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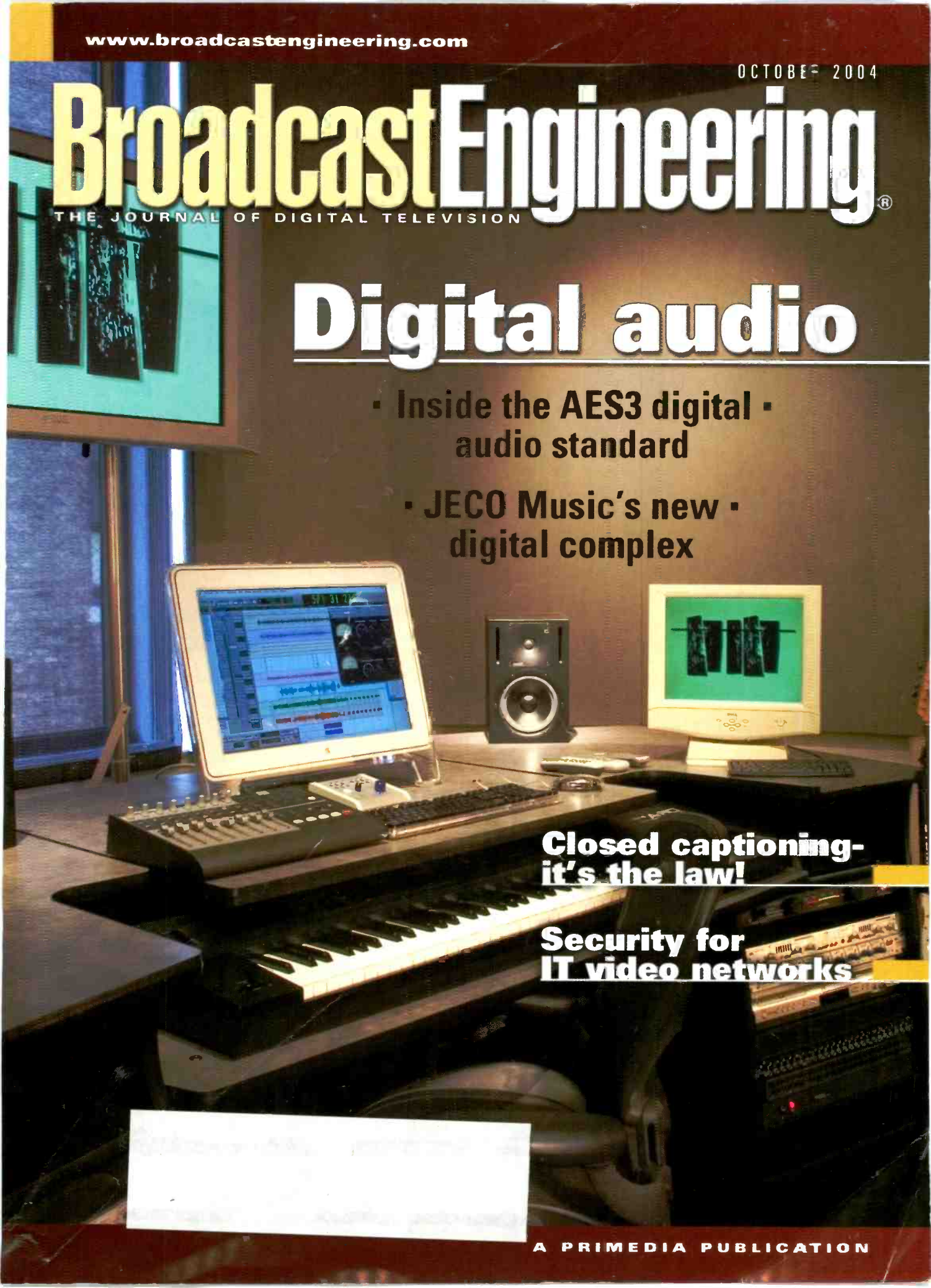
OCTOBER 2004

Broadcast Engineering®

THE JOURNAL OF DIGITAL TELEVISION

Digital audio

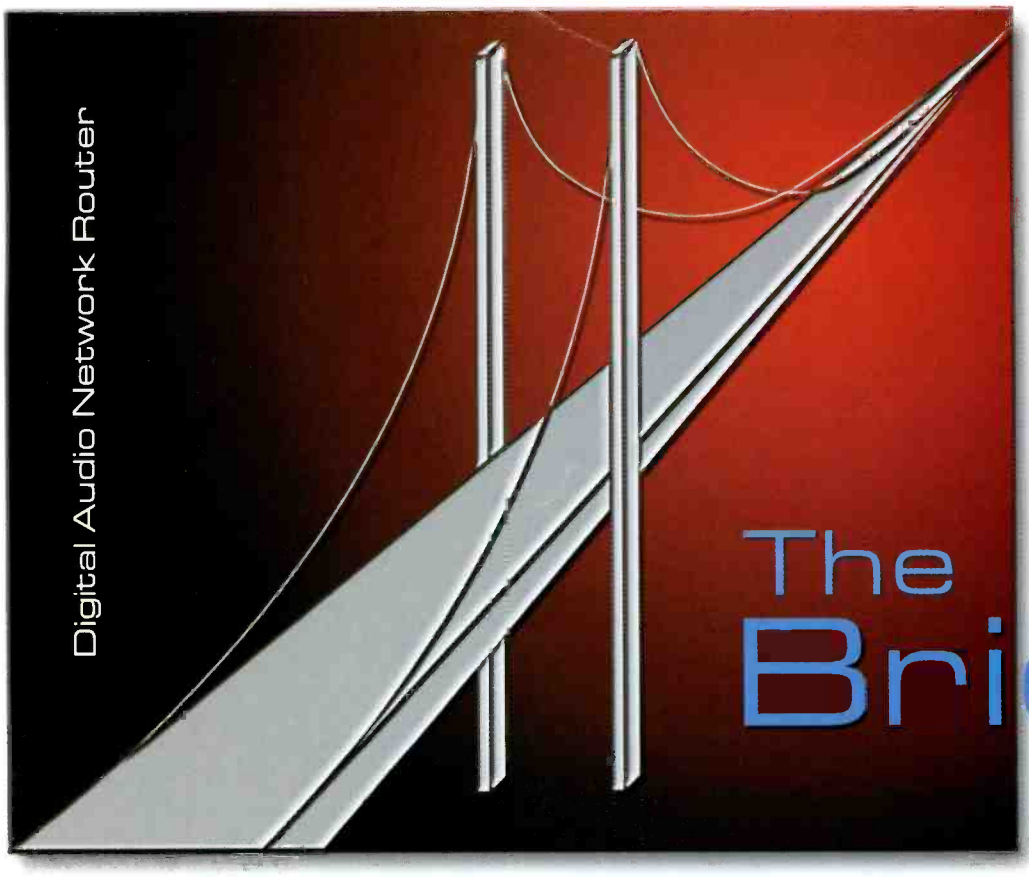
- Inside the AES3 digital audio standard
- JECO Music's new digital complex



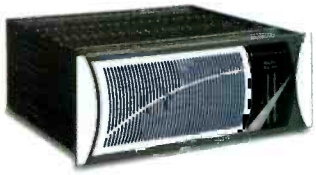
Closed captioning-it's the law!

Security for IT video networks

A PRIMEDIA PUBLICATION



The Bridge Router can hold all the electronics you'll need for a small console: I/O cards, mix engines, and DSP processors. Naturally it can also have automatic fail-over DSP and CPU cards to keep you on-air. You can expand the system with a simple cage-to-cage interconnect.



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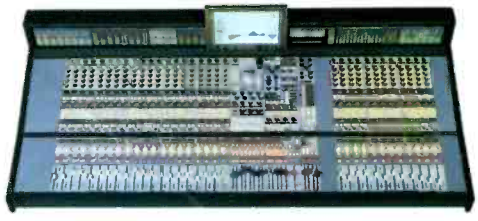

Wheatstone Knows Live Audio. The D-5.1 is loaded with MXMs, foldbacks, and clear easy-to-read displays. You'll have all the power you need when the news breaks! Its intuitive layout helps your operators work error-free, and it can handle and generate all the 5.1 content and simultaneous stereo capability any large or medium market station could need.

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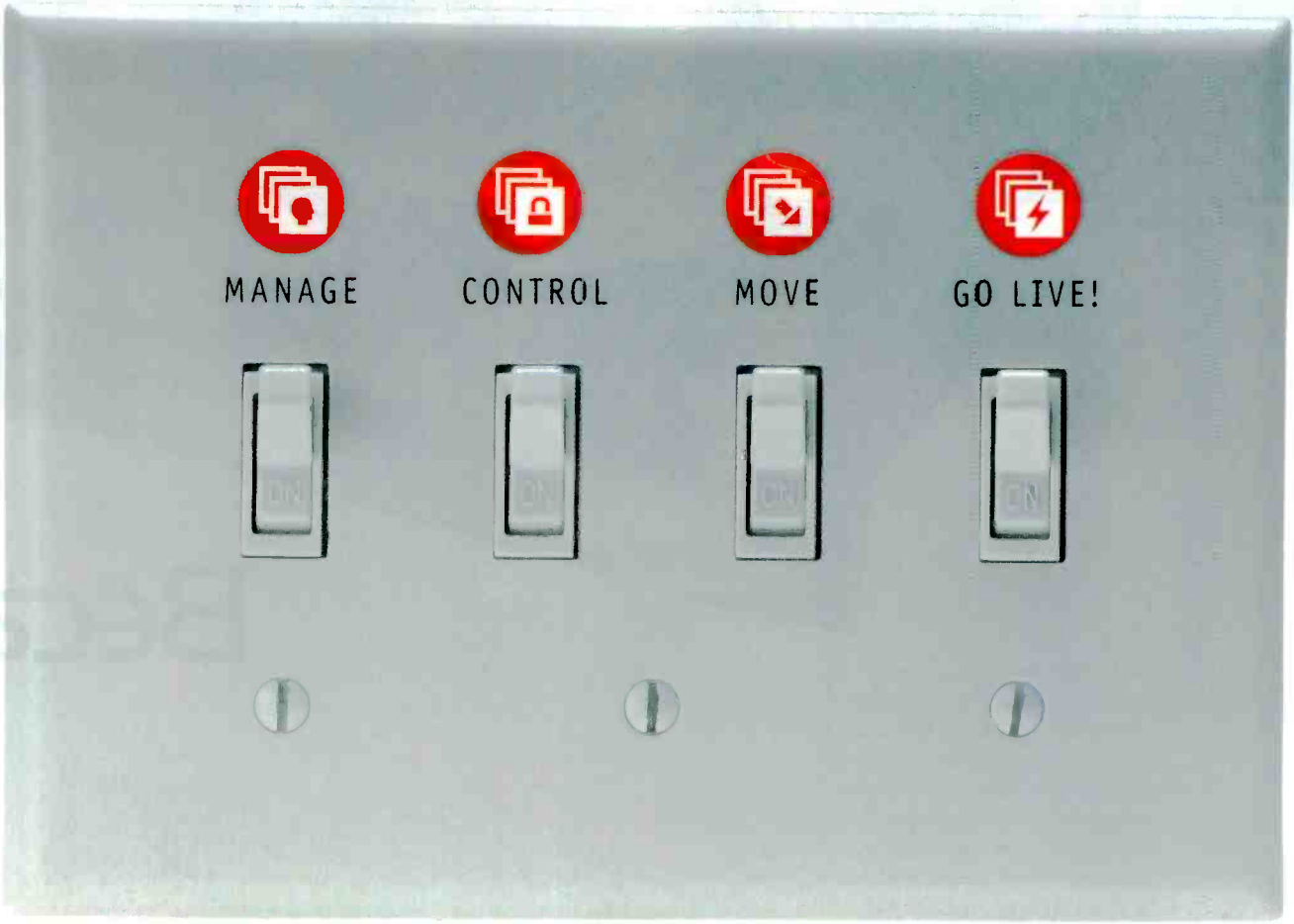

Here's a switch, turn complexity to simplicity in ingest-to-broadcast workflow. The Harris Resource Suite provides a complete set of integrated automation tools that deliver true productivity improvements. From process and asset management to workflow control and movement, the HRS tool set offers simple, intuitive resources to simplify management of the broadcast process. Through pre-defined business rules and links between traffic and master control, we make workflow smooth and seamless. And whether it's automating labor-intensive processes, originating live products outside of master control or seamlessly sharing assets throughout your enterprise, HRS helps to take your organization to higher levels of efficiency in the competitive broadcast environment. So turn on a whole new world of productivity with the Harris HRS.

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FEATURES

BEYOND THE HEADLINES

DIGITAL HANDBOOK

ON THE COVER: The main control room in the expanded post complex features Pro Tools HD Accell 3 running on a dual 2.5Ghz Power Mac G5, Emagic's Logic Pro, GigaStudio 3 and a 42" Philips HD plasma TV. Photo by Phillip Angert.

(continued on page 8)

now on the streets of new york

NY1 making big news with P2

Around the clock, around the block, news here happens in a New York minute. That's why NY1 News has taken Panasonic P2 to the streets, covering national events like the Republican National Convention, where reliability is paramount. P2 gets breaking news on-air faster by eliminating digitizing and providing seamless connection of camera original-quality DVCPRO data directly to laptop editors, servers and IT networks. With P2 and Pinnacle Edition non-linear editing, NY1 can cover New York's non-stop news with greater speed and efficiency. How about your city? To find out more about Panasonic P2 news solutions call **1-800-528-8601** or visit **www.panasonic.com/broadcast**.

Panasonic ideas for life

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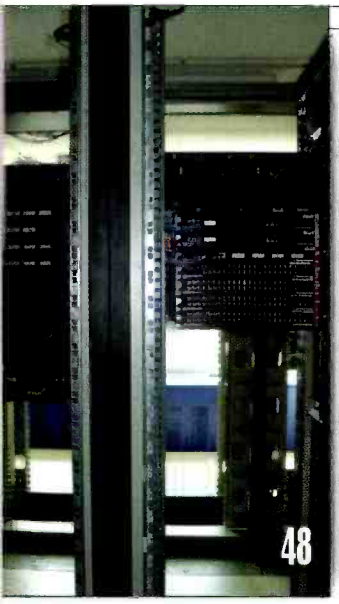
Systems Design & Integration

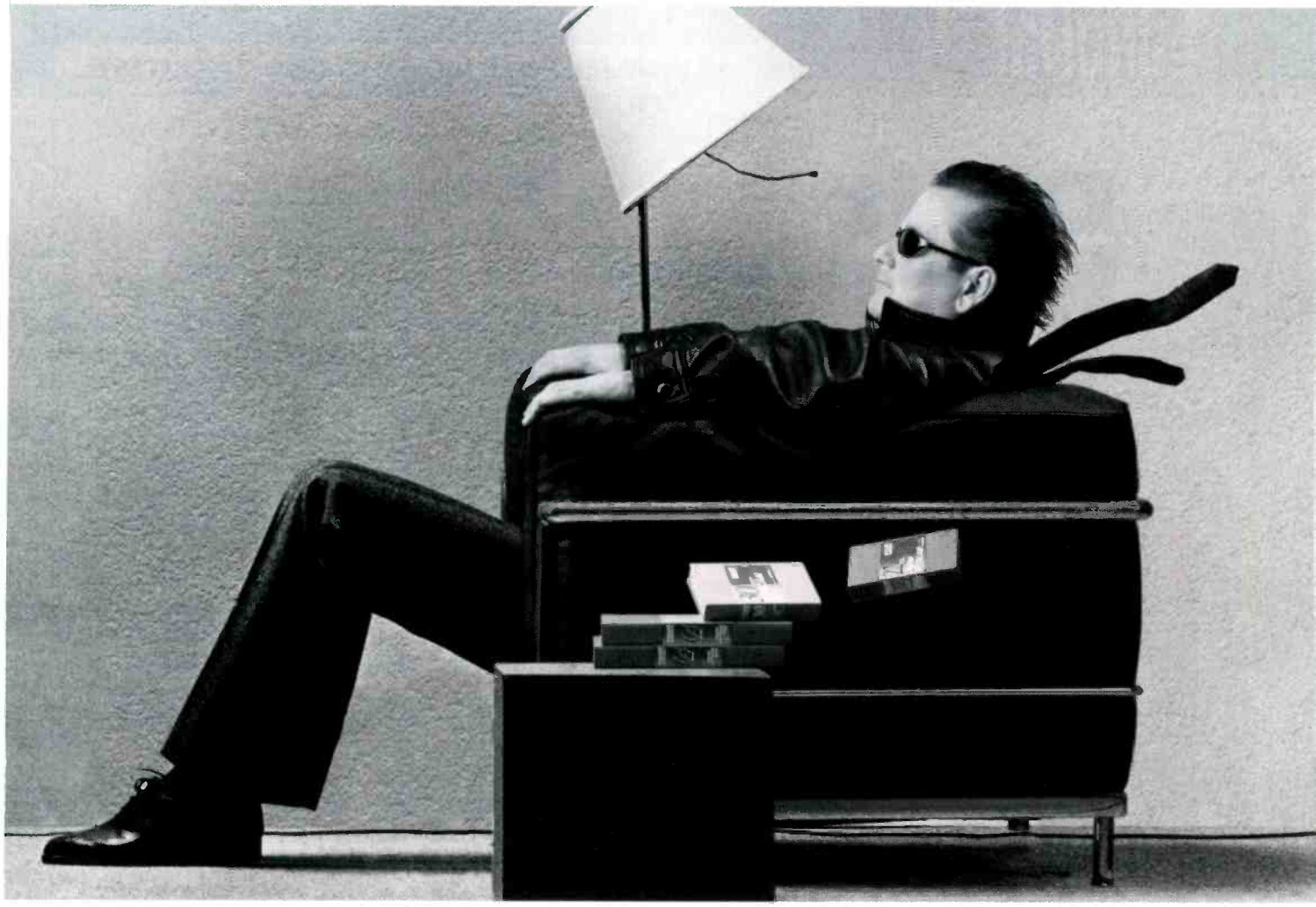


New Products & Reviews

Departments

Freezeframe

Name the company and product name of the first videodisk recorder for ENG applications. Readers with 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, 2004, are eligible to win.



Tom Duff

To The Power of Maxell

"Work hard, play hard, and we do them both better than anyone." These are the guiding words that Tom Duff and his partners live by at Optimus - a full service commercial post-production house. Tom's a stickler for quality with an eye for creativity, and he's blown away by the power and performance of Maxell Professional Media. "Maxell offers the superior technologies we need to do our best work." That's why Tom and his people use Maxell Digital Betacam, D-5, HDCAM and DVD. You can email Tom at tduff@optimus.com. To learn more about Maxell Professional Media, call 1.800.533.2836 or visit maxell.com.

