAL SUPPORT

WHERE AND WHEN YOU NEED IT

We're determined that your transition to server-based news production with Newsbox will be absolutely worry-free. That's why every Newsbox system comes with five years of Quantel's QCare support as part of the package. So in the unlikely event of a problem, we're on hand 24/7 with remote diagnostics, telephone support, parts from local stores and on-site support if we can't fix it remotely.

MAKING NEWS

"QUANTEL UNDERSTANDS NEWS. WE LIKED THAT. THEY MAKE THINGS WORK."

NOW YOU CAN MAKE THE NEWS – FASTER – BETTER – SMARTER – EASIER!

Newsbox is the tool News Directors everywhere have been waiting for. The system that will transition your station painlessly into the full benefits of server-based news production.

Newsbox will help you get your stories to air faster, looking the way you'd like them to look, all created with the world's simplest to use yet most powerful creative interface.

Newsbox is the very best of server based production technology packaged up into a single, all capable system. It's everything you want to make the news – and nothing you don't.

Be faster

Newsbox has the shortest flight time from ingest through editing to air of any system in the world.

Look better

Newsbox carries the Quantel name for quality and creative tools so that you know you've got the best there is.

Work smarter

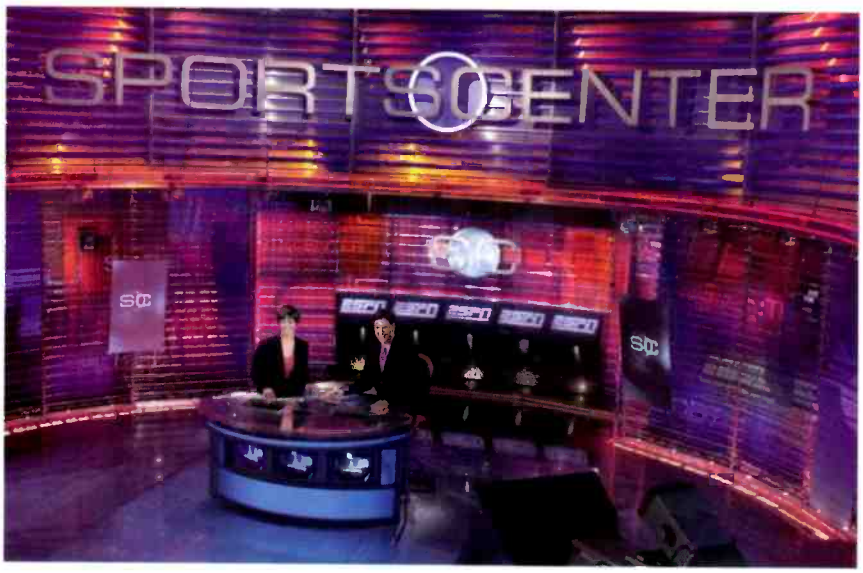
With Newsbox nothing's committed so you can re-package stories almost instantaneously to give every bulletin a fresh look.

Breathe easier

Newsbox is about story telling, not video editing. The toolset is easily mastered by journalists with no prior video knowledge.

Spend less

Incredibly, Newsbox is priced within the reach of every TV station, no matter what its market size.



"ESPN'S WORKFLOW HAS BEEN TRANSFORMED BY sQ SERVER TECHNOLOGY."

QUALITY ON SCREEN

ALTHOUGH SHOT SELECTION AND EDITING WITH NEWSBOX IS REMARKABLY EASY TO LEARN AND USE, THE TOOLS GO WAY BEYOND THE CAPABILITIES OF CONVENTIONAL TWO MACHINE EDIT SUITES.

Better stories

Not only will craft editors quickly use Newsbox's tracking, color correction, effects and compositing tools, but also journalists will rapidly gain the confidence to exploit the full capabilities of the system, producing more creatively packaged, better told stories that help to build and maintain audiences.

Winning audiences

Behind all the technology and workflow genius, winning audiences is what Newsbox is all about. Newsbox helps you get stories to air faster and looking better – gaining audience share for your station while maximising your use of valuable resources.

MAKE IT EASY

WORKFLOW – MAKE IT EASY ON YOURSELF

Thanks to its unique Frame Magic technology, Newsbox offers the shortest flight time from ingest through editing to air of any server-based production system on the market. Journalists and editors can start working with material the moment ingest begins – they do not have to wait for the complete piece to be recorded into the system.

Simultaneous users

And for a big story, that could be several journalists and editors simultaneously working with the same single piece of material while it is being ingested; no problem for Newsbox.

On air fast

For stories that require more sophisticated editing treatment, the moment the journalist has finished the preliminary cut, the craft editor can pick the job up for finessing. Thanks to Frame Magic, the finished result is then immediately ready for playout to air – no copying, no shunting between servers with Newsbox!

TV7 CHOOSES NEWSBOX

THE BRAND NEW SOFIA, BULGARIA BROADCASTER TV7 HAS INSTALLED A QUANTEL NEWSBOX FOUR AS A KEY COMPONENT OF ITS BROADCASTING OPERATION.

First choice

TV7 Managing Director, Rumen Artarski, said, "Our aim is to be Sofia's first choice for keeping up to date with what's going on both locally and internationally, and news and current affairs will obviously play a vital role in this. The Newsbox is perfect for our needs.

Ready to go

"When you're building a new operation from scratch, you don't need engineering nightmares," continues Artarski. "The Newsbox is a complete system yet it comes ready built and tested so it's ready to go as soon as we are. It's also brilliantly easy to learn and use, yet very powerful in what it can do. And because it's 'off the shelf', the price is within our small station range but still has all the facilities we will need in the future to meet our much larger ambitions."

All the news

TV7 began broadcasting in September 2005. The Newsbox is used for the breakfast show, creating and updating regular news bulletins throughout the day, the main 7pm news, a 9pm magazine programme and – at weekends – for sports programming as well. "We are certainly making the most of our Newsbox!" concludes Artarski.

"NEWSBOX IS BRILLIANTLY EASY TO LEARN AND USE"

Rumen Artarski, TV7 Managing Director

NO MORE COPYING, COPYING, COPYING

WHEN A BIG STORY COMES IN YOU'RE GOING TO WANT TO THROW MORE RESOURCES AT IT. IN TAPE-BASED SYSTEMS, THE FIRST THING YOU HAVE TO DO IS MAKE COPIES.

Same old story

In many other server systems the story's the same – the system is just not agile enough to cope without copying. Anyone who's used a conventional IT network even for sharing just documents with a few kilobytes of data knows the frustration of the 'locked for editing' message because another user is already accessing the document.

In the news environment, with Gigabytes not kilobytes of data, it means not only unacceptable delays, but also a data management nightmare in keeping track of it all.

Multiple access

But thanks to Newsbox's Frame Magic technology, no matter how many journalists, producers and editors want to work with the material, you won't need to make copies. And you'll never hear 'who's got the tape?' again!

Straight to air

And what's more, the second new edits are ready, they can go straight out to air – because unlike many other systems, Newsbox is powerful enough to incorporate editing and playout capability within the same server. This means that Newsbox gives you a shorter time to air and greatly simplified media management – all at a much lower cost than other systems.

"WITH QUANTEL WE CAN HAVE A HOME RUN REPLAY ON AIR BEFORE THE BATTER HAS REACHED SECOND BASE"

THE NEWSBOX RANGE – SOMETHING FOR EVERYONE

THE RIGHT FIT

Newsbox One
Fast turnaround treatment of breaking stories

A very compact, very powerful, production system. It's ideal for use in a studio environment for highlight production and packaging. The type of organisation who would use Newsbox One would be affiliate stations to larger neighbourhood stations, who want to have a risk free production centre, which retains the ability to be expanded as business grows. Newsbox One – a great way to experience the power of Quantel news production.

Newsbox Two
A full news production system

Designed to support the full production workflow this model can produce edited stories, news packages and show openers for a complete news programme. Newsbox Two offers more collaborative working, by having more editing seats connected. Several different projects can be processed simultaneously, and you still keep the ability to expand the system as and when desired.

Newsbox Three
For massive amounts of news production

A very powerful model for high volume news production, either supporting several daily shows or creating content for rolling news. Newsbox Three has the capability to run a complete self contained news channel for example. It can handle any news editing load - from headlines, self produced stories, packages, special programmes, investigative reports, sports reports and as many bumpers, openers and trails as the show can handle.

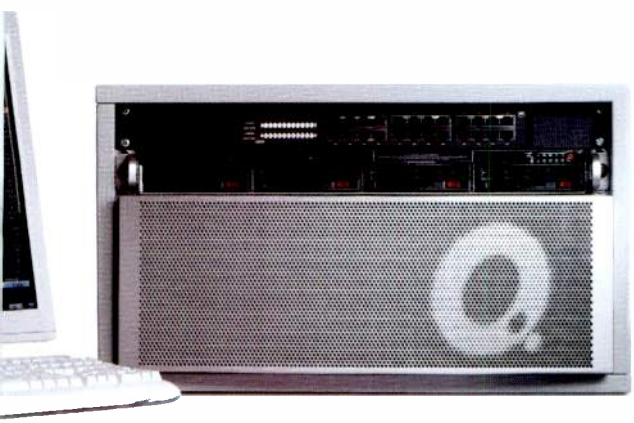
Newsbox Four
Adds NEW Paintbox for additional graphics power

Don't forget the power of close-to-air graphics, if you were going to equip a TV facility from scratch Newsbox Four is for you. The integrated Paintbox allows designers instant access to material for graphics and a completely shared workflow for editing graphic intensive packages. If you are thinking about longer form programming, with punchy graphics sequences – Newsbox Four is for you.

Newsbox Five
With the NEW Picturebox sQ graphics playout

It's the "King of the Hill" in the Newsbox range. It gives you dedicated production and the additional audience attraction value of a complete Picturebox sQ for graphics playout. Newsbox Five is a production power house enabling a shared workflow for high value graphic & news content. Sports or prime time news shows will find Newsbox Five is a self contained production centre, turning out high production value and high volume programming.

	NEWSBOX CAPACITY	INPUTS/ OUTPUTS	KEY PRODUCTS
One	sQ *30hrs* sQ Edit *2 hrs for local ingest*	QRecord QPlay	2x sQ View/sQ Cut 1x sQ Edit
Two	sQ *60hrs* sQ Edit *2 hrs each for local ingest*	QRecord QPlay	4x sQ View/sQ Cut 2x sQ Edit
Three	sQ *110hrs* sQ Edit *2hrs each for local ingest* sQ Edit Plus *2hrs compressed* *2hrs uncompressed*	QRecord QPlay	4x sQ View/sQ Cut 4x sQ Edit 1x sQ Edit Plus
Four	sQ *110hrs* sQ Edit *2hrs each for local ingest* sQ Edit Plus *2hrs compressed* *2hrs uncompressed* Paintbox *2hrs uncompressed*	QRecord QPlay	6x sQ View/sQ Cut 4x sQ Edit 1x sQ Edit Plus 1x Paintbox
Five	sQ *110hrs* Picturebox sQ *10hrs 10,000+ stills* sQ Edit *2hrs each for local ingest* sQ Edit Plus *2hrs compressed* *2hrs uncompressed* Paintbox *2hrs uncompressed*	QRecord QPlay	6x sQ View/sQ Cut 4x sQ Edit 1x sQ Edit Plus 1x Paintbox 1x Picturebox sQ



"NEWSBOX FIVE – THE KING OF THE HILL IN THE NEWSBOX RANGE"

THE RIGHT TOOLS FOR THE JOB

ALL sQ TOOLSETS ARE DESIGNED TO WORK AS PART OF A TOTAL PRODUCTION SYSTEM, IN CONJUNCTION WITH THE COMPLEMENTARY PRODUCTS TO AN sQ SERVER UNIT.

sQ View

Software application for journalists/producers to review, select shots, annotate clips and approve final edits. sQ View is the "window into the world of sQ". In news, sQ View is ideal for looking at feeds, selecting shots for headlines, or to give final approval before stories are transmitted.

sQ Cut

Software application for cuts only, very fast turnaround editing. Great audio abilities too, including voice over recording. Equally suited to craft editors, working on complex packaged stories, as well as to journalists, producers etc.

sQ Edit

Software application for general news editing with toolset optimized for news editing. Cost-effective edit workstation, with optimized features to solve day-to-day editing issues.

sQ Edit Plus

Complete editing workstation for more complex effects edits. sQ Edit Plus is designed to offer the broadcaster every effect and feature required for sophisticated packaging of promos, specials, documentaries and other complex edits.

Paintbox

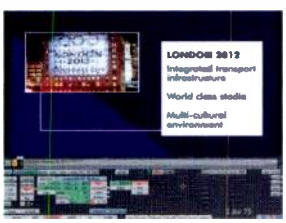
Graphics are key in differentiating your station from your competitors; the legendary Paintbox gives you a massive advantage. Everything you need for stunning graphics close-to-air – winning you market share, ratings and revenues.

sQ View

sQ Cut

sQ Edit

sQ Edit Plus



Paintbox

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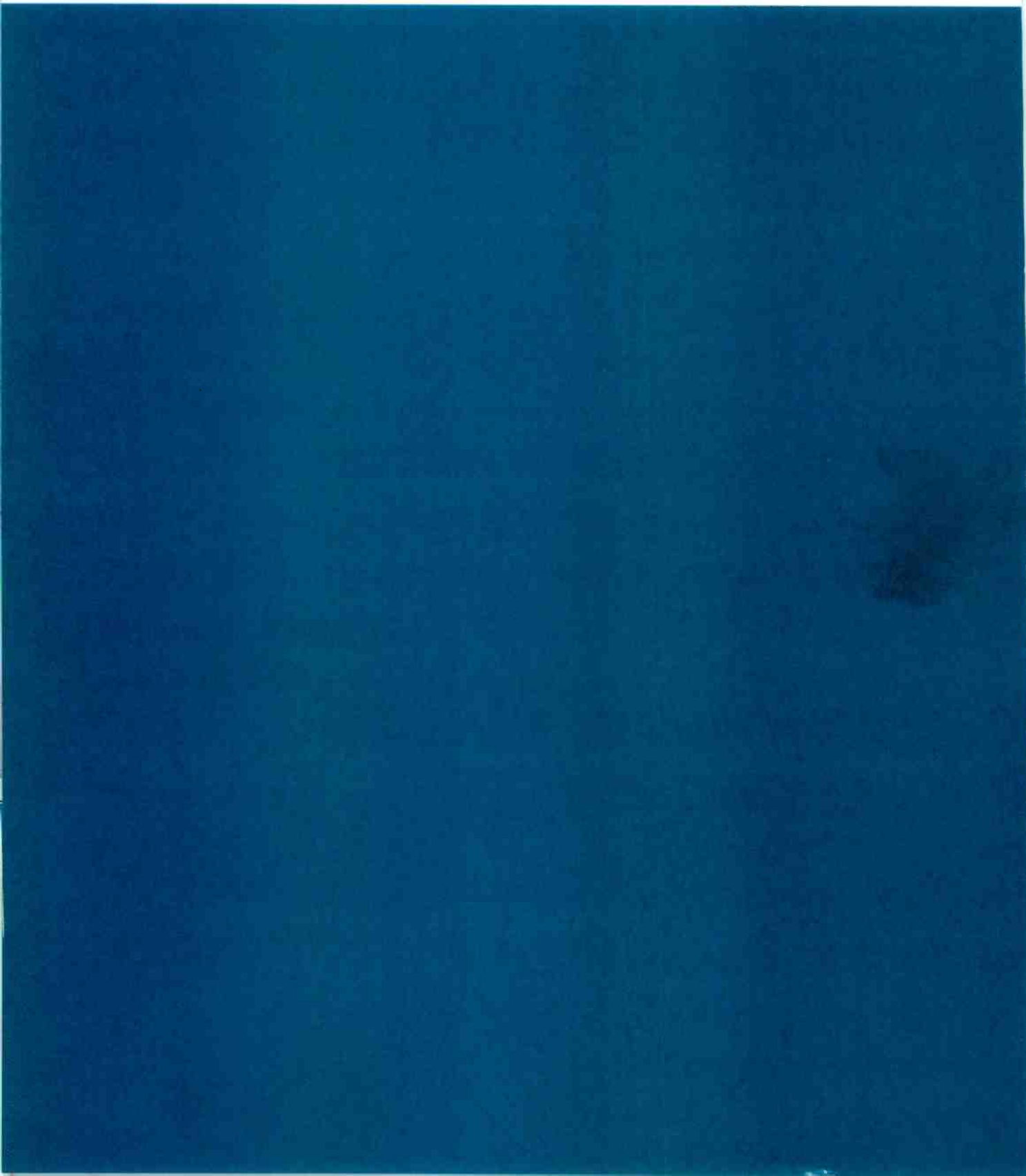

SPECIAL REPORT:

Understanding VIDEO CAPTIONING rules

BY HEATHER YORK

According to the FCC, as of Jan. 1, 2006, all nonexempt TV programming must be captioned. A simple enough statement, but one that has led to many questions. For instance, what's a nonexempt program? Do live newscasts have to be captioned? What about emergency information and the Emergency Alert System? Let's see if we can answer some of these questions because, if you get it wrong, it could cost your station plenty.

Captioning is an assistive technology designed to provide access to television for people with hearing disabilities, but the beneficiaries extend beyond deaf and hard-of-hearing viewers. Captioning is used by a much wider audience than many first think. Captions help children

It has been proven that captioning on cartoons helps children learn to read.

A real-time captioner enters words into her dictionary in preparation for a live broadcast.

All programming produced by the federal government must be made accessible to deaf and hard-of-hearing viewers.

learning to read, people watching TV in loud environments such as airports and bars, and people learning English as a second language.

Real time vs. offline

There are two ways to caption most programming: real time and offline. What's the difference?

Real-time captioning is the process where captions are added live to a program while it's broadcast. Highly trained real-time captioners listen to the program and write what they hear on a steno machine. As the captioner writes, a computer translates the steno keystrokes into English captions, which are sent via phone line or Internet connection to a caption encoder at the TV station or uplink site. There, the captions are encoded into the video, where they are visible to the entire viewing audience.

Offline captioning is the process by which captions are added to a program master. In this case, the producer or programmer sends the master or work tape to a caption vendor. There, captioners transcribe the program, breaking the sentences into readable segments following strict style guidelines. For example, captioners try to never end a line with a conjunction (i.e., and, or, but, either), and they always keep proper names together on a line (i.e., Alison Smith).

Each caption is then assigned time and placement codes so that the text appears in sync with the audio and does not interfere with the video. After several reviews, the final caption file is encoded onto a new program master. Encoding may be done by the caption vendor or the producer or programmer. This process generally takes between three and five business days.

Offline captioning is the preferred method of captioning for prerecorded programming because the captions become a permanent part of the program master. Real-time captioning is the only way to caption live programming or shows with short turnaround times.

Selecting a caption service provider

Finding a good caption service provider can seem like a daunting project. As you do so, remember to look at more than price alone. Here are some key points to consider when searching for a caption vendor.

Quality. Will the caption vendor guarantee accurate captions? Are the real-time captioners registered professional reporters? Does the vendor use subcontractors or employees?

Emergencies. Will the caption company guarantee to be available for emergencies? Is there an extra charge for on-call availability?

Technical expertise. Does the company have a full-time engineering and systems department available 24/7? You may be surprised at the questions on captioning your own staff can't answer. You'll need help.

Turnaround. How fast can prerecorded programming be captioned? Three to five business days is standard.

Capacity. The FCC mandates affect all broadcasters and most programmers. That's especially the case beginning in 2006. Is your vendor big enough to handle your programs among the onslaught of new captioning demands? Do you have a guarantee of service?

On-air examples. Can you see live samples of the caption company's programming? Often watching nationally captioned programming side-by-side from several vendors will show you right away who offers the best captioning.

Company history. How long has the company been in business? Can it provide referrals from other customers? Is it financially sound?

Extra services. Can the caption company encode your captions if necessary? Does it have a presence, or can it support any station outreach efforts in the deaf community? What other services can it provide?

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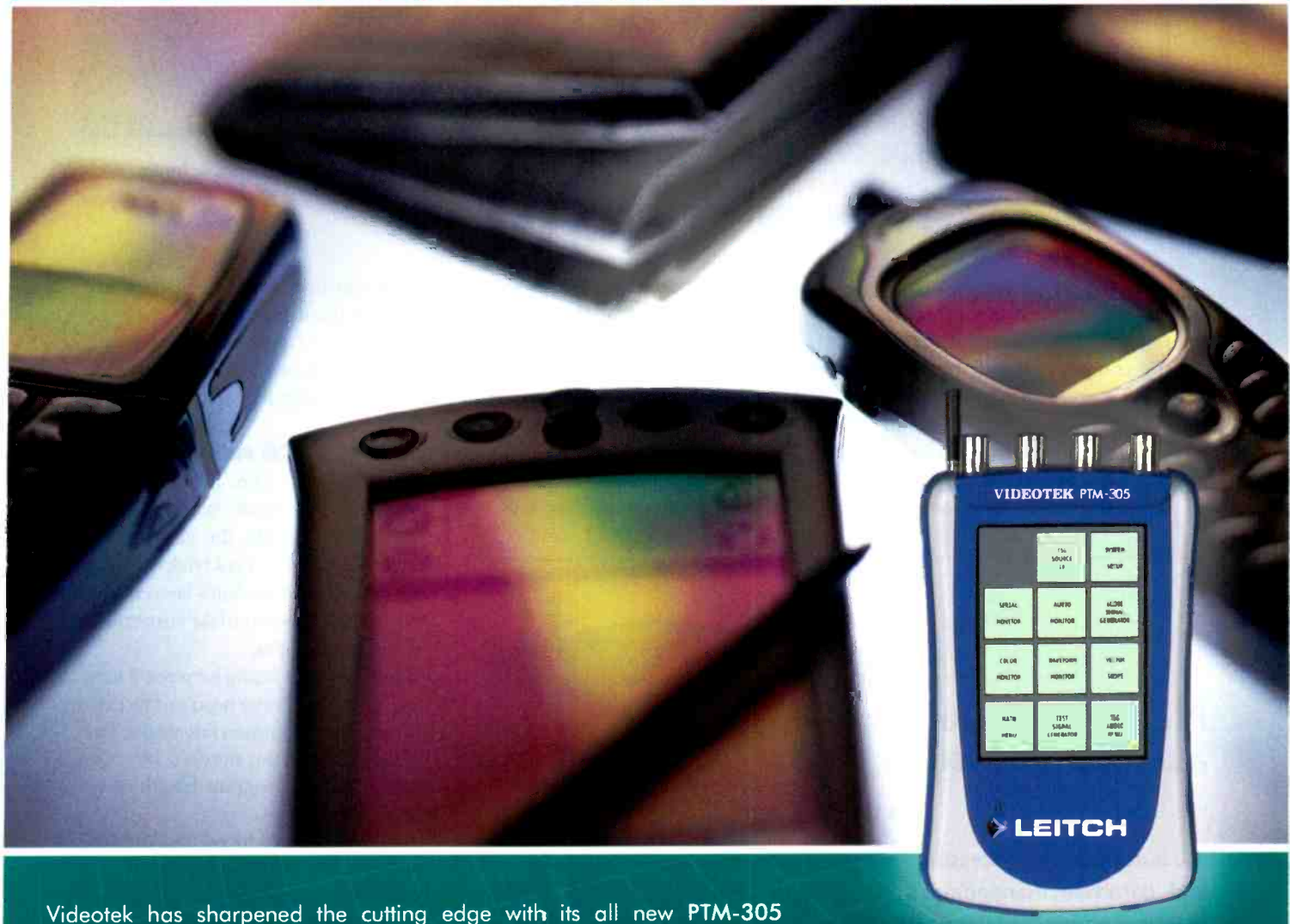

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POTENTIAL CAPTION AUDIENCE

80 Million	Baby boomers with potential age-related hearing loss
28 Million	Those who are deaf or hard of hearing
28 Million	Foreign-born Americans, many who speak languages other than English
18 Million	Children under the age of 5 who can use captions to improve reading skills
3 Million	Schoolchildren with limited English proficiency
1 Million	High noise locations, such as fitness centers, airports, bars, hospitals and other public places

Offline captioners spend hours deciphering audio.

Adding captioning to any program is best handled by knowledgeable captioners from a reputable captioning company. Skilled real-time captioners are typically registered professional reporters who spend years updating their dictionaries so that any word spoken in a program will be automatically translated by their software. Updated dictionaries result in more accurate captions.

Professional offline captioners usually spend at least three months in training, where they not only master English and spelling, but learn to consider important details such as reading rates and caption speed. Good caption companies will not allow real-time captioners to go live without them first proving they can maintain a 97 percent accuracy rate. For more tips, see "Selecting a caption service" on page 86.

Now, the FCC rules

As of Jan. 1, 2006, all nonexempt programming must be captioned. Before delving into the exemptions, please note that this is a tricky area, so check with your station's lawyers and the FCC Web site to make sure you're following the rules.

Programming airing between 2 a.m. and 6 a.m. local time need not be captioned. Also, commercials under five minutes' duration needn't be captioned. If it's a program-length commercial, caption it.

Most locally produced and distributed non-news programming with no repeat value need not be captioned. For example, if you broadcast high school or college games, it probably doesn't need to be captioned. However, if you feed those programs to other stations, you have to caption them.

Instructional programming produced by local television stations for use in grades K-12 and post secondary schools is exempt by the FCC. However, many states require schools to air only captioned video, so check with your Department of Education.

Any programs originating in languages other than English or Spanish are exempt. If you are broadcasting only in Swahili, you're off the hook. But if you broadcast in Swahili and English, you

Satellite dish farms allow caption companies to receive signals from many sources.

will probably have to caption the English portion. Also, programs shown on new networks for the first four years of the network's operations are exempt. This caveat allows Al Gore's new *Current TV* channel to be exempt.

Public service announcements and promos shorter than 10 minutes are exempt unless they are federally funded or produced. There are a few other minor exceptions, so check out the rules before you decide how to handle the programs.

Newsroom captioning

Currently, stations outside the top 25 markets may use newsroom captioning to meet the requirements. Newsroom captioning means that the captions are fed from newsroom software directly to a line 21 caption encoder. It's important that stations using this type of captioning prescript as much of their programming as possible, including weather and sports. This way, the entire newscast will count towards the FCC requirements.

Stations outside the top 25 markets may use newsroom captioning to meet the requirements.

FCC rules do not permit the four major national broadcast networks (ABC, CBS, NBC and FOX) or their affiliates in the top 25 television markets to use the Electronic Newsroom Technique (ENT), or the newscast script. Also,

Know the rules

Real-time captioning can be added easily to any satellite broadcast or teleconference.

According to the Telecommunications Act of 1996, all video program distributors (cable operators, broadcasters, satellite distributors and other multichannel video programming distributors) are required to phase in closed captioning of their television programs according to benchmark dates. Currently 1350 hours of new programming per channel per quarter and 900 hours of Spanish programming per channel per quarter must be captioned. As of Jan. 1, 2006, all new programming, with some exemptions, must be captioned. And Spanish captioning requirements will increase to 1350 hours of programming per channel on Jan. 1, 2007. All Spanish programming, with some exemptions, must be captioned by Jan. 1, 2010.

For all the rules, the FCC's guide on captioning can be found at http://ftp.fcc.gov/cgb/consumerfacts/closedcaption.html.

national non-broadcast networks (any cable system serving at least half of the total number of households subscribing to video programming services) may not count live news programming using ENT toward its captioning requirements. Rather, these networks and their affiliates must provide real-time captioning for their live news programming.

Captioning increases audience size by as much as 10 percent, increasing sales.

On July 21, the FCC announced that the commission will review current closed-captioning rules in response to a petition from the deaf community lead by Telecommunications for the Deaf, Incorporated (TDI). TDI is asking for changes in captioning regulations, including the monitoring and reporting of captioned hours, caption accuracy, whether or not the ban on newsroom captioning should be extended to all markets, and revising complaint procedures for the viewing public.

Emergency information

Probably the most important captioning a station can do is for emergency information. The FCC requires that emergency information be made accessible for deaf and hard-of-hearing viewers. Emergency information is defined by the FCC as "information that helps to protect life, health, safety or property. Examples include, but are not limited to, hazardous weather situations such as tornadoes, heavy snows, hurricanes and earthquakes, and dangerous community situations such as the discharge of toxic gases, widespread power failures, civil disorders and school closings."

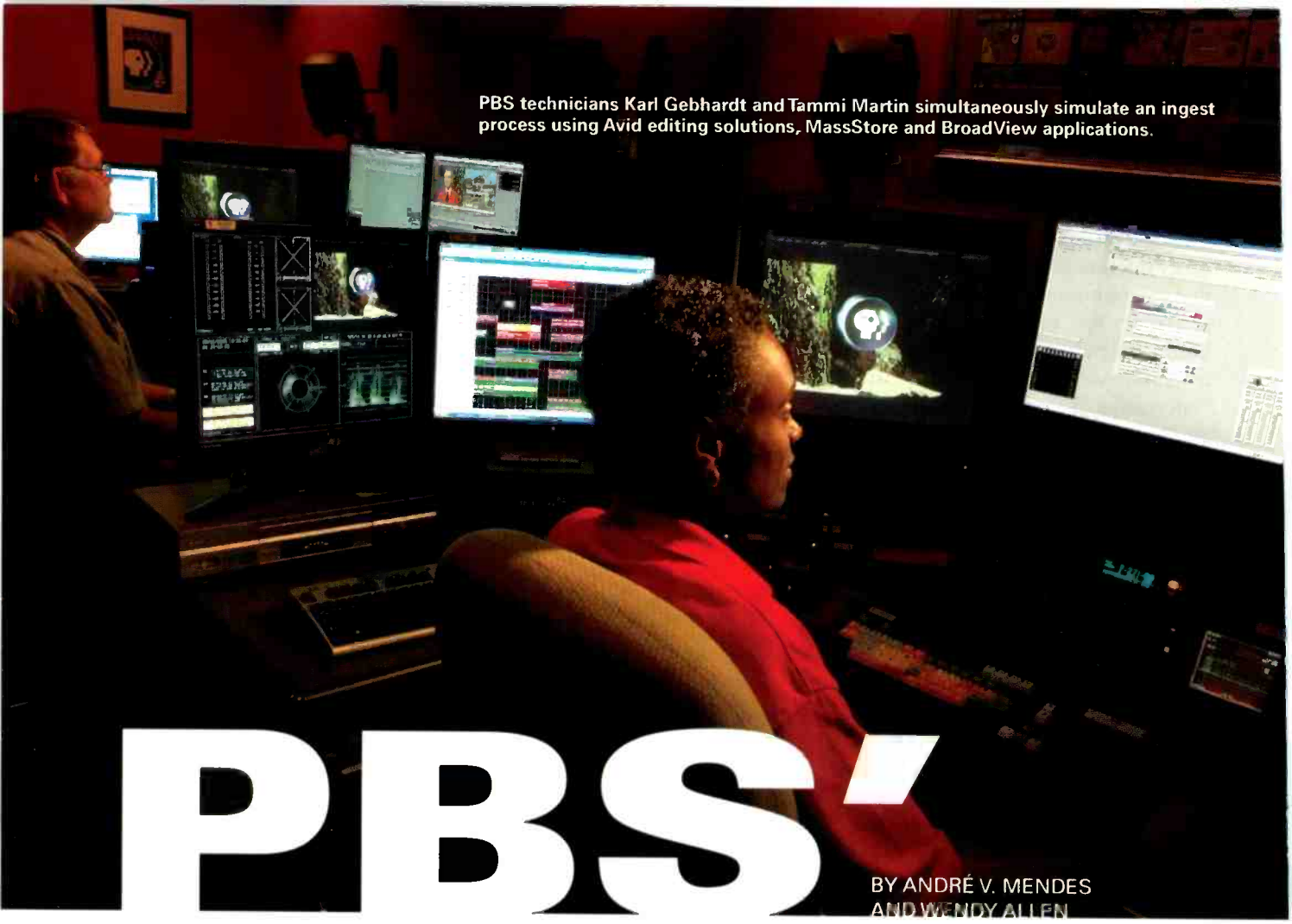
These particular requirements have been cause for alarm this year because the FCC has fined six stations, each between $8000 and $24,000, for failure to provide information in an accessible manner. In each report, the FCC detailed instances where emergency information was spoken (evacuation guidelines, hurricane protection tips) yet that same information was not provided in a visible form.

The FCC has fined six stations ... for failure to provide information in an accessible manner.

It's important to note that with emergency information, making it accessible does not necessarily mean it must be captioned. If the audible emergency information presented is simultaneously represented in visual form, be it with captions, graphics or crawls, the program provider is meeting accessibility standards. The best practice for broadcasters is to not only call the caption company as soon as an emergency occurs, but to make it a standard operating procedure that complete emergency information be repeated in graphic form at least until real-time captioning has started.

Mandates aside, adding captions is one of the easiest and least expensive ways to increase your audience. Other assistive technologies can do the same, including video description for the blind, Spanish captioning for Hispanic viewers and subtitles for audiences that speak other languages. All of these options will help broadcasters and programmers spread their message to a larger audience, and they are well worth the cost. BE

Heather York is an account executive for VITAC, a captioning provider.



PBS technicians Karl Gebhardt and Tammi Martin simultaneously simulate an ingest process using Avid editing solutions, MassStore and BroadView applications.

PBS' integrated file-based workflow

BY ANDRÉ V. MENDES AND WENDY ALLEN

The entire broadcast industry is rapidly developing and moving to a server- and file-based environment with more emphasis placed on the technical integrity of the content. Just as important, an emphasis on the accuracy and completeness of the accompanying metadata is also emerging.

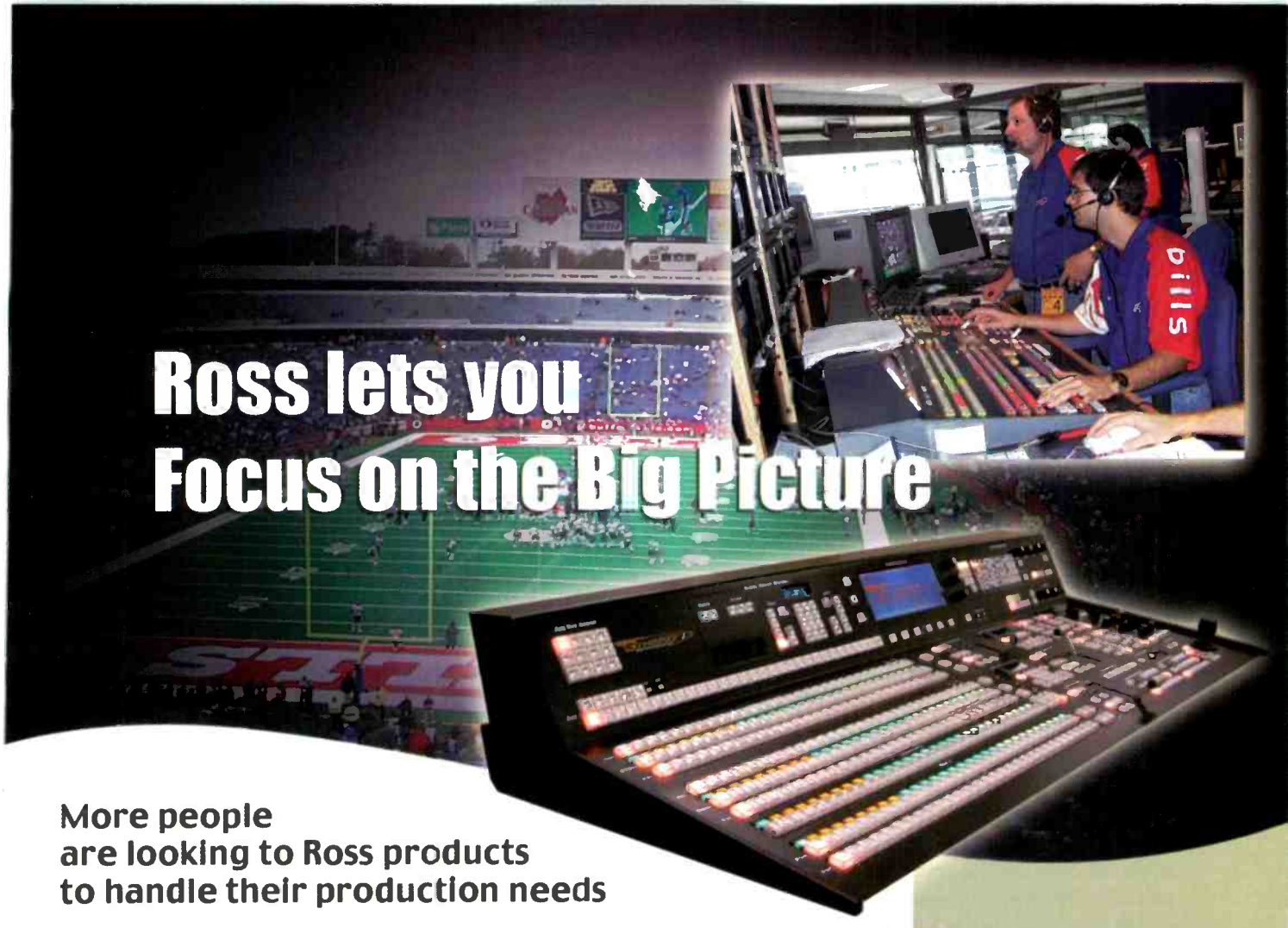
The PBS Media Operations Center recently completed the engineering, testing and deployment of a digital, server-based content ingest and editing facility. Designed to decrease and eventually eliminate the use of standard videotape, this facility aims to minimize the re-entry of content-related data, substantially curtailing the potential for data-entry borne inaccuracies while simultaneously allowing for future metadata-driven content changes and automated program reassembly via frame-accurate content segmentation.

The ingest system design is a clear departure from the standard hardware-driven signal paths into an intricate choreography of software, messaging, middleware and hardware interactions. These interactions are commonplace in standard manufacturing environments but have been missing up to this point in the broadcast environment. In fact, PBS has designed a system that totally integrates a scheduling and trafficking software program with what has traditionally been known as a post-production environment. To the user, the integration appears seamless, starting with the process of receiving metadata and a file or tape of a program through ingest of the content and on to play out for air.

The ingest system design is a clear departure from the standard hardware-driven signal paths into an intricate choreography of ... interactions.

Upstream process

The ingest process starts well before any source material arrives at PBS when the producer submits a Media Inventory via the Web containing frame-accurate program metadata into the BroadView Software scheduling and traffic system. The Media Inventory is reviewed and later approved by the PBS programming department. Upon approval, as part of the process and also via the Web, BroadView provides the program



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PBS video technician Bill Andrea simulates the ingest process using Avid, MassStore and BroadView applications.

producer with a printable bar-code label that is then affixed to the program tape prior to submission.

The tape arrives at PBS and is scanned into the tape library. One single click of the bar-code scanner unleashes processes in several connected databases that are then used to track content, allocate physical and human resources and maintain a reliable connection between program essence and its accompanying metadata. The scanning of the bar code automatically changes the BroadView media status from "Awaiting media" to "Arrived" and proceeds to trigger two separate downstream processes.

The first process uses standard Avid application program interface (API) calls to create an advanced authoring format (AAF) file with all of the necessary program metadata in the Avid Unity catalog system. The second process uses XML-based messaging protocols and Microsoft's BizTalk and triggers a message into ScheduALL, which then creates an ingest work order with the status as "Scheduled."

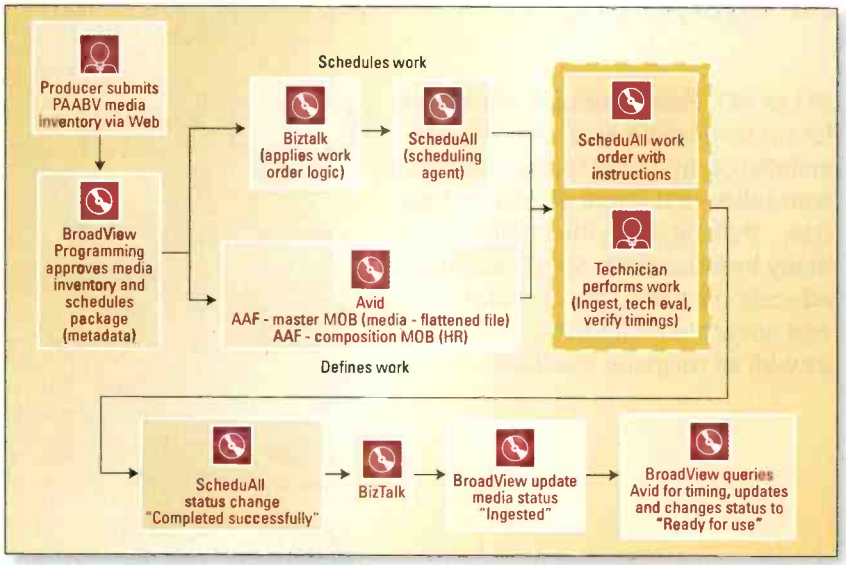

Figure 1. Metadata workflow

The work order contains all of the relevant instructions for the technician to perform the technical evaluation.

When a technician arrives for his or her shift, the ScheduALL work orders automatically triggered by the arrival of media have been prepared and clearly lay out all the tasks for the day. If the technician opens a work order that requests a program be ingested from one of the Avid Media Composer Adrenaline Ingest/QC stations, the technician logs into the Avid Unity system via MediaManager, drags and drops the BroadView-created AAF file into its workstation and follows the step-by-step ingest procedures as prescribed by the metadata contained in that particular ScheduALL work order. (See Figure 1.)

Ingesting's technical apparatus

During the ingest and technical evaluation process, a technician uses three devices to ensure that PBS technical operating specifications are met. They are the Avid Media Composer Adrenaline, a VideoTek VTM 440 and the Dolby LM100.

The Avid environment was selected as the Ingest mechanism because it provides the economical ability to accomplish both ingest and editing using the same tools and the same streamlined workflow in SD and HD. The media composer environment also provides media management solutions.

For example, file submissions follow the same process as tapes. As the source material is ingested into the Avid environment, the technician performs a comprehensive technical evaluation. Then the technician checks the appropriate Avid locators that define the ins and outs of every segment in the program. These locators were initially defined by the producer in the Media Inventory and carried through by BroadView into the AAF structure. The technician may move the locator's ins and outs a couple frames in either direction to ensure that the audio and video represent clean segment breaks.

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PBS editor Robert Sottile streams three channels and takes an IMX50 50MB file and rerecords it to an 8MB file in the flattening room.

An instance of when this may occur would be when the segment break was stepping on the secondary audio program, which occurs on channel four for PBS. By moving the locator, the technician could prevent a problem that would result in an audio burp in repackaging the program at a later date. These frame-accurate in and out locators are used to automate the replacement of such program elements as underwriters, schedule-specific promos and other dynamic spots.

The VideoTek VTM 440 with the SpyderWeb software interface provides an electronic measurement of video and audio. The Dolby LM100 measures the perceived loudness of dialog. These devices are calibrated based on PBS technical operational standard parameter settings. Logs are generated by each of these devices and become part of the metadata associated with the ingested material.

Once the ingest task and technical evaluation are completed, the technician changes the ScheduALL status to "Completed successfully," which automatically updates the media status in the BroadView program to "Ingested" via an XML BizTalk message. It also signals BroadView to query the Unity and extract the timing information from the locators to update its database. At this stage, the program is available for review by the programming department or any other authorized user via Avid's MediaManager high-resolution Prolog browser.

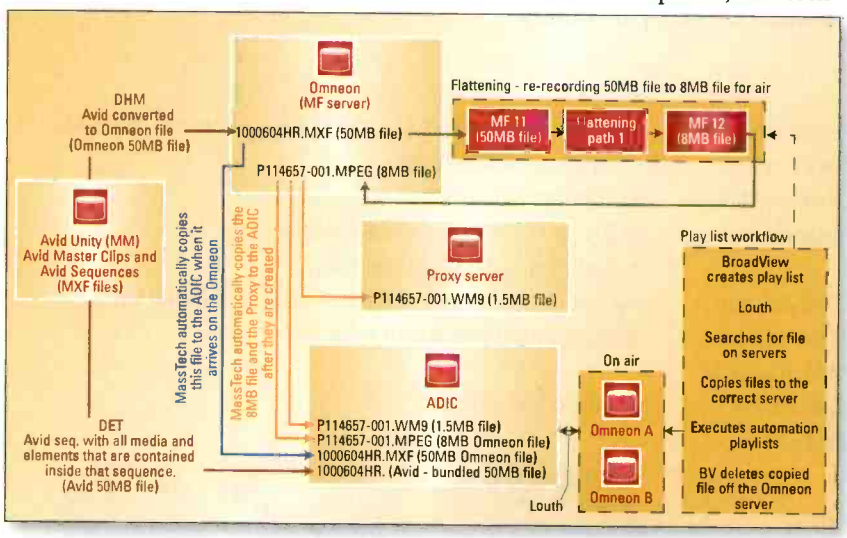


Figure 2. File movement

Archiving for later editing

A program is archived with all of its related Avid metadata in an I-frame only, MXF-wrapped IMX50 file. This relatively high bit rate will allow subsequent changes to be made, if necessary, to the actual program content without sacrificing picture quality.

Simply by right clicking on the completed file sequence name and selecting the "Send to workgroup" (archive) option in the Avid editor, the operator invokes the MassTech SAvI option that interfaces Avid's Transfer Manager with the MassStore archive manager. This interface uses Avid's dynamically extensible transfer API to move Avid media objects in native Avid MXF file format between the Unity and the MassTech system.

MassTech first moves those media objects from Avid Unity to its nearline cache and later to PBS' LTO-based ADIC Scalar 10K data tape library, while simultaneously updating its database to reflect the addition and location of these assets. This lower-cost tape archive effectively and economically extends the storage capability of the high-performance Avid Unity storage subsystem. Currently, these FTP-based Avid-to-MassTech transfers are occurring at approximately three times faster than real time, a higher rate of speed than PBS had originally expected.

Later on, if content features need to be added to that program, for example closed captioning or descriptive video services (narration tracks

for the sight impaired), or if the program needs to be edited for content reasons, such as language or nudity, several events occur. First, an edit request would be created in BroadView, which holds the media status as "Ingested." This request would initiate a message to BizTalk. Second, BizTalk would send an XML request to MassStore, triggering the automatic restoration of the program from the ADIC tape library back to the Avid Unity. BizTalk would also send a message to ScheduALL, triggering an edit work order with the proper instructions. When the editor arrives for his or her session and opens the appropriate work order from ScheduALL, all the required program material has already been loaded and is available on the Avid Unity in native Avid MXF format, making far more efficient use of the editor's time and unique talents.

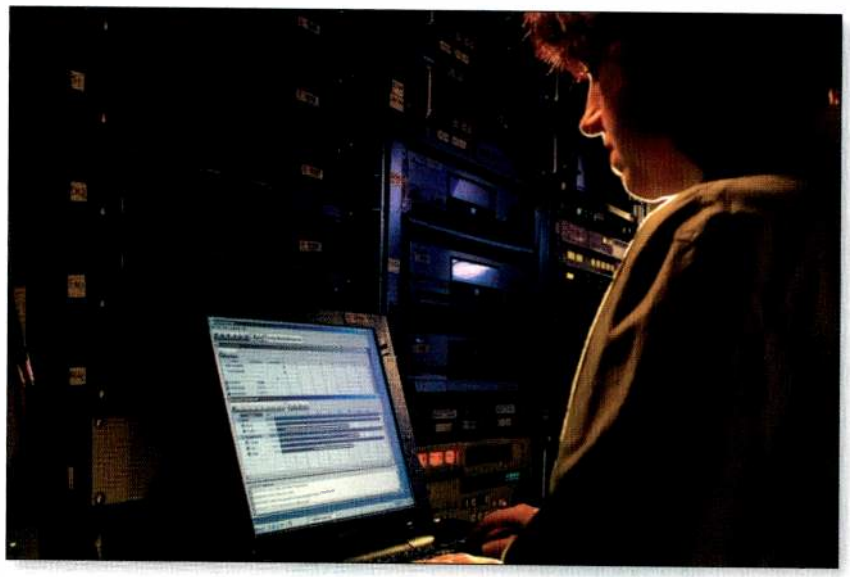
Archiving for content packaging

After completion of the archiving in the Avid format, the technician will initiate a second process using the Avid FTP service through Transfer Manager. This FTP service transfers the file to an Omneon server in a 50Mb/s MXF format (OP 1a). Immediately upon arrival on the Omneon server, the file will automatically be archived to the ADIC tape library via MassTech's MassStore archive software. At a later date this file can be repurposed in an automated process when the program is repackaged.

Repackaging entails the producer switching out underwriters' spots within a program (historically underwriters have been part and parcel to the program). These underwriters' spots are defined by the producer in the BroadView Media Inventory as segments. The process of removing an underwriter spot and replacing it with a new spot can be accomplished strictly in software by creating a new package in BroadView. One can drop the metadata for the original program essence and add the metadata for the new underwriter spot, letting the scheduling software and automation actually stitch the new program together by following the timings from their respective metadata. Termed flattening, this automated process ends the hours and hours of content re-ingestion, editing room manipulation and tape recreation.

Archiving for content distribution

When all the needed media for a program has been ingested, BroadView triggers a series of automated events to create the final program file for distribution to PBS stations. BroadView generates a series of playlists that are executed in the flattening



PBS director of the Media Operations Center Wendy Allen does management file transfers in the storage and networking room.

process. This process consists of the 50Mb/s file being played out, stamped with the appropriate V-chip, Nielsen and other pertinent information and then immediately rerecorded at PBS' standard MPEG distribution rate (8Mb/s for 4:2:0 video and 4Mb/s for uncompressed audio for a total payload of 12Mb/s).

tored by Evertz AVM 7760s to ensure that all of the expected audio, video, V-chip and captioning are present on the final distribution file.