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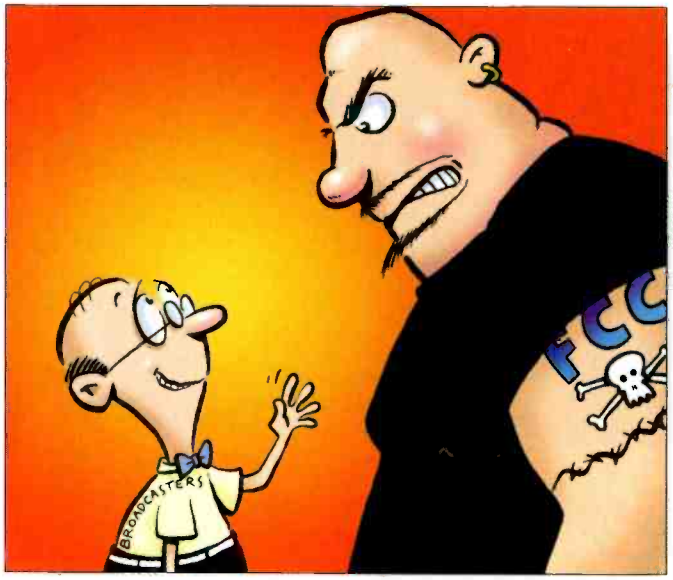
Expanding Memory & Mobility

Recordable Media Data Storage Portable Energy Technological Partnerships

Do it
for the children

The FCC just adopted additional regulations for broadcasting children's programming on digital channels. Needless to say, the commission placed more bureaucratic demands on the backs of broadcasters. Now, the FCC is deciding how much kiddy-focused programming you have to broadcast to keep your license.



Don't you just love it when the government claims to know what's best for us? There's always some bureaucrat who has never worked in broadcasting telling us what needs to be done — this time under the guise of serving children.

The key change regarding digital operation is that, as stations increase the total number of broadcast hours, they must increase the amount of children's programming as well, in proportion to the total core hours broadcast.

If you effectively double the number of hours you broadcast by dividing your channel into two parts, you have to provide six hours of kiddy shows. If you split your operational channel into four parts over the core period, you have to provide a total of 12 hours of children shows.

This all works out to three percent. The magic number is obtained by dividing the current three-hour guideline by 105, or the total number of hours/week available for core programming during the 7 a.m. to 10 p.m. broadcast window. At 15 hours/day times seven days/week, this equals 105 hours per week. Therefore, to calculate the total number of tot shows you'll have to broadcast, multiply the total number of core digital (non-subscription) broadcast hours per week by three percent and round up to the nearest one-half percent.

Okay, maybe that's not too bad. But don't think you can start an all-kid channel and have it count toward your requirement. You still have to transmit three hours of tot shows on your main channel. This means you can't offload all the kid shows to one digital multiplex. Gee, wouldn't it be awful if a station devoted one of its digital channels entirely to children's programming? Given Uncle FCC's I-know-better-than-you attitude, the station would still have to broadcast three hours of tot tidbits on the main channel.

Finally, stations will have to transmit the educational/instructional (E/I) bug throughout any children's programming. I suppose if the program is about Barney the purple dinosaur, viewers need the E/I bug to know it's okay for kids to watch it, as opposed to a sitcom with Barney Fife.

The new rules also address commercials within the kid shows. The order specifies a limitation of 10.5 minutes per hour on weekends and 12 minutes per hour on weekdays. The FCC says that leaves 49.5 minutes for actual program material. Yes the math is right, but it's not real world. Stations still need room for two IDs and two bumpers, and programming will want a couple of promos (which, by the way, count as commercials). All this ought to leave the local station with about three minutes of spot time — if it's lucky.

Don't get me wrong; I'm not complaining about having kid shows. But the new rules represent just another in a long list of mandates on broadcasters, justified by the excuse that we are "using the public's spectrum." Okay, then I want my neighbor to pay $10 a month to use his garage door opener because I open mine by hand!

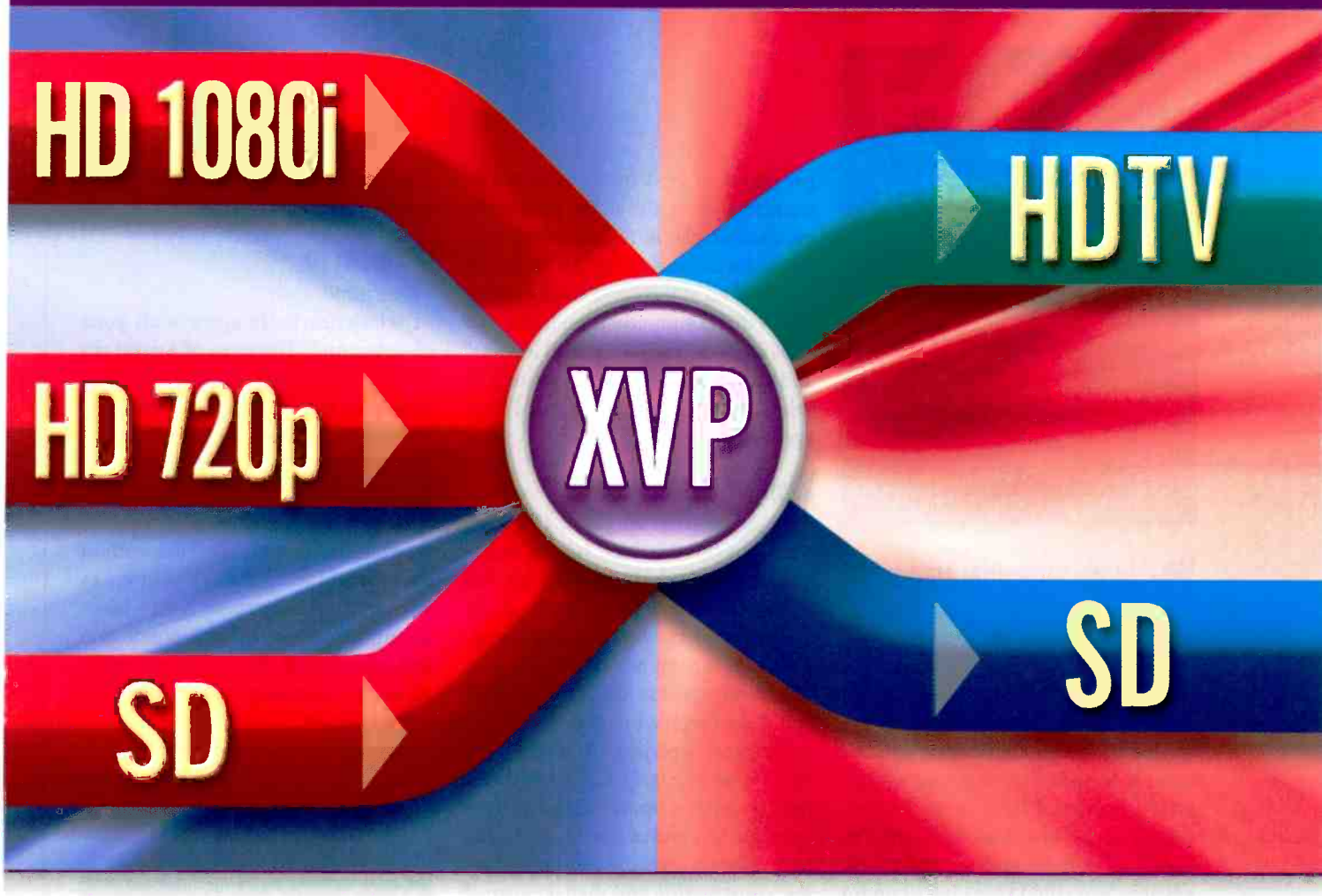
What's next, a charge to breath the air?

Brad Dick
editorial director

Send comments to: • editor@primediabusiness.com • www.broadcastengineering.com

IMAGING XVP-801i
UNIVERSAL PROCESSOR UP/DOWN/CROSS CONVERTER

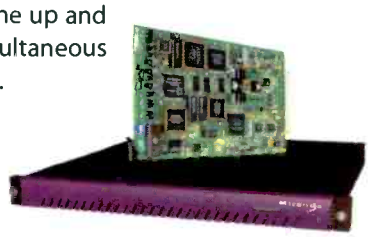
Miranda



Any format in. Your formats out.

If you need to work with multiple HD formats and SD or are running a hybrid HD/SD facility, then you'll really like our new XVP-801i processor card.

It can automatically detect the input video format, and perform the up and down conversion and processing necessary to maintain two simultaneous outputs, one HD and the other SD, in your chosen station formats.



Working in 1080i but receiving material in 720p? No problem, the built in cross version will take care of it.

This single, affordable module offers high-quality up, down, aspect ratio, and HD cross conversion, as well as HD/SD signal processing, frame synchronization, and 16-channel audio processing.

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Worldwide terrestrial standards

Mr. Robin:

I am the head of the digital TV industry group within Asimelec, Spain's electronics industry association. We perform market research for the industry and liaise with the Spanish government to assist in the migration to digital TV. Further, I serve as media consultant to the broadcast industry. I've seen your articles and wanted to ask whether you could point me to useful articles or Web sites offering a comparison of U.S. and European digital (terrestrial) TV standards.

GIUSEPPE FLORES D'ARCAIS

Michael Robin responds:

There is a scarcity of articles dealing with the items of interest to you. Insofar as the North American development of terrestrial digital video transmissions is concerned, the best sources of information are the ATSC documents that deal with U.S. standards and their implementation. These documents are available for download at *www.ATSC.org*. Irrespective of the reliability of the off-air terrestrial transmissions using the U.S. 8-VSB transmission method as opposed to the European COFDM transmission method, the trend in North America is the development of digital cable and satellite DTH transmissions. The superior reliability and large choice of programs offered by these alternate transmission modes all but predict the eventual demise of the terrestrial digital video transmissions. As far as the future of HDTV is concerned, I would like to direct your attention to the July 2004 issue of "EBU Technical Review" and especially to the article written by John Ives of Sony Europe titled "Image formats for HDTV."

Wanted: superhuman

For more than 20 years, I've been scanning the classified ads in magazines like *Broadcast Engineering*. Ads seeking broadcast technicians or engineers almost always demand the applicant be up on not only every possible variation of studio, ENG and EFP equipment repair, but also have IT expertise and experience as a live-truck driver-operator/grip and roustabout, master control operator and camera operator. Oh, and of course, applicants have to be up on the planning, designing, construction and management of broadcast facilities.

OK, that's a little bit of an exaggeration. But only a little.

My question: Do the stations posting these ads ever get any applicants, and do those applicants actually have the superhuman qualities demanded? If so, I'd better stay where I am until I retire or die — the competition is way too stiff.

KARL

Brad Dick responds:

Yes, stations do get applicants for the jobs posted in *Broadcast Engineering*. Now, I wouldn't be so sarcastic as to say that some employment ads, no matter where they are placed, are there because of ridiculous EEO requirements, but a reasonable person could come to that conclusion.

As to why you've never been contacted, maybe you need new set of threads, something with a large "S" on the chest and, oh yes, don't forget the red cape.

IT versus RF

Dear Brad,

I wholeheartedly agree with your observation ["The value of a good engineer," May 2004]. IT engineers and broadcast engineers have a vastly different view of system reliability standards. I'm amazed by the number of Internet discussion threads that contend that five-nines is overkill for IT systems and that an hour a month of downtime is acceptable. Of course, I'm also amazed that there aren't more young broadcast RF engineers who will take care of the RF systems when all of us "old-timers" retire. But that's another letter...

Keep up the good work!

TOM FRANKLIN
NORCOM BE

May Freezeframe:

Q. What product, first introduced in *Broadcast Engineering*, called itself the first "digital storage system" providing what we now know as video serverlike functions? Some have called it the first video server. What company made it, and what year was it introduced?

A. Dynatech D2S2 (pronounced, D-squared, S-squared), digital storage system, 1993. It was a Pick Hit.

Winner:

No correct entries were received.

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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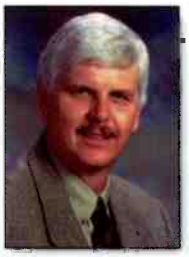
Free no more?

BY CRAIG BIRKMAIER



Of all the technical innovations that have influenced our lives and economic fortunes during the past century, none has had a more profound impact on our lives than broadcasting — first radio, then television.

According to the Department of Commerce, the total 2002 Gross Domestic Product (GDP) for all information industries in the U.S. was just over $1 trillion. Telecommunications and information/data processing services make up well over half of the total information industry GDP. Motion picture- and sound recording industry revenues were $81.8 billion. Cable- and pay-TV revenues were $80.5 billion. Television broadcasting accounted for about $37 billion, and radio broadcasting added another $14.8 billion.

So how is it that the impact of broadcasting on our lives has been so profound? Simply stated, broadcasting technologies have become the portals through which we see and hear the world around us. Broadcasters have done more to bring entertainment into our homes and to shape our perceptions of the world than any other medium.

That being said, there are some who believe that the Internet and networked delivery of digital media content may soon relegate broadcasting to a less prominent future role. Thus, it should come as no surprise that today's well-entrenched mass media are doing everything in their power to control the future.

Old Hollywood

Perhaps a brief review of the impact of broadcasting on the motion-\ picture industry will help clarify this discussion. During the "golden age" of radio, before TV brought moving pictures into our homes, movies informed and entertained patrons. Newsreels brought information and images from around the world into the theater as a prelude to the visual entertainment experience.

With the introduction of television broadcasting, news, information and entertainment flowed into our homes, for free. By the 1960s, movie theaters had lost 60 percent of their average weekly attendance and more than half of the 20,000 theaters that began operations in the 1940s were forced to close down.

The FCC has approved TiVo's implementation of content management techniques that support the broadcast flag, including a proposed feature that would allow TiVo owners to access content on their PVRs from remote locations over the Internet. Pictured: the Series2 DVR.

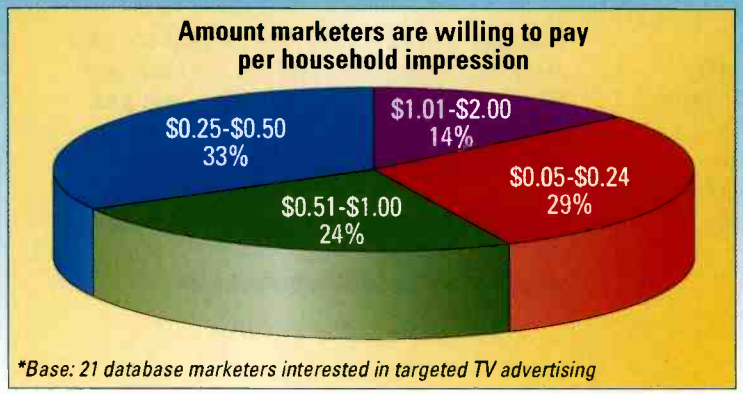
When Hollywood learned about the tremendous promotional impact of television, it used broadcasting to reverse its declining fortunes. In the '70s, the motion picture industry began to advertise its wares, using the power of broadcasting to bring patrons back to the theaters. And, when it accepted the reality of videocassette recorders — instead of trying to make them illegal — Hollywood leveraged the platform developed by broadcasting to bring its movies into our homes.

The $37 billion in 2002 revenues from "free TV" suggests a somewhat different reality than "free" TV; we pay for broadcasting indirectly because the cost of advertising is buried in the price of the products that are advertised. We pay directly for cable or DBS and various forms of packaged media — mostly music and movies. In fact, the

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

The price of reaching consumers

Most advertisers won't pay more than $1 per impression



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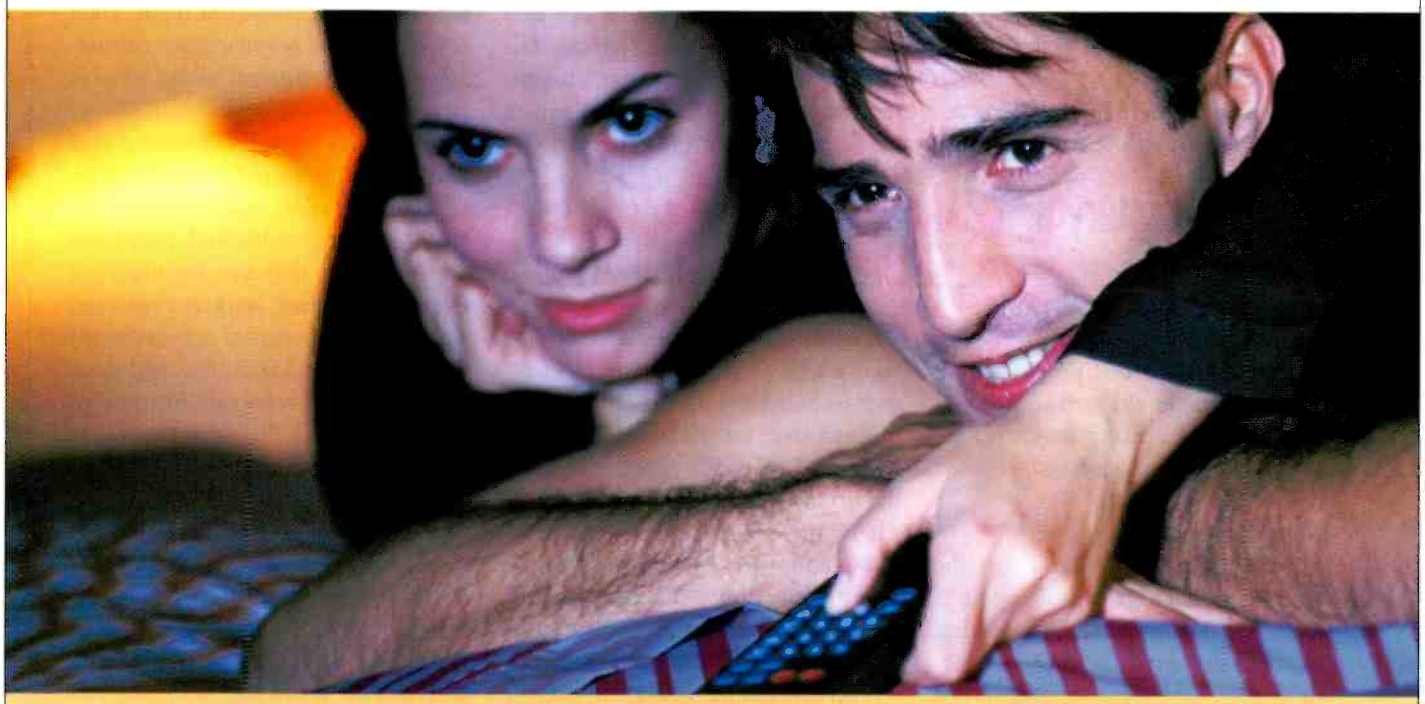
Turn Up the Experience with Dolby Pro Logic II



DP563 Dolby Surround and Pro Logic II Encoder

Audiences love Dolby® Digital 5.1 discrete surround in digital entertainment such as DTV, DVDs, and video games. But what about surround sound for two-channel audio delivery?

Dolby Pro Logic® II offers the best matrix-surround experience for stereo-only television services, top-selling video games, or VHS tapes. With five full-range channels, improved steering logic for greater channel separation, and an exceptionally stable sound field, Dolby Pro Logic II remains compatible with consumer decoders with Dolby Pro Logic, stereo, or mono outputs.

Encode your analog or digital two-channel productions in engrossing Dolby Pro Logic II matrix-surround, now available with the DP563 Dolby Surround and Pro Logic II Encoder.