When the distribution file recording is finished, MassTech will initiate another archiving process, creating now a third instance of the content in the library, albeit this one at a lower bit

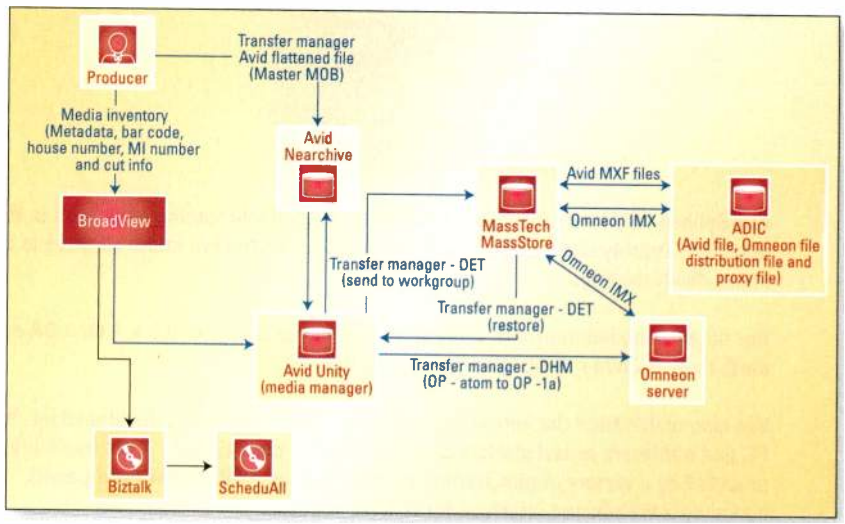


Figure 3. System design

The flattening room consists of automation control and the monitoring of three channels of Omneon play out, record and review ports for the packaging of programs, as well as a fourth port dedicated to dub creation. The flattening process is monirate. The file is then moved to the network operations center for both real- and non-real-time distribution.

These files will be repeatedly leveraged in our standard schedules, via future next-generation interconnection system using user datagram protocol multicast over satellite or even in on-demand member station requests fulfilled via Internet-based broadband connectivity.

Archiving for proxy viewing

In addition to the archiving process, the completed recorded distribution file triggers the creation of a Windows Media proxy, encoded at 1.5Mb/s. This proxy file is available at the desktop of PBS content screeners by virtue of dual high-quality flat screens. Every program aired by PBS can then be screened, flagged and annotated for content. This proxy viewing is triggered simply by clicking on the appropriate program in the BroadView schedule and selecting the "View media" option. The proxy is also archived in the tape library creating now a fourth copy of the content in the tape library.

When all is said and done, there are four different copies of each program in the tape-based archive. Each has unique characteristics that make it well-suited for a specific purpose, but each one carries with it the objective of leveraging one initial ingest and quality control cycle across the program's lifespan. In combination with frame-accurate, complete and coherent metadata, PBS expects to generate substantial savings in time, materials and human resources, while significantly reducing the number and gravity of metadata-related on-air discrepancies. In addition, it is expected that the elimination of codec cycles will continually increase the technical quality of the programs delivered to PBS member stations.

Creating a collaborative work environment

As you would expect in a system that integrates so many software and hardware providers, the overwhelming majority of problems were centered around the interfaces between these systems and the ability to accurately and succinctly describe what PBS wanted to accomplish. Using the proper terms to describe functions

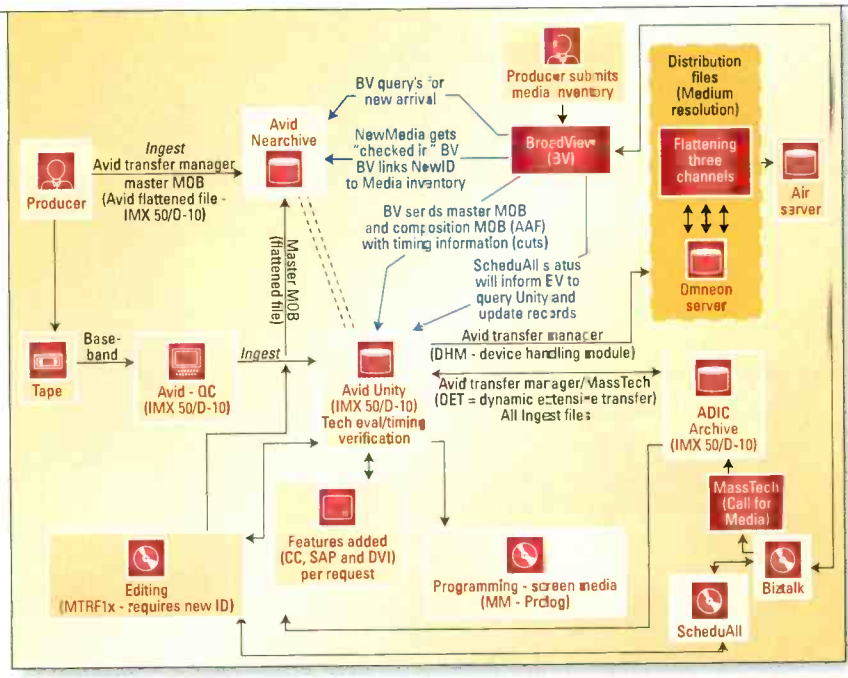


Figure 4. System integration

and data points across so many vendors was challenging.

The skills needed to address the entire system ranged from such classical broadcast engineering issues as drop frame time code, the relative infancy of MXF and 16-bit versus 24-bit audio, as well as typical IT concerns, such as database constructs and optimization, message passing protocols, hardware RAID optimizations, fiber-optic IP networking, sub-netting and access control lists.

Combining the finest broadcast hardware, operations management and engineering know-how with the best practices from the information technology and enterprise application integration disciplines, the Media Operations Center has enabled a revolutionary set of automated, radically streamlined and, ultimately, far more efficient content processing workflows. It required tremendous dedication by an enormous number of PBS personnel, vendors and consultants. BE

André V. Mendes is chief technology integration officer and Wendy Allen is director of the Media Operations Center for the Public Broadcasting Service.

The new playout facilities at Turner Broadcast System in London feature Pro-Bel automation.

Broadcast automation: The next challenge

BY NEIL MAYCOCK

Broadcast automation has been with us for many years now, and it has evolved rapidly. Many broadcasters are now on their second or third generation of products and have experienced the joy of rolling out these ever more complex software systems.

As facilities move forward, there are several more changes through which the industry must transition. Let's examine them briefly.

Stages of broadcast automation

Broadcast automation can broadly be categorized into a series of three generations:

• *Tape:* The challenge of early automation was to reliably and frame-accurately synchronize multiple devices in order to play out a schedule. This generation culminated in large cart machines typified by the Sony LMS.

• *Tape/server hybrid:* With the advent of video servers in the mid-1990s, broadcasters moved to hybrid playback systems, with short-form material played from servers and long-form material still played from tape. The reason for the hybrid approach was that servers were still too expensive to be used for long-format content. The advent of video servers also required new management software to track the many files across servers.

• *Tapeless:* Many current automation projects are now focused on moving to entirely tapeless workflows. With this approach, the content is usually delivered electronically directly to playout systems, typically from a satellite ingest platform.

Of course, this view of broadcast automation as represented by three generations of technology is a bit of oversimplification. The reality is that all of the above required that many other device control issues be addressed throughout the playout process — from master control and graphics to closed captioning and other ancillary data streams.

The automation of many of these

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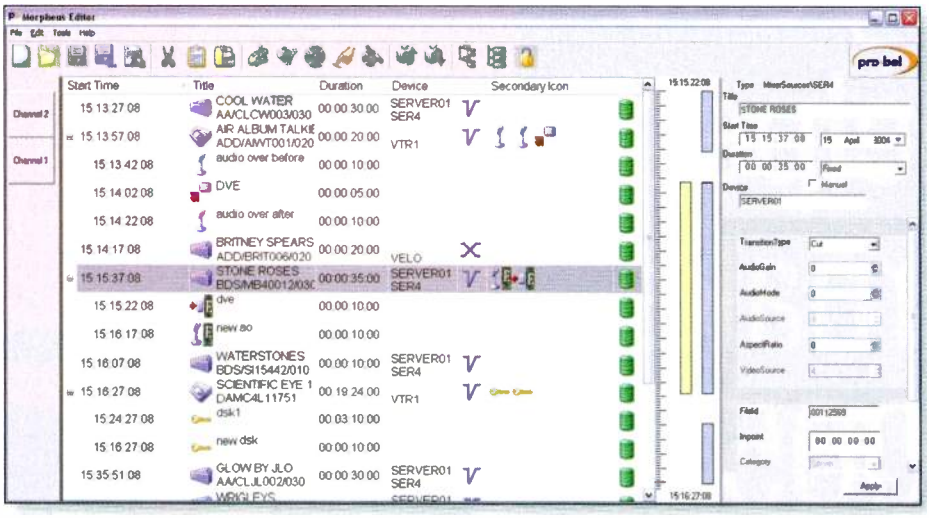
devices has introduced the requirement to play out events in parallel, commonly referred to as secondary events. A simple example might be control of a downstream keyer during a program to turn a station logo on and off. While we're still solving the issues of changing to a tapeless operation, additional demands are appearing.



Pro-Bel's Morpheus automation system is designed to handle simple server playout to complex channels where schedules are changing regularly and unpredictably.

The first new area of complexity is the ever-increasing amount of data that has to be transmitted along with the basic picture and sound. Typically, this means closed captioning and audio descriptions.

Another new requirement for broadcasters involves the transmission of metadata for interactive applications that execute on a set-top box. Finally, broadcasters are no longer one-channel operations. Many stations will find themselves having to handle multiple feeds, often with no additional staff. This trend will certainly continue as broadcasters provide services to mobile devices and begin using new delivery platforms such as IP.

All these factors mean that as the number of services increases, there is a greater need to repurpose content. Ideally, an automation and media management solution should be able to air different versions of a program, possibly with different graphics and captioning, all from a single master copy without the need to manually create custom versions.

Possibly the biggest issue is that there is no clear picture of what the broadcast world of tomorrow will look like. Therefore, the challenge today when looking at a fourth-generation automation system is not knowing exactly what it is going to have to automate, and how, over its lifetime.

Even with this major challenge, it is possible to identify some key attributes that should be considered in a future automation system that could meet the challenges described above.

True multimedia

Multimedia is a highly overused and often misused word, but we need to consider it in its purest form. For our fourth-generation automation system, we need a solution that is media agnostic, i.e. not tied to 25fps/625 or any other standard, for that matter.

Arguably, we are not talking about a future requirement but one that is here today. Media has to be delivered in many different resolutions and frame rates; the days of working to one dominant standard such as PAL or NTSC are over. Our proposed new automation system needs to handle multiple video standards, including future ones. And in a multichannel or multi-stream environment, the automation system has to be able to work with different standards on different services simultaneously.

The schedule

Traditionally, schedules have taken the form of flat files that describe a linear sequence of events, often with some capability for describing secondary event functions such as DSKs. For the types of applications that have been outlined, more scalable and flexible schedules will be required. The core scheduling criteria can be summarized as follows:

- Ability to describe unlimited event properties. This means that file format cannot be fixed to specific event parameters that were defined in the original system.
- Ability to describe unlimited secondary events, and for those secondary events to be hierarchically grouped.

Fortunately, we already have an ideal tool that meets these requirements — XML. This is the same XML code that originated in the Internet development community, and it allows self-described data to be transferred between systems. Let's look at an example of how this might work. We will use a simple schedule example. Here is how a typical event would be described with a simple ASCII string: 0001,Coke Ad,1000000,00003000.

In this example, the event number is 0001, the title is Coke Ad, the inpoint is 10:00:00:00, and the duration is 00:00:30:00. To understand this, both the system that authored the schedule (traffic) and the receiving system (playout automation) need to speak the exact same language — labels, variable order, etc. In XML, the same event could be described as:

```
<event>
<ID>0001</ID>
<title>Coke Ad</title>
<inpoint>10:00:00:00</inpoint>
<duration>00:00:30:00</dura
 tion>
</event>
```

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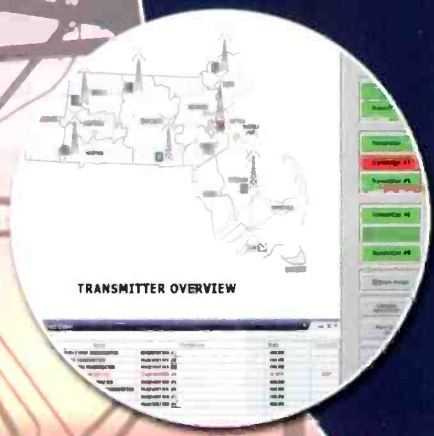

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While the full capabilities of XML are beyond the scope of this paper (see Ref. 1 below), the key points to note are how each piece of data is described and how the data can be grouped hierarchically. These two characteristics will allow the most complex of schedules to be described.

Consolidating information

Conceptually, automation is a simple product. It is a software program that executes a list of events, each one controlling a machine that will air a television program. However, as with many concepts, the complexity lies in dealing with the unexpected. For example, what happens when a tape doesn't cue or when there is a last-minute change to the transmission schedule?

Automation systems can have automatic responses to a number of anticipated failure conditions. However, many conditions will need a subjective judgment that is beyond the scope of an automated process. This means that clear status information for events must be presented to allow appropriate action. However, with the increase in numbers of both channels and secondary events, effectively summarizing large quantities of event status for a single operator will soon become an issue.

Status information requires consolidation, as reporting the raw status of many hundreds of events will just result in information overload. Being able to integrate status for logical groups of events will be essential in live broadcast environments.

Intelligent monitoring

Another aspect of information overload is when an operator has to monitor the final output of multiple services, as well as the off-air pictures. Keep in mind that with future systems, the term off-air may not be an accurate description of the delivery channel.

Automation systems will increasingly have to integrate and accept data from automated monitoring systems. No longer will it be sufficient for the automation system to report only if a device fails to roll and then rely on a human operator to intervene. End-to-end solutions that can reconcile the signal from ingest through transmission (in whatever form) will be required.

System resilience

Of course, for any automation system, the reliability of on-air playout is of primary importance. One approach to this reliability is through dual redundancy, both in terms of automation system components and control peripheral devices. Unfortunately, with an increasing number of channels, having two of everything ceases to be a viable economic model. The N+1 or N+X resilience models are becoming more the norm, where systems providing N channels of playout have additional capacity that can be switched in the event of failure.

Standardization of automation systems, interoperability between devices, is vital. Therefore, the adoption of workable standards is essential. As we have seen, the number and types of devices that an automation system has to interface to is multiplying; hence, the development of workable standards will become key, but this comes with a health warning.

Program and System Information Protocol, PSIP (see Ref. 2), is a standard protocol that defines data in a digital transmission. A flexible automation system will allow PSIP data to be attached to events in the schedule. The requirement for DTV metadata is likely to be an increasing one, and the addition of other types of delivery channels will bring new standards and data that need to be supported by the automation platform.

Currently, XML is being used as the basis for many protocol standards. Unfortunately, despite all its benefits, a tool such as XML will not guarantee compatibility between systems. As we're seeing, even when a hugely powerful and important industry-specific standard such as MXF (see Ref. 3) is defined, that does not ensure absolute interoperability.

The MXF language uses XML and is analogous to its core principals in that it provides a mechanism for metadata. The language does well in describing a piece of media to be combined in a single file with the media. This allows the media to be exchanged between two systems and understood by the receiving system. But just as with XML, the use of MXF does not ensure interoperability. It is perfectly possible and completely valid to define two incompatible MXF schemas. As an example, the metadata required in post-production is different from that required in master control. Such issues need to be considered early in the planning of a master control operation.

Adherence to standards will be key for an automation system, but this alone will not alleviate the need for detailed system and workflow planning to ensure workable solutions.

An evolving solution

Broadcast automation has been, and continues to be, an evolving technology. Developing solutions for our immediate future presents many challenges. From this vantage, the simple requirements our future automation systems must meet is that of complete and unlimited flexibility. Now that's a tall challenge. BE

Neil Maycock is chief technology officer for Pro-Bel.

References:

1. W3 Schools: www.w3schools.com/xml
2. Program and System Information Protocol (PSIP): www.psip.org
3. Media Exchange Format (MXF): www.smpte.org

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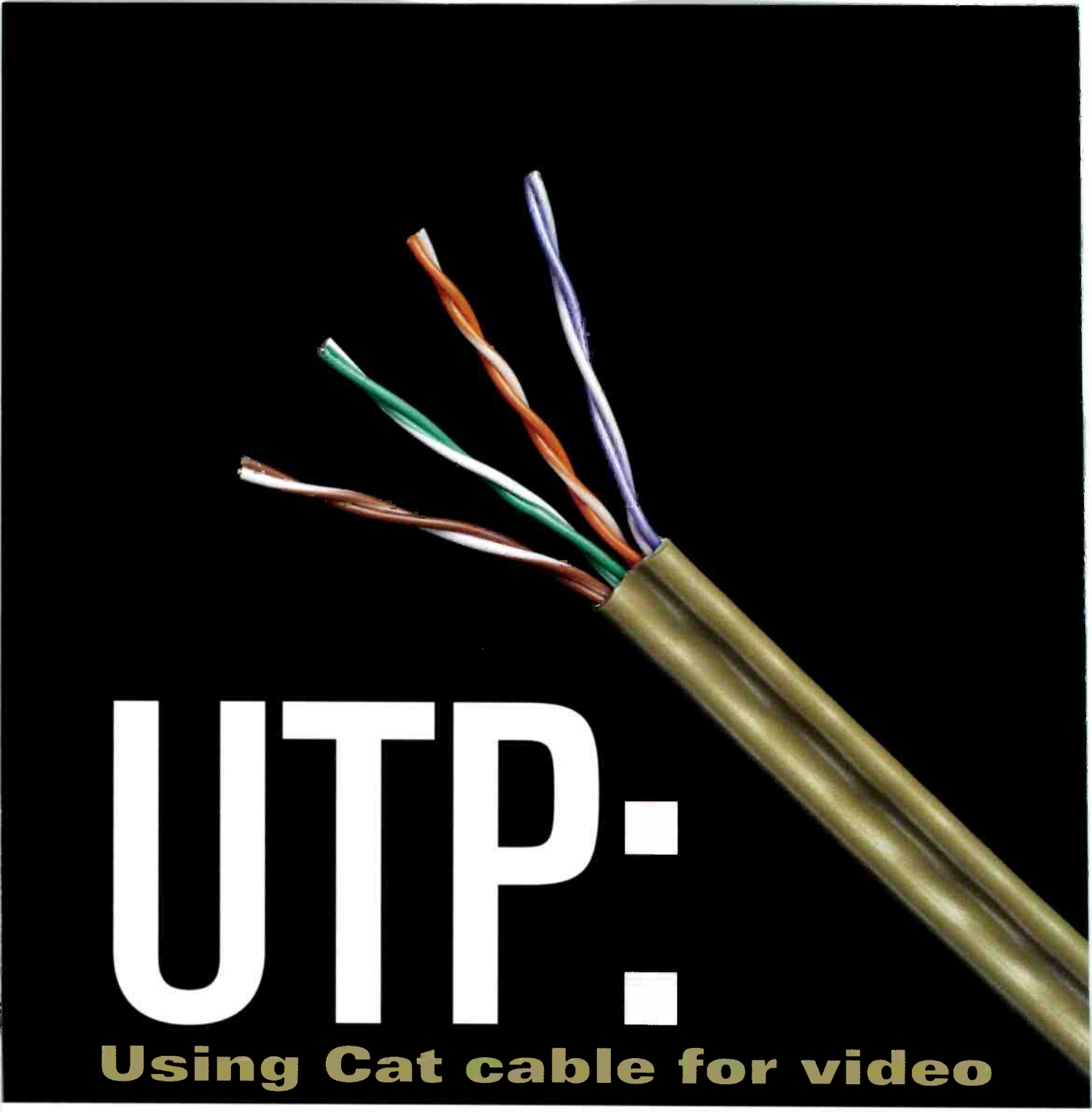


UTP:

Using Cat cable for video

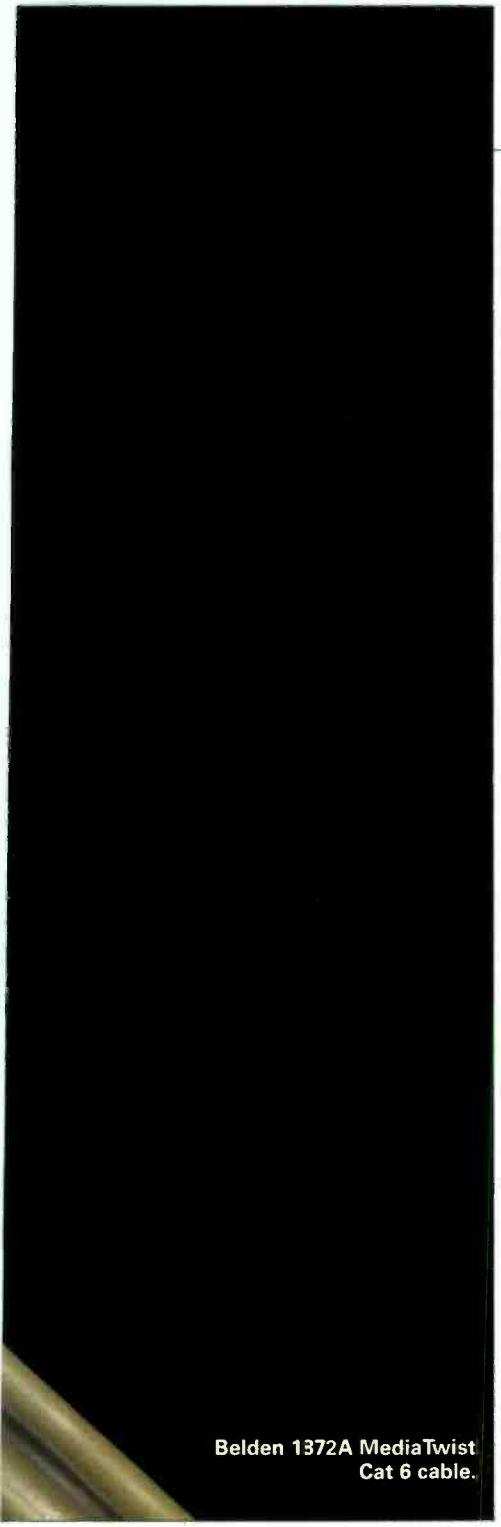
BY STEVE LAMPEN

Last month, we covered unshielded twisted pairs (UTP) to carry audio. The highest-quality UTP is computer cable, premise/data cable. It's called Cat 5, Cat 5e or Cat 6. Cat 5 has been around for more than 10 years, so it may be familiar to you.

While Cat 5 cable is still in use, if you try to buy some, you'll have a pretty hard time. The reason is that Cat 5 cable is no longer part of the EIA/TIA 568 standard. You can still buy Cat 3 (for telephone applications) but the other cables you will see are Cat 5e and Cat 6 cables. Of course, there are billions of feet of Cat 5 already installed, so you might run into it there. It's just hard to buy these days.

In last month's article, we covered the proper procedures to use UTP cable for analog and digital audio, basically putting a single channel on each pair. In the case of AES digital, you have an option of one or two channels per pair. This means a piece of Cat 5e or Cat 6 cable could be an eight-channel digital audio snake cable. Pretty cool!

We also talked about running audio in a networked format, as part of a 100 Base-T Ethernet signal. Then, you can use much of the cheap IT equipment used to run networked



Belden 1372A MediaTwist Cat 6 cable.

data to run your audio or video. However, there's one problem with networks: latency.

into a data signal. It also takes time to send those packets of data down the cable. If one of the packets has an error, standard Ethernet protocol resends those bad packets, which takes even more time. (Many audio and video networking schemes do not allow resending packets, meaning that the packets must be perfect right out of the gate and remain perfect all the way to the destination device.)

Then, the packets are reassembled, and the audio, video, control signal or whatever you put in at the beginning comes out the other end. All of this takes time. If you're recording the signal, or sending it across the country, a few milliseconds means nothing. However, if you are monitoring your voice audio on a pair of headphones while talking on-air, just a few milliseconds of delay will cause you great confusion, and you can end up sounding like you're intoxicated. So what's causing the delay?

It's really down to number crunching. If you use professional (and expensive) equipment, you may get sufficient speed to minimize the encoding delays. Will the extra cost be worth the expense? Your call.

Don't blame the cable

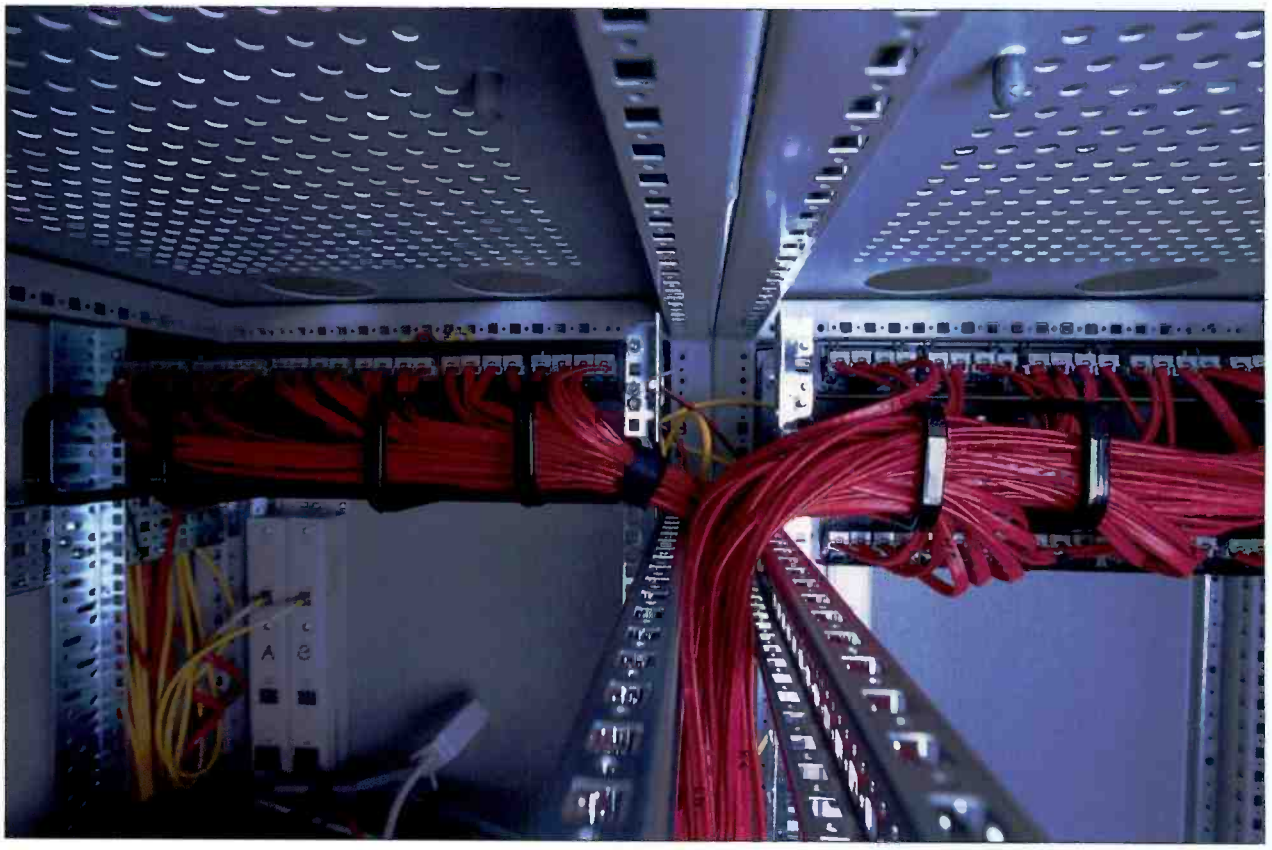
Don't blame the cable for the delay. Most Category cables have a speed (velocity of propagation) of 70 percent the speed of light. If the signal is audio, you couldn't hear that delay, even if the signal went 1000mi!

Unfortunately, even minute signal delays can be a problem for video signals. After all, the typical analog video signal goes up to 4.2MHz, and that requires a lot more bandwidth than analog audio. This means the number crunching, encoding and latency can get pretty intense. Of course,

It takes time to turn the audio or video into a data signal. It also takes time to send those packets of data down the cable.

What's the hold up?

It takes time to turn audio or video monitoring a picture that's delayed a few milliseconds is not the same as



Cat 6 UTP can be easily converted for video or audio applications with baluns. Photo courtesy Belden CDT.

monitoring audio live on headphones; therefore, latency is less of an issue.

Don't get too satisfied because if you're shipping audio with video, then delay is again a serious problem. If both the audio and video signals are processed separately, the audio is encoded much quicker than is the video. This often creates the notorious lip-sync problem that was so common in the early DTV days. Again, these types of delay are not caused by anything in the cable — they are software, processing and number crunching problems.

One of the problems with video is that it comes in such a wide variety of signal qualities. We start with surveillance video, where UTP is already a major contender. Many surveillance cameras have RJ-45 connectors on them instead of the standard BNC or F connector. The reasons are quite obvious and practical.

First, UTP comes in four pairs, so one cable can carry video on one pair, controls on another pair and double up the remaining pairs for power. Everything you need is in one cable, whereas before it took three separate cables.

There are cameras where the video signal is converted into 100 Base-T data, and the camera essentially becomes a node in a network. In the industrial world, the hot thing with cameras in factories is 1000 Base-T (Gig-E) networked video cameras.

Cat 5e and Cat 6 cable were invented to carry 100 Base-T, which runs at up to 100Mb/s. They were also created to have sufficient bandwith to support 1000 Base-T, which is 1Gb/s. And, yes, there are cameras with incredibly fine resolution that need just that kind of bandwidth. This includes industrial and HD cameras, which are used for looking at things like the insides of ICs or super-fine surface-mount assemblies.

You can imagine if you're in a factory looking at ICs traveling down an assembly line at 1Gb/s, latency can be a serious problem. By the time your camera sees a problem and the fault is recognized, the chip is way down the line. So, number crunching is serious!

In the broadcast world of 601/SDI and SDI/HD, we're getting to the hairy edge of UTP.

Cost vs raw performance

In the broadcast world of 601/SDI and SDI/HD, we're getting to the hairy edge of UTP. Even Cat 6 is tested only to a bandwidth of 250MHz. To carry 1GHz of bandwidth, the signal is split between all four pairs. This means that any timing variations between the cable pairs is crucial to eventually recombining the signals. The timing variations between cable pairs is called delay skew or just skew.

Let's assume we have a broadcast SDI video signal, with a data rate of 270Mb/s (for component SDI) and a bandwidth of 135MHz (Manchester coding). This signal can easily be carried on a single pair of Cat 6. Note that the 100MHz bandwidth of Cat 5 or Cat 5e no longer has sufficient bandwith to carry this signal. Besides, the baluns to convert to balance line are expensive, $80 a piece or more, and you need two, one at each end.

So, can we transport high-quality signals around a BOC or NOC on UTP cable? *Is* UTP better than coax?

Absolutely not. If you compare raw performance, coax is better in almost every way. When it comes to impedance stability, return loss, attenuation and maximum usable distance, coax is superior.

So why the rush to UTP? Because it's cheap, readily available and easy to install. A couple of well-trained cavemen could easily install it. In addition, any of those expensive baluns to run SDI? Well, what if you have to run a camera from the GM's office, but, of course, there's no coax going in there? If he has Cat 6 for his laptop, you just need a couple of baluns, and you're in business.

At one state college auditorium, engineers installed three runs of digital coax and a few runs of Cat 6 to run DMX lighting and other computer equipment. Naturally, as soon as they were finished, some VIP showed up, and they needed to support six cameras. So what did our clever engineer do? He purchased some of those expensive baluns and used the UTP cable he already had in place. Halfway through the shoot, he suddenly realized that he couldn't tell which cameras were on coax and which cameras were on twisted pairs.

There is a reason for the similar quality. These are digital signals. With digital signals, as long as all the bits

So why the rush to UTP? Because it's cheap, readily available and easy to install. A couple of well-trained cavemen could easily install it.

UTP cable has natural noise rejection because it is a balanced line. Coax is unbalanced, which makes it susceptible to common mode noise. UTP also has four pairs, so you can combine lots of things onto one cable, making complex installations easier.

Even with the benefits of coax, UTP is approaching coax performance. Some bonded-pair construction UTP cables have a typical impedance tolerance of ±7Ω. That sounds pretty good until you compare it with a precision video coax that is typically specified at ±1.5Ω or less. But, if you compare a twisted pair with even high-quality AES pairs, they're 110Ωs ±20 percent (22Ω variation). Suddenly ±7Ω looks pretty good.

The choice between UTP and coax is simplicity and cost versus raw performance. So why would anyone buy get to the destination, then the picture is perfect. It doesn't matter if they got there on coax, twisted pairs or a pair of Dixie cups with a string. If all the bits get there in the right order, at the right time and with enough signal strength, you can't tell the difference. Perfect is perfect.

In the next article of this series, we'll revisit the world of UTP with a look at the emerging 10Gb/s copper cables, their applications for HD video and the parallel video uses for Cat 5e and Cat 6, such as RGB and VGA. BE

Steve Lampen is multimedia technology manager for Belden. He holds an FCC Lifetime General License, is an SBE Certified Radio Broadcast Engineer and a BICSI Registered Communication Distribution Designer. His latest book, "The Audio-Video Cable Installer's Pocket Guide," is published by McGraw-Hill.

Small Tree's InfiniBand technology

BY CORKY SEEBER

In the broadcast industry, content delivery bandwidth is critical, and today's network wiring typically offers no more than a gigabyte of throughput. As the industry moves toward HD, a network-wiring alternative is needed to handle increased data requirements. The emerging solution is InfiniBand — a one-wire, high-performance interconnect supported by Small Tree Communications.

Moving data quickly

Traditional networking protocols are directed through a TCP/IP stack. TCP was designed more than 20 years ago, at a time when files were smaller and networks were slower and less reliable. Packet sizes were limited to 1500B as a tradeoff between using large packets for efficiency, while keeping them small enough so a small amount of corruption would not require too much data to be retransmitted. Each of these tiny packets is encapsulated with a medium access control (MAC) header, an IP header and a TCP (or perhaps UDP) header, which all have to be stripped off at the final destination. This leads to quite a bit of overhead and protocol traffic, creating additional latency and congestion and making a traditional TCP/IP network less than ideal for editing HD footage in real time.

The idea behind the InfiniBand technology was to create a scalable, extensible fabric that could be used to interconnect systems, I/O devices and storage. The latency to send a message across the fabric needed to be extremely low in order for things like MPI clustering and storage to be effective.

The technology's low-level protocols allow upper level protocols to be set on top of them in such a way as to add minimum overhead. Sockets Direct Protocol (Expected Q106) is one such example. It allows sockets-based applications to send data directly through the InfiniBand network without using TCP. As a result, there is much less protocol overhead, and updating frames can happen more quickly. Latencies on the TCP stack on Mac have been measured at 60µs, even with 10Gb, whereas when using InfiniBand, latencies have been measured at 6µs.

A problem with current cluster file systems is latency to and from the metadata server. Somewhere in the organization, there is a server tracking who is working with a file. It also prevents two people from working from the same file at the same time. Unfortunately, almost every one of these metadata servers cannot provide greater than 40µs to 60µs latency from the time the message is sent out and the other side receives it. This technology offers the promise of reducing latency by a full order of magnitude to improve the ability of clustered file systems to operate across a group of machines at greater speeds.

A substantial problem with current cluster file systems is latency to and from the metadata server.

So just what is this one-wire technology? It's a switch-based serial I/O interconnect architecture that operates at a base speed of 20Gb/s per port, or 10Gb/s in each direction. It differs from shared bus architectures in that it is a low pin-count serial architecture that connects devices on the PCB and enables bandwidth out of the box. It provides both the high bandwidth one would expect from a 10Gb/s interconnect as well as the low latency advantages one might see when communicating with a device over a local bus. The architecture was designed to simplify and speed server-to-server connections and links to additional server-related systems.

The primary use of this technology is focused in cluster systems — two or more systems working as one. It was originally created to serve as a bus replacement, acting as a switched fabric network in place of 10Gb or other Ethernet networks. Today, more and more broadcast companies are looking carefully at cluster file system technologies. These technologies are viewed as a way of storing all data in one place and helping reduce copies.

Shifting to one wire

As a one-wire network interconnect, the InfiniBand technology also helps reduce infrastructure requirements. Current workstation systems easily have four cables — one or two each for Ethernet and Fibre Channel — plus a disc drive connected to one system.

With Small Tree's technology, each individual workstation in a workgroup of 20 users, for example, would run their workstations via one wire to a relatively small switch that is bridged back to a larger switch in the data center. This gives each user up to 10Gb/s of access to all the data stored on the server. Using bridged I/O, none of these systems need to have Ethernet, and you can get rid of the discs within those systems. BE

Corky Seeber is president of Small Tree Communications.

Frank Graybill,
WNET, New York

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KESQ-TV automates with Telemetrics

BY TODD GRAHAM

Technology changes in the production of local television news programs will never garner the public's attention like the departures of Tom Brokaw and Dan Rather or the death of Peter Jennings. However, transformations going on behind the camera are creating a different kind of news.

At television facilities across the country, operations managers are streamlining their production procedures and developing new workflow strategies by automating traditional manual functions (i.e. camera operators, switching, recording) with robotic systems. The result is a local newscast produced and delivered in a superior, more consistent and less expensive fashion.

Automation held another attractive feature: ... flexibility

Gulf California Broadcast, which operates KESQ-TV, the ABC affiliate in Palm Springs, CA, as well as the local Fox (KDFX-TV) and Telemundo (KUNA-TV) stations, is a perfect example of this industry-wide trend toward newsroom automation. The broadcaster uses a Telemetrics camera robotic system in both the main control room and the news studio to produce six hours of news daily on its three broadcast stations.

Improving the ability to go live

The broadcaster turned to automation partly because of a lack of qualified part-time floor crew. Conventionally, television studios hire students from local colleges and universities as interns or part-time employees to fulfill staffing requirements, but there are no universities in Palm Springs or surrounding communities to support this practice.

Automation held another attractive feature: the flexibility to go on the air at a moment's notice without having

Gulf California Broadcast audio and graphics operator Chris Jaunsen has easy access to the LCD touch-screen monitor displaying the available camera shots.

The cameras on the studio floor are mounted on Telemetrics PT-LP-S2 pan-and-tilt mechanisms on top of Telemetrics Televator elevating pedestals.

The unmanned camera is controlled by an operator in the control room using Telemetrics' CPS-ST-S control software.

to wait for a floor crew to assemble from geographically distant locations. The Telemetrics system installed at KESQ provides computer-controlled camera robotics that are ready to go on-air 24/7.

Automation elements

To automate its broadcast, the facility uses Telemetrics' Televator motorized elevating pedestals, PT-LP-S2 pan-and-tilt mechanisms, CPS-ST-S control software with an 18in LCD touch-screen monitor and a CP-D-3A camera control panel. The touch-screen monitor with the camera shots sits next to the audio operator. The camera control panel is next to the technical director, so he can touch-up shots if needed and resave them. There is no staff on the studio floor, and communication with the anchors is through IFB.

The three motorized, elevating pedestals provide fluid vertical camera positioning from different perspectives, while the pan-and-tilt mechanisms mounted on the pedestals further enhance camera positioning. The units also feature RS-232/422 control, preset/motion control and smooth slow- and high-speed movements with programmable timed presets.

With the software, the system operator can preset the key points of the trajectory as single shots (up to 16 at one time) and display live video on the monitor. The operator can track the movement of the system on the monitor and use a mouse, joystick or touch-screen monitor to select desired camera positions from the presets, resulting in more consistent camera shots and cleaner communication. BE

Todd Graham is operations manager for Gulf California Broadcast

KLRT-TV
gets a new look with Chyron's graphics-creation equipment

BY MICHAEL FABAC

Owned by Clear Channel Communications, KLRT-TV is the local FOX affiliate in Little Rock, AR. Last year, the station launched its new 9 p.m. newscast — a full-hour newscast that runs seven nights per week — dubbed FOX 16 News at 9. In an unusual but enviable situation, the station was able to build everything from scratch, starting with the building and facilities to the purchase of all new equipment.

From the station's perspective, a key priority for this new newscast was to fully develop the brand — First Complete Local. It refers to the breaking news element, which is an integral part of the brand. When developing a brand for a newscast, presentation is not just important; it's paramount.

Working in tandem with station engineers, the news department looked closely at different vendors. We set our sights on being as seamless as possible and as tapeless as possible.

In addition, given that program presentation was one of the biggest opportunities we had in the Little Rock market, the visual aspects of the broadcasts were a major priority. Chyron products fit the bill. The station purchased Chyron's MOS newsroom computer system with AP's ENPS, Chyron's Duet LEX and Chyron's Aprisa RePlay video clip server.

The equipment enabled us to achieve our presentation goals. For example, the newscast needed to excel with crisp, vibrant animated graphics. Given the flexibility that these products allowed, especially in a live working news environment, it was quite impressive. That was the barometer for everything — to see how things will work in an unscripted, frenetic environment.

Moreover, anyone with a producing background in the broadcast business can tell how good a piece of equipment is or even how good a person is by how they react when they're out in the field and need to perform on the fly.

The primary challenge for the station has been that the equipment is high-tech, complex machinery and that the newscast personnel are mostly new people working with new equipment station-wide. As a result, we are not using our graphics creation and management products to their full potential. We know that we can do so much more, but our engineers and technical crew members haven't had the chance to learn all the various capabilities of our new units. Right now, we are producing only one show, so our use is fairly limited. The next step for our facility is to get more training so we can use our new equipment to its maximum potential.

In the meantime, the graphics equipment is allowing the station to fulfill its goals. As far as presentation goes, we are still ahead of the curve because our on-air presentation has shown marked improvement regarding our ability to be flexible in live, breaking-news situations and by improving the look of our animated graphics. We are certainly getting what we need out of our new equipment. Further, all Chyron equipment has proven to be user-friendly and backed by top-notch customer service.

For titles, KLRT uses Chyron's Duet LEX character generator.

In fact, customer service was one of the main points taken into consideration when we selected our vendors. That is still crucial to the station, especially when looking at a MOS newsroom environment where there are so many vendors. Tracking down problems isn't always the easiest thing when equipment is tied together. That made the customer service all the more important.

Thanks to our new graphics-creation and content-management equipment, FOX 16 News at 9 is now poised for success. BE

> When developing a brand for a newscast, presentation is not just important; it's paramount.

Michael Fabac is the news director for KLRT-TV.

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Vinten's remote cameras at Dover Downs

BY DAVID SNYDER

Dover Downs in Dover, DE, conducts both harness racing and NASCAR racing. The harness track is inside of the NASCAR track. People pay big money for NASCAR races, so Dover Downs decided to install a bridge with seating over the NASCAR track that would block the camera tower for the harness racing. This is a mandatory camera and a specific camera angle. Dover Downs didn't want a camera platform and operator located on the bridge and asked International Sound to find a solution.

The Lynx controller offers remote operability using traditional operator techniques.

The Vinten HS-102 pan-and-tilt head is positioned discreetly over the track.

The remote camera system is almost invisible to the spectators, yet provides exceptional close-up action shots.

Robotics was the answer based on the mechanical constraints. There are many robotic systems available, several of which we currently use in other applications. All of these other systems use joystick control.

We felt that it would be impossible to cover the entire race using a joystick system and still get high-quality results. The solution was to use the Vinten AutoCam HS-102 with the Lynx controller. This system allows the operator to shoot the race as if he or she were behind the camera.

Easy install

The camera head hangs on an arm from the bridge and is connected to the controller via fiber. The controller is approximately 1000ft away. The head is so small you hardly know it's there.

We were surprised at how easy the system was to install and use. Our major concerns were ease of operation and any delay between movement of the controller and the camera. Neither was an issue, and the system operates perfectly.

The fast, smooth and accurate pan and tilt allows the operator to provide a camera shot as if he or she were there.

Looking ahead

In this particular facility, the HS-102 with the Lynx controller fulfilled the need for something discreet, but it hasn't been a money saver yet. We hope that, in the future, the system will control multiple cameras with one controller. That's when the system will start saving money.

The features that make this equipment so suitable for this application are the remote operability and the fast and smooth pan and tilt. The remote operability enables operation with an unmanned camera. The fast, smooth and accurate pan and tilt allows the operator to provide a camera shot as if he or she were there. It is amazing how little effort it took to become used to panning a camera away from its location.

When operators are out in a tower and have their camera viewfinders in front of them and one eye on the track, it is easy to keep up with what's happening in the race. If something happens in the field, the operator can go to it. There are no drawbacks from not having the operator on the camera. The HS-102 and Lynx controller provide a remote camera that has the qualities of a local camera shot without the need for an operator. BE

David Snyder is president of International Sound, which offers video, audio and security services for the racing industry.

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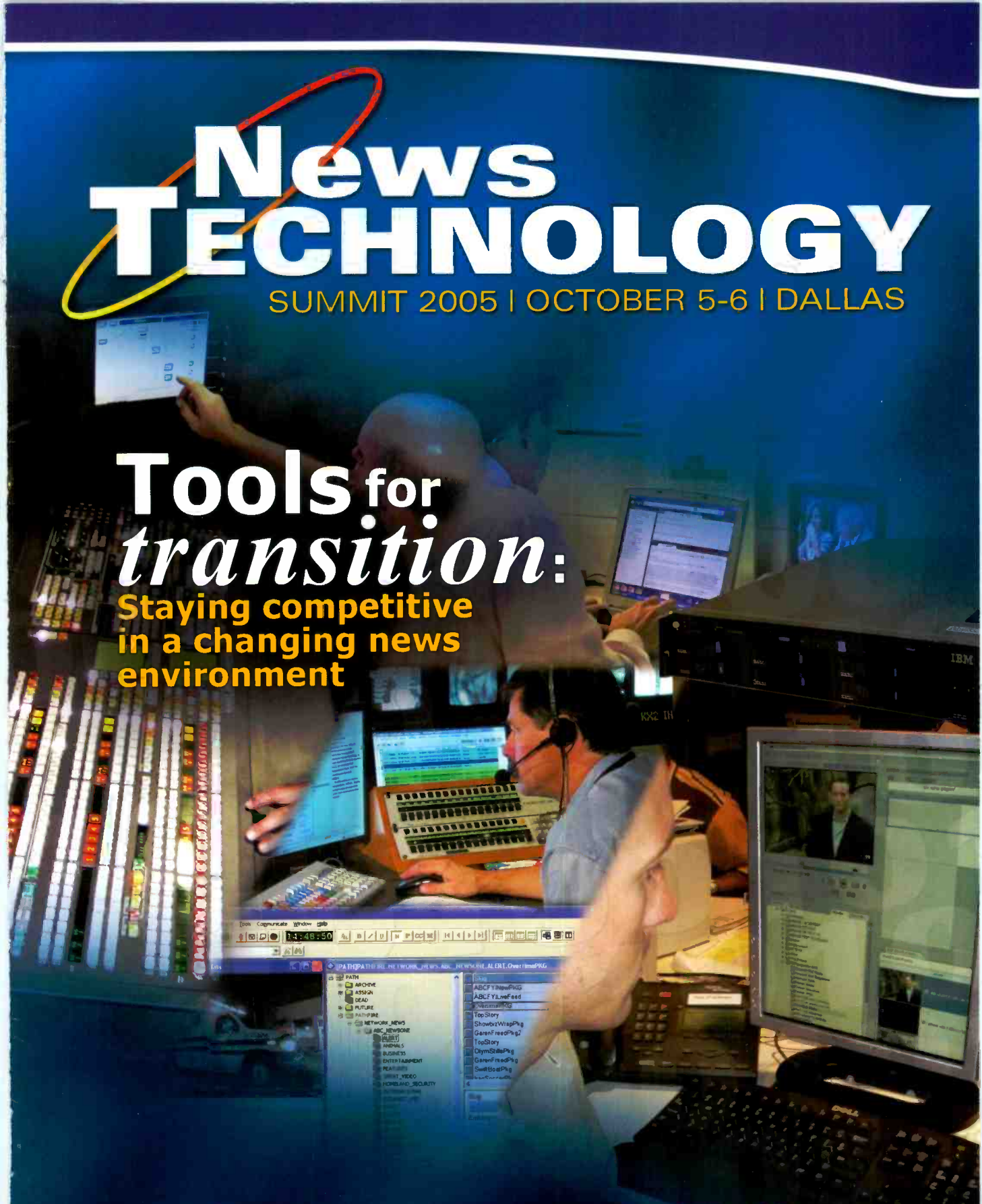

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A letter from the publishers

Welcome to our fourth annual sponsored supplement covering news technology. One of the primary editorial missions of both *B&C (Broadcasting and Cable)* and *Broadcast Engineering* magazines is to provide television executives the information they need to incorporate these developments into their operations. Clearly, choosing the right technology is crucial to the success of a station or network news operation.

This special project is focused on educating television station and network owners, managers, news directors and engineering talent on the opportunities and challenges presented by the latest technological developments.

Among the critical topics driving today's newsrooms are:

- Asset value — how managing media assets can streamline workflow, improve editorial content and generate revenue;
- Editing in a file-based world — with accompanying opportunities for efficiencies in the studio and in the field;
- The changing shape of newsroom graphics — from templates to cell phones, IT to HD, the tools and distribution channels for news graphics are undergoing a radical transformation;
- The HD news equation — in the calculus of converting newsrooms to HD — the formula for success may be leadership;
- And new wave news — how newsrooms seeking to improve efficiencies with IT infrastructures may be best positioned to earn new revenue from a flood of new distribution channels.

More than 100 television executives joined our editorial teams and sponsors to discuss, explore and find solutions that will improve their products and operations. We sincerely hope this special partnership provides insight that is helpful to the readers of both magazines as you strive for more efficient and profitable operating efficiencies.