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average consumer spent $763.20 on all forms of media in 2002 (not including the hidden costs of advertising).

The TV in the family room is no longer the exclusive domain of the broadcaster; it has not been for decades. The VCR and multichannel subscription television leveraged the TVs that were once the exclusive domain of broadcasters. Even today, DVD players — perhaps the most successful product in the history of the consumer electronics industry — deliver digitally encoded programming to the venerable old analog TVs developed half a century earlier to receive television broadcasts.

A half century ago, TV came onto the scene as a challenger to Hollywood.

Convergence

A half century ago, TV came onto the scene as a challenger to Hollywood. It would be fair to say that Hollywood has now been devoured. Or to be more accurate, the world of entertainment content has converged. Today, a handful of companies control the content that we listen to and watch every day. Most of these conglomerates have tentacles into music, TV and motion pictures.

The enduring value proposition of mass media, first brought to us by broadcasters, is that it defines and reinforces popular culture. This is the factual basis for the claim that broadcasting is the most influential technology of the past century. Mass media is the closest thing we may ever see to a perpetual-motion machine. It has the ability to determine what or whom to promote and to ignore. The only power left for the consumer is to opt out.

According to mass media, one of the tactics that the illegal drug industry uses to build its business is to give its product away until it has created a dependency. When the victim is hooked, the drugs are free no more.

Is TV the "soma" that Aldous Huxley wrote about in "Brave New World"? There's little doubt that broadcasting has been a powerful precursor to the development of a mass media habit.

Where would the music industry be without radio and MTV to promote the artists who are mere "works for hire" to the big record labels? We have grown accustomed to the notion that we can record music off a radio station; apparently this is a form of promotion, rather than piracy. And it has been effective; billions of dollars are spent each year buying recorded music that is available for "free."

Likewise, the VCR did not destroy the broadcast or motion picture business models; it enhanced them. Such is the nature of popular mass culture.

So we are compelled to ask what is so different about being "digital."

The media conglomerates claim that the ability to make perfect digital copies is what makes digital different. Analog radio and television are impaired; they are far removed from the original program masters. They claim that digital copies do not degrade like analog copies; and now, they can be moved easily from point to point through digital networks, or copied onto a recordable CD, DVD or magnetic hard disk.

Like "free TV," the reality is far different than the end-of-the-world scenarios being advanced by the media conglomerates. Digital content can be delivered with higher quality/fidelity than analog. It can also be worse; just look at the sometimes-poor quality of the MPEG-2-encoded video delivered by the bandwidth-constrained DBS systems.

Or look at the positive impact that

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Encoda Case Study: Southern Cross Broadcasting, Australia

ASSETS:
4 sites
25 channels

MISSION:
Centralization
Improve ROI
Improve on-air quality

SOLUTION:
Encoda Automation
D-Series™

Dseries

Raoul Prideaux, Southern Cross Broadcasting
Director of Engineering and Technology

"With the rollout of digital television in Australia, we were faced with either rebuilding our 4 regional television stations scattered across eastern Australia or completely rethinking our workflow and centralize. We knew centralizing could save significant capital and operating costs. And after considering all major automation vendors, it became clear that Encoda offered us the features and rock-solid performance we needed for our style of regional affiliate operation. Better still, they provided the flexibility to configure multiple synchronous schedules on one screen. The D-Series automation solution has not only performed to our expectations, but so too has the after-sale support and training." Mission accomplished.

DVDs have had on the sale of movies. Consumers are acquiring legal DVD titles at a rate that is more than double that of the pre-recorded VHS tapes they bought previously. Is this increase in sales due to improved quality, additional content or ease of use? Perhaps all of these factors are contributing to the success of the DVD. What is even more pertinent, however, is that the lightweight copy protection scheme used with DVDs appears to be adequate, despite the fact that it can be bypassed easily, with a little effort.

Copy protection

Next summer, it may take a little more effort to make and view legal recordings of broadcast television programs. On July 1, 2005, all new products that may come in contact with the bits from a digital television broadcast must look for and deal properly with the broadcast flag. The "flag" is more correctly called the redistribution-control descriptor, a single bit in the MPEG transport stream of a DTV broadcast that announces whether the consumer has the right to redistribute a copy of the broadcast over a digital network such as the Internet. Clearly, selling such a copy is a violation of existing copyright laws. Given the well-established precedents that allow recording television programs for personal use, why it is necessary to prevent individuals from viewing legal copies over a network that extends outside of their home?

The FCC just blessed a TiVo technology that deals with the broadcast flag. When introduced, it will allow a TiVo user to access programs on his home PVR from a remote location over the Internet. Someone with a lake house that has a broadband connection could, in theory, access his TiVo and other caches of recorded content in his home. The Motion Picture Association of America vigorously opposed this capability and has now petitioned the FCC to prohibit it.

You can buy products today that implement some of the technologies already approved by the FCC to honor the broadcast flag. Many new HDTV-capable monitors and receivers now include a DVI connection with high-definition content protection (HDCP). This allows a digital connection between a set-top box or DVD player and the display, encrypting the content as it travels across the high-speed digital bus. In addition, now, some products support the IEEE 1394 network connection with Digital Transport Control Protocol (DTCP). This allows content that has been marked for protection (e.g., using the broadcast flag), to be encrypted as it passes through the IEEE 1394 network to another trusted device that supports DTCP.

All this to protect content that hardly anyone wants to copy for redistribution. Anyone who does want to do this will find it easy because the DTV bit streams are not encrypted. There are already a large number of products in the field that do not look for the broadcast flag or attempt to prevent redistribution. And then there is the analog hole. It is trivially easy to make digital files from analog outputs. If all else fails, you can point a camcorder at that fancy new HDTV screen.

So why all the fuss about protecting digital broadcasts? As mentioned earlier, most quality content has already evolved beyond broadcast distribution. Broadcasting has become the promotional engine for the big media conglomerates. It is a necessary "feeder network" to steer consumers to the good stuff — the stuff that is free no more. BE

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

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BEYOND THE HEADLINES

FCC sets DTV timetables

BY HARRY C. MARTIN

The FCC is moving on the DTV conversion. The agency has imposed a freeze on changes to the TV and DTV Tables of Allotments and, in a related move, has released channel election and replication dates and procedures.

The freeze. As of Aug. 3, 2004, the commission will not permit any changes to stations assigned channels two through 51 on the DTV Table of Allotments. This includes changes requested through a petition for rulemaking or through an application to change a station's service area beyond that which has previously been authorized in the DTV Table, prior construction permit authorizations and/or applications on file as of Aug. 3, 2004.

Moreover, licensees assigned channels two through 51 on the NTSC Table of Allotments are prohibited from filing petitions to change NTSC channels or communities of license, or filing minor modification applications that would increase the NTSC service area beyond that which has been previously approved or specified in a pending application on file as of Aug. 3, 2004.

Dateline

Dec. 1 is the deadline for TV, Class A TV, LPTV and TV translator stations in Colorado, Minnesota, Montana, North Dakota and South Dakota to file their 2004 renewal applications with the FCC. TV stations in those states also must file their biennial ownership reports and EEO program reports by Dec. 1. Also on Dec. 1, TV stations in Kansas, Nebraska and Oklahoma must begin their pre-filing renewal announcements.

The FCC will keep the freeze in place until such time as it has adopted the final DTV Table of Allotments. As matters now stand, this is likely to happen in late 2006.

DTV transition dates. The commission also adopted channel election and replication/maximization procedures, as well as new deadlines for the conversion to DTV facilities. Essentially, the commission has established a three-round channel-election process, preceded by a cleaning up of the commission's database. The following are the relevant dates:

The FCC is moving on the DTV conversion.

• *October 2004* — The commission will issue a Table of Station Information that will provide the DTV service populations that will guide the DTV election process.

• *November 2004* — Stations must file a certification that the FCC database is correct, and they must also certify their intent to replicate or maximize on their post-transition channel.

• *December 2004 (round-one elections)* — In this first round of channel elections, licensees with two in-core (2-51) channels will elect which channel they will use for permanent DTV operation, and licensees with one in-core channel and one out-of-core channel will elect whether they will use their in-core channels.

• *July 2005 (round-two elections)* – In this second round, licensees without a current in-core channel will elect an in-core channel from those remaining after round one.

• *January 2006 (round-three elections)* – In this third round, licensees still without an in-core channel (i.e, due to conflicts between elections) will make their final elections.

• *August 2006* – The commission will release the final DTV Table of Allotments for comment.

Replication and maximization deadlines. Generally, the commission will permit each DTV licensee to replicate its current analog service area and to maximize that service area as long as the station's service area does not exceed that of the station in the market with the largest service area. The anticipated timetable is as follows:

• *July 1, 2005* – Top-four network affiliates in the top 100 markets that tentatively plan to remain on their current digital channels must construct their full authorized facility. Licensees in this category that do not plan to stay on their current digital channels must still provide DTV service to at least 100 percent of the analog population they cover.

• *July 1, 2006* – All other commercial and noncommercial licensees that tentatively plan to remain on their current digital channels must construct their full authorized facilities. Licensees in this category that do not plan to stay on their current digital channels must serve at least 80 percent of the analog population they cover.

Those licensees that intend to move to a new digital channel will be able to carry over their maximized service areas to their new digital channels if they meet the deadlines. BE

Harry C. Martin is president of the Federal Communications Bar Association and a member of Fletcher, Heald & Hildreth, PLC, Arlington, VA.

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Audio multiplexing

BY MICHAEL ROBIN

Audio and video data are captured and processed separately for delivery to the end user. Analog approaches require separate distribution media for audio and video. In a teleproduction studio, this is usually done by using two separate cables. In transmission to homes, separate carriers are used. The result is a frequency division multiplex (FDM). Digital video allows for a more efficient distribution on a single cable or carrier using the time division multiplex (TDM).

Figure 1 shows details of the 4:2:2 525/59.94 horizontal blanking structure. The component digital standards do not provide for the sampling of the analog sync pulses. Two timing reference signals (TRS) are multiplexed into the data stream on every line immediately preceding and following the active line data.

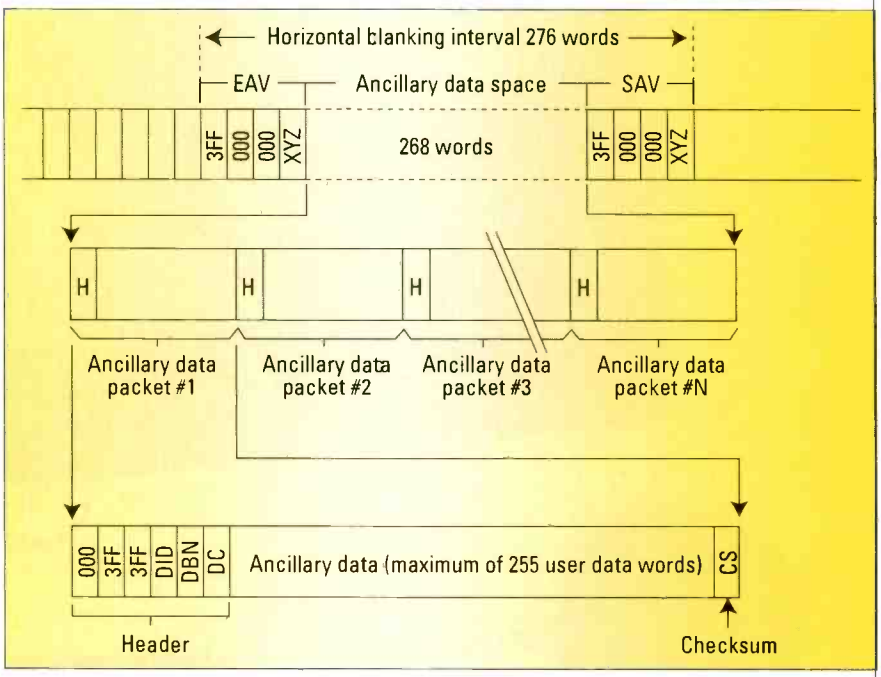

Figure 1. Ancillary data packet structure for 4:2:2 525/59.94 format

Of the 276 data words in the horizontal blanking interval, eight are reserved for the transmission of the TRS. Words 1440, 1441, 1442 and 1443 are used to transmit the end of active line (EAV) TRS message, and words 1712, 1713, 1714 and 1715 are used to transmit the start of active line (SAV) TRS message. Each TRS consists of a four-word sequence. Using a 10-bit hexadecimal notation, these words are represented as follows:

3FF 000 000 XYZ

The first three words are a fixed preamble and unambiguously identify the SAV and EAV information. XYZ represents a variable word and defines the field identification, state of the vertical blanking and the state of horizontal blanking.

Space for ancillary data

In the horizontal blanking interval, 268 words — 1444 through 1711 — can be used to transmit ancillary data. During the vertical blanking duration, large blocks of data, up to 1440 words, can be transmitted within the

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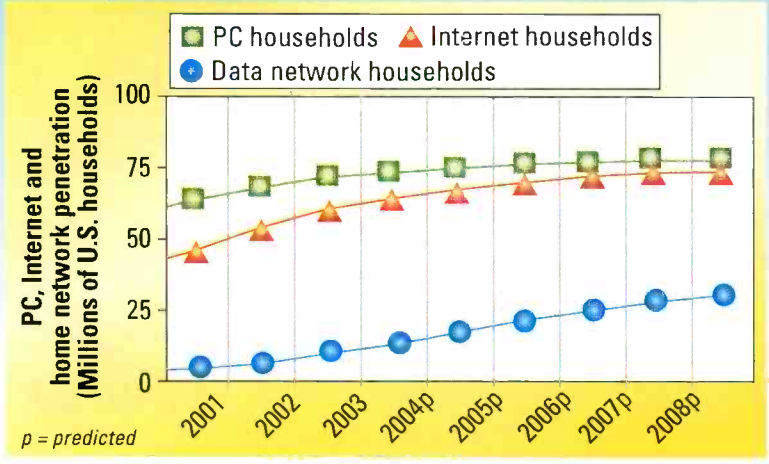

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Horizontal ancillary data space (HANC)	268 Words/line x 525 lines/frame = 140,700 Words/frame 140,700 Words/frame x 29.97 frames/s = 4.216779 MWords/s 4.216779 MWords/s x 10 bits/Word = 42.16779Mb/s
Vertical ancillary data space (VANC)	1440 Words/line x 38 vertical interval lines = 54,720 Words/frame 54,720 Words/frame x 29.97 frames/s = 1.6399584 MWords/s 1.6399584 MWords/s x 8 bits/Word = 13.1196672Mb/s
Total ancillary data space	42.16779Mb/s (HANC) + 13.1196672Mb/s (VANC) = 55.3Mb/s Data formatting and exclusions may reduce this value by 10 percent to 20 percent
Total bit rate	1716 Words/total line x 525 lines/frame x 29.97 frames/s x 10 bits/Word = 270Mb/s
Essential bit rate	270Mb/s - 55.3Mb/s = 214.7Mb/s

Table 1. 4:2:2 525/59.94 ancillary data space

interval between the end of EAV and the start of SAV. Only eight-bit words can be used in the vertical blanking interval. Certain restrictions on the lines that can be used exist, allowing only the use of lines one through 19 and 265 through 282. To prevent switching clicks, lines 10 (vertical interval switching instant) and 11 are not used. Lines nine (fields I and III) and 272 (fields II and IV) are reserved for error detection and handling (EDH) signals.

Table 1 summarizes the ancillary data space available with the ITU-R601 4:2:2 format. The horizontal ancillary (HANC) capability is listed in the upper row of the table and indicates the bit rate available for insertion of ancillary data in the horizontal blanking interval. The vertical ancillary (VANC) capability is listed in row two of the table and indicates the bit rate available for insertion of ancillary data in the vertical blanking interval. The total ancillary data space, listed in row three of the table, represents the sum of the HANC and VANC capability of the system. This value may be reduced by 10 percent to 20 percent by the data formatting used. Row three of the table lists the nominal (total) bit rate. The essential video bit rate required by the standard is shown in row four. It results from the elimination of nonessential samples in the horizontal and vertical blanking intervals. Ancillary data may include digital audio, time code, EDH, or user and control data.

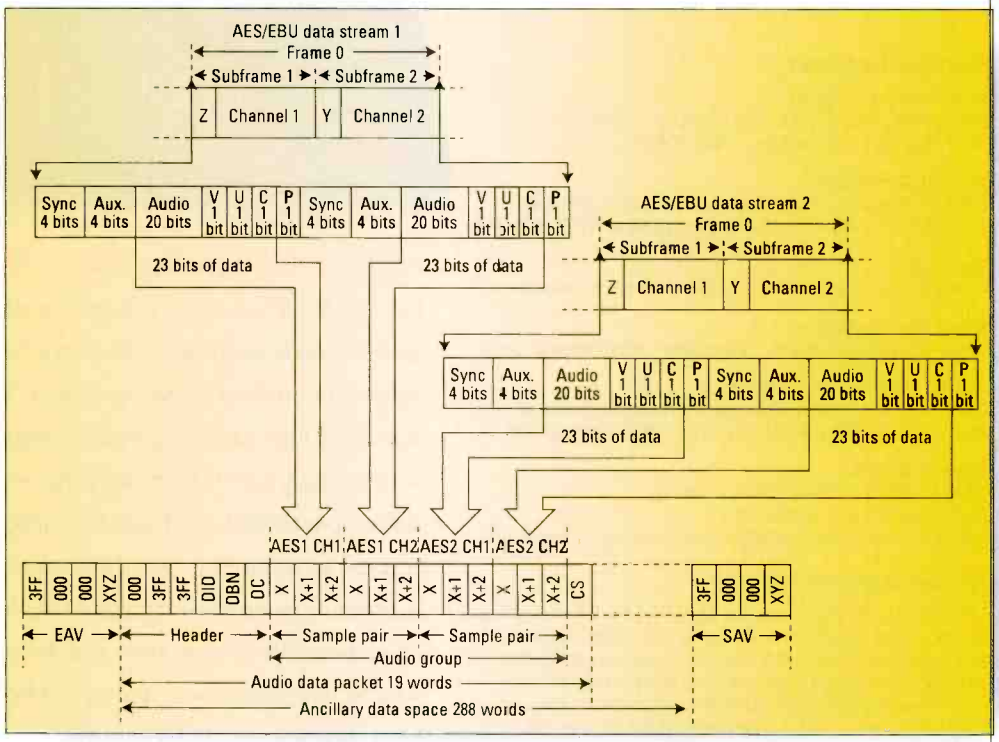

Figure 2. Audio data packet formatting from two AES/EBU data streams

Audio data multiplexing

The most important use of the ancillary data space is for the insertion of audio signals accompanying the video signal. The 4:2:2 component digital standards have a considerable amount of overhead. They can easily accommodate eight AES/EBU signals (eight stereo pairs or 16 individual audio channels), still leaving a considerable amount of overhead for other uses.

The ANSI/SMPTE 272M document defines the manner in which AES/EBU digital audio data, AES/EBU auxiliary data and associated control information are embedded into the ancillary data space of the bit-serial digital video conforming to the ANSI/SMPTE 259M standard. As mentioned above, the 4:2:2 525/59.94 component digital signal can accommodate 268 ancillary data words in the unused data space between the end of active video (EAV) timing reference and start of active video (SAV) timing reference.

Figure 1 on page 22 shows the ancillary data packet structure for the 4:2:2 component digital interface. Each packet can carry a maximum of 262 10-bit par-

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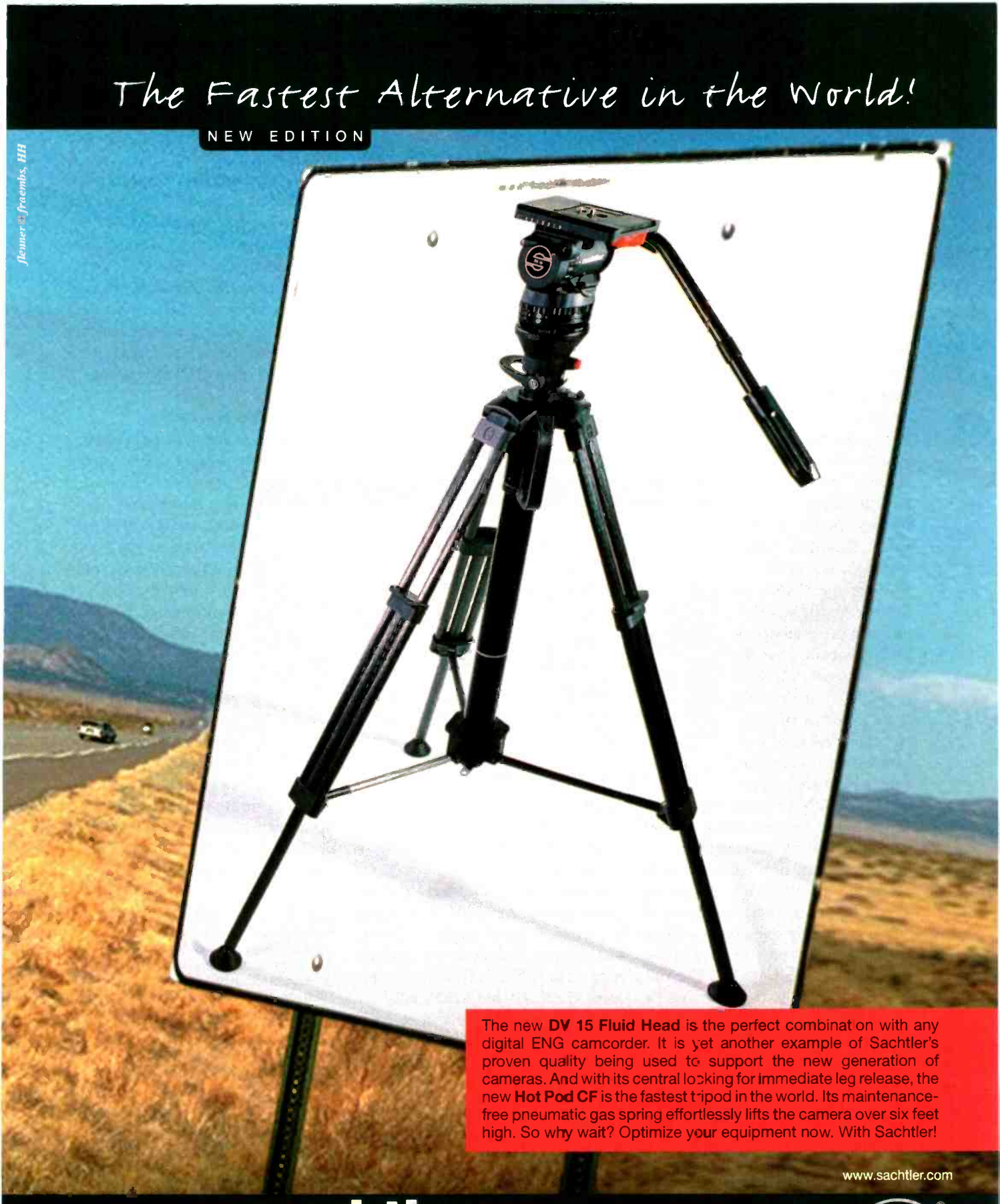

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allel words. A six-word header precedes the ancillary data and contains:

- A three-word ancillary data flag (ADF) marking the beginning of the ancillary data packet. Word values are 000, 3FF and 3FF, respectively.
- An optional data identification (DID) word identifying the user data.
- An optional data block number (DBN) word.
- A data count (DC) word.

A variable number of data words, not exceeding 255, follows. The packet is closed by a checksum (CS) word allowing the receiver to determine the validity of the packet. Multiple, contiguous ancillary data packets may be inserted in any ancillary data space. They must follow immediately after the EAV for the HANC, or the SAV for the VANC to indicate the presence of the auxiliary data and the start of a packet. If there is no ADF in the first three words of an ancillary data space, it is assumed that no ancillary data packets are present.

Bit address	Word X	Word X+1	Word X+2
b9	not b8	not b8	not b8
b8	audio 5	audio 14	P
b7	audio 4	audio 13	C
b6	audio 3	audio 12	U
b5	audio 2	audio 11	V
b4	audio 1	audio 10	audio 19 (MSB)
b3	audio 0 (LSB)	audio 9	audio 18
b2	channel 1	audio 8	audio 17
b1	channel 0	audio 7	audio 16
b0	Z	audio 6	audio 15

Table 2. Formatted audio data structure

SMPTE 272M proposes two modes of operation for embedding digital audio into a digital video data stream. The minimum implementation is characterized by 20-bit resolution, 48kHz sampling, audio synchronous with video, only one group of four audio channels and a receiver buffer size of 48 audio samples. The full implementation is characterized by 24-bit resolution; sampling frequencies of 32kHz, 44.1kHz or 48kHz; audio synchronous or asynchronous with video; up to four groups of four audio channels; a receiver buffer size of 64 audio samples; and indication of relative time delay between any audio channel and the video data signal.

Figure 2 on page 24 shows an example of the minimum implementation in which two data streams (AES/EBU data stream one and AES/EBU data stream two) are formatted for embedding into a 4:2:2 525/59.94 component digital signal.

- A six-word header starts the audio data packet.
- To begin the embedding sequence, frame zero of AES/EBU data stream one provides data from its subframes one and two. Each of these subframes is stripped of the four sync bits, the four auxiliary bits and the P bit. The remaining 20 bits of audio and the V, U and C bits — a total of 23 bits of subframe one — are mapped into three consecutive 10-bit words identified as X, X+1 and X+2 of AES1/CH1.
- The 23 bits of subframe 2 are similarly mapped into three consecutive 10-bit words identified as X, X+1 and X+2 of AES1/CH2.
- AES1/CH1 and AES1/CH2 form a sample pair.
- To continue the embedding sequence, frame zero of AES/EBU data stream two provides data from its subframes one and two. These data are similarly reduced to 23 bits and result in sample pairs AES2/CH1 and AES2/CH2.
- The two consecutive sample pairs form an audio group.
- The 19-word audio data packet closes with a CS word.
- Subsequent horizontal blanking intervals will accommodate frame one of AES/EBU data streams one and two, frame two of AES/EBU data streams one and two, and so on until the 192 frames (each constituting one AES/EBU block) of each of the two AES/EBU data streams are embedded.
- Then a new block of 192 frames coming from the two AES/EBU data streams will be embedded, and the process will continue.
- At the receiving end, the packets are extracted and fill a 64-sample buffer from which the original data are extracted at a constant bit rate and then reformatted.

Table 2 shows the audio data structure represented by the three 10-bit data words. Two bits indicate the channel number, and a parity is calculated on the 26 bits, excluding all b9 address bits.

Some afterthoughts

The distribution of digital audio and video signals using a single coaxial cable is advantageous if the multiplexed signal does not have to be processed separately — that is, if the product is ready for distribution or transmission. However if the video signal has to feed a production switcher for further processing, the audio has to be demultiplexed and processed separately, which may prove to be awkward and costly. To embed or not to embed is a decision that requires a clear understanding of predictable and unpredictable operational requirements. BE

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

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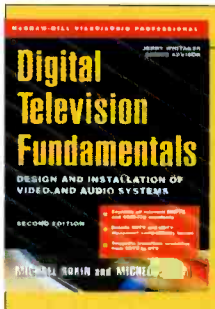

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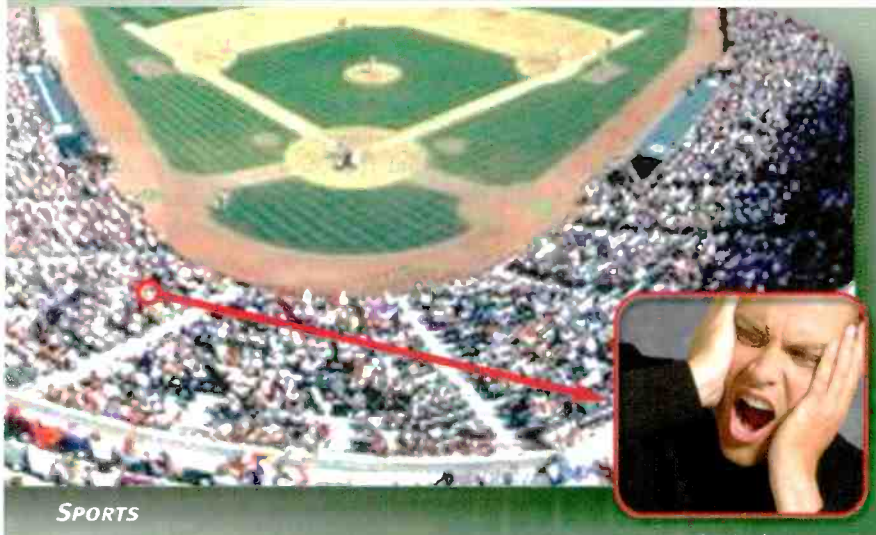

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Network security

BY BRAD GILMER

People who design computer networks for professional television applications face a dilemma. Users almost universally demand Internet connectivity. But engineers know that there are risks associated with providing that connectivity. A fairly typical reaction from engineers to a request by users for Internet connectivity in these high-risk environments has been, "Over my dead body!" To which users and management have replied, "That can be arranged." It is fair to say that a bit of tension exists on this topic.

These days, users expect ubiquitous Internet connectivity. Like it or not, access to e-mail and Web sites, and the ability to share files and other information over the Internet, have become deeply ingrained in almost all business organizations, including professional television production. Many studies have found that there are real economic gains to companies and countries that have easy, low-cost Internet connectivity. And you can expect user pressure to increase. At some point, you will likely be required to provide at least some level of access to the Internet on critical networks. So it would be prudent to take a realistic look at the risks associated with this connectivity.

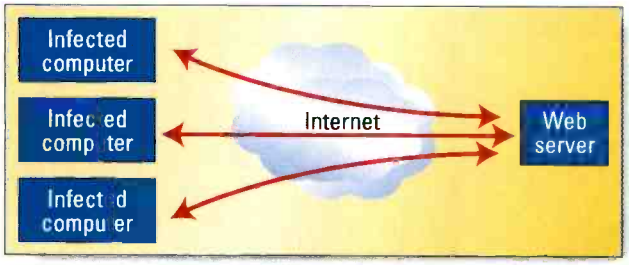


Figure 1. When hundreds or even thousands of computers all try to contact the same Web server at the same time, the Web server becomes unavailable. This is called a denial-of-service attack.

Security threats

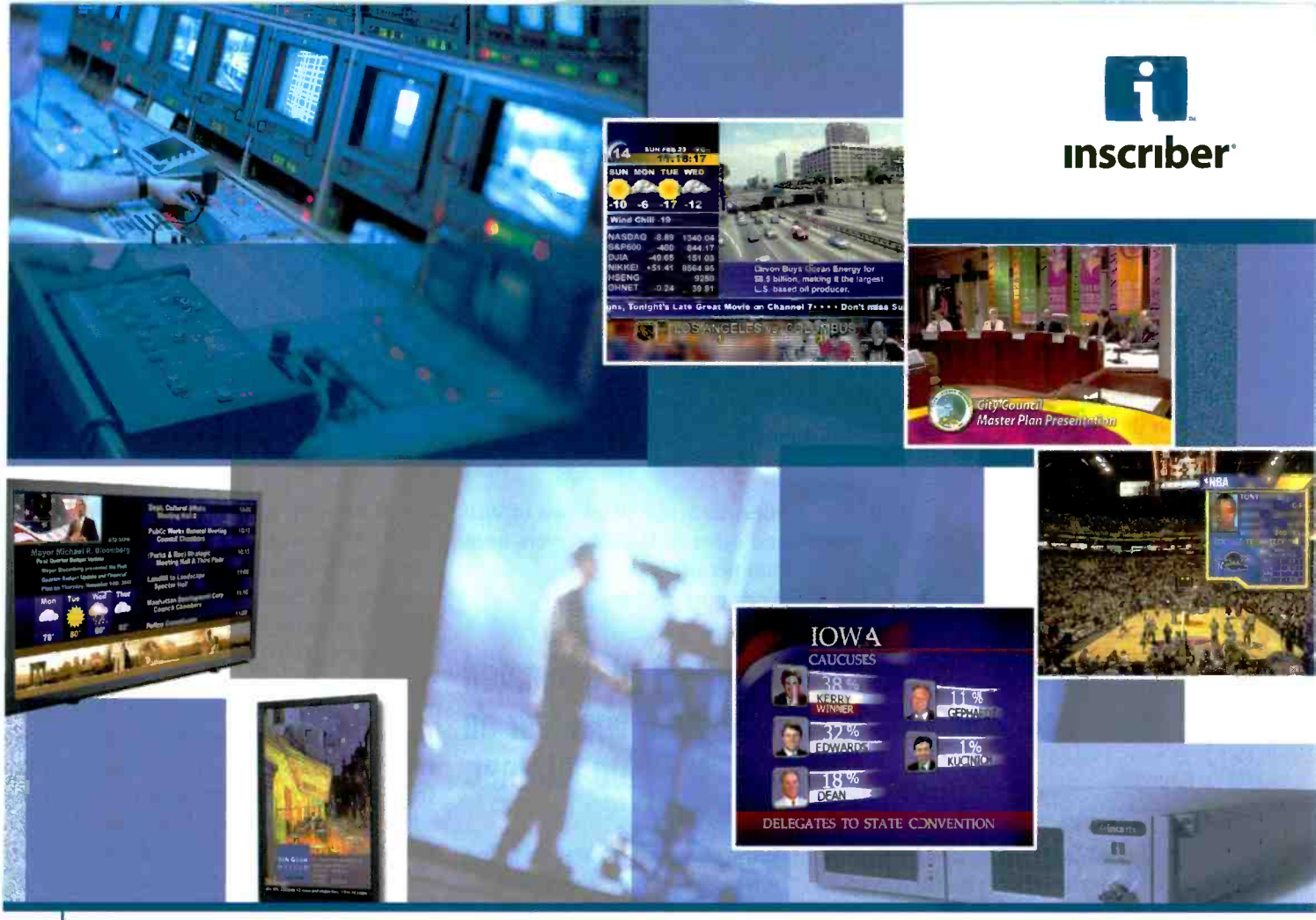
There are a number of threats you may encounter when you connect to the Internet. Common threats include port probes, viruses and worms, denial-of-service (DoS) attacks, ping-of-death (PoD) attacks, and Universal Datagram Protocol flood attacks. Port probes check a computer connected to the Internet for vulnerabilities. The attacking computer systematically checks for ports that are open and available on your computer. Internet-aware applications usually "listen" for communications on a specific port. For example, telnet uses port 23. When a remote computer initiates communication with your computer on port 23, your computer responds with the commands necessary to establish a telnet session. Once the attacker knows what ports are open on your computer, he can then use this information to launch specific attacks on open ports.

There are a number of threats that may cause problems for you when you connect to the Internet.

Many readers are personally familiar with viruses and worms. Viruses usually pass from computer to computer through infected files or removable media. These days, worms are much more common. Worms are most often transmitted through e-mail. The user opens an attachment containing an executable code that runs and infects the computer. The worm then reads the e-mail address book on the infected computer and e-mails itself to everyone on the list. In some cases, the worm remains dormant on the computer until a specific time, or until it receives a specific command from a remote computer. One worm, when activated, sends an HTTP request to a targeted Web address. As Figure 1 shows, there may be hundreds or thousands of infected computers on the Internet that are all directed to go to a specific Web server at the same time. When this happens, the Web server cannot service all the requests, and the system is effectively "knocked off the air." This kind of attack is called a denial-of-service attack.

Almost all computers on the Internet contain a utility called Ping. Ping is a simple but useful utility that sends a message to another computer on the Internet saying, in effect, "Do you hear me? If so, could you please respond." Ping then displays how long it took from the time it made a request until it received a reply. By manipulating Ping, an attacker can create Ping messages that can cause the target machine to quit working. This is called the Ping of Death. Of course, an attacker could use machines infected with a worm to create multiple, simultaneous attacks from different locations.

Attackers can use the Universal Datagram Protocol (UDP) as well.



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Because of the way UDP is designed, it is possible for an attacker with a high-speed Internet connection to send a large, continuous stream of data to the target machine. UDP is not fair to all traffic. If the stream or multiple streams are large enough, UDP can crowd out other traffic, effectively bringing Internet communications with the target computer system to a halt. This kind of attack is known as a UDP flood attack.

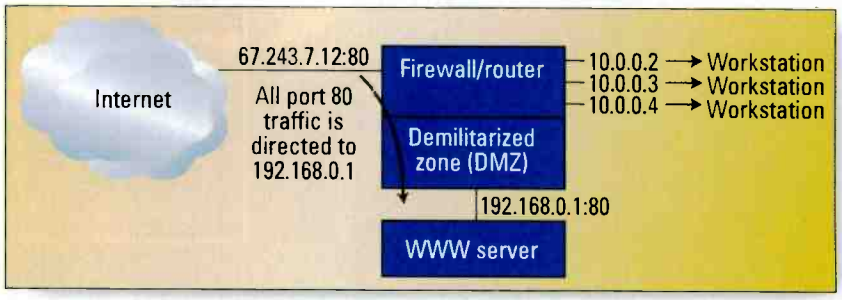


Figure 2. Firewalls use NAT and PAT to conceal the existence of computers on local networks.

Firewalls are our friends

To defend against the attacks listed above, and to control the types of traffic allowed from the Internet onto a local network, network engineers created utilities called firewalls.

A firewall can do several things to protect your local network while permitting access to the Internet. A firewall can:

- Conceal a local computer's IP address from an observer on the Internet.
- Hide the actual IP address of Web and other dedicated servers from Internet users
- Block port probes
- Allow an administrator to admit only the traffic types she decides are acceptable across the firewall and on to the local network
- Provide logging so that security threats from the Internet can be analyzed

Firewalls can hide the actual address of dedicated servers such as Web servers from an observer on the Internet.

A firewall can conceal the private IP address of your workstation from prying eyes on the Internet. This is called network address translation (NAT). In the example shown in Figure 2, the public Internet address of the corporate firewall is 67.243.12.80. Workstations on the private network all use the 10.0.0.0 private address space. Someone trying to probe the port of a workstation from the Internet would not see the workstations at all. The only device visible from the Internet is the firewall.