Dennis Triola
Group Publisher
Broadcast Engineering

Chuck Bolkcom
Group Publisher
B&C

Contents

Managing media assets to improve workflow, content and revenue

Television newsrooms are awash in media: graphics, video files, audio bytes, satellite feeds, live ENG shots, digital videotapes — the list goes on and on.

Every day brings a new round of stories, more feeds, new live shots and another stack of tapes. Day after day, the pile gets deeper, the right tape a little harder to find and the entire newsroom a little less efficient.

Still, the relentless grind of producing television news goes on with little time or energy left to address the problem. Besides, a television reporter's job is to tell a story. A news director guides the overall editorial process. Who's going to spend the time and effort to manage these news resources, especially if there's no immediate editorial benefit?

"The news production operation isn't perceptibly broken," Avid Technology's senior product marketing manager James Frantzreb observed. "The news goes on the air every day. However, when the station starts to feel pressure to raise productivity — for instance increasing news programming by 40 percent with the same staff — momentum gathers for change," he said.

A first step towards making that change comes with rethinking what the television news business is all about. "Whether broadcasters realize it or not, there's a battle underway between traditional and new media," said Associated Press ENPS product manager Bill Burke. "Which part of a media enterprise will be the core — creating content for multiple platforms?

"Will broadcasters evolve from a platform-specific workflow to content creation for multiple platforms? Or, will new media content be created elsewhere and broadcast become less central than today?

"So, we have to talk about broadcast newsrooms in a far broader way. And if we do create output for multiple platforms, it quickly becomes complex — controlling where stuff is going, the editorial rights. It's a hugely complex thing."

Avid Technology, iNEWS Instinct

On its most basic level, managing the complexity requires knowing what assets exist, where they are and how to get to them.

Managing assets

With news, the need for asset management is driven by the velocity of material coming into the station, the quantity of material, or both. Many stations ingest an enormous amount of media over a short time window, often right up to and during the news broadcast. Time spent locating media adds up to a significant wastage and inefficiency.

"An asset management system that automatically checks-in or registers media as it's ingested can present every piece of media in the station — even archived media — by a variety of different criteria, instantly to anyone," explained Avid Technology's Frantzreb.

"Crucial minutes and seconds lost trying to find the right shot from a local story or sifting through long feeds are regained. The entire production process becomes more efficient, and it becomes easier to refresh stories or to reuse and repurpose material," he said.

Storing assets as digital files with metadata descriptions allows everyone in the newsroom to find and use the media needed for the project at hand, said Grass Valley's Matt Allard. "The first thing a good media management solution provides is access to a greater number and variety of personnel in the workflow," he said.

"Rather than be restricted to having only a few key editors and their associated edit stations have access to media content, a media management system provides access to other personnel such as producers and journalists."

Not only does that improve efficiency, managing digital assets makes for better stories. "Desktop access to content makes it easy

to write to the video," said Rick Young, Pathfire director of product management. "This is Journalism 101, and media management tools make this easier than ever. Desktop access also provides easier collaboration, editing and approval within the newsroom."

Having a convenient, quick way to access the subject of the story improves the reporting process, "especially in the realm of politics," said John Deutscher, senior program manager for Microsoft Worldwide Media & Entertainment Group. "The ability to crosscheck a resource, qualify a statement against previous statements and extract historical references makes asset management very valuable to a reporter."

Getting started

Managing assets first requires being able to find them. That's where metadata enters. "Management of assets must begin with the associated metadata," said Pathfire vice president of business development Brad Ferris. "Something as simple as a yellow sticky note applied to a cassette enables a form of asset management. Obviously, this is the most simplistic form. Without the sticky note identifying the asset, there is no asset to manage."

While many believe the source of that metadata starts in the field with the news videographer and reporter, the Associated Press' Mike Palmer sees things differently. "We have long described the process of asset management as beginning on the planning or assignment desk within the newsroom computer system," he explained. "Story ideas must win a Darwinian fight for survival. Generally, stories with better or more metadata win that fight and make it to air.

"In order for a story to make air, the assignment editor or planner must have a description of the story, including location, time, a place and additional descriptive information before they can assign a crew. This is all relevant and immediately useful metadata that is fundamental to asset management, but until recently it's been thrown on floor.

"Now with ENPS assignment and planning, metadata can be exchanged with media ingest systems — effectively linking metadata on both systems. Bringing metadata from the field and requiring a photographer or reporter to manually type a description is a time-consuming, error-prone and onerous task. This can be avoided with more advanced systems that enable media to be joined with metadata at the point of ingest or creation. It's very important that this metadata be created and firmly attached to the media as early in the process as possible. This allows the greatest degree of management and control by asset management, production, distribution and archive systems later on."

"Management of assets must begin with the associated metadata." — Brad Ferris, Pathfire

Collecting metadata in the field doesn't have to be a manual process, according to Deutscher at Microsoft. "I think a lot of value will come when we have the ability to link the reporter's field notes up with the clips that are being shot. Simple wireless interaction between camera and reporter's laptop or PDA would provide valuable metadata at the point of capture," he said. There's a lot of time in the field where a reporter can fill out a ton of useful metadata," he said. Such tools are not yet available however.

Beyond the assignment desk and the field, metadata is generated throughout the entire news production process. "Metadata begins in the field, and as a piece of content moves through the process, a couple of things happen," said Omneon Video Networks' vice-president of marketing Geoff Stedman. "The amount of media becomes less and less as the story gets edited down, and at the same time metadata — information about the content — is added because you have additional people and processes."

Storage and proxies

Metadata without pictures, graphics and sound isn't an effective tool. After all, it's the assets that reporters and producers need to put their stories together. But what exactly should get stored? "The rule of thumb is that you store the media once and add additional descriptive metadata," said Avid Technology's Frantzreb. "Until the media is actually sent to playback or consolidated as a unique clip, only one instance of the media needs to exist — or two if mirrored."

Proxies — low-resolution versions of original material — give reporters visual access to stored assets and allow news managers to create and use layers of storage in their media management system, balancing available storage, network bandwidth and budget. However, this equation is always in flux as technology prices drop and performance climbs.

"Because of the ever increasing amount of network bandwidth, there is an argument that says there is no need for proxies," explained Grass Valley's Allard. "For parts of the workflow, breaking news for example, this may be true. Where the argument starts to fall apart is when the workflow is more complex.

"The increasing use of an archive is a case in point. For users to choose what material to send to ar-

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chive and more users to select what to restore from archive, a proxy implementation is the only practical way to make this work. If a proxy layer is going to be used with archive anyway, then it can do plenty of other duties as well."

Avid's Frantzreb agreed. "With media networks more capable than ever of moving and storing large amounts of broadcast-quality media, the need for proxy-based workflows has diminished somewhat, but there are still several good applications for proxies," he said.

"Proxies serve to extend media workflows across corporate (standard, non-digital-media optimized) networks, where file sizes must be much smaller in order not to overwhelm the infrastructure. Proxy workflow also can be the answer for very high-quality HD production, especially when access is needed by more than a few people," said Frantzreb.

"Lastly, keeping proxy versions of archived, high-resolution media on online storage is a way of allowing complete access to the archive without having to wait for it to be restored and pulling only the necessary high-resolution media off the archive at the end of the production process," he added.

The issue of whether or not to use proxies fits closely with establishing different layers of storage for different stages in the life of content, said Omneon Video Network's Stedman. "We definitely see customers looking at different layers of storage for different stages of content life. Recently recorded or played out material is the most active and generally resides in media servers," he explained. "Media server storage, therefore, must support those functions where storage is high-performance and deterministic because it must support real-time operations.

"The next level of storage is disk-based online storage that is used to stage all of the content that must be available for all parts of the news process: creation of browse proxies, content for editors actually cutting material, mix segments from different sources, the addition of graphics and other elements of the audio and voice over. This is a repository for all media content and material being worked on to create a final story," said Stedman.

"Layer one of storage is real time and stores material for a short period of time — perhaps 24 hours or less. Content in layer two might be active for a matter of days, weeks or even potentially months with an evolving news story. At some point

An IT Bill of Rights.

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this content no longer has active value, and it might be moved off to optical or tape archive or someday even to a disk as drives continue to drop in price. There's a progression from real time to offline based on where you are in the content lifecycle," he explained.

Proxies are important across all of those layers because they provide a way to preview, search and evaluate content regardless of where it exists. In some ways, it is an asset management tool that eliminates the differences in storage.

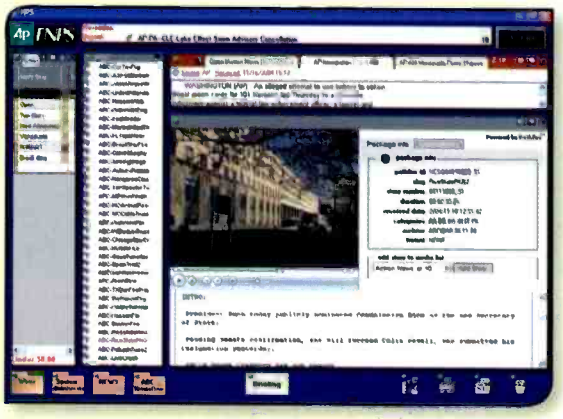
Voice of dissent

While media management offers improved efficiencies and a host of other benefits, the experience of Sundance Digital's vice president of news automation, Fred Schultz, indicates that the perception that nothing is broken in local station newsrooms is pervasive. "Sundance Digital offered digital archiving prior to developing newsroom automation," Schultz explained, "and we continue to do so."

"We are also in the second full generation of Seeker, a workflow, asset and media management system designed specifically for the television broadcast market. But unfortunately, few call letter news departments can make a business case for either," he said.

In his view, the desire to archive assets will be consistent, but small among call letter stations. "Except for the occasional Monica-hugs-Bill source tape, archives don't carry their own weight," he said. "Stations rightly keep their archives out of journalistic pride, a corporate and public record of what has happened. But the appeal of news is the news itself, with retrieved history providing at best a marginal boost.

"So instead, NewsLink automates the traditional process of saving stories on tape," he said. "We made retrieval easier by automatically generating a daily printout and a searchable running log containing slug and ID metadata along with a tape ID and time code of the story on the tape."



Associated Press, ENPS

Untapped potential

Call letter stations and networks are grappling to find their place in a dynamic media landscape where Internet blogs; online newspapers; RSS aggregators; cell phone-delivered news, weather and sports; and other outlets and technologies are competing for eyeballs.

Perhaps in so doing, many will take a fresh look at what they do best — namely, consistently shoot high-quality footage, create appealing and easy-to-understand news graphics, grab important sound bites — and find ways to extract the full, untapped value of those editorial resources through profitable arrangements with some or all of these emerging distribution avenues.

According to Omneon Video Network's Steadman, the ability to take a news story and repurpose it for alternate distribution is driving the whole notion of file-based workflow. "If you are going to send a news story to a cell phone, you may want it to be somewhat shorter and highlight-oriented compared with traditional television, so being able to quickly repurpose for multiple outlets is central to what newscasters are going to do with asset management file-based workflow," he said.

Managing those assets makes that possible. "Maintaining the assets in a digital format makes for easy translation to various outlets for content distribution," said Pathfire's Young. "Tools are now available to move digital content from one point to another for repurposing. Transcoding tools are also moving content creation closer to format interoperability."

While there still are some hurdles to overcome, the day when assets in a station's media management can be transcoded for other distribution avenues is approaching.

New distribution channels mean potential new revenue streams, and asset management will be key to realizing that opportunity.

"That's what asset management is all about," said Microsoft's Deutscher. "Assets equal rights, which equal money. If you own good content, there are quite a few new avenues available to exploit the distribution and monetization of that content." ■

"Except for the occasional Monica-hugs-Bill source tape, archives don't carry their own weight."
— Fred Schultz, Sundance Digital

Editing in a file-based world

Reporting and editing television news with today's quicker news cycles and growing demand for content from allied distribution channels begs for efficiency and editorial collaboration.

Without streamlined ways of working, newsrooms will lose the news production race. The inefficiencies of older news workflows will become an intolerable impediment to doing what must be done in a changing news environment.

"The old paradigm was analogous to a relay race with the videocassette acting as the baton," said Grass Valley news workflow manager Ed Casaccia. "No matter how hard you run, your efforts don't count unless you hold the baton.

"That turned the production process into a serial, linear affair that was at odds with the dispersed and iterative method used in the editorial process," he said. "The answer was to get rid of the baton!"

"Tapeless systems allow a truly nonlinear production process, and by no means should the use of the term nonlinear be confined to the one part of the process represented by audio and video editing," said Casaccia.

What it does refer to is a file-based digital workflow where reporters, news producers and directors have instant access to the editorial tools and resources, including news wires, script-writing tools, video clips, editing functions, graphics templates, CG functions and voice-overs, needed to complete a story from their desktops. It also refers to storing these editorial resources on a central news server that gives instant, simultaneous access to content. Finally, it refers to playing out a rundown of completed stories from a server and having the ability to rebuild a newscast on the fly.

"It comes down to a file-based workflow," explained David Schleifer, vice president of broadcast and work groups at Avid Technology. "All acquisition is going to a file-based format, and that allows us to integrate with them and move more information around more easily."

Associated Press, ENPS

As Omneon Video Networks vice president of marketing Geoff Stedman put it, "We think there is a need in the market — especially in news — to ingest into the server, edit it on the server and immediately make it available for playout on the same SAN or on one platform. Capture, edit, play on one platform."

A file-based IT workflow, when applied to news production and management, is intended to streamline all aspects of traditional news production. One needs to look no further than titling to find the benefits. "Consider the case of lower-third titles. It used to be that a reporter or writer would write up an order form for these, a character generator operator would see to it that they were inserted into the proper template and ensure that the characters kerned properly, and then the director and technical director would insert them into the live broadcast in the proper sequence as gleaned from the newscast rundown and individual scripts," explained Grass Valley's Casaccia.

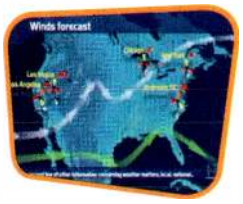
"Now the reporter orders the lower thirds simply by adding them to the script, the system knows the proper templates to use for each type, and an MOS interface sequences them properly without human intervention," he said.

Resistance is futile

To hear some tell it, adoption of new file-based workflows in the editing, production and management of news is inevitable. Perhaps it is, particularly at green field sites — new news operations where there are no pre-existing workflow or brand loyalties. But for the vast majority of the 800 or so newsrooms, reporters, editors and news directors have built up a workflow that they may intellectually be ready to replace, but emotionally are tied to

Viz|Weather™

Image Courtesy of ETB



Viz|Weather is a complete 3D as well as HD/SD real-time weather solution with countless visualization possibilities, and easily accessible and accurate weather data. The graphics and animations are driven by the weather data and can be controlled, switched, and manipulated in seconds. Viz|Weather was designed for and by meteorologists and weather presenters. Viz|Weather now also supports Curious World Maps.

Weather Data

Plug and play weather data, easily accessible and available online globally, triggers the weather graphics. With Viz|Weather you can show your viewers real-time weather either as point based symbols or as high-resolution 3D animations. Viz|Weather includes an interface with local real-time weather data of less than 1km resolution, providing accurate local forecasts for use in transportation control, large outdoor sports events, etc.

With the Particle Generator functionality you can create a visually true copy of the forecasted weather development: The shape and movement of 3D clouds can be broadcast showing the true speed of the various cloud layers. Weather data, such as temperature, wind speeds and direction, weather symbols, 3D maps, and radar maps are displayed automatically with corresponding graphic elements in real-time, using pre-made templates.

Viz|Weather, by default includes, but is not limited to, an interface to the online and interactive Weather on Demand (WOD) service, from Storm Weather Center (www.storm.no), for delivery of worldwide weather data. The WOD/Viz|Weather combination has a flexible, online user-selectable weather feed for point forecasts, girded animation data, satellite data, observations and more. Point forecasts for all locations on the globe can be received from the WOD system. The choice of area for the 3D forecasted and satellite based animations is also a true global on-demand service, allowing the user to change the area of interest within. Unlike a traditional weather presentation system it is not necessary to call the weather provider to get additional information since the locations are not predefined. The WOD service ensures flexibility to go on-air with locally updated weather information where ever and whenever - particularly useful in time-critical emergency events such as airplane crashes, hurricanes or forest fires.

Viz|Weather is also fully compatible with data from many leading data providers.

Key Features and Benefits

- Fast and easy to use.
- Real-time weather data with constant updates.
- State-of-the-art 3D HD/SD graphics & animations creation using Viz|Artist powered by Viz|Engine™.
- Weather data available for all types of graphics, tickers, weather presentations and virtual sets.
- Supports Curious World Maps Software
- Weather symbols, 3D maps, isobars, radar maps, temperatures, wind speeds and direction displayed automatically in real-time.
- Template based: Demands very little manpower to prepare a forecast ready for air.
- Weather data resolution from Storm: 36km down to under 1km resolution.
- Automatic (or manual) data insertion from the weather supplier into the graphics.
- Creation and manipulation of the show sequence from within Viz|Weather.
- Ability to control, switch, and manipulate weather data and graphics in seconds.
- Preview of weather graphics is instantly available within the user interface.
- Easily manipulated graphics, even during broadcast, show up-to-date weather events and locations.
- Full integration of weather data in other Vizrt systems such as the Viz|Ticker™.
- Worldwide, high-quality, weather data supplied from Storm Weather Center (www.storm.no).
- Sound effects.

ON AIR The superior 3D renderer, Viz|Engine™, is the output source for Viz|Weather.

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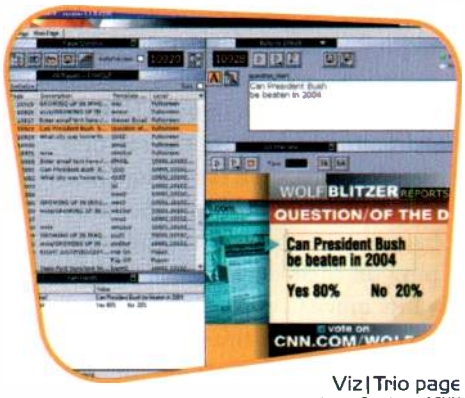
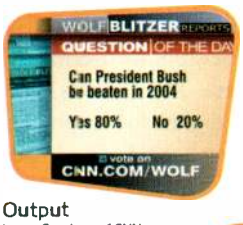
vizrt

Viz|Trio™



Viz|Trio page
Image Courtesy of CNN



Output
Image Courtesy of CNN

Output
Image Courtesy of WQAD

Viz|Trio is a cost-effective, yet powerful, real-time 2D/3D character generator. In addition to the basic CG features it offers a feature-rich 3D design system for creation of true 3D graphics and animations. Viz|Trio offers a wide range of attractive features such as the Look-Ahead Transition Logic™, multiple clients controlling one output channel and integration to Non-Linear Editing systems.

HD/SD Output

Viz|Trio can deliver both High and Standard definition formats. Being built upon the Viz|Engine real-time output machine Viz|Trio as a software automatically supports SD and HD. The core technology in Viz|Engine is entirely resolution independent, hence adaptation to new output standards is only a hardware issue.

ON AIR The superior 3D renderer, Viz|Engine™, is the output source for Viz|Trio.

Look-Ahead Transition Logic™

The Look-Ahead Transition Logic is unique for Vizrt. It will make sure that for any new page taken to air the system will automatically perform optimal transitions between existing and new graphic elements. Graphics elements meant to be on the screen at the same time are put in different logical layers. The concept of independent layers enables you to put on air any combination of graphics and control them independently of each other.

Reduce the number of pages

If you for instance have a Live Bug, a Lower Third and a Side Panel, they can be designed to reside in different layers. You can then take your Live Bug, Lower third or Side panel on and off without having to worry about whether the other two elements are on or off. Without this feature you would have needed 2^3 pages to be able to show all possible combinations. With Transition Logic you only need 3.

Automatic transitions when variants of your Lower Third are loaded

If you have variants of your Lower Third, for instance one for a single text line, one for two text lines, and one for three text lines, the layer can be designed with transitions which change the Lower Third backplate to make it fit the number of text lines. If you for instance have a single line Lower Third on-air and take on a three lines Lower Third, the Lower Third layer will automatically seamlessly transition into a bigger version of the Lower Third backplate to fit the three lines text page. The workflow for a non-transition system would have been to use two channels and perform a cross fade or to do a crude cut.

Make layers interact to ensure correct composition of all elements

It is also possible to make layers affect each other. If the Side Panel is on-air and you go from the one line Lower Third to the three line variant, it might be the case that the Side Panel needs to be moved or scaled to make room for the bigger lower third backplate. This logic can also easily be designed into the layer logic. Without this possibility you would have to design the Side Panel with a static size that would fit the biggest version of the Lower third. This would again result in an open space between the Lower Third and the Side Panel with the smaller Lower Third variant.

Key features and Benefits

- True real-time 3D graphics.
- Easy-to-use feature-rich 3D design tool.
- Look-Ahead Transition Logic enables seamless automatic transitions between graphics (no need for mix off/on).
- Integration with the leading non-linear editing (NLE) systems from Pinnacle and Avid.
- Supports all SD and HD formats.
- Advanced multilayer logic reduces number of pages needed for composite graphical elements.
- Client/server architecture allows multiple clients to perform off line creation, preparation and/or editing of graphics.
- Client/server architecture allows multiple clients/operators to control the same output channel.
- Optimized workflow: various screen layers, content creation and playout divided between operators.
- Seamless newsroom integration with all major newsroom systems: INews, Octopus, ENPS, Dalet+, OpenMedia, Pronews, and other systems which supports MOS Newstar.
- Runs on standard, rack mountable PC hardware and laptops.
- Intuitive GUI with WYSIWYG display of graphics, without use of the on-air playout unit.
- Four independent video input sources, 2 built-in clip channels with playback of DVCPRO25/DVCPRO50, and MPEG-2 clips. Clip playout can be controlled from the animation timeline.
- Multiple real-time video output with adjustable video buffering.
- Local (VGA) and external (SD/VGA) preview channels (multiple configurations available).
- Import of 3D objects from: Wavefront™, 3Dstudio™, Autocad™, VRML 2.0™, Maya™, and Softimage|xsi™.
- Import of Softimage|xsi pre-designed animations.
- Still store/Image/Clip/DDR database with search functionality.
- Wide range of different advanced text effects.
- Built-in 2D DVE with sub pixel accuracy, RGBA input, and Chroma Keying.
- Intelligent Interface™ support and powerful native API.

because it's the way they've been producing news for years. "The challenge for stations' newsrooms and journalists now is about being able to understand the range of tools out there and pick and choose those that will benefit them and the workflow," said Mike Palmer, director of technology development ENPS and director of digital distribution systems and strategies for the Associated Press.

Picking and choosing — not extreme file-based workflow makeovers — is exactly what happens at most stations with existing news operations, according to Fred Schultz, vice president of news automation at Sundance Digital.

"Every call-letter news operation has its own set of legacy devices and its own idea about upcoming technology," he said. "Because Sundance Digital is an automation company with a tradition of brand agnosticism, we not only work with virtually all devices in the industry, but the very backbone of our business is continuing to do so with future devices. This strongly differentiates us from companies offering news automation as a subsidiary product to their main enterprise of selling servers, editors or other hardware.

"From early on, virtually all server manufacturers built an application to run news demos, then added it to their catalog labeled as automation," said Schultz. "While these applications could load the server from the rundown, most vendors were reluctant to step beyond their own product line and accept responsibility for controlling CGs and still stores, much less audio, camera robotics and switchers. On the other hand, that breadth of control is what Sundance Digital is in the automation business to do."

This isn't to say that a file-based approach to editing and all of the other tasks required to build and play out stories doesn't make sense. It's just that existing infrastructures and work habits don't evaporate overnight.

"There are tremendous advantages to a digital-file approach to news editing," said Brad Ferris, Pathfire's vice president of business development. He pointed to his own company's Digital Media Gateway (DMG) as an example of how a file-based workflow streamlines editing by allowing reporters and news producers to browse low-resolution on their desktop.

"News producers no longer have to locate tapes and find runners to track these tapes through the newsroom," he said. "The low-resolution digital files enable this real benefit today. Through digital file delivery, stations are experiencing significant savings over the cost of tape. With Pathfire's DMG, stations no longer have to roll tape on network news feeds. Therefore, they only use tape for stories they want and only have to make one copy of the story."

Sony, XDCAM PDW-530

Virtual newsroom

As videotape gives way to digital files, an interesting thing happens: Newsrooms can go virtual. Why make reporters in the field return to the station to edit their piece when they can copy video files to a laptop computer, edit their stories and file them using broadband Internet connections?

"A mobile field editor untethered from a truck can take full advantage of wireless networks," said Pathfire's Ferris. "Prior to these technologies, mobile units were essentially required to be paired with a microwave truck. Now, a field unit can jump in the car, film the story, edit it on the laptop, find a hotspot and transmit the story back to the station — while sipping on their decaf, non-fat, light whip, mocha cappuccino."

Don't think of this as being unidirectional, either. "One of the unique attributes of a file-based environment is that I have the ability to make content movement two-way. Push it into the station or pull content from a library or repository," said Omneon's Stedman.

"So, if I am out in the field and I created a story and copy it into the station, I just have to find a high-speed Internet connection and FTP it. I don't need the real-time link.

"What is really interesting is the reverse. You are working on a story, and you need a shot of available graphics. Over the same standard network, I can pull that content again without a real-time feed."

Pathfire's Ferris agreed. "With tools and applications today, stations can give field producers access to content at the station," he said. "The primary challenge to the station is for field producers to have online access to station archives.

"FTP is a popular mode of transport of files. However, stations need to be able to provide not just the transfer of the file but the ability to search on content, view low-res before transfer, remotely clip portions of high-res content, search metadata and transfer content all in one application. Pathfire Direct allows remote bureaus and producers to pull content and metadata directly from the station."

However, using FTP to transfer

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"It's amazing that with a scroll of a menu I can go from 60i to 24p and get a totally different look."

Patrick Higgins,
Director of Extreme Makeover: Home Edition

File-based production: the new reality in reality TV.

The new way to produce is substantially faster and easier, according to Patrick Higgins, director of Extreme Makeover: Home Edition. "In nine days we shoot 350 hours to bring a 42-minute show together. So I'm a big proponent of anything like the XDCAM™ system that's going to make our jobs a lot easier."

"I love scrolling through the camcorder thumbnails to see a shot really quickly, then going from playback to recording instantly. Then there's no worry about backing up a tape or recording over footage. It's an amazing, practical advantage. The camera is also phenomenally fast. I'm seeing light levels that I can't see with my naked eye."

"We shoot in the rain; we shoot in the snow, below 30 degrees or 115 degrees. Also, when you're building a house there's all sorts of dust, dirt. We cannot wait for the environment to work with us. We have to work within whatever environment we're in. We've had zero problems with our XDCAM camcorders."

"I would say to anyone who was thinking about using this camera, they're going to have an incredibly positive experience."

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video files and other assets to and from the field isn't without its own set of concerns. Forward error correction can swell file sizes. Additionally, because FTP is a product of the Internet, it is subject to bandwidth and access issues. The Associated Press' Palmer put it more bluntly. "FTP is not a good idea," he said. "Products, such as SnapFeed, use a more reliable transport with error-correcting technology."

Regardless of whether or not FTP will ultimately be acceptable, the idea of allowing reporters or producers to work in the field as if they're in the newsroom only became practical as field acquisition became tapeless. Without tape, transferring video files from a camcorder to a laptop for editing became practical.

"Unfortunately, the tapeless acquisition formats offered to date have serious workflow problems," said Grass Valley's Casaccia. "In some cases the medium is by its nature too slow to perform as anything other than rotating video tape. Solid-state media are so expensive that the manufacturer is actually offering detachable disk drives as an intermediate step between the original medium and the editor."

"Grass Valley's Infinity puts an end to all of that by using Iomega's commercially available Rev technology in both its standard form and an enhanced Professional series, as well as Professional Grade Compact Flash solid-state memory. Infinity devices allow the user the choice of encoding DVCPro, DVCam, MPEG-2 or the advanced JPEG2000 codec, and the choice can be made just before pressing the record button."

"Properly designed tools make it easy for even the most traditionalist reporter to function. . ."
— Ed Casaccia, Grass Valley

Optical media like XDCAM offer distinct advantages throughout the news acquisition-editing-playout process, said Sony vice president of optical and network products marketing Bob Ott. "From the standpoint of tapeless acquisition which is optical, the media is proven to withstand humidity and G-force and everything else," he said.

In the newsroom during editing or playout, optical media allow engineers to lay a hand on a particular story if there is an equipment failure, he said. "If you have a system committed to a hard drive and one goes down, you can't pull a hard drive out of there and hope to retrieve the file you want," he explained "With optical, the solution is you can remove the media and use a working machine."

In that way, optical discs "offer the familiarity of tape with the benefit of disc, namely random access," he said.

Control, alt, delete

As broadcasters look forward and can see the closing of the final chapter of their analog existence, a new era of digital challenges and opportunities presents itself. At the same time, as stations are grappling with ways to fill multicast DTV channels — some of which are sure to be news related — newsrooms must continue to feed the insatiable demand for news of their core channels. Additionally, new distribution avenues, including HD newscasts, webcasts and news updates for such mobile devices as cell phones, will need to be fed and managed as well.

Fortunately, file-based workflows in the newsroom translate into efficiencies in editing and will allow content to be repurposed. "Because it is file-based, you can quickly repurpose (news content) for different field outputs and tackle HD and SD," explained Avid Technology's Schleifer. ■

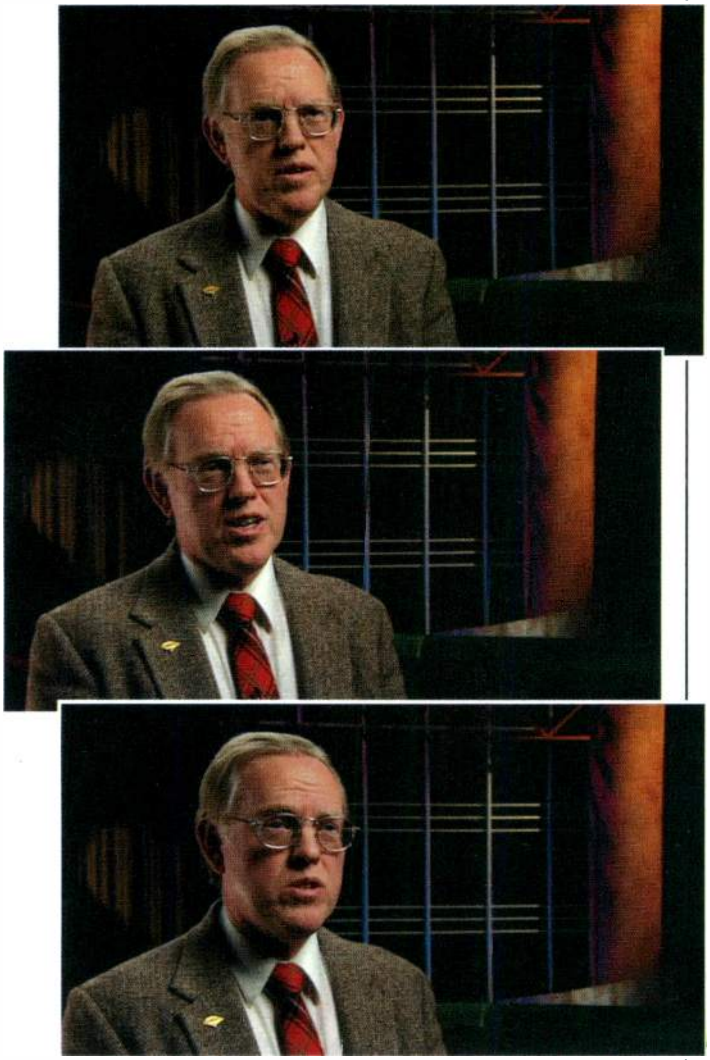
Grass Valley, NewsEdit

SONY

THE NEW WAY TO BROADCAST.

"We've been putting three times as many head hours on our decks as the typical commercial station."

Jim Gale,
Director of Engineering, KNME



Optical disc transforms the economics at KNME.

Tape-based studio operations are the old way of broadcasting. The XDCAM™ disc-based system is the new way. "The biggest challenge in public television is finding operating dollars, rather than equipment dollars," says Jim Gale, director of engineering and operations at Albuquerque's KNME. "We have to consolidate and become more efficient. We were desperate for a format that was very economical to not only use but maintain. That's a big reason why we fell in love with the XDCAM format. There are such great savings in operations. The media only costs $30 and lasts 50 years; there's no better bargain than that."

"Another reason we chose XDCAM decks: they have only three moving parts. We've been putting three times as many head hours on our decks as the typical commercial station. That's because we program every minute of the day, just like a network operator would do. We need a format, a video transport that is very reliable and easy to maintain. XDCAM delivers."

"The tests we've run have been perfect. In operations, there are no flaws whatsoever. I expected that when I saw the quality of the engineering in the product. And I've never seen Mr. Rogers look so good, because it looks like the satellite feed. It's really, quite frankly, the most exciting thing I've seen in my 30-year career."

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Only Avid fully integrates the Avid iNEWS NRCS, Avid Unity media networks, and Avid NewsCutter editing systems with the industry's most powerful on-air graphics and multi-channel playout servers—all backed by a single service, support, and training organization. And unmatched interoperability with third-party products allows broadcasters to choose from the world's leading solutions, from tapeless cameras to archive libraries.

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The changing shape of newsroom graphics

Managing newsroom graphics these days is as much about managing change as it is about managing people and resources.

Consider the following facts:

- The Academy of Television Arts and Sciences this month will award a Technical Emmy to Sprint Nextel and MobiTV for live mobile television delivered to cell phones.
- In 2005, Americans will buy about 13 million HDTVs according to the CEA.
- A Forrester Research study has found that households with a laptop and home network watch three fewer hours of TV per week than offline households.

Clearly, the shape of television news must change — both figuratively and literally — to take advantage of these new dynamics in news consumption and distribution.

Viz | rt, Viz | Trio, Viz | Artist, Viz | Engine

Creating graphics for these new distribution alternatives while continuing to satisfy the demand for traditional TV distribution could not have come at a better time. New IT-based tools and workflows can allow broadcasters to serve up news graphics to new distribution channels without duplicating effort. Affordable digital storage and new graphics applications help as well.

In short, many broadcast newsrooms are much better positioned today to deliver news graphics for these new avenues than they were even a few years ago when standalone CGs and paint systems dominated the news landscape. As Isaac Hersly, Vizrt president of the Americas, put it, "What we are talking about is optimizing the management of graphics."

"...the current model of graphics production, taken as a whole, is outdated and soon to be obsolete." — Matt Allard, Grass Valley

Those that aren't are looking to escape the box of proprietary hardware and software. "Much of the push for centralized production is due to the fact that the current model of graphics production, taken as a whole, is outdated and soon to be obsolete," said Matt Allard, applications product manager for servers at Grass Valley.

"Users are tired of purchasing expensive proprietary boxes that do half the job at twice the price. The off-the-shelf hardware and software graphics technology developed for other industries, such as industrial design and electronic games, has far outpaced anything that the television industry uses or needs — including HD. A new combination of existing IT technologies in databases, Internet presentation, client server applications and graphics can and will do a better job for users than the current models," he said.

Managing graphics for news

Effective management of television news graphics requires many things, but at the foundation is the ability of reporters, producers and news directors to find and retrieve graphic elements as required. "Centralized access is most important," said Vizrt's Hersly. "Having graphics available to the creator of the story — normally a writer or producer — and having them available immediately with ease of access is important.

"Speed, ease and having a variety of graphical digital assets available is where we can contribute by enabling users to have the ability to find clips, stills and other graphical assets on the desktop. Our goal is to have a completed story constructed on that desktop, manage any changes efficiently and provide easy playback. We also want to give everyone in the workflow an opportunity to reorganize a story or make last minute changes."

Centralized access to news graphics is an important component of an overall transformation of workflow in the newsroom. "Through centralized graphics creation, broadcasters can make use of a single set of graphics assets and focus creative tasks to one department that will facilitate the delivery process in either a single station environment or across multiple stations in a hub and spoke type workflow," explained Teicia Joffe, product

marketing manager of graphics for Avid Technology.

"Benefits include reduced complexity in the delivery of news content, thereby seeing operational cost savings and enabling a greater focus on visual impact and program appeal," said Joffe. "Broadcasters gain a better sense of identity and brand consistency. As content becomes more widely available, late-breaking news can hit the air faster and with greater accuracy."

While the cost savings, improved accuracy and more consistent look are appealing, IT demands workflow change. Graphic artists, reporters, producers and news directors will be required to modify existing work patterns to take advantage of the efficiencies these new hardware and software tools offer.

Avid Technology, Deko3000

Building blocks

In the view of Avid's Joffe, there are three building blocks to a successful implementation of graphics production: a well-equipped art department, fail-safe creative tools and proper asset management.

"A skilled and focused art department can more than meet the creative demands of multiple news stations — provided they are well-equipped with industry-leading tools that enable a higher level of quality and control in graphics production," she said.

"Successful centralized graphics production starts with the creative process. The tools used in the design of templates must enable content to be dynamic and fail-safe to support a now broader scope of graphic fulfillment," she said.

"Within an MOS environment, journalists are now creating their own graphics right up to air using Avid's DekoMOS plug-in to the NCS. Deko templates can force desired properties, such as text case, justification, spell check and even limiting, to a maximum character count so text does not air squeezed, compromising the program's quality."

In the view of Vizrt's Hersly, templates are a critical component of incorporating centralized graphics production into newsroom workflow. "We are finding more and more that templates are still the easiest for non-technical, non-creative people to build graphics," he said.

"They fit very well within the normal desktop and writing tools that reporters and producers use now constantly. And we have also implemented a complete preview capability. Any asset can be fully previewed and reviewed on the desktop so that the complete graphics animation may be reviewed before it leaves the desktop."

They also ensure a consistent on-air look. "Templates define style, layout and behavior of elements in a graphic," said VertigoXmedia president and CEO David Wilkins. "That's a one-time job. Once graphic artists do that, journalists use the template without having to go back to the graphic artist. It makes sense to allow people to do what they are best at.

"Smart templates are a step beyond an ordinary graphic template. Smart templates allow information to be inserted but go beyond filled in by the user. They assign a behavior to a graphic so that it can get modified based on streaming data according to predefined rules. For example, a green arrow automatically points up when the stock market rises, and a red arrow points down when it declines."

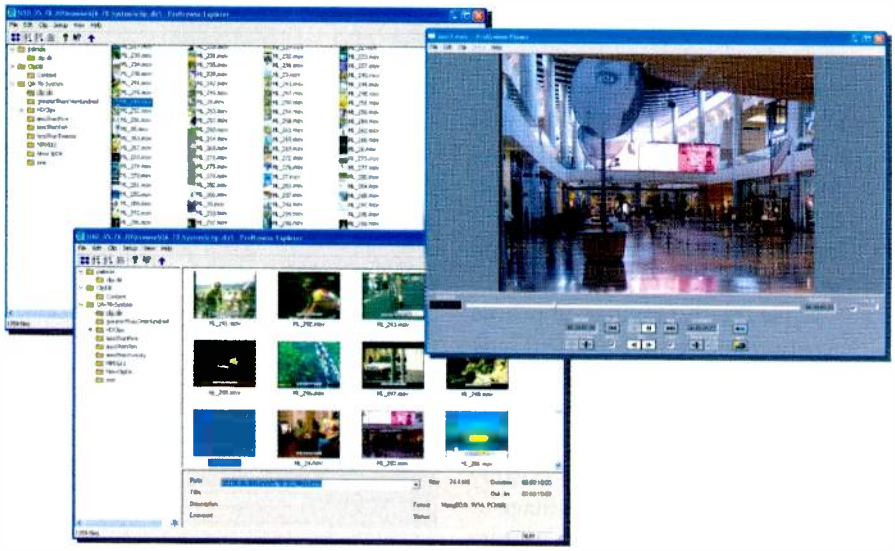
"Templates are still the easiest for non-technical, non-creative people to build graphics."
— Isaac Hersly, Vizrt

Shape of things to come

With the imminent transition to HD, broadcasters need a solution

Omneon Spectrum™ Media Server

The Omneon ProBrowse™ System delivers fast and easy access to low-resolution media for previews, clip selections, research and approvals from any networked desktop.



Today's broadcasters are looking for newsroom solutions that allow news producers, directors, editors and others to quickly view and pull together clips for broadcast. Omneon Spectrum media server systems support your news department through the entire process of bringing stories to air. Once source material is ingested into the system, editors, producers and engineers can access the content over the network without making local copies or multiple dubs.

With networked shared storage that makes content available to existing applications through standard file formats, Omneon Spectrum media servers maximize workflow productivity in any news environment. With an Omneon Spectrum system in your facility all content lives in one place and can be accessed from any system in the facility.

This means less time moving files and more time preparing stories. It also means producers and editors can continue to use the tools to which they are already accustomed.

Omneon Spectrum media server systems include high-bandwidth Gigabit Ethernet connectivity to support browsing and editing over the network, even for multiple editors or producers simultaneously. And since there's no difference between the edit storage and the playout storage, the story is ready to play to air the instant that editing is completed. The Omneon Spectrum media server maximizes the use of IT-based hardware and software and is built with an open architecture to support a broad variety of third-party applications for automated ingest and playout, media management and archiving.

Leveraging industry-standard formats and protocols to enable the broadest range of applications gives broadcasters the freedom to choose best-of-breed applications for their end-to-end solution. With support for leading tools, operations staff can quickly begin to take advantage of a shared storage infrastructure. Departments can share files at the same time and deliver content directly from storage to the target applications without having to convert formats.

For Newsroom Operations

Omneon ProBrowse

One of the keys to newsroom operations is having the ability to access and view content across the many desktop users within the facility. Providing a low-resolution version of high-resolution media reduces server and network bandwidth loads, while enabling a greater number of people to access content.

The Omneon ProBrowse System was created to meet these demands by enabling the creation and use of low-resolution versions (proxies) of full-resolution material contained within an Omneon Spectrum system. Journalists and editors can access proxies during ingest and frame-accurately mark selects. All the decisions they make are synchronized back to the high-resolution content immediately.

Included with every ProBrowse system is the Omneon ProBrowse Desktop, a comprehensive software package for media information management. The Omneon ProBrowse Desktop includes tools to search for content, create picons, add user-definable metadata and mark in and out points. Media tagging and marking can be done from any networked desktop computer. For those users that simply need to view proxies, Omneon ProBrowse proxies are fully compatible with standard PC viewers such as the Windows Media™ Player and the QuickTime® Player.

Get the most out of your investment. Take advantage of the Omneon Spectrum media server's open platform approach and get what you need to run your operation now and in the future

For more information about Omneon Spectrum Media Servers, Omneon ProBrowse or any other Omneon product, please visit our website at www.omneon.com.

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that will let them embrace HD and still maintain SD environments. That means not having to require separate hardware for each standard.

In the view of Avid's Joffe, broadcasters are opting for a hybrid solution capable of outputting both SD and HD from the same system and configurable to either standard through software. "Avid's Deko Hybrid is just this — a solution for both formats from one box. It's an avenue for transitioning without burdening the budget," she said.

"Embracing multiple formats also means not having to build graphics for both SD and HD standards — duplicating time and effort, increasing costs," Joffe said. "At an advanced level, users will need tools for taking advantage of the extra HD canvas. Avid's Deko graphics system uniquely offers tools for multiformat programming without needing to build two sets of graphic assets."

Not only does a mixed HD/SD environment present the challenge of efficiently creating graphics to support both format's aspect ratios, it also offers an opportunity for newsrooms to use the wider aspect ratio of high definition that graphically may better inform viewers during the newscast. "There is much opportunity for the next Bloomberg-look graphics breakthrough," said Avid's Joffe.

Several users of Vizrt's graphics products, including CNN Pipeline and ESPN, are currently producing in HD and setting up their onscreen presentation with 16:9 center-cut graphics. However, the company has made an effort to foster new ways to use the wider aspect ratio for graphics.

"At NAB we showed graphical content — a sports application — on the HD side curtains, not only left and right side curtains but the ability to shift the picture to have a double curtain on one side that's more usable and practical for graphics display," explained Vizrt's Hersly. "We do believe some clients would like to see this as real estate for targeted advertising for the HD audience as well as specialized data display for HD. We see promise in that application with our customers appreciating the potential for additional revenue streams."

Associated Press, ENPS

"What we have been doing in broadcast for 10 years is really content automation," explained VertigoXmedia's Wilkins. "It happense in most examples to be TV graphics, but that same content can be repurposed for the Web as streaming media or as HTML, or a handheld device, or a set-top box. Our tools are more general abut automating creation of content for any of those output channels. HD and SD are two good examples of that too. You don't want to build a process of building SD that can't be flexible enough to handle HD."

Other streams of additional revenue are emerging as well. WRAL in Raleigh-Durham, NC, has pioneered efforts by local stations to use cell phone distribution of news, sports and weather information, opening up new branding opportunities and potential profits. Others, such as CNN Pipeline, are using the Web as a distribution avenue for news presentation to broadband Internet news consumers.

So, will news graphics for cell phones and webcasts require a parallel track on which news graphics will be created in new resolutions and unusual sizes? Several experts don't seem to think so.

"While broadcasting to the SD/HD audiences," said Vizrt's Hersly, "broadcasters desire the capability to deliver specifically for handheld mobile devices — without incurring an increase in overhead for the creation of the graphics for these additional devices.

"The new tools we are developing will take a subset of the SD/HD graphics and format graphics for the smaller screen without having to totally recreate the graphics. On the mobile devices, we would provide powerful capability to target or personalize graphics based on individual viewers' demographics," he said.

To a large degree, the relative ease with which news graphics can be created for these new avenues can be attributed to the file-based IT workflows that are being adopted in newsrooms. "Going back to the IT technology model, the same architecture easily supports different output types," explained Grass Valley's Allard.

"The software tools already exist to create the graphic elements in multiple resolutions, and additional templates can be created for new output presentation," he said. With such tools, television newsrooms have a good chance of keeping pace in today's heated competitive environment. ■

The HD news equation

Bit by bit, HDTV is becoming a reality. Statistics from the CEA indicate that 15 million DTV products will be sold this year — 85 percent of which will be HD capable.

Add that to the existing 7 million U.S. HD households, and it's clear that high definition is slowly gaining traction with consumers.

To date, a small but growing group of local stations, including WRAL in Raleigh-Durham, NC; KUSA in Denver; WUSA in Washington, D.C.; and KABC in Los Angeles, are regularly producing local news in high definition.

While a growing HD audience is seen as being fundamental to opening the floodgates to new HD local news operations, it's only one factor. Others, such as affordability of acquisition equipment, resolution of the government-mandated date for analog shutoff, capital budgets and a host of return on investment issues, are likely to prove just as important as audience size in transforming the trickle into a deluge.

In the view of Sundance Digital vice president of news automation Fred Schultz, the decision to produce news in high definition is about something other than dollars and cents, at least for the moment. "The decision to go HD is really a political decision, and every station makes political decisions for its own political reasons," he said. "In the long run, HD is inevitable, but at this time it is not essential.

"Most of our entertainment technologies co-existed with the older technology they ultimately replaced until some form of content appeared that could not be adequately enjoyed on the old medium," said Schultz. "Then the changeover was sudden. Should such must-have HD content arise, it would guarantee a quick and decisive transition."

According to Grass Valley's news workflow manager Ed Casaccia, besides the few pioneers who have done an instant transition to all HD news, the integration of HD into the newsroom has been gradual.

"The evolution, not surprisingly, seems to have followed the availability of support products," he explained. "A generalized transition starts in the studio with SD/HD switchable cameras — certainly a reasonable first investment. When an HD switcher is added, it's a fairly simple matter to switch to a production in which the studio material is HD and field material is SD — initially analog followed by 4:3 SD and then 16:9 SD."

"Since the overwhelming majority of home receivers are still 4:3, that aspect ratio dictates the framing and composition of both the studio and field shots, even if those shots are using the full width of the 16:9 frame. The SD material is upconverted going into the switcher. HD output from the switcher goes to the ATSC encoder while that same output is downconverted and sent to the NTSC transmitter."

Serving up HD

Even if Congress this fall passes anticipated legislation that will mandate a hard date for cessation of analog transmission on Jan. 1, 2009, stations will continue to serve the needs of an audience that's a jumble of 4:3 NTSC viewers and 16:9 HD viewers for a long time to come.

Beyond the shutoff, millions of viewers are likely to continue watching television on their existing 4:3 sets, thanks to inexpensive digital-to-analog converter boxes, which are in the design stage, and an SD multicast signal.

This mixed environment places demands on news servers. "For Pathfire, HD has extreme impacts on the Digital Media Gateway (DMG) receive server," said Brad Ferris, vice president of business development. "More content — encoded at a higher bit rate — will require more storage and more bandwidth to transmit the content."

"Pathfire will use advanced codecs to mitigate the impact of HD.

Avid Technology, iNEWS

The transmission of HD will have little effect on Pathfire, but the downstream integration of HD content will have huge implications on the station environment, as they will now be required to work in a dual environment that accommodates HD and SD and NTSC."

Omneon, Spectrum server

Fortunately for newsrooms, those implications can be managed technologically so journalists, producers and news directors can concentrate on writing and editing stories — not on what format was used to shoot and store source footage.

"Servers have to have the ability to upconvert SD and downconvert HD material to allow a newscast to be mixed," said Omneon Video Networks vice president of marketing Geoff Stedman. "Omenon will do it in the server, and others can, too. The reason for that, if you are building a playlist of clips as a producer, you don't want to worry about whether it is HD or SD and route it out to the encoder," he explained.