Firewalls can hide the actual address of dedicated servers such as Web servers from an observer on the Internet. Web clients normally connect to servers using port 80. In the example in Figure 2, the firewall permits all inbound traffic from the Internet 67.243.7.12 port 80 to traverse the network, and directs it to the Web server located inside a demilitarized zone (DMZ) at 192.168.0.1. The firewall can be configured so that only HTTP traffic is permitted into and out of the DMZ. The firewall also can be configured with rules different from the rest of the company network. For example, the firewall may allow FTP across a DMZ to an FTP server, but it might not allow any workstations to use FTP.

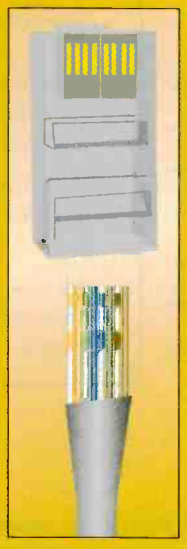
Administrators can configure firewalls to defeat port probes as well. A port probe queries a particular port and waits for a response. If it detects a response, it logs the port as being open. It is possible to configure the firewall so that it sends back a response indicating that the port is closed. But a better way to defeat port probes is to configure the firewall so that it discards queries without communicating any information back to the port-probing program. This is

Wiring Ethernet cables

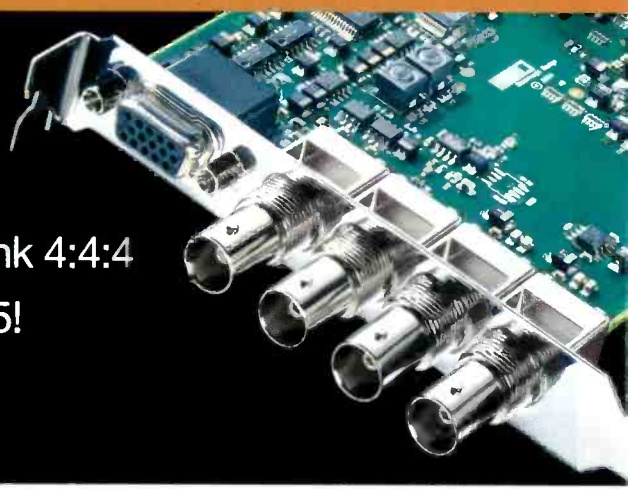
Several of you wrote to let me know of an error in the RJ-45 wiring diagram for Ethernet cables that appeared in my August column. Thanks to you for catching this error. Here is the correct way to wire the connector:

Pair #1 white/blue, blue
Pair #2 white/orange, orange
Pair #3 white/green, green
Pair #4 white/brown, brown

Pin 1 - white/orange
Pin 2 - orange
Pin 3 - white/green
Pin 4 - blue
Pin 5 - white/blue
Pin 6 - green
Pin 7 - white/brown
Pin 8 - brown



DeckLink



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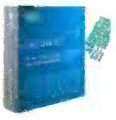

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frequently referred to as "stealth" mode. (You can go to *www.grc.com* and run a port-scanning program that will report the status of all ports on your computer.)

Another protection a firewall can offer is to allow only certain protocols to traverse to the local network. This allows the administrator to block all telnet traffic, for example, because data sent over telnet (including passwords) are unencrypted.

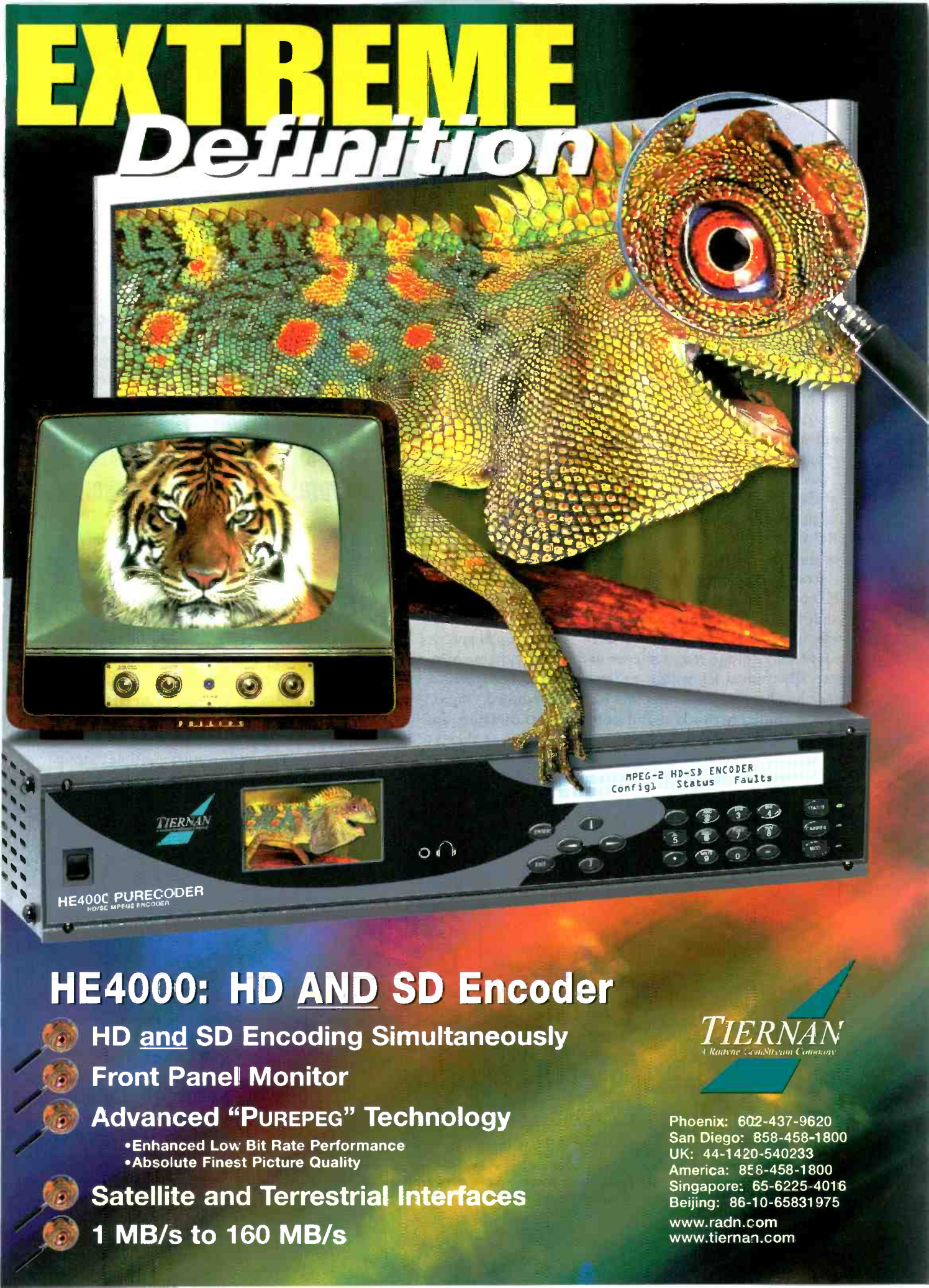
Limitations

While a firewall can do a lot to protect computers on your network, there are certainly things it cannot do. A firewall cannot protect your network or servers from a denial-of-service attack. Also, a firewall cannot stop the spread of viruses or worms because they typically are spread by e-mail applications that are allowed to traverse the firewall. The best way to block these attacks is to install a central mail scanning server with appropriate software. Finally, a firewall cannot provide a totally bulletproof solution to all security attacks. People can be very creative — both in creating firewalls and in working to defeat them. But firewalls can provide a reasonable level of security while granting users the Internet access they demand.

The decision to allow Internet connectivity on local critical networks is difficult. Engineers frequently find themselves in the middle, trying to protect the interests of the company while also meeting the users' needs. BE

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

Send questions and comments to: brad_gilmer@primediabusiness.com



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HD camera production tools

BY GILBERT BESNARD

The production world is experiencing a shift from shooting on film to electronic acquisition with HD camcorders. While shooting in HD won't always replace film, which has its own special look and gamma (qualities), it has penetrated a significant portion of the market for several fundamental reasons.

One reason is the wide acceptance of the 24p HD format as a universal mastering format. From the 24p HD format, which does offer many of the visual benefits of film, material can be converted to virtually any HD or SD format for broadcasting, archiving, DVD mastering and numerous similar applications. What's more, the storage requirements of 24p HD content fall within a range that has become manageable with contemporary networking and storage equipment. In addition, new camcorders and interfaces can accommodate a complete range of other HD formats — including 1080i, 1080p and 720p — at all the popular frame rates, including 23.98PsF, 24PsF, 25PsF, 29.97PsF, 50i and 59.94i.

Pricing and availability have brought HD products into the mainstream, but the success of these systems rests also on the flexibility and efficiency they introduce into the production. They can give everyone on set — the director of photography, cinematographer, director, producer and now often the colorist — the ability to monitor images as they are recorded. On-set HD monitoring allows directors and producers to see shots as they are being taken, and then move immediately to scene selection and the rough-cut editing process.

HD acquisition can cut production time by nearly half. Rather than wait on film processing and a transfer of dailies, the production team can jump right to offline editing, scene selection and even preliminary color correction. As a result, the online editing process can begin as early as the next day.

While shooting in HD won't always replace film, it has penetrated a significant portion of the market for several fundamental reasons.

Camcorder interfaces

HD production can become even more efficient with the use of electronic acquisition interfaces that mount on the back of an HD camera between the camera and battery.

These interfaces for HD camcorders typically feature multiple outputs including HD SDI, SDI, composite and DV/IEEE 1394, the last of which allows the camcorder to be plugged directly into a laptop/DV editing system or a DV portable drive. The DV signal includes embedded audio, time code and metadata, facilitating fast and accurate editing.

These new interfaces may include built-in aspect ratio converters that allow 16:9 material to be viewed on either a 16:9 or 4:3 monitor, as well as time code burn-in (both video and audio), graticule markers and on-screen display of metadata information such as scene, take and reel number. These features allow everyone

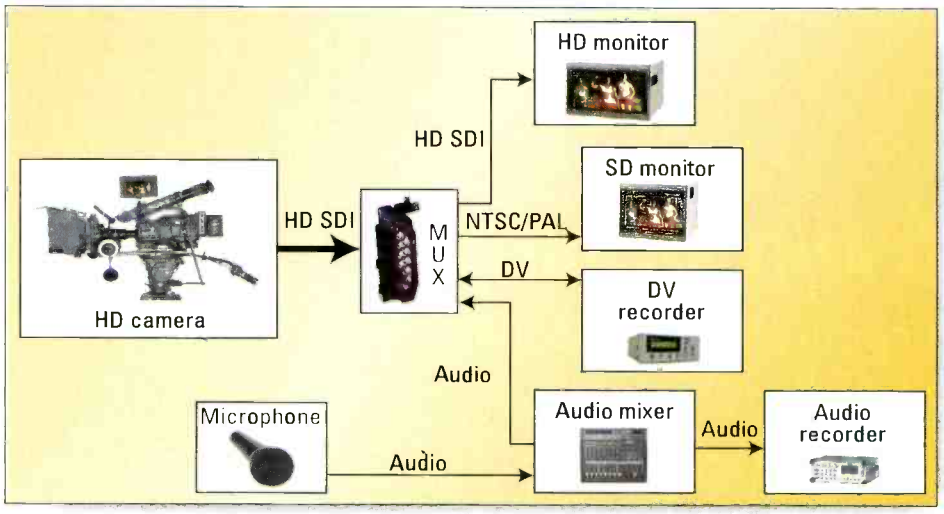

Figure 1. The support and monitoring equipment videomakers need when acquiring video need individual feeds from the camera. New conversion systems are now available that mount on the camera and provide these feeds.

Camcorder interfaces, such as Miranda's DVC-800, provide extra functionality in on-set monitoring and editing.

on-set to see the complete picture at all times. The inclusion of key scene information minimizes the possibility of expensive errors. If the HD interface provides a DV loopback feature, DV material can be recorded on a DV recorder (or a laptop) and later played back for review and approval on the set.

Typical configuration

In a typical acquisition configuration, the HD camcorder operates in a self-contained manner. However, all of the preferable support and monitoring equipment still need individualized feeds to perform their duties. They can be developed from the HD feed from the camera. However, that requires a lot of extra gear.

It used to take a truckload of equipment just to get feeds from the camera for both HD and SD monitors so the producer/director and maybe the AD could "see" the images coming from the camera. The HD output from the camera couldn't drive the SDI monitor. These were significant obstacles to the videomaker needing HD quality and finding a complete solution unavailable. Add to this the drive to reduce staff and make the field crews smaller, and it's almost a wonder that HD field production worked at all.

Early attempts used an external downconverter to get an SDI image that could be used to drive an SD monitor so the director and other crew members could "see" what the camera operator was seeing.

That was the first step. The problem remained that it didn't provide the HD quality that was needed. Cameras have an HD output, so now it was possible to add a second connection to the camera for an HD monitor.

Now we had both HD and SD, 4:3

and 16:9 monitoring, but what about time code? What about safe area markers? If we had a DV recording, the crew could do rough cuts in the field, putting them maybe 50 percent ahead in production time.

All these factors necessitate the use of an on-camera downconverter. Shown in Figure 1 on page 34 is an example connection diagram of a Miranda DVC-800 downconverter.

This device mounts on the camera, just before the battery pack. It provides both HD and SD monitor outputs and DV/1394 to feed a DV recorder. It can capture metadata and audio, all while burning in time code if necessary.

Even effects-based shots such as blue-screen can be checked without waiting for dailies to return — and the inherent loss of an entire day of production.

If the editing system has the foreground and background for the scene, an editor can simulate the final look of the scene while still on the set.

It used to take a truckload of equipment just to get feeds from the camera for both HD and SD monitors.

Such an interface can make remote shooting not only easier, but highly productive. These crews can become practically self-contained. They return to the studio knowing that the takes were good, the rough cuts are done and that conversion between 4:3 and 16:9 will not lose critical image information — because they've already seen the results.

As the new performance capabilities of HD cameras increase, video becomes an even more tempting solution over film than before. Armed with a few tools like this, the transition from film to video becomes easier — and even perhaps less expensive. **BE**

Gilbert Besnard is director of product development for Miranda.

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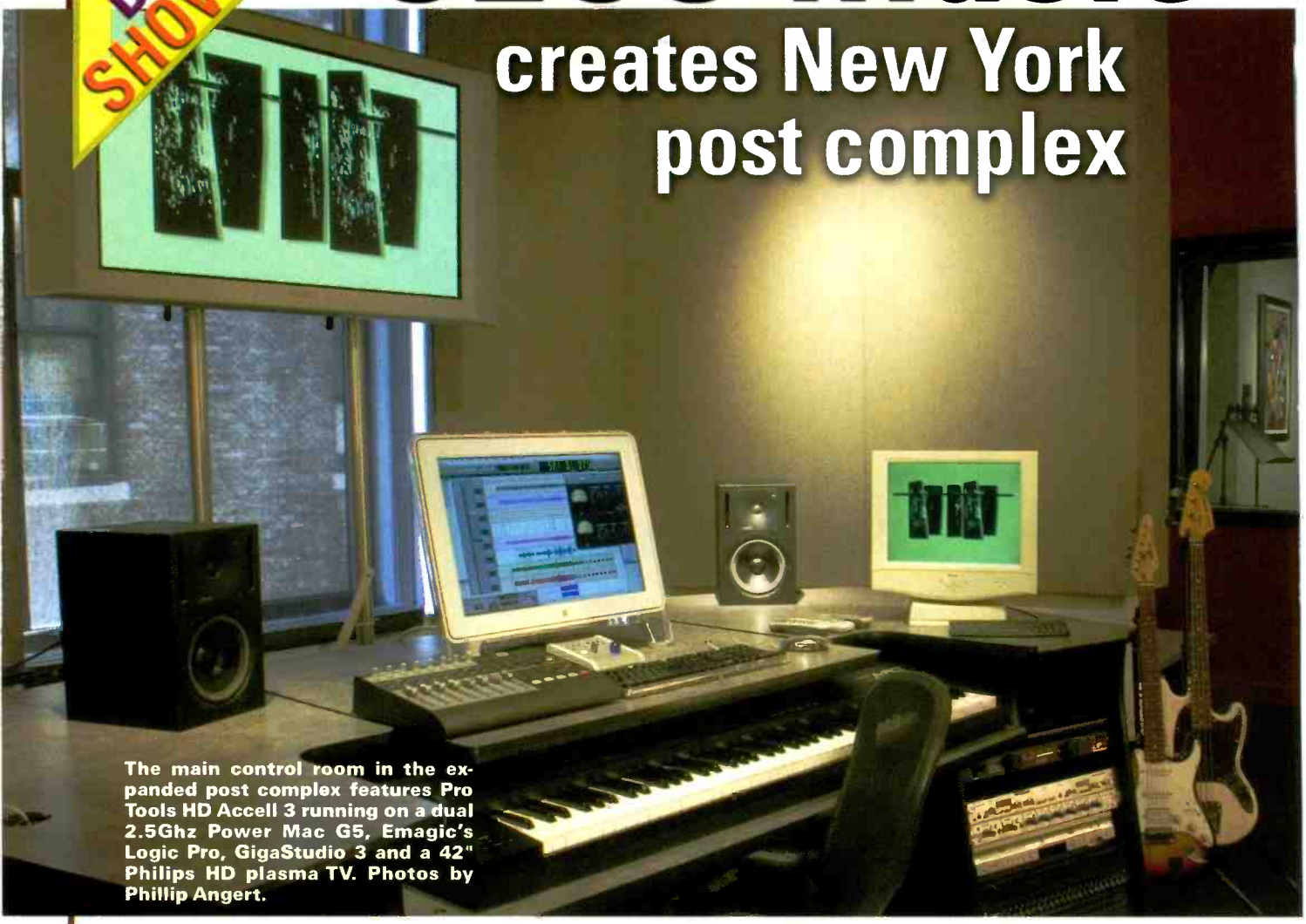
SYSTEMS DESIGN SHOWCASE

JECO Music creates New York post complex



The main control room in the expanded post complex features Pro Tools HD Accell 3 running on a dual 2.5Ghz Power Mac G5, Emagic's Logic Pro, GigaStudio 3 and a 42" Philips HD plasma TV. Photos by Phillip Angert.

By Howard Sherman

Space, at least in New York City, is the ultimate rather than the last frontier. No matter what your budget or purpose, however much space you carve out of this city's real estate jungle, there will almost never be enough to meet all your needs. You can also be certain you'll have some configuration issues to deal with.

JECO Music, a bicoastal company specializing in TV programming, feature film and commercial music production, recently partnered with sister company Stolen Car Productions to develop an unusual new audio-video production/post-production complex for New York City's production and advertising community. Created by studio architects/acousticians the Walters-Storyk Design Group, this 4000-square-foot facility occupies the entire 10th floor of its building (see Figure 1 on page 40).