"With a single pool of common storage, you want to build a list of SD and HD back to back and hit play. What you really want out of the server is a continuous HD stream and maybe at the same time SD. It's really important that a server can do that. Build a single list of clips and automatically upconvert and downconvert. You get straightforward SD and HD out," said Stedman.

In the words of Grass Valley's Casaccia, "Codec agility in both the editor and the server means that any clip, SD or HD, can be used in any production with upconversion or downconversion performed on the fly as needed, completely transparent to the users."

Codecs also play an important role in an HD news server's storage and bandwidth requirements. As Avid Technology vice president of broadcast and work groups, David Schleifer put it, "Bandwidth and more storage all come with managing HD." However, as HD codecs become more efficient, the extra storage and transport bandwidth required will decline, said Grass Valley's Casaccia.

"The Infinity Series offers a great deal of user choice in just what bit rate is used for HD, with a sweet spot apparent in JPEG2000 at 75Mb/s. Here's where Moore's Law comes into play. By using IT standard drives and networking, the cost of storing X hours of material and connecting Y number of editors, ingest ports and playout ports is actually falling even when scaled for HD."

Omneon's Stedman agreed that file format and size impact server performance in the newsroom. However, HDV — the prosumer 25Mb/s HD format that has piqued the interest of stations looking for affordable high definition acquisition alternatives — would place no greater demands on news server storage and bandwidth than SD files, he said.

"Capacity — higher capacity — depends on the format of video being used," he said. "If you're talking HDV, you're not using up more bandwidth or capacity than SD. It's roughly the same or smaller." The company announced in late August that it has added HDV playout capability to its Omneon Spectrum server to advance its goal of delivering on its capture, edit, play workflow concept for stations — even those that decide to use HDV as their acquisition and editing formats.

The notion of a unified format throughout the entire news workflow isn't limited to the realm of HDV. It's a worthy and desired goal regardless of formant, said Avid Technology's Schleifer.

"Homogeneity of formats within the system gives users a workflow that says, 'When I am done, I can send it to air with a reasonable delay,'" he said. "It can't be five minutes to air and take 15 minutes rendering and transcoding so you can play it. That's not acceptable in news."

HD in the field

To date, most stations have resisted converting their ENG crews to HD cameras. Even many of the HDTV news pioneers have limited HD field acquisition to specially mounted high definition cameras on news helicopters. The reason is simple: money.

"The next step is HD field acquisition, an investment prospect that has so far proven daunting to most customers," said Grass Valley's Casaccia. "The Infinity Series is an example of how true immersion in IT makes it possible to deliver a high-quality HD acquisition, contribution and editing system at a price far below existing expectations. Look for HD news acquisition to become the norm in large markets in the next 12 to 18 months."

However, Omneon's Stedman pointed to the HDV format as a viable alternative to higher priced

"Bandwidth and more storage all come with managing HD." – David Schleifer, Avid Technology

professional HDTV ENG cameras that are likely to make HD news acquisition happen sooner than that. "I think HDV will grow dramatically," he said. "It offers a cost-effective way to do HD acquisition, and the quality is good. It may not compare technically to the quality of higher bit rates, but it is a viable alternative for stations looking for a cost-effective way to go to HD acquisition."

Grass Valley's Casaccia sees the issue as a new spin on "the time-honored question of 'Is it good enough.' The answer to that question is always specific to each customer. However, one generalization is possible," he said. "The better the initial encoding, the better the image will be all the way through the production and transmission chain. We believe that while HDV has certainly generated a lot of interest in its Prosumer form and at Prosumer prices, it will only be acceptable to those operations whose cost structure is constrained to the point that it overrides the desire to maximize quality."

Pathfire's Ferris disagrees. "I think that this argument has already been settled and HDV — based on the cost advantages of HDV and relative lack of quality differentiation — will lead to mass adoption of HDV. Budgets will require a cost-effective solution and HDV is as close as you get — for now."

Avid Technology's Schleifer said he believes one need look no further than the roots of field reporting with video to glimpse the possible impact of HDV on news. "With 3/4in, when that came along, it reduced the quality of what went on-air. But look at how successful that that was. It was the reason an ENG workflow took off. It allowed you to be first on the air."

Shooting 16:9 SD with a 4:3 safe area today is the right approach to acquisition, according to Sony's vice president of optical and network products marketing, Bob Ott. "The key is, if you shoot something in 16:9 today, even if you don't have HD news, your archive is very important to your news operation. Three years from now it will be in 16:9 when you are ready to launch HD operations. The 16:9 emphasis will become a bigger and bigger issue," he said.

Pathfire, Direct encode side

Fade to black

For all of the hype about HDTV, it's difficult to predict how and when the right confluence of factors will create conditions favorable to launching HD news operations en masse. For now, committing a newsroom to HD operations is happening one step at a time, with the last being out the door and into the field for HD acquisition.

Still, some stations are pushing the envelope, and in doing so, are demonstrating their determination to be a leader in this historic change in television technology. Grass Valley's Casaccia compared the switch with another major shift: from black-and-white to color TV. While the change to HDTV may be every bit as sweeping, Casaccia said, "The switch to HDTV is actually less dramatic a change than black and white to color." That less noticable change for the viewer — particularly in news — is a hard pill to swallow for an industry that literally has invested billions of dollars on the digital transition.

"After all, a glance at a screen from any distance is sufficient to tell if the image is in color or black and white," said Casaccia. "But the real difference between HD and SD only becomes apparent as one gets closer to the screen. The ability to have more emotional impact by filling more of the field of vision without discerning the line structure of the picture is what HDTV is really all about.

"So, unlike color, there might not be a big discernable difference in being the first to go HD, though it will certainly have marketing value. But there certainly will be an audience penalty paid by stations that adopt high definition significantly later than their competitors and viewers grow accustomed to the HDTV experience."

However, for the moment HD news production comes down to something far simpler, according to Sundance Digital's Schultz. "Right now, producing news in HD is about showing leadership, claiming bragging rights and climbing the learning curve before the eyeball count gets any higher." ■

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New wave news and new IT infrastructures

Given the cost of producing a newscast, news directors, station managers and group and network management must improve workflow efficiencies, leverage existing resources and find a way to win audience in a changing competitive environment.

If they can do that and establish themselves as a primary source of information in new markets, television news organizations will succeed in making lemonade from the proverbial lemons.

Studies show the media landscape is changing — and not to the benefit of broadcast TV news. For instance, a January 2004 study from the Pew Research Center for the People and the Press, found that TV news remained dominant as a source of information for the 2004 presidential election, "but there has been further erosion in audience for broadcast TV news," according to the study.

Additionally, it found: "The Internet, a relatively minor source for campaign news in 2000, is now on par with such traditional outlets as public television broadcasts, Sunday morning news programs and the weekly news magazines."

Newsrooms have not remained static as these changes have occurred, however. New file-based IT workflows are improving efficiency, in the newsroom and positioning stations to capitlize on emerging distribution avenues.

As Microsoft Worldwide Media & Entertainment Group senior program manager John Deutscher put it: "When you consider the cost to produce content, you want to maximize the return and reach, drive brand loyalty and monetize those distribution channels. By leveraging a digital content base, broadcasters can create an efficient workflow model and revenue base as well as look to generate new revenue models.

"Going forward people will pick their favorite video sources through the Web, and they will play them back. Kids and technology enthusiasts will increasingly get their content on demand from the Web and other portable devices."

Return on investment

Justifying the transformation of news workflow to an IT infrastructure hasn't been done in light of new revenue opportunities. After all, the changeover has been happening for nearly a decade, and stations have only just begun serving news to cell phones.

No, the transition from linear news production where single-function devices dominated has until this point mostly been measured against the yardstick of improved efficiency. So, the obvious question becomes: Has the transformation — measured on the efficiency scale — been worth it? Are file-based IT solutions fulfilling their promised return on investment (ROI)?

"The digital newsroom is certainly delivering on its ROI promise, and improved efficiency is the driver for that," said Grass Valley news workflow manager Ed Casaccia. "A unified client-server approach implies a single vendor solution, and that is certainly not to the benefit of customers. Of course islands aren't very beneficial either."

As Omneon Video Network vice president of marketing Geoff Stedman sees it, the notion of digital islands is slowly receding as broadcasters increasingly demand vendors support interoperability standards to link the islands.

Sundance Digital, NewsLink

"The growth of MXF and the desire to have equipment that supports MXF between vendors is an example of the integration of different parts of the workflow in the use of common file formats," he explained. "The desire by broadcasters to ingest once and keep it as a file all the way through the process and at the end turn back to a real-time stream if necessary is the desire and

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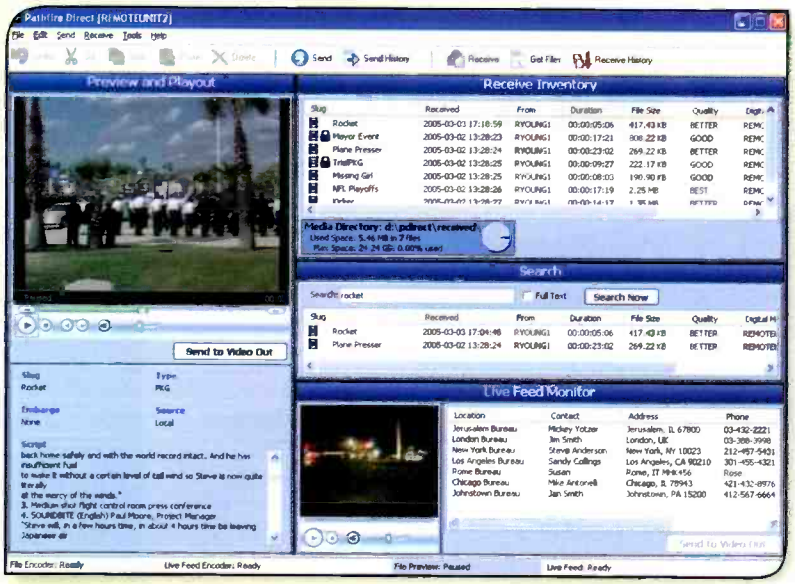

Pathfire, Direct receive side

motivation for updating a facility and implementing new technology.

"Move away from multiple dubbing and transfers from one island to the next as real time transfer; embrace ingest once. Once a file always a file throughout the process, and the ability to use unified storage is certainly something broadcasters are actively looking for."

Of course, the idea that ROI can be realized from improved efficiency is one face of a two-sided coin. The other implied, less celebrated aspect of the ROI coin is staff reductions, or alternately, and more benignly, doing more news production with the same newsroom staffing.

But on the whole, that isn't how things are working out, said Sundance Digital vice president of news automation Fred Schultz. "Our industry is at V1.5 of the ROI and head count issue. V1.0 was exclusively about dropping people from the payroll. Experience has revealed a more complex picture, e.g., the competitive markets where prime news still justifies a full head count," he said.

"What has become indisputably clear is that there are three separate kinds of news, each of which requires a different optimization from automation. Single-anchor shows with locked scripts, like cut-ins, should be run using a single operator. The off-prime newscasts need to be competitive, glossy and error-free while run by a crew of two or three. And for prime news, automation should support a staff level of the station's choosing," Schultz said.

"Just as experience has revealed shades of gray on the topic of head count, it has also given rise to questions about preparedness, versatility and station operations," he explained.

Where IT-based workflows succeed in delivering the greatest newsroom ROI is with broadcasters who are willing to change old work patterns, according to Pathfire vice president of business development Brad Ferris. "While the promise of improved efficiency associated with a digital newsroom is alluring, the results are often dependent on the organization and how they embrace the digital workflow," he said.

For example, many of the company's tools and applications are designed to transfer metadata from Pathfire's Digital Media Gateway (DMG) server to downstream newsroom computer systems, including the ability to transcode and transfer files to nonlinear editors.

"These products are designed to facilitate the workflow within the station and improve the ROI," he explained, "but they must be designed within the workflow of the station to truly maximize the benefits. Digital for digital's sake does not always lead to improved efficiency. Our products bridge the distance between these digital islands."

In the words of Avid Technology vice president of broadcast and work groups David Schleifer: "An IT-based newsroom changes how you work, and this is one of the harder things to swallow. You can install an IT-based solution and work real hard to maintain the old workflow and the benefit is zero. Those who do embrace the change find the benefits."

According to Deutscher at Microsoft, those are easy to identify. "Speed content creation. Improve content management. Streamline content distribution. These goals weigh heavily on the minds of broadcast and film studio executives. Combined, they tally up to an ultimate business achievement: increased business productivity and the realization of new business opportunities.

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"The digital newsroom is certainly delivering on its ROI promise." — Ed Casaccia, Grass Valley

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Multi-targeted media

Today, forward-looking stations are beginning to provide news stories, graphics and even video via emerging avenues, such as cell phones and the Web. For example, WDSU-TV, the Hearst-Argyle-owned NBC affiliate in New Orleans, used the Web to deliver continuing coverage of the devastation resulting from Hurricane Katrina after its transmitter was knocked off the air. In the days following Katrina, the station's Web site served more than 15 million page views and nearly 2 million video streams of the station's live coverage of the disaster.

"One of the great things inherent in the multiplicity of new paths to the customer is that broadcasters may, for the first time in decades, be able to think in terms of improving the bottom line by enhancing revenues rather than relying solely on continuous cost reductions," Grass Valley's Casaccia said.

"The idea is always the same: create once, publish everywhere. The graphically creative individual makes templates and elements. The editorially knowledgeable individual combines those templates and elements to build story-telling support. The system itself renders the results of that process in the form appropriate to the distribution medium," he added.

In the view of the Mike Palmer, director of technology development ENPS and director of digital distribution systems and strategies for the Associated Press, the newsroom computer system is the central engine for planning, organizing and creating text and linking it to various output and distribution channels.

Omneon, Spectrum server

"Within ENPS we have the concept of content collection," he said. "In broadcast production workflows, this is referred to as Running Order, and an external production system (video server) will play the stories in the order presented by ENPS.

"When this same type of list is output to a Web site, the stories in the collection are presented in the context of a larger, linked Web site. Point this same collection at a newspaper publishing system and you'll get stories on newsprint. The point is to create common workflows for creation of content across many different types of output."

However, it would be naïve to think that repurposing television content for the Web or mobile phones is as simple as pressing a button. Each new distribution avenue comes with its own set of editorial demands, physical limitations and use patterns unique with their own set of presentation requirements.

Repurposing news for multiple delivery platforms, however, is only in its infancy. Many broadcasters aren't too sure what to make of the possibilities. "We are in an interesting place," said Avid Technology's Schleifer. "There's a growing knowledge that the future brings change, but there is a real short-term vision that's putting it off.

"The example of the Web is the clearest and most obvious. We have many stations not actively controlling their Web presence."

With time, more stations are likely to follow suit for competitive reasons, as the pressure they feel to distribute news via these alternate avenues is likely to accelerate their further acceptance of IT-based newsroom workflows.

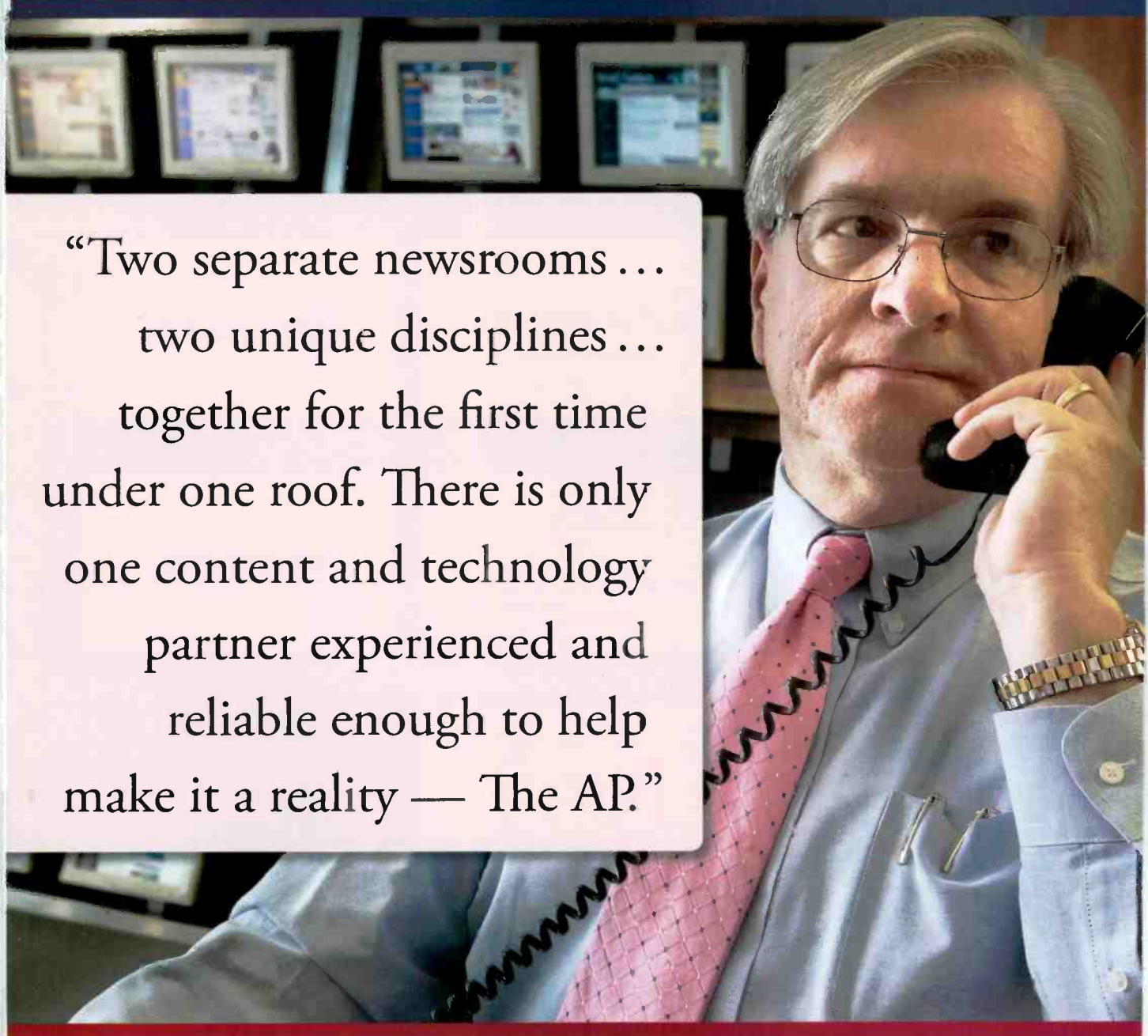
"It pushes the whole newsroom into the IT production environment rather than the old broadcast environment," said Microsoft's Deutscher. "It forces us to move things into the digital realm where you can edit and distribute content to digital channels.

"The quicker you're capturing or creating news in an IT-based environment, the easier it is to push content to multiple distribution channels. This results in new revenue opportunities, broader distribution and reach, and brand extension." ■

"An IT-based newsroom changes how you work, and this is one of the harder things to swallow."
— David Schleifer, Avid Technology

Convergence in Tampa

TV and print in one newsroom



"Two separate newsrooms ... two unique disciplines ... together for the first time under one roof. There is only one content and technology partner experienced and reliable enough to help make it a reality — The AP."

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VERTIGO MEDIA

BTV+ delivers
video via IP with Modulus Video

BY BILL BARR AND NEIL BRYDON

BTV+ provides business TV and distance learning services, such as systems integration, operations, connectivity and distribution, to its clients.

The company traditionally has used a satellite-to-small-dish video content delivery platform. A centralized uplink at its operations center in Toronto sends content to North American locations from Mexico to Alaska to Hawaii. This centralized uplink has proven to be cost-effective; however, the backhaul of video from the origination site to the Toronto uplink could be costly. That's because video was backhauled using costly circuit-switched transport technology such as satellite links, leased lines and ATM.

The distance-learning company saw an opportunity to dramatically reduce the cost of video backhaul and enable the company to extend its services to a broader, global market. The key was to do it through IP networks. IP networks are a fraction of the cost of circuits and can be set up on a temporary basis. Using IP, the company could backhaul video from customers to its Toronto-based operations center using private networking infrastructure or the public Internet.

The advantages of IP delivery are reinforced with the availability of MPEG-4 AVC and its ability to deliver video at half the bit rate of MPEG-2. By reducing bandwidth requirements to half or less of that required of earlier technologies like MPEG-2, companies can dramatically reduce the cost and complexity of video distribution. Cost savings for backhaul network services alone can be as high as 80 to 90 percent when replaced by delivery over the public Internet. Private networks, where available, offer additional massive savings. In addition, IP networking infrastructure is much simpler to administer and maintain.

To accomplish its goals, the company purchased the Modulus Video ME1000 AVC SD video encoder and MD1000 AVC SD professional decoder, as well as Path 1 Ax100 gateways to migrate its video services. The video encoder and decoder readily deliver an AVC compressed stream over an IP network. The encoder delivers video in less than half the bandwidth of MPEG-2, yet it achieves excellent image quality with the support of sophisticated algorithms, including motion compensated integrated noise reduction, CABAC entropy coding, macro block adaptive field/frame coding, multi-frame reference support and a de-blocking filter.

IP networks are a fraction of the cost of circuits and can be set up on a temporary basis.

IP networks, especially the public Internet, tend to exhibit impairment characteristics such as delay, jitter, packet losses and out-of-order packets that can spoil real-time delivery. The encoders and decoders are combined with forward error correction video gateway technology from partner Path 1. The video gateway protects video data for delivery over public networks. Using sophisticated algorithms, the unit first synchronizes transmitting and receiving gateways. Then time-stamped serial data is delivered to the receiver, where errors are corrected and synchronous digital video is output.

With network protection, operators can use the public Internet as a cost-effective and flexible means for transporting broadcast-quality video. The IP network is transformed into a long and reliable BNC cable, offering the ability to move video for less money than other video transport technologies. This shift from satellite to terrestrial transmission is surprisingly transparent and simple to use.

Today, between 1Mb/s and 10Mb/s of IP network bandwidth can be made available to 90 percent of U.S. businesses and households. These service packages are usually T1, bonded T1, DSL, E1 or broadband cable access. With these access points, it is possible to create an end-to-end IP network.

The new technology is already paying huge dividends. The distance-learning company has deployed a public Internet backhaul from several U.S. and Canadian cities, followed by satellite distribution. Bonded T1 services are used at the U.S. origination site, and an E10 is used at the studio in Canada, resulting in a video service bandwidth of 1.2Mb/s that is protected with 40 percent IP FEC overhead. BTV+ can now provide traditional satellite or new terrestrial backhaul with identical service level agreements, where the method of transport is transparent to the consumer.

IP has the potential to revolutionize the distance learning business, offering a low-cost method to execute backhaul to the headend and the potential to deliver services anywhere in the world. MPEG-4 AVC systems from Modulus Video make it possible to realize the vision of delivering good quality video over IP networks. BE

Bill Barr is CTO at BTV+ and Neil Brydon is director of product marketing at Modulus Video.

Newsroom automation

BY JOHN LUFF

It sometimes appears that this is the age of automation. It might better be looked at in our industry as the age of workflow automation, specialization and integration of tools, all of which were not possible in previous generations. Three classes of newsroom tools have developed that might all be considered automation of one sort or another: production automation, newsroom workflow automation and a hybrid in-between, which controls the production hardware using the workflow automation of a second product.

Production automation

In the last several years, production automation became possible due to the advent of products that allowed importing news rundowns from newsroom automation and added powerful scripting tools that permitted camera shots, microphone selection, switcher control and playback control for VTR servers and other sources. The advent also included control over remote-control camera pedestals and lens zoom and focus.

KIRO-TV in Seattle directs its evening news with Sundance's NewsLink automation system.

To the extent that a production can work from a scripted environment, it is a powerful concept and can potentially save the labor of at least one or more employees in the control room and more in the studio. It is, in effect, workflow automation for the production process. The rundown is marked up offline, and then a single person can effectively run the entire production. Of course, there is a downside: No matter how good machines are at consistent and complex behaviors, it's hard to get the kind of problem-solving and instantaneous response that humans can give.

Many of the first systems were not intended for installation in mainstream broadcast control rooms. They used industrial cameras and integrated much of the video and audio system into computer hardware. This strategy might have produced a lower-cost system, but it left many mainstream broadcasters less than enamored with hardware that wasn't ready for prime time.

However, the latest generation of products support conventional hardware, including cameras, lenses, remote pedestals, production switchers and audio consoles. A system like this is not for every newscast, but it is ready for prime time in most markets. In addition, it is well-suited for fringe programs in the early morning or late night windows, where the length of the program is limited and the production is less prone to changes during airtime. As broadcasters become more comfortable with the concept of production, automation newscasts will increasingly be done this way.

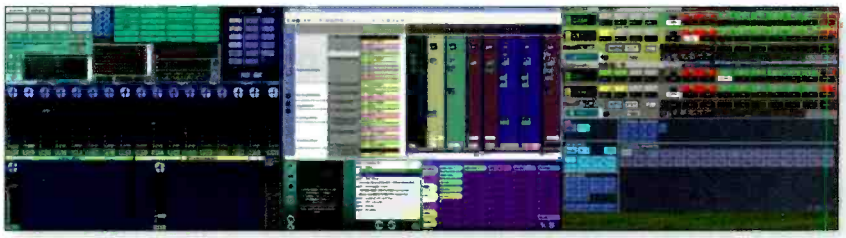
A slight twist on the full production automation approach is to use software that is not intended as a standalone production automation system, but rather the device interface between traditional workflow automation software and the controlled devices. Two manufacturers have systems with varying degrees of tight integration with newsroom software. By moving some portions of the process onto the screens in the newsroom computer system, it is possible to achieve the same effect that production automation software intends.

It is important to note that this approach works only when there is a newsroom workflow product that builds the script and provides the framework for the production. The more generalized production automation is extensible to any type of production, at least in theory. The rational assumption is that this is true when the production style is format-driven, as is the case with news of all kinds.

Newsroom workflow automation

The most important application in the newsroom is the workflow automation tool, or newsroom computer system. Newsroom computer systems pretty much all sprang from one product developed in the United Kingdom: BASYS. That product was certainly a long way from where systems are today, but it is the predecessor of Avid's current offering. (Avid acquired BASYS in 1994 from Digital Equipment.) By moving the product to a company with broadcast ambitions, new synergies were created. And though at the time Avid had no experience in newsroom workflow, it certainly had experience in production workflow innovation and likely saw the possibilities that broadcast news offered. In any event, by focusing on the complete production workflow, the company radically altered the future of the newsroom in broadcast environments.

The linkage Avid created, tying the creation of scripts and the communication of them to the control room and the studio floor (prompter control) to the editing and production of the content itself, was a leap of faith and innovation. Over the last two decades, the progress to an integrated newsroom has been inexorable. The key is the complete integration, from acquisition and writing to editing and presentation, of the completed content.



Grass Valley's Ignite features a Transition Macro Element timeline command that sends individual modules, creating an on-air event upon execution.

The complete newsroom computer system is a complex assemblage of software. It encompasses the ingest of wire copy, the logging and sorting of media elements and writing, the editing and approval of stories, and the management of the rundown and its progress through the production process. Keeping all of the elements synchronized is much more than a database issue, though relational databases are obviously part of the technology. The system touches many pieces of the chain, thus including communications technology in many ways.

Hybrid automation

At the heart of automation is communication to the outside world. The industry has collaborated to develop media object server (MOS) technology. MOS allows the system to communicate to an abstract device interface without having to develop device-specific interfaces to each model available.

For instance, if each manufacturer of character generators uses MOS as its standard interface, then the newsroom system need only speak in one language and the controlled device interprets the commands in a standard way. A manufacturer's method of selecting a new page is reduced to a simple command.

One of the most important aspects of MOS is that it is based on XML, making it a convenient and standardized method of sending and decoding commands. This approach is so clean, and the interface is so predictable, that there is an SMPTE committee working on using MOS as a method of communication for master control automation.

Now newsroom systems routinely include either integrated editing applications or tight integration with separate applications. Some have taken the approach of integrating widely available editing products such as Final Cut Pro, making fully-integrated systems even less expensive and more scalable.

As acquisition systems without videotape become a fact of life in news, we will see the process move to even tighter integration with the newsroom system, due to the nature of file-based processes instead of streaming products like videotape. The future can only offer new capabilities.

One word of caution: Evaluating competing concepts has become extremely difficult, as has staff training. Know when it's time to seek outside expertise. This might be your first experience with the technology. Find someone who has done this all before; as with surgeons, you want someone who has done the procedure many times. BE

John Luff is the senior vice president of business development for AZCAR.

Send questions and comments to: john_luff@primediabusiness.com

REAL-TIME RENDERING 3-D VIRTUAL STUDIO

FOR-A digiStorm: An on-air graphics solution; created with Brainstorm Multimedia's eStudio; Brainstorm tools allow for the creation of 3-D objects, text and animations, multi-pass textures and reflection; text quality is high with edge effects including emboss, shadow and glow; example applications include 3-D character generation, wraps, rotating logos and sports scores.

714-894-3311; *www.for-a.com*

LI-ION BATTERY SYSTEM

PAG L95 Power Circle: Battery uses advanced Li-Ion cell technology; provides 95Wh capacity; weighs 745g; provides extra run-time for cameras and lights up to 35W; two L95s provide sufficient power for a day's shooting with most camera and lighting set-ups; easily stowed in camera bag; available in PAGlok, V-Mount and AB connectors.

+44 20 8540 4116; *www.paguk.com*

HDV CAMERA BATTERY

Swit S-8770 DV: Designed for HDV cameras; has Li-Ion technology; includes built-in multiple protective circuit design; has no memory effect; display accurately shows remaining power within minutes; features 7.2V, 31.8Wh and weighs 10kg.

+86 25 85805295; *www.swit-battery.com*

LUMINAIRE

Sachtler Director II: Has two versions, 575 W fresnel luminaire and a 575 W PAR luminaire; optional DMX module provides remote switching and dimming, compact design and reduced weight; fast setup; operates at any voltage from 90V to 260V; equipped with four-leaf barndoors and filters.

+49 89 32158200; *www.sachtler.com*

CONTENT DELIVERY PLATFORM

Harris H-Class: Provides broadcasters and content providers with the means to integrate disparate processes into a single, modular system; handles all content management and delivery enterprise-wide from creation to consumption; based on open standards.

217-221-7180; *www.broadcast.harris.com*

HD DISC RECORDER

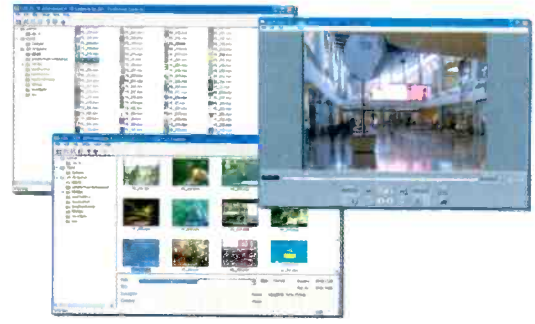
Sony XDCAM HD: Combines 1080-line picture quality with the workflow benefits of nonlinear, file-based production; uses MPEG Long GOP encoding at selectable bit rates of 18Mb/s, 25Mb/s or 35Mb/s; offers backwards compatibility; will play back DVCAM material recorded with an XDCAM SD machine.

800-686-7669; *www.sony.com/professional*

NEWS CATALOGUING AND ARCHIVE SYSTEM

Crispin NewsCat: Archives news stories and makes them easily searchable for reuse; Web-browsable interface enables multiple users to search and retrieve video from archives as well as view low-resolution proxy video.

919-845-7744; *www.crispincorp.com*



CLIP MANAGER

Omneon Video ProBrowse: Creates and displays low-resolution (proxy) versions of full-resolution material contained within the server system; identification and viewing is simplified with automatic proxy generation, coupled with user-selectable thumbnail images and metadata searching; monitors content directories within several networked Omneon Spectrum servers; automatically generates 1Mb/s low-resolution versions of all material.

408-585-5000; *www.omneon.com*

HARD DISK DRIVE

JVC DR-HD100: Attaches directly to the JVC GY-HD100E camcorder; uses a single FireWire cable to communicate audio, video, timecode and control information; is available in two versions: a 40GB capacity hard disk, which offers more than three hours of uninterrupted recording, and a 80GB version, which offers seven hours of uninterrupted recording; both record and back up DV and HDV video.

973-317-5000; *pro.jvc.com*

STUDIO DIRECT TO EDIT RECORDER

FOCUS Enhancements FireStore FS-2E: Records video to FireWire disk drives in edit-ready, native DV-NLE file formats; features several standard audio and video I/O options; interfaces with standard control protocols such as RS422, RS-232C, AV/C and GPI; can connect to networks via FTP using an Ethernet interface to copy files and control the unit.

408-866-8300; *www.focusinfo.com*

DIGITAL VIDEO PROCESSOR

Terayon DM 6400 Network CherryPicker: Applications include grooming of custom channel line-ups, rate shaping and statistical multiplexing; designed to deliver superior picture quality for both SD and HD digital video services; now features support for the H.264/AVC advanced codec.

408-235-5500; *www.terayon.com*

IT-BASED ACQUISITION, RECORDING, STORAGE DEVICES

Grass Valley Infinity: Uses IT-based disk drives and IT-based storage solutions; includes removable hard disk-based Iomega REV products and Pro-grade CompactFlash; features 14-bit digital imaging; allows users to choose between several video formats; SD formats are selectable in either 16:9, 4:3 or letterbox aspect ratios; features JPEG2000 codec, which delivers 10-bit 4:2:2 resolution images and is frame accurate; includes the Infinity Digital Media Camcorder and Infinity Digital Media Recorder.

503-526-8200; *www.grassvalley.com*

DIGITAL MASTERING AND PLAYBACK SERVER

QuVis Encore: Master and playback more than 50 video formats, including SD, HD and high-resolution graphics formats; features 12 independent channels of digital audio, a standard Gig-E network interface and native front panel access to internal storage; remote editing and playback control is available via RS-422/RS-232 and TCP/IP interfaces.

785-272-3656; *www.quvis.com*

ROUTERS

PESA Cheetah: 128NE offers a 128x128 routing matrix; requires one power supply of fewer than 600W to drive the compact 7RU system; the 11RU Cheetah 128XE can select between a 128x128 configuration with output options or output expansion up to 128x256 without option slots available; 128WE is housed in 11RU and supports a 128x128 configuration with all output options available and support for Matrix WatchDog.

631- 912-1301; *www.pesa.com*

MULTICHANNEL INGEST AND PLAYOUT SERVER

Geevs MR: Handles compressed or uncompressed HD or SD media; can work independently or as part of a mass-distribution or capture facility; storage options include support for SATA, SCSI, or Fibre Channel storage; designed for integration with Lightworks' Alacrity and Touch NLEs.

+44 1256 810123; *http://geebroadcast.co.uk*

HD LCD

eCinema Systems DCM23: Uses custom TFT LCD technology with custom modified optics; has a 23in diagonal view, 4in width and weighs 22lb; can be used for color grading and for critical picture evaluation; communicates color from set to post; has less than 15ms response time; video displayed at frame rates for all standards.

661-305-9320; *www.ecinemasys.com*

DIGITAL MEDIA TOOLS

Telestream Flip4Mac: Provides file compatibility and direct file transfer into Final Cut Pro systems from Grass Valley servers and Ikegami cameras; browses, imports, edits and exports content to and from devices not natively supported by Final Cut Pro; transfers can occur faster than real time; features the ability to view keyframes and metadata support.

530-470-1300; *www.telestream.net*

MULTISERVICE ENCODING PLATFORM

Harmonic DviCom Electra 5000: Encodes multiple channels in multiple formats using multiple video/audio compression standards; delivers broadcast video services to a variety of devices; basic configurations simultaneously encode two full resolution SD channels using MPEG-2, MPEG-4 AVC and/or VC-1; can encode a single channel in multiple formats, multiple channels in a single format or multiple channels in different formats.

408-542-2500; *www.harmonicinc.com*

HD/SD SWITCHABLE TURNKEY BRANDING SYSTEM

Chyron Channel Box: Features 3-D motions and effects of live video, clips and graphics; has an intuitive Creation GUI; can customize Event Control GUI, all events in a scene are maintained within a timeline and controlled through the Event Control GUI; includes API and control interfaces; has an HD/SD switchable platform.

631-845-2000; *www.chyron.com*

COLOR CORRECTION SYSTEM

Quantel The Pablo Suite: Combines image processing hardware and color correction software; is built on the foundations of eQ and iQ; is a complete Digital Intermediate system; includes Integrated Concurrent Processing; suite includes three models: eQ Pablo Suite for HD applications, iQ2 Pablo Suite for 2K digital intermediates and iQ4 Pablo Suite for everything up to and including 4K DI working.

+44 1635 48222; *www.quantel.com*

NAS-BASED UNCOMPRESSED HDTV STORAGE TECHNOLOGY

Exanet ExaStore: Allows data sharing of high volumes while substantially simplifying systems integration and lowering overall costs; does not require any special hardware or software in the workstation or host computer; is based on off-the-shelf commodity hardware; provides seamless access to data regardless of load on the system, with no downtime; clustering provides total solution reliability.

917-210-8290; *www.exanet.com*

SAN

Studio Network Solutions globalSAN X-4: Includes 1.6TB of SATA storage in 1RU; contains a single RAID controller and two client licenses of SAN software; can connect directly to the X-4 over Gigabit Ethernet and share RAID-protected storage; is based on the iSCSI protocol; offers more bandwidth and greater distance capabilities than USB or FireWire.

877-537-2094; *www.studionetworksolutions.com*

NETWORKED BROADCAST MONITORING SYSTEM

Barco NG System: Includes a rack-mountable chassis; features redundant power supplies and integrated shelf-management module; is equipped with hot-swappable auto-sensing input boards supporting SD and HD video feeds; one rear-projection module is capable of simultaneously displaying multiple analog and digital video feeds together; two or more modules can be combined into a huge display wall to monitor hundreds of signals.

916-859.2500; *www.barco.com*

MULTIVIEWER

Zandar FusionPro+: Features two versions; a 1RU version provides eight scalable windows; a 3RU version allows for 26-channel operation; video input is modular and on easily accessible front-loading cards; user display configuration is now provided via the Z-Configurator Layout Configuration software; control remotely over RS-232, RS-422/485 or LAN; accepts all common video formats; supports resolutions up to W-UXGA and 1080p.

321-939-0457; *www.zandar.com*

3-D ANIMATION SOFTWARE

Avid Technology SOFTIMAGE|XSI version 5.0: Includes non-destructive character tools and a comprehensive set of migration tools for Maya users; features the GATOR attribute transfer system for repurposing properties and animation between models; has native 64-bit support for XSI and mental ray 3.4 software; has a gigapolygon core that leverages multi-processor and multi-core platforms.

212-983-2424; *www.avid.com*

MULTI-CHEMISTRY BATTERY CHARGER

IDX VL-4Si: Advanced battery charger system handles up to four Li-Ion, NiCd or NiMH batteries simultaneously; LCD display monitors battery condition; direct USB PC interface; charges NP-style batteries with A-E2NP adapter; quick charge at 3A for one to three channels or 2.3A for four channels.

310-891-2800; *www.idx.tv*

SDK

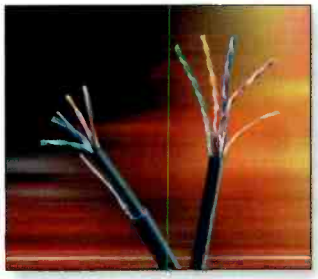
Rhozet Carbon Engine SDK and Carbon Farm SDK: Provides the encoding power of the Carbon transcoding engine and Carbon Farm to custom third-party applications; allows third-party applications to interact directly with the Carbon transcoding engine; the Carbon Engine SDK allows control of a single transcoding kernel.

408-432-3333; *www.rhozet.com*

AES/EBU TO ETHERSOUND INTERFACES

Digigram ES881, ES1241 and ES16161: The rack-mount AES/EBU to EtherSound interfaces are available in a variety of I/O configurations that connect any digital product to an EtherSound network; all devices offer sample rate converters on each input and World Clock input and output; ES881 offers four stereo AES/EBU inputs and outputs (eight EtherSound channels for each); the ES1241 offers two stereo AES/EBU inputs and six stereo AES/EBU outputs (four and 12 EtherSound channels respectively); the ES16161 features eight stereo AES/EBU inputs and outputs (16 EtherSound channels for each); the ES881 and ES1241 come with XLRs on the digital audio inputs and outputs; the ES16161 features Sub-D connectors.

+33 0 476 52 53 01; *www.digigram.com*



CAT 5E UTP CABLES

Belden CDT Brilliance CatSnake: Tactical field-deployable Category 5e audio/video cables designed for use in patching Ethernet or other Cat 5e digital audio and video formats; are AES/EBU compliant; designed for indoor broadcast applications in high-traffic areas and broadcast truck applications; features Belden's bonded-pair unshielded twisted pairs with 24AWG stranded bare copper conductors and polyolefin insulation; also available in a heavy-jacket wall version and an up-jacketed version for the harshest heavy-duty applications.

847-590-1110; *www.belden.com*

PATCHBAY

Switchcraft StudioPro 6425: The 64-way patchbay of 4x6 jacks is fitted with TT EZ Norm audio jacks, which allow the normals to be set or changed from the font of the panel; internally wired using 110Ω cable; connections on the rear are 25-way D-Sub; the grounds are bussed to allow passing of phantom power.

773-792-2700; *www.switchcraft.com*

HANDHELD TV ANALYZER

Rohde & Schwarz R&S FSH3-TV: Designed for servicing new installations and maintaining or repairing TV cable network or transmitter components; combines the functions and characteristics of a full-featured spectrum analyzer and a TV test receiver; comes equipped with a TV board, preamplifier and tracking generator; supports all common analog TV standards; can be upgraded at any time for DVB-C, J.83/B or ATSC/8VSB.

888-837-8772; *www.rohde-schwarz.com*

LI-ION CAMERA BATTERY

Frezzi FLB-100/130/300: Li-Ion series of batteries; 14.8V, output ranging from 100Wh to 200Wh; has an advanced power metering system; connects to all cameras using V-LOCK or other mounts; lightweight for easier camera balancing.

800-345-1030; *www.frezzi.com*

M/E DIGITAL SWITCHER

FOR-A VPS-700 GINA: Includes 2-D DVE for every input, up to 16 SD inputs and outputs, six keyers, six chroma keys and six channels of 2-D or 3-D DVE; offers optional 2-D DVE in every input; delivers up to 32 DVE channels; supports 525/60 and 625/50 SD formats; features eight standard inputs, each of which has a frame synchronizer and still store feature using the F/S freeze and eight standard outputs, which can be increased by increments of four up to 16 primary inputs, 16 outputs and six key layers (four keyers and two DSK).

714-894-3311; *www.for-a.com*

VIDEO ENCODER

Telairity Semiconductor AVClarity: Works with the Telairity-1 processor architecture to create next-generation H.264 HD broadcast video encoding systems that cut bandwidth use in half compared with MPEG-2 encoders; supports AVC level 4.0 for broadcast encoding at HD resolutions of 720p and 1080i.

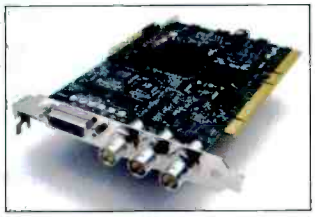
408-764-0270; *www.telairity.com*

CHANNEL BRANDING SYSTEMS

Miranda Oxtel Series Imagestore HDTV, Intuition HD and 300: Each of the three systems allows broadcasters to output HD and SD channel branding and promotional graphics with multichannel mixing; the Imagestore HDTV features a dual DVE and integral, four-group audio mixer; the Imagestore Intuition HD's coprocessor extends the graphics capabilities of the Imagestore HDTV to allow the playout of multilevel HD channel branding; the Imagestore 300 offers SDI channel branding and a master control switching processor that features dual 2-D and 3-D DVEs, video and 16-channel audio mixing, eight-channel audio playout, automated character generation, animation and still playout and EAS support.

561-477-6124; *www.miranda.com*

VIDEO CAPTURE CARD



AJA Video KONA LH: The 10-bit uncompressed video capture card is available for OSX and Final Cut Studio; offers HD and SD analog and digital I/O; supports such codecs as DVCProHD, HDV playback and DV50 with hardware acceleration on-board for the playback of DVCProHD, HDV and Apple's Dynamic RT Extreme.

530-274-2048; *www.aja.com*

SDI-TO-ANALOG FORMAT CONVERTER

Kramer Electronics 7408: Part of the Kramer DigiTOOLS line, the compact, multistandard, adjustment-free, 10-bit analog-to-digital converter accepts an SDI (4:2:2 serial digital video) input; provides a reclocked and equalized looping SDI output; converts the original signal to analog outputs in three common signal formats: composite video, s-video (YC) and composite video (YUV); uses four-times digital oversampling to minimize digital artifacts.

888-275-6311; *www.kramerelectronics.com*

DIGITAL AUDIO MIXERS

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- Flexible schedule – position requires the ability to be on call 24 hours a day
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Please submit resume to:
Ronda K. Porter
KUTV Human Resources,
299 South Main, Suite 150
Salt Lake City, UT 84111
Fax 801-973-3173
Email: porterr@kutv2.com
No phone calls please.

Help Wanted

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Frontline Communications, the leader in manufacturing broadcast and command vehicles, has immediate openings for Systems Design Engineers in our Clearwater, Florida and Riverside, California facilities. Qualifications include proficiency in creating AutoCAD systems designs. Experience with operation and maintenance of terrestrial microwave/ENG equipment, satellite up-link equipment, video, audio, intercom, IFB, satellite, 2-way radios, telephones and computers. Must possess the ability to communicate effectively within all levels of television engineering management. Requires the physical ability to climb ladders, work on top of vehicles and lift moderate loads.

For consideration please forward resume and letter of interest to personnel@frontlinecomm.com or fax (727) 561-9591.

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Applicant must be available to work weekends and holidays.

If interested, mail your résumé and cover letter to:

KGO-TV / ABC 7
900 Front Street • San Francisco, CA 94111
Attn: Human Resources Department

Or e-mail your résumé and cover letter to:
kgo-tv.hr@abc.com
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Job Description: WIFR-TV is seeking a Chief Engineer to lead our Engineering staff. Duties include troubleshooting and repair of all broadcast equipment to component level, evaluate and recommend new equipment for capital budget, oversee IT, maintain operating budget, plan technical operations for live remotes, maintain building and grounds, ensure compliance with all FCC rules and regulations, and other duties as assigned.

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Please send resumes to:
Greg Graber
Vice President and General Manager
WIFR-TV
P.O. Box 123
Rockford, IL 61105

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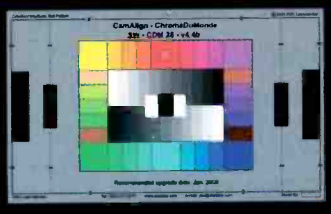

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Anarchy
for the masses

BY PAUL MCGOLDRICK

The court debacle over the sale of PBS affiliate KOCE-TV in Orange County, CA, is probably now well-known to most broadcasters. In essence, a court said that the 2004 sale of the station to a foundation that was formed to save the station through long-term funding was not legal. The case was brought by Daystar, a televangelist group based in Texas with worldwide coverage through terrestrial and satellite links. Daystar had offered a belated $40 million for the station.

The idea that a non-commercial license can be changed from public broadcasting content to religious content begs the imagination. But, unfortunately, the FCC fails to define any classes of non-commercial programming, and it leaves the door wide open for this kind of change to take place.

Maybe it's about time to start a movement to get the government to butt out of allocating broadcast licenses. Let's leave it to the market.

Chaos, right? Absolutely not. During the late 1970s, I watched just such a situation unfold. At that time, my hottest market was Italy, where video piracy went from nothing to a point where every VHF/UHF channel was filled in only a few months. Quite often the pirate used a Sony U-matic connected directly to a modulator that fed an antenna on a residential roof. Once you found a clear channel in your city, you had to stay on the air 24/7, or someone else would grab it. Most of the material was porn, and the whole thing was a rebellion about the lousy programming that the state broadcaster had fobbed off on the public for many years. Viewers had no alternatives to Radiotelevisione Italiana (RAI) unless they happened to live in an area where they could pick up a French or Swiss transmitter.

At first, RAI waged war on these people with the relevant Italian Ministry, tracking down the stations and seizing their paltry equipment in attempts to keep the pirates off the air. They would even steal RAI's channels at night when the network shut down. Policing was impossible as the pirates multiplied day after day. At the zenith, you could find something on every channel in both Milan and Rome. RAI attempted to respond by airing 24/7 and with a lot more raunchy shows to try to keep its audience.

The better pirates wanted more professional equipment to improve their signal quality and broaden their coverage, and it was a broadcast equipment manufacturer's dream market. Some of the stations were even making their own programs — the most popular being saucy game shows. And then the almost unbelievable happened: the creation of the first pirate TV network throughout Italy. It was called Canale Cinque and was owned by Silvio Berlusconi, now prime minister. To move from an unlicensed pirate to running a country is like a story straight out of an opera.

Later on, I waited three days in a Milan hotel, most of the time in the bar, for Berlusconi to grant my boss and me an audience — which he finally did.

The piracy spawned an incredible VHF/UHF TV transmitter industry in Italy, now major competition in some sectors for U.S.-based manufacturers. Thus, the continuing presence on the floor of NAB.

So anarchy can work — in fact, I'm tempted to say anarchy always works. Out of the chaos comes order, as with everything. I would be in favor of such a move to change the broadcasting landscape, and I'm sure the FCC could be overwhelmed within months. The FCC is currently ignoring a large number of VHF/FM pirates and only seems to move slowly when a license holder complains of interference.

Maybe now really is the time to build that transmitter in the garage that has been in my mind's eye for years. BE

Maybe it's about time to start a movement to get the government to butt out of allocating broadcast licenses.

Paul McGoldrick is an industry consultant based on the West Coast.

SEND Send questions and comments to: paul_mcgoldrick@primediabusiness.com

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