Having resided in considerably smaller quarters on the third floor of the building for seven years, the production company had completely outgrown its space. Beyond the physical limitations of its cramped studios, it also planned to reach out to a higher level of client, and to support its creative credentials with a substantially larger, more attractive, more comfortable and more technically sophisticated physical plant. In the advertising and TV production universe, appearance and creature comforts can give a company as much credibility as awards and a power reel.

Beyond this "glamour" quotient though, serious thought was devoted to the fact that, in a small company with a hands-on creative/management team, the partners spent more time in their studios than at home with their families. To support that large investment of time and energy,

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When the entire 10th floor became available in its midtown building, JECO jumped at the chance to acquire it.

The new complex offers clients a vast array of creative and technical advantages along with substantial creature comforts. These include four composing/audio-post suites; two Avid Media Composer/Meridian rooms; a live studio capable of accommodating up to 12 musicians; a three-person voice-over studio; a conference room; and executive, production and administrative offices.

As is usually the case in NYC, JECO was out of space before they started. However, creative designing and specialized studio construction techniques enabled architect John Storyk to optimize the available space without the creation of a single mechanical room.

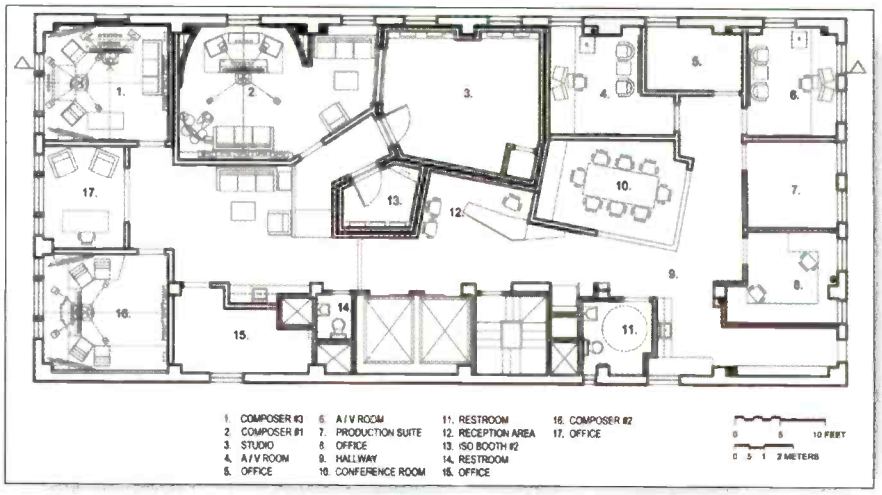

Figure 1. JECO's new expanded post complex houses five other creatives. Four composing/audio-post suites; two Avid Media Composer/Meridian rooms; a live studio capable of accommodating up to 12 musicians; a three-person voice-over studio; a conference room; and executive, production and administrative offices are available for the companies' use.

JECO's interior design was developed by WSDG co-principal Beth Walters through a valuable ongoing dialogue with the production company's partner/composer Leigh Roberts on color and texture.

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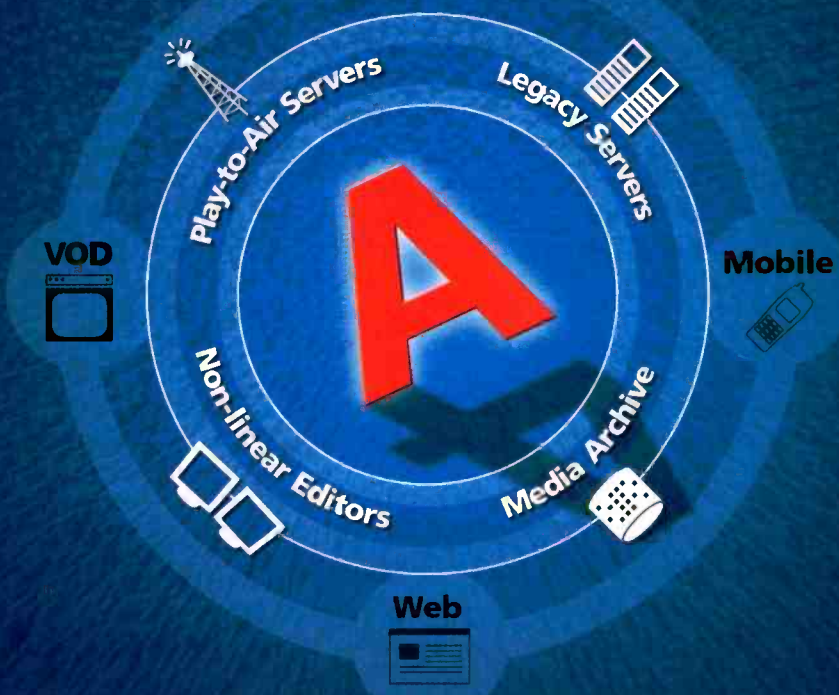

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SYSTEMS DESIGN SHOWCASE

Long-time WSDG contractor Chris Bowman and his construction team have excelled at navigating the many issues related to building the complex facilities so crucial to a successful studio operation. The nature of this building itself, however, presented the construction team with considerable challenges. Foremost of those was the absence of a freight elevator to remove the debris resulting from a bare-walls demolition and to deliver an equally formidable amount of construction material. The passenger elevator had to be free for the other tenants during normal business hours. Fortunately the production comany had a solid relationship with the landlord, and the work was accomplished.

Equally daunting was the discovery that the 10th floor shared a power line with other tenants in the building. The initial concern was that a new riser would have to be installed to provide adequate power to the new complex, a potential $15,000 to $25,000 investment. Further investigation led to the realization that the power needs of the new facility would not necessarily be any more demanding than they were in the original third-floor studios. In fact, new, more energy-efficient air conditioning (three smaller units to replace the original 15 ton system) would actually lower their power needs. To further guarantee a safe, clean power source, the facility's technology manager recommended the installation of UPS power conditioners in each room. These small, highly reliable, surge protectors are further supported by battery backup systems to protect against unexpected blackouts and other disasters.

Because three of the six companies sharing the complex are music/sound related, the acoustic design of the space was critical. The audio technology evolution has seen computers replace massive tape machines, bulky monitors reduced to slender plasma screens, and the features of a 10-foot-long $300,000 mixing board written into a piece of software. Still, there is no substitute for a great-sounding room.

Beyond the given of creative talent, the most integral component of a recording studio is pure acoustics, regardless of the size of the room, gear or client base. All of the rooms had to sound great, as well as provide a high

Design team

JECO:
Leigh Roberts, co-principal/systems integration
Gus Reyes, partner/executive producer
Glenn Ianaro, technology manager
Walters-Storyk Design Group:
John Storyk, principal architect/acoustician
Beth Walters, interior design
Construction: CHBO, NYC
Contractor: Chris Bowman
HVAC: Marcy Ramos Associates, Marcy Ramos
Lighting and electric: Robert Wolsch Designs, Robert Wolsch

Equipment list

Power Mac G4, with Aurora Igniter video capture card
Pro Tools HD Accell 3
Apple Cinema Display 22"
42" Philips HD plasma TV
13" LCD for viewing ISO booth and private client monitor
GigaSampler Dell PC Pentium IV 1.8GHz
Genelec 1030 powered monitors
Mackie Baby HUI ProTools control surface
PreSonus central station monitor matrix
Roland A 80 controller
Server computer G4 Dual 500 running OSX server
ProTools 6.41
Plug-ins by Focusrite
20" Sharp Aquos LCD screens (main studio)
13" Sharp Aquos LCD screens (isolation booth)
Avid Meridian editing suites with G5

Rack gear:
Emagic Unitor 8 Midi interface
Roland 5080 with six expansion cards
Fosxtex D-15 time code DAT
Denon CD player with digital output
Eventide DSP 4000 harmonizer
Lexicon PCM 90 FX
DBX 386 two-channel tube mic preamp
PreSonus Dig Max 96 eight-channel mic pre/limiter with optical out
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ISO Box Studio
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Mics:
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Audio-Technica AT4033, 414, AT4041
Shure SM57, 52
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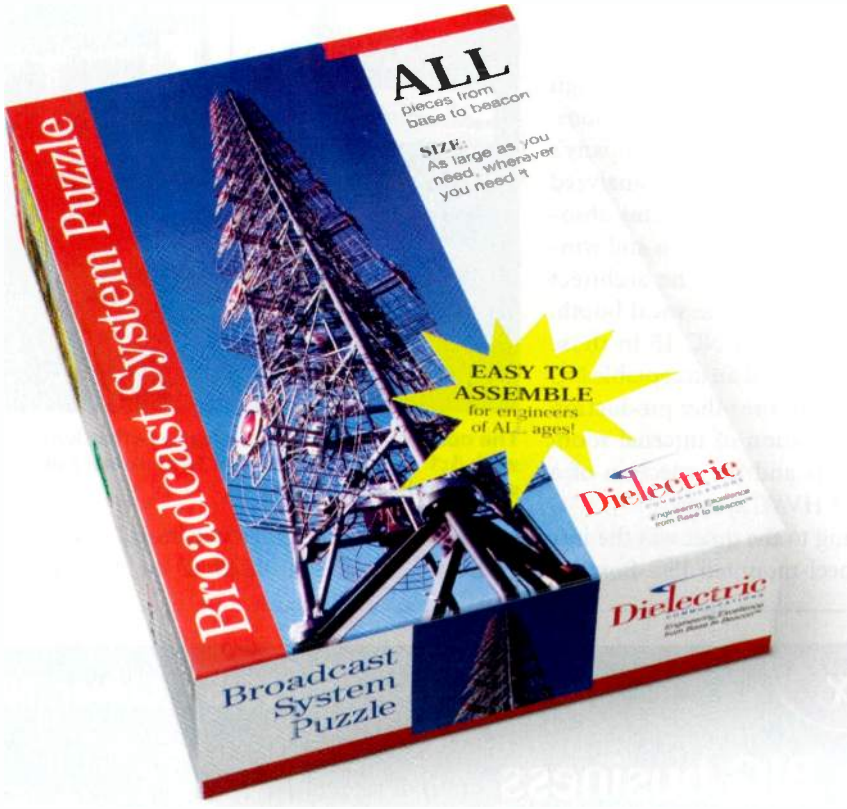

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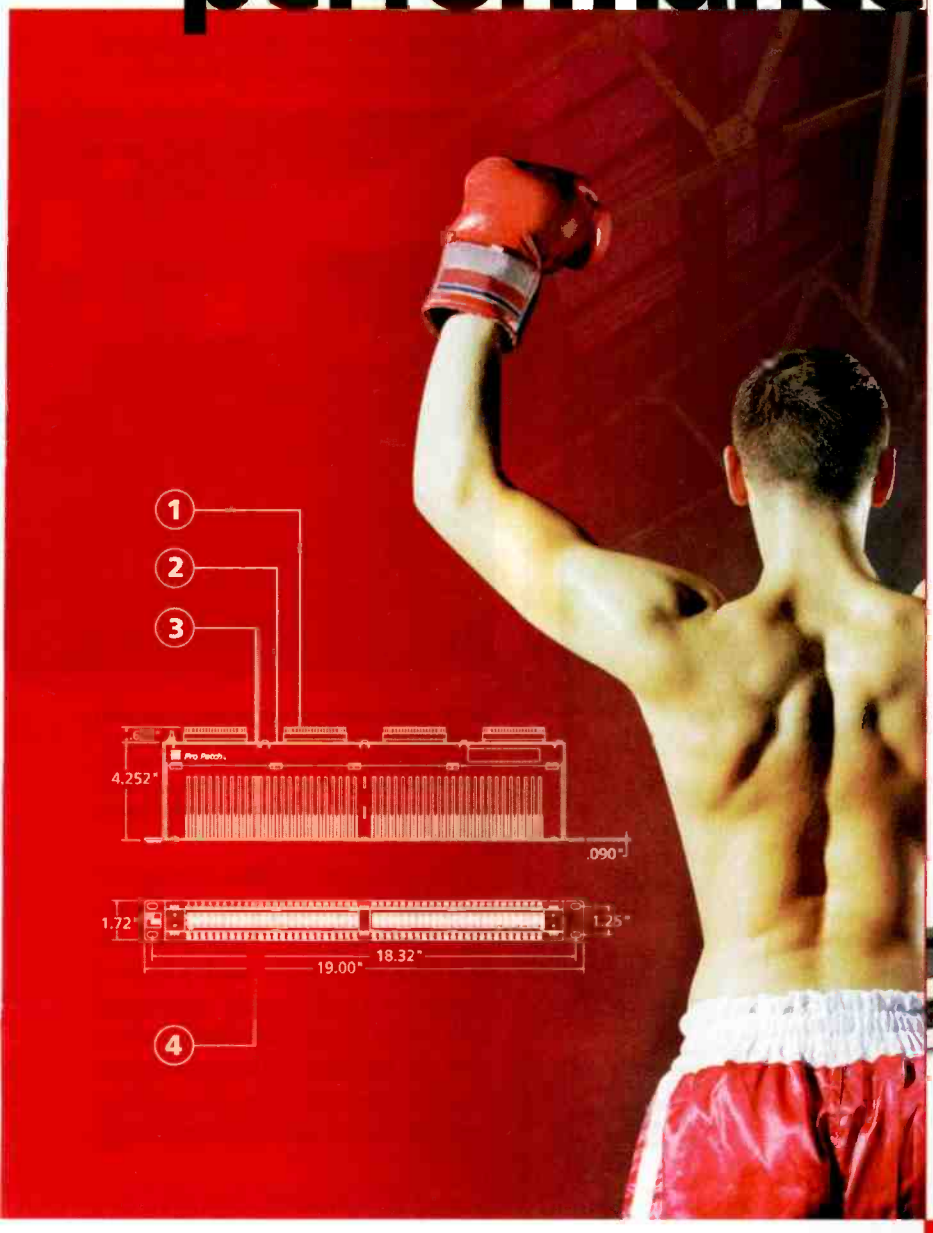
level of isolation so as not to interfere with the functions of the other rooms.

An intractable budget placed a fully floated studio out of reach, but the team was convinced that an acoustic solution complementary to the type of creative work done in those dedicated non-recording spaces could be accomplished with design rather than more costly physical solutions. To accommodate the production company's financial realities, the WSDG team analyzed their plans to confirm which rooms absolutely required complete isolation and winnowed these down to two. The architect floated the live room and the vocal booth, establishing an average of NC 15 in those spaces. Sound isolation of an acceptable NC 25-30 was attained for the other production rooms by a combination of internal room acoustic treatments and the selection of a particularly quiet HVAC system.

The complex's two editing rooms offer Avid Meridian editing suites with 1:1 capability, Mackie 1202 mixers and 500GB of drive space standard in each room.

Also contributing to the quiet was the introduction of a freestanding, wheel-mounted ISO Box Studio. The 4½-foot-high, 3-foot-deep, 2-foot-wide maple cabinet was designed to hold all the computer towers, hard drives and

performance by design.



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related gear that contribute to the general noise environment. The unit is equipped with a thermometer for monitoring internal temperature, super-quiet fans, cable access in the rear and a glass door for visual monitoring. The system can be shifted easily from studio to studio.

Other creatives headquartered in the new complex are: Chris Hajian's Moving Picture Music; Propeller Music & Sound Design headed by creative director/composer Doug Hall and executive producer Iris Schaffer; director Conrad Fink's This Is TV; and Paul LeBlanc's Lantern Eye, TV.

Now, open barely six months, the new facility's unique approach seems to be working to everyone's advantage. Clients and tenants alike find a creative synergy between composers, graphic designers, editors and writers. They aren't collaborating on every project, but they have noticed an increasing number of clients that appreciate access to so many diverse disciplines in one location. This is an especially attractive option given the ongoing issues of tighter production schedules and shrinking budgets.

InTV production, a company can gain credibility by offering creature comforts. JECO's complex offers an attractive and creative atmosphere with a fully equipped conference room.

This community of like-minded individuals with companies specializing in their respective fields offers clients the resources and physical amenities traditionally associated with much larger companies, along with the benefits of the personal attention, creativity and adaptability typically found only at boutiques. BE

Howard Sherman heads a New York City-based public relations firm specializing in audio and video production/post-production companies.

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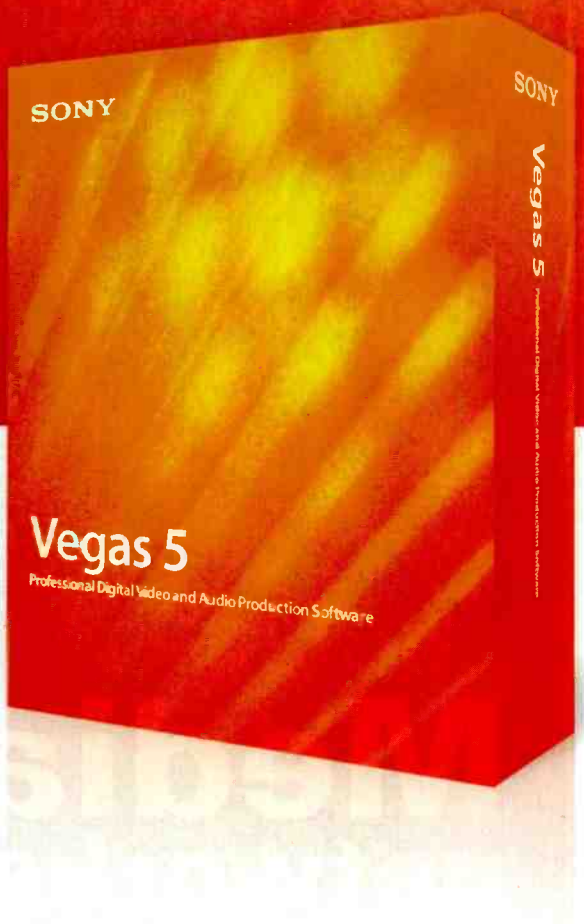

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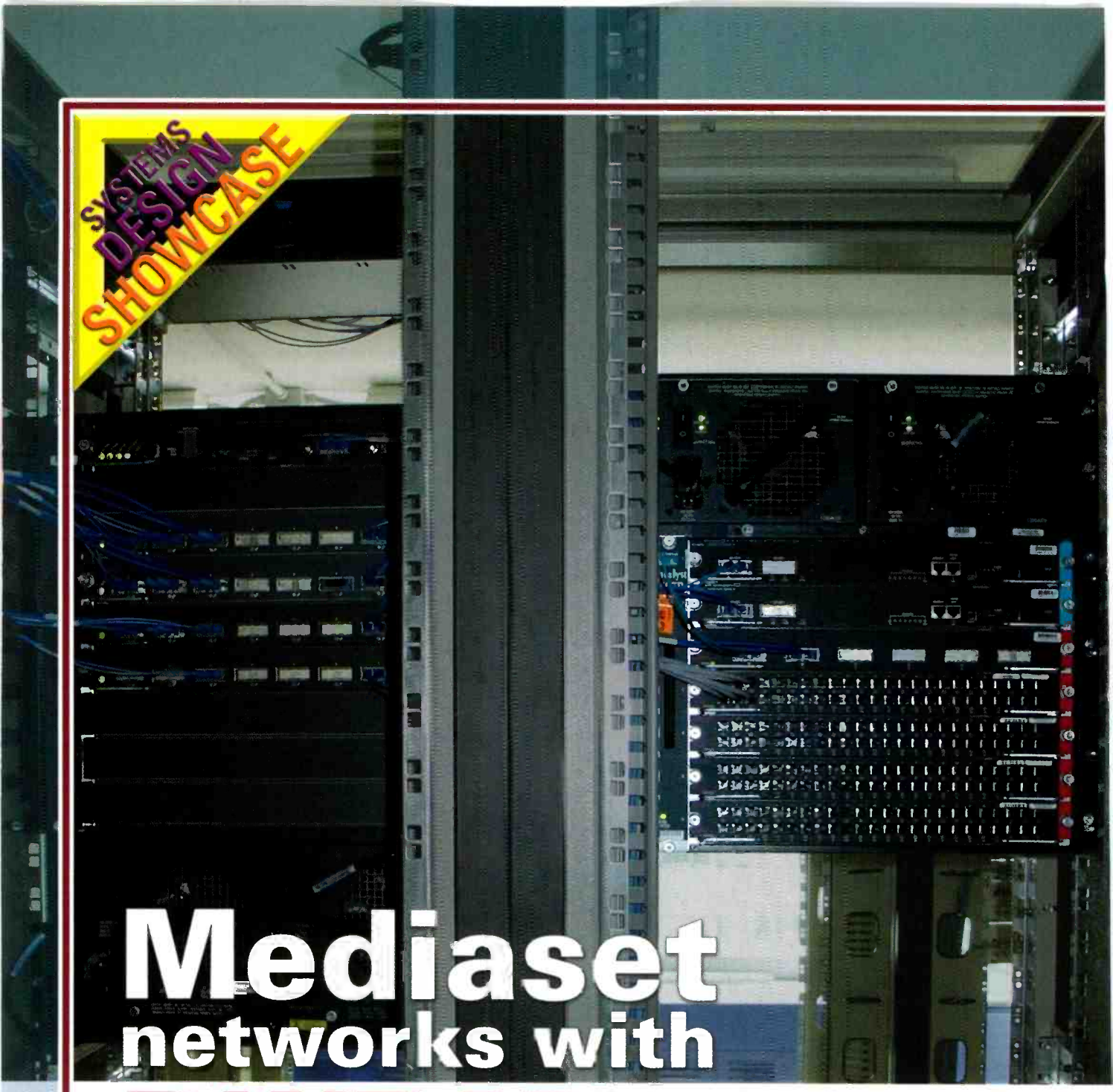

Mediaset networks with DWDM

When Italian broadcaster Mediaset faced the challenge of connecting its Rome production centers with a digital network, it deployed a solution based around Cisco's ONS 15454 multiservice transport platform. The platform includes the Catalyst 4500 and 6500 switches, shown here.

BY MARC FROEMELT

Broadcasters worldwide have struggled against an economic downturn and sluggish advertising revenues. Italian broadcaster Mediaset Group is bucking this trend, posting a 45.7 percent increase in net profit from advertising revenue that had climbed an almost negligible 0.4 percent compared to the previous year. This was achieved by a 10 percent reduction in operating costs, and by programming changes that resulted in increased viewership — direct benefits resulting from the company's investments in digital networking to better use its media assets and increase operational efficiency.

With the Italian government laying down new rules regarding ownership and market share that privatized the public broadcaster Rai, and setting targets aimed at an overall switch to digital terrestrial television (DTT) by January 2007, the group needed a new network solution for its Rome facility. As part of its longer-term vision, the broadcaster created a high-speed TV

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production network in the late 1990s — primarily to serve its TV news production teams, based in three sites in Milan. The results there were dramatic but, in trying to repeat the network formula in Rome, the company faced a number of goals and challenges, including:

- The need for a sufficient return on investment (ROI) based on the right choice of transmission technology.
- The need to ensure that the solution fit into its long-term vision of creating a high-capacity, totally digital national infrastructure — first by connecting the new Rome network to Milan, and then extending its reach to regional branches and beyond to its programming partners.
- The need to address bandwidth bottlenecks and the unreliability of microwave links due to atmospheric conditions between the three Milan production sites.
- Its inability to lay its own fiber cables because of Rome's population density and architectural heritage.

The group needed an answer that offered the high broadcast-quality performance it demanded and maximized ROI by also supporting corporate voice, data and low-quality video over the same fiber-optic link. For a

In trying to repeat the network formula in Rome, the company faced a number of goals and challenges.

The Catalyst 4500 and 6500 switches provide high-speed Ethernet connectivity for Mediaset's production facilities and individual employees within each site.

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broadcaster planning to start DTT transmissions, digital networking offered the opportunity for new workflow and efficiencies. The broadcaster believed that the way forward was with DWDM technology, and it soon began discussions with several vendors, including the main supplier of its core microwave-based transmission equipment. After four months of careful evaluation, Mediaset chose to implement a solution based on dense wavelength division multiplexing (DWDM), a technology more often found at the core of a telco network than at the core of a broadcaster's network. It selected a solution based around the Optical Networking System (ONS) 15454 multiservice transport platform from its technology partner, Cisco Systems, and leased fiber optic to create a ring linking the three production centers in Rome.

Mediaset decided to go with a network based on DWDM technology to meet its needs in Rome.

Cisco Systems had been a technology partner to the group for many years, providing the equipment that supported corporate LANs and WAN. In 2003, it suggested that its new ONS 15454 multiservice transport platform could place the synchronous digital hierarchy (SDH) aggregation of Gigabit Ethernet frames alongside the transport of digital SDI signals on a transparent clear-channels port.

One of the key reasons for Mediaset's choice was that the system could provide a single multiservice platform capable of supporting both the TDM and DWDM requirements of the production centers. It also enabled broadcast-quality video streams to run on dedicated channels, completely separated from the Fast Ethernet/Gigabit Ethernet-based services required for corporate network traffic.

The scalability of the platform was also

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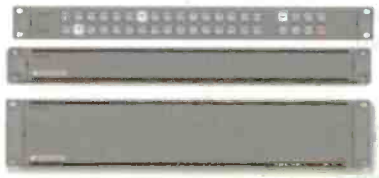

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The NK Series is a new line of compact and cost effective routing switchers. NK routers are available in sizes of 16x16 or 32x32 and in a full range of signal formats including serial digital, analog video, AES/EBU, analog audio and data routing. NK ships with a powerful web browser based configuration system and is available immediately.

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GEARLITE MD

GearLite MD is a line of Multi-Definition (High Definition & Standard Definition) products. These include the DAC-9213 Multi-Definition Digital to Analog Converter, the SRA-9201 Multi-Definition Reclocking DA, and the SEA-9203 Multi-Definition Serial Equalizing Amplifier.

A -PVM version of the DAC-9213 is used specifically for Sony PVM/BVM monitors.

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The Synergy MD and MD-X series offers models ranging from the compact and powerful Synergy 100 MD single ME switcher to the extra large, hyper powerful Synergy 4 MD-X 4 ME switcher. Synergy MD and MD-X support all popular formats of HD and SD out of the box.

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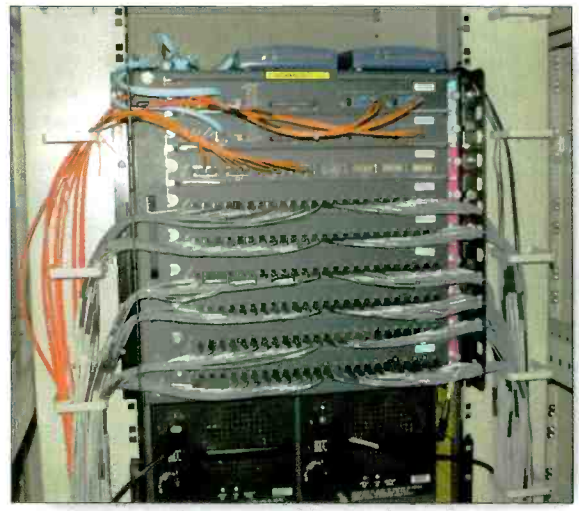
an important factor, as it was able to support up to 32 optical channels – each capable of running up to 10Gigabit Ethernet. This amount of potential bandwidth, in a platform supporting a variety of protocols, was seen as particularly attractive. The new DTT standard allowed the multiplexing of several channels in a digital form, far beyond the capacity of a microwave link.

The group also favored the flexibility of the platform. All the signals would be managed via a cross-connect matrix, making it a simple task to change the configuration to accommodate new traffic patterns and requirements. Cisco Transport Manager makes plug-and-play deployment possible by offering networkwide control of the optic transport domain. Network resilience is also built-in, with a splitter-based protection mechanism ensuring that traffic failing to get through in one direction of the ring is picked up automatically as it comes back the other direction.



Cisco's 7600 series routers deliver optical WAN and metropolitan-area network functionality with high-touch IP services at the network edge.

The birth of the company's high-speed production network came with the laying of 100 fiber-optic cables. Mediaset launched its first DTT channel in December of 2003, broadcasting Rete 4 and five programs from third-party providers such as Class News, BBC World and VJ Television. The company also started a trial of interactive services via set-top box to 2000 households in the Varese area, northwest of Milan.

The benefits of this next-generation fiber-optic network have exceeded expectations. Some of the capacity has been used to create a dedicated production network with a total capacity of

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4Gb/s, which enables transmissions of industry-standard SDI video at 270Mb/s. It also enables news teams to edit and create programs directly from their workstations. In addition, the network has reduced dramatically the mass of videotapes that need to be physically transported from one facility to another. Some 50 percent of tapes used each day originate from the group's own archive, with the remainder coming from third parties. Journalists can access material from the central Sony Newsbase video server, which is taken by terrestrial or satellite links directly from branches throughout Italy to create content for most of the news bulletins that go out each day.

The ONS 15454 transport platform supports both the time-division multiplexing and dense wavelength-division multiplexing requirements of Mediaset's production centers, as well as the Fast Ethernet- and Gigabit Ethernet-based services needed for the network's corporate traffic.

Currently, the broadcaster is in the process of migrating to a fully digital production environment, so only one of the newsrooms uses exclusively digital format video to ingest, edit, broadcast and archive stories. This means that most of the video coming into the news area needs to be in both tape and digital formats. A server-based news production system encodes footage in three main formats:

- High-quality 30Mb/s MPEG-2 (I-frame only).
- Motion JPEG at 3Mb/s and above, including un-compressed audio suitable for editing on a journalist's workstation.
- 600Kb/s MPEG-1 that is used by non-journalists for browsing the archive.

All material is encoded, including videotape archive footage, as soon as the journalist puts the cassette into a player — and once in the digital domain it remains there. The playout area includes two video servers, each capable of storing up to 1000 hours of material of up to 50Mb/s quality.

The ability to reshape existing content is another key benefit, and the company is pioneering the use of a polymedia content management system as a platform for the management and distribution of online content. The content management system accepts input from any source and uses standard XML technology to transform it into information that can be edited, distributed, stored and reused on any digital output channel (Web, mobile, iTV, Teletext).

SYSTEMS DESIGN SHOWCASE

It separates legacy or acquired content from its presentation format, stores it in a relational database, and prepares it for editing and quick, simultaneous distribution over traditional and new media. Another innovative application facilitated by the production network is shared access to every second of programming broadcast by the group and its main competitors, enhanced with actual viewing figures supplied by a third-party auditor.

Mediaset sees the development of this end-to-end digital workflow as necessary for its continued commercial success. As DTT gains ground, the group is exploring further ways of leveraging the digital workflow across the entire TV production chain. The next phase in the plan will see a high-speed connection between Milan and Rome, with DWDM providing the means to extend networking even further, to its regional centers throughout the country. Group technologists point to the benefits of fiber optics and DWDM, as these enable the company to merge different services. While DWDM is not expected to replace all of the broadcaster's technologies (there is still a role for satellite and microwave) the company praises DWDM for providing a versatile infrastructure, which is key for Mediaset today and into the future. BE

Design team

Cisco:
Gianluca Guazzoni, optical sales executive
Mario Acquati, optical account manager

Elettronica Industriale:
Fabrizio Falcini
Giuseppte Burzi
Paolo Acquati

Mediaset:
Fabio Rossi

Cisco
ONS 15454s configured for DWDM, IP and SDH transport
Catalyst 4500 and 6500 switches
7600 series routers

SeaChange International
Mediacluster

Sony Newsbase video server

Marc Froemelt is a marketing manager for Cisco Systems' Media and Entertainment Group.

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FCC freezes
and transmitter choices

BY DON MARKLEY

There are two big things to report in the world of DTV. One has to do with the FCC, the other has to do with transmitters.

FCC freeze

The FCC has dropped the other shoe. In August, the commission announced a freeze on most types of applications for television stations. Basically, if an application involves an improvement in facilities, it won't be acceptable (see DA 04-2446 [MB released Aug. 3, 2004]). The freeze covers several petitions for rulemaking, including those concerning a change in DTV channels within the DTV Table of Allotments, new DTV allotment proceedings, swapping in-core DTV and NTSC channels, changing DTV channel allotments among two or more licensees, changing NTSC channels or communities of license, modifications applications that would increase a station's DTV service area (with conditions), and Class A displacement applications. The FCC is allowing applications where the applicants are working to resolve international coordination or where the station lost its tower as a result of Sept. 11, 2001.

The commission stated that this freeze will last until the new DTV Table of Allotments is complete, which is going to be some significant distance away — just this side of swine aviators. The first step toward cleaning up the Table of Allotments is cleaning up the existing database. That would seem to be a worthy goal, and it's one that the FCC has attempted several times now. First, the commission changed it from a flat file (usable) to the current relational configuration (pretty much unusable). The commission also went through the process of requiring all stations to register their towers to correct all coordinate values and elevations.

While many stations handled the registration process by having either their consulting engineers or a surveyor confirm the coordinates, then having their consultants check the elevations, many stations simply went to the transmitter room and copied everything off the station license. By failing to require that a qualified person check the data filed, the commission ensured that the database would still contain bad material. On the good side, it's not as bad as it used to be. Many stations do now have accurate data on file. In any case, the first step in the new process is a request to all television broadcasters to check their records in the database and notify the commission of any errors that they find. When the corrections are made, the database will be as accurate as can reasonably be expected, given that some broadcasters will simply ignore the request — just like they handled their tower registration.

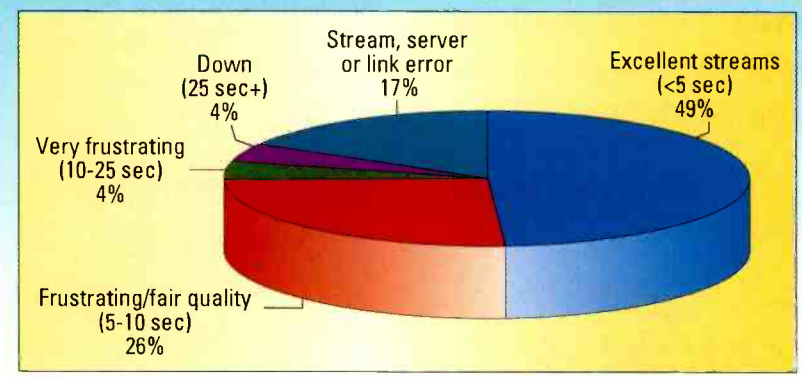
The first step toward cleaning up the Table of Allotments is cleaning up the existing database.

The commission published a new Report and Order on Sept. 7, 2004, in the matter of the Second Periodic Review of the Commission's Rules and Policies Affecting the Conversion to Digital Television (MB Docket No. 03-15, RM 9832) (FCC 04-192). This document basically sets out the procedures and timeline for stations to elect which channel they plan to use

FRAME GRAB A look at the consumer side of DTV

Evaluating Internet media streams

Fifty-one percent frustrate viewers and advertisers in some way



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for their final DTV operation. The document is lengthy and covers a lot of procedural ground. For most of it, stations are strongly advised to contact their attorney. This thing is going to be a lengthy process for some. The first channel election will identify the channel that each station would like to have if possible. For many stations, this will be the end of the process and their request will be granted. But their choice, coupled with other stations' choices, may result in DTV interference. The commission will attempt to resolve the conflicts. To avoid unanticipated problems, stations should work closely with legal counsel to make sure that they jump appropriately at the correct times.

The transmitter field has grown to the point where engineers no longer have to choose between "the meatball or the other guy." Three companies/products available are pictured (clockwise from front left): Axcera's Innovator HX high-power VHF transmitter, Thales' DCX Paragon MSDC-IOT UHF digital transmitter and Harris' Atlas Analog UHF transmitter.

One almost feels sorry for attorneys when it comes to issues such as this — almost, but not quite.

There are two big dates that the engineering community must keep in mind. July 1, 2005, is the "use-it-or-lose-it" deadline for DTV licensees affiliated with the top four networks in markets one through 100. Those licensees that receive a tentative DTV channel designation on a channel that is not their current DTV channel must serve at least 100 percent of the number of viewers served by their 1997 facility.

By July 1, 2006, the same use-it-or-lose-it requirement hits for the rest of the commercial stations and for all noncommercial stations. But the replication requirement changes to 80 percent of the 1997 population. (By the way, all population figures are based on the 2000 census.)

"Use it or lose it" doesn't mean that a station will be thrown off the air. It means that the FCC will no longer protect the originally authorized service area from interference. Others may only be required to protect the actual station's operation and not its allocation. In the more widely spaced markets, that probably won't be a big problem — but it sure will be for the top 50 or so. In any case, station chief engineers should get together with

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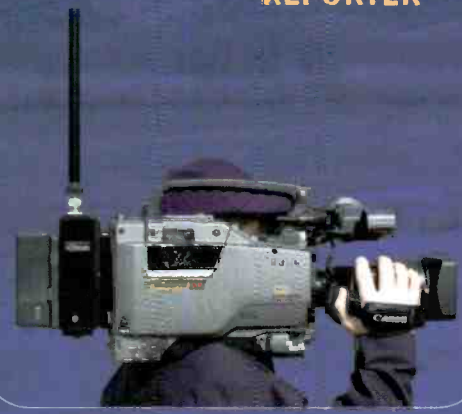

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their management, consulting engineers and attorneys to plan their strategy for the final transition. The last days are coming; be prepared.

Transmitters

Years ago, there were two types of station engineers. The first type was the conservative, careful engineer who simply bought from RCA — everything from antenna to audio. This type of individual was said to be afflicted (or blessed) with "meatball worship." That isn't a religion practiced by Dom DeLouise — it refers to the globe that appeared as part of the old RCA logo. Broadcasters recognized it as easily as consumers recognized Nipper — the dog seen in RCA advertisements listening to "His Master's Voice." While there was no great adventure involved in this purchasing scheme, those who practiced it rarely were fired because they were buying high-quality stuff.

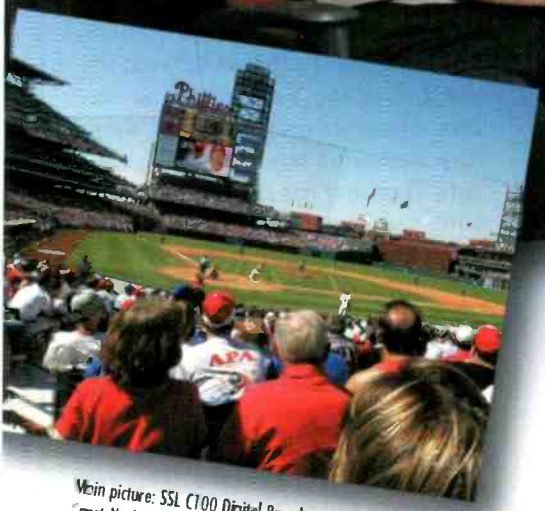
The other buyers, the non-meatball-loving crowd, primarily bought from GE. That was the other primary manufacturer of TV-origination equipment. Many argued that it was just as good as RCA. That may well be the case. But, just as engineers of those days would be found arguing the merits of Post versus K & E slide rules, broadcasters rigidly maintained their positions concerning the two broadcast giants. Those were the days when the NAB convention was held in Chicago three out of every four years, in the basement of the Conrad Hilton hotel. You could see everything on the floor — absolutely everything — in one good day. Everyone attending the convention, even engineers, were expected to show up in a suit and tie. At night, there were two penthouse areas that were used as courtesy suites by — you guessed it — RCA and GE. Anyone who was anyone could be found in those suites. The finger food and booze flowed freely. Broadcast engineering was a grand fraternity, and everyone was amazed at the industry's rate of growth.

Since those days, most manufacturers have undergone both name and personality changes.

First, we all know that RCA and GE are gone. GE sold its transmitter line to Harris, formerly Gates. Harris also bought up PYE, an excellent British manufacturer. RCA simply got out of the business. Emcee was picked up by Axcera, which had grown from a retrofit and LPTV supplier to a quality provider of high-power systems. Currently, the biggest in the field are Harris and Thales. Thales came from Comark when a massive influx of money and engineering arrived from Thompson *et al.* Now, in terms of quality and performance, Thales transmitters are right up there with

Comcast SportsNet & SSL C100

The perfect mix



Main picture: SSL C100 Digital Broadcast Console in Comcast SportsNet's High Definition control room. Standing left: Dick Miller, Director of Engineering; standing right: Dave Finocchiaro, Asst. Director of Engineering; seated: Mike Giacaloue, Digital Audio Consulting Engineer. Above: Citizens Bank Park, the all-new home of Major League Baseball's Philadelphia Phillies.

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anything built anywhere. Harris and Thales set a high standard that reflects extremely well on this country's manufacturing ability.

But, let's not forget other players in the industry. Larcan had a wonderful line of VHF equipment, which it joined with the UHF abilities of TTC. Again, a great product resulted. TTC, from the great mind of Byron St. Clair, had really been involved in the translator business and moved into high power. That move became successful when Larcan joined TTC, bringing more good engineering talent and cash.

The translator business also boosted another company, Acrodyne, to success. However, Acrodyne took a slightly different route of growth. It actively pursued the LPTV business, where it was highly successful. It courted the lower-power television broadcaster with a successful tube-type 5kW air-cooled transmitter. There are a lot of those transmitters around.

Acrodyne then joined others in the name-changing game, becoming Ai — ah, those marketers really know how to confuse us, don't they? Now, Ai has gotten involved with Nat Ostroff and the Sinclair Broadcast Group. Mr. Ostroff was not unfamiliar with turning around a transmitter company, and his influence on Ai has been profound. The company's product line now includes a full menu of high-powered transmitters for analog and DTV applications. Perhaps one of Ai's big developments has been its ESCIOT line of transmitters, which offer high overall efficiency.

For us RF types, it is truly a new day. There are at least five major manufacturers of television transmitters competing for the DTV business. Stations no longer have to choose between the meatball or the other guy. Now, station engineers need to spend some time evaluating several lines of products. They may feel more comfortable with size, but they certainly should look at the smaller firms as well. Several different manufacturers, including many whose names were never heard in the Hilton penthouse, have products that are certainly worth consideration. Of course, the names of most of the people reading this were also unknowns back then. This age stuff stinks, but it's better than following RCA into the darkness. BE

Don Markley is president of D.L. Markley and Associates, Peoria, IL.

Send questions and comments to:
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News TECHNOLOGY SUMMIT 2004

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LETTER TO OUR READERS

Dear Readers:

Welcome to our third annual sponsored supplement covering news technology. 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.

Vital and hot technology topics are driving today's newsrooms. These topics include: moving to tapeless; producing news in HD; making your news pertinent and profitable; the integrated newsroom; graphics creation and control workflow issues; information sharing with IT; acquisition, archiving and managing news assets; and bringing the big-station look to small markets faster, better and with new techniques.

One of the primary editorial missions of both *Broadcasting & Cable* and *Broadcast Engineering* magazines is to provide television executives the information they need to incorporate these developments into their operations. It is clear that today, choosing the right technology is crucial to the success of a station or network news operation.

More than 90 television executives joined the 12 equipment sponsors to discuss, explore and find solutions that will improve their news products.

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.

Regards,

Dennis Triola
Group Publisher
Broadcast Engineering

Chuck Bolkcom
Group Publisher
Broadcasting & Cable

CONTENTS

AN IT APPROACH TO NEWS GRAPHICS

Look behind the flash and sizzle, and you'll find IT technology giving journalists and producers greater control.

When done properly, news graphics create a visual style that instantly lets viewers know they're tuned where they want to be. They provide a consistent backdrop upon which news stories are built and assist journalists in communicating even complex concepts in a clear, concise fashion.

Generating the constant flow of graphics is challenging. Traditionally, a producer or journalist ordered an over-the-shoulder graphic or chart from the art department well in advance of air time. The artist, employing a number of tools — including paint, animation and titling systems — went about fulfilling the order. Once completed, the graphic was returned to the newsroom, where the person ordering it gave it a quality-control check and approved it or returned it to be reworked. When the graphic was complete, it might be stored in a still store, referenced in a run list and manually called up at the right moment and played to air through the production switcher during the newscast.

Above: KWGN-TV graphic designer Daniel Tarango works on theWB2 morning show using Proximity software. Right: Proximity's Artbox is designed to let producers and artists manage work from a single interface, thus enhancing workflow.

That approach has worked for a long time, but there's a better way. A new approach to generating news graphics is emerging that offers journalists and producers greater control over the content of the graphic and seamlessly integrates into an IT-based newsroom workflow to maximize efficiency, decrease graphics time to air and provide station managers with new options for personnel allocation.

The benefits of templates

The fact that newscasts follow a familiar pattern helps graphic artists establish a consistent look and feel to the telecast. Lower-thirds, over-the-shoulder graphics, charts, graphs and maps are consistent staples of news graphics. That pattern of graphics usage also makes it possible for journalists and producers to become far more involved in the actual production of graphics by filling out templates right from their newsroom computer systems.

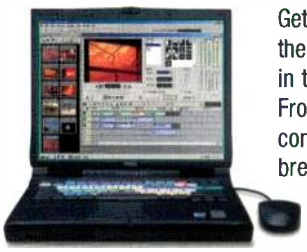
"Normally, producers or journalists will create a lower-third or access a full-screen template from a popular newsroom system, and the templates will be linked to the story," said Isaac Hersly, Vizrt president of U.S. operations. "When the newsroom system builds its set of information, not only will the newsroom system do its normal functions, it will also build a graphics list in proper sequence and will change the sequence when a producer changes the run order — adds or deletes stories in the show line-up."

Besides immersing journalists and producers in the production of news graphics, templates offer the advantages of improved accuracy — because journalists aren't relying on someone else to key in names — and automation of redundant tasks necessary for successive newscasts.

"We also have provided people with write-once and input or use many different ways," Hersly explained. "For example, during the 4 o'clock news, you could have the closing stock market values branded as an early afternoon show. Then the journalists can just go back to

(Continued on page S6)

Products That Work the Way You Do



The Grass Valley NewsEdit LT, laptop-based nonlinear editor lets you assemble stories in the field and file them wirelessly.

Getting a story on air first is often the best weapon your station has in the drive to be number one. From timely exclusives to comprehensive team coverage, breaking the news often translates into improved ratings and increased revenue.

But producing compelling news stories is still a step-wise process. So you need tools that streamline those steps and offer a competitive edge—in speed, in storytelling capability, in presentation, and in on-air signal quality.

With years of experience helping newsrooms like yours make the transition to digital, we offer a full suite of tools that fit the way you work—from the minute a story breaks to the moment you send a finished package to air.

Scalable and completely customizable, our Grass Valley™ Digital News Production solution is on the air in newsrooms of every size: from national networks and major-market affiliates to medium- and small-market stations. In 2003 alone, we installed news and shared-editing systems for more than 60 new customers.

Our products are available separately or as part of our Grass Valley TV Station in a Kit™ Series, which features affordable, pre-configured packages for digital newsgathering and shared news production.

No matter your choice, our solutions will streamline the way you produce news segments, save valuable time-to-air by letting you share materials easily, and significantly reduce the costs associated with videotape-based infrastructures.

So you can keep your attention where it should be: on the news.

Easy Access to Video.

With a PC, a network connection, and a browser, our Digital News Production solution gives you unfettered access to the materials you want. You can quickly reuse existing assets to extract the greatest value from them—and share materials with colleagues as easily as sending e-mail. With this improved workflow, and the rock-solid reliability of our tools, you have additional time to create richer, deeper stories that get to air on time, every time.

At the center of these video-access capabilities is our Grass Valley NewsBrowse™ Web-based browser/editor. Using it, you can log on to a terminal anywhere in your facility and access the materials you need. You can perform complex searches, select shots, develop storyboards, and create edit decision lists in minutes, not hours. And using our shared-storage systems you and your sister stations can easily access each other's materials.

Fastest Nonlinear Editing. Period.

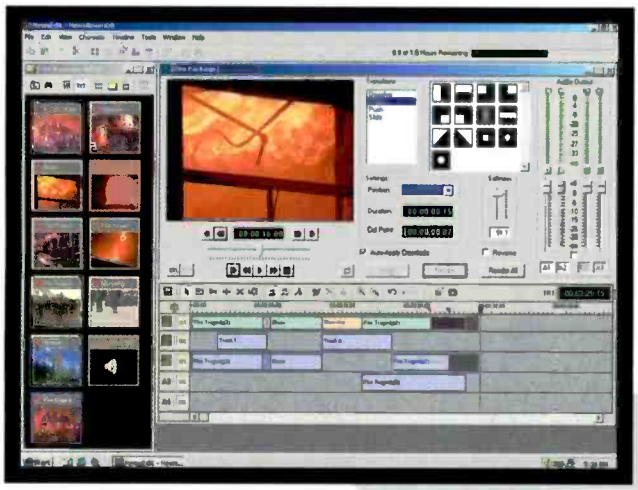
Our Grass Valley NewsEdit™ nonlinear editors are used in major markets and small cities to cover everything from national college football games to local fire stories. That's because they offer two key advantages: collaborative story development and unmatched speed.

The integration of the Grass Valley Digital News Production solution and Apple's Final Cut Pro software provides unmatched capabilities at a fraction of the cost of other systems.

With a NewsEdit system, multiple editors can access the same feed simultaneously to produce completely different stories. There's no need to wait until someone is finished or to duplicate tapes.

Because it's networked, a NewsEdit system can also automatically grab media ingested from subscription news distribution systems and insert it into a story. The insertion is transparent to the news-service operator and completely seamless to station operations. The NewsEdit system also eliminates the chance of a typing error because the name on a sequence always matches the slug name in the rundown.

Digital News Production



The NewsEdit family of nonlinear editors provides unmatched speed, supports collaborative story development, and offers an intuitive interface to make new users productive in days.

The NewsEdit line, and our Digital News Production solution, is also integrated with the Apple Final Cut Pro editing software. This integration provides unmatched speed and finishing capabilities—all in a shared environment and at a fraction of the cost of other systems.

Tightly Integrated Play to Air.

Tightly integrated with our Profile® video servers and shared-storage solutions, our Grass Valley NewsQ™ Pro system handles your story playout flawlessly.

The NewsQ Pro system is directly connected to the rundown list in your newsroom computer system (NRCS), providing a variety of distribution options, real-time updating of playlists, and direct playout control of a story.

The NewsQ Pro system is so easy to operate, you can play out clips in any order just by hitting the space bar. And its support of the media object server (MOS) protocol in NRCS solutions such as AP ENPS and iNEWS gives you frame-accurate machine control during playback.

Delivering Automation Efficiency.

To meet the growing demand for automation efficiency, we offer an array of solutions, including PVTV™ live news production systems and CameraMan® robotic cameras.

PVTV technology links traditional functions requiring multiple operators into a single automated command module. CameraMan products reduce or eliminate the need for operators while consolidating camera control. Both can help you deliver a consistent look and feel across broadcasts, which is key to driving viewership, ratings, and revenue.

Days, Not Weeks.

Every time we roll our products into a newsroom, people ask how long the training will take. And every time we leave, they can't believe how little time it took.

If you're a proficient editor in a tape-to-tape environment, for example, you can begin cutting new, air-quality stories on a NewsEdit system within two to three days of training, not the year-long learning curve required by traditional nonlinear editors. And the rest of our products are similarly easy to learn.

Designed for numerous applications and lighting conditions, the CameraMan line can reduce or eliminate the need for operators while consolidating camera control.

A Clear Choice.

Every day, Grass Valley Digital News Production products are meeting and exceeding the challenges of demanding newscasters and passing the test of on-air reliability. They help make newsrooms more efficient, letting them produce more content, more quickly, and with the same resources—and help increase ratings and revenue in the process.

To learn more about bringing these benefits to your newsroom, contact your Grass Valley products representative or visit **www.thomsongrassvalley.com/newsproduction/** today.

grass valley

(Continued from page S3)

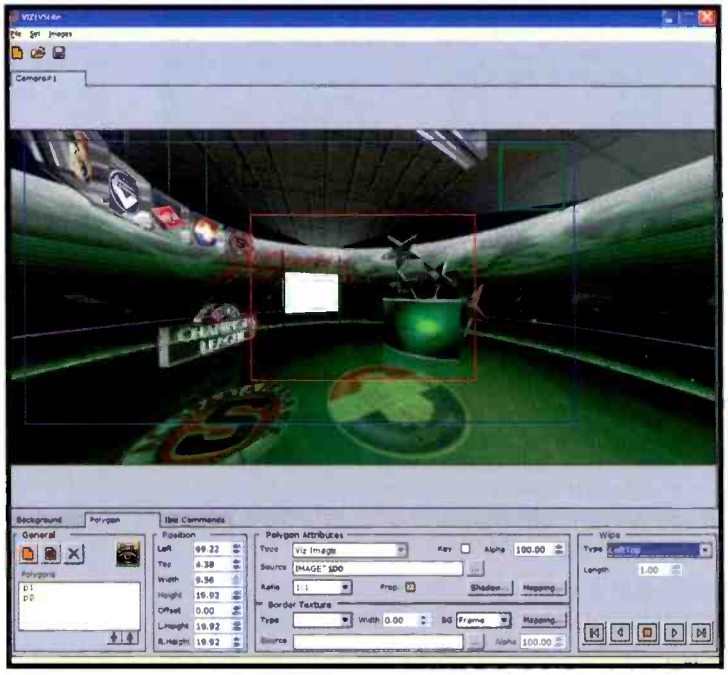
the template and check off a box to brand the same closing stock values for the late news. The fonts, logos and other graphic elements for the newscasts are branded without needing to be recreated or re-entered into the template."

Speed advantages of templates extend beyond regular newscasts. Their availability makes response time to breaking stories quicker.

Joe Torelli, Quantel director of broadcast applications, said, "We aren't (only) talking about the simple addition of a title at the bottom of the screen. (We) are talking about taking brand new, semi-live material being added to a pre-created template and becoming available for air instantly.

"As I watched coverage of Hurricane Ivan approaching the Alabama coast, I wondered how a station could possibly get away with showing a graphic that was made an hour ago, which I saw on the air in Philadelphia. If I were in Birmingham watching a promo for the local 11 p.m. news and saw a graphic with the NOAA loop from an hour ago, (that would be of less value). I could have a different viewpoint as to which direction I would evacuate (with up-to-the-minute graphics). We are now talking life or death here. Hmmm ... puts it into a different perspective."

"We are now talking life or death here. Hmmm ... puts it into a different perspective."
– Joe Torelli, Quantel



Vizrt's Viz|Ibis 2D virtual studio software costs less than the company's 3D virtual studio and is intended for budget-conscious or smaller stations.

Centralization and graphics

Improving graphics workflow isn't simply confined to individual stations. Groups and network-owned stations can benefit from faster, more efficient production of news graphics.

As part of a larger, overall centralization of group and network operations, some have re-examined how graphics get done and concluded that it makes sense to concentrate a pool of graphic artists at a central location to fulfill the entire broadcast group's needs. There, graphic artists not only can create the templates to be used by local producers and journalists, but also fulfill requests for specialized graphics that are likely to find life across an entire network of stations or station group.

"We have auto-management of workflow that allows producers to request content or clips that are sent out to a location with the ability to have different graphic artists create them," said Sai Koppala, Proximity vice president sales and marketing. "When they are finished working on the content, we automatically push it back to the requesting station. That is being used at NBC, where a producer from New York requests a graphic. The request might go to Texas, where it will be created and pushed to the playout server in New York after a review step."

According to Vizrt's Hersly, that approach can generate significant savings.

"We have found that our customers are enjoying approximately 20 percent reduction in overall graphics budget," Hersley said. "Savings come from personnel and operating efficiencies. We are reducing calls back and forth between a producer or journalist and artists. A lot of control over graphics is now available to journalists on their desktops."

Quantel's Torelli is a little less enthusiastic of the potential to reduce personnel and see savings.

"(This approach) cuts a couple of heads at the local station," he explained, "but some have learned that you can't cut all the graphics design heads."

According to Proximity's Koppala, many station groups are inching forward on graphics centralization because of the impact it will have on people.

"Each station group is moving at its own pace," he said. "Some are doing regional groupings, and some are distributed. Because people's jobs are at stake here, it is a highly sensitive and political issue. Therefore, it takes time to implement centralization of graphics, including animation, as a station group needs to build consensus among its senior management, station GMs and news directors."

Maintaining a local look

Creating news graphics off-site at a network or group graphics center may add to efficiency, accuracy and an overall improved newsroom workflow. But if having graphics created remotely impairs in any way the local identity of a station and its newscasts, the savings that approach generates will be dwarfed by the damage done to the years of expense and effort expended to create a recognizable look with viewers.

Companies feeding the IT appetite of newsrooms are well aware of the potential for problems.

"We use a template-based concept with the ability to modify the template as needed," explained Bruce Lane, Thomson Broadcast & Media Solutions director of applications engineering. "However, the templates provide the common look and feel designed for the newscast by the graphic and artistic departments. Keeping a local identity is critical, and Grass Valley DNP equipment and systems allow stations to do that."

"Because people's jobs are at stake here, it is a highly sensitive and political issue."
— Sai Koppola, Proximity

Quantel's Torelli is somewhat skeptical about the impact of centralization on local identity.

"(The) feedback we have heard is that it de-localizes the look of the station — makes it look more like a behemoth factory," he said. "The good things (about the approach) are that, properly managed, graphics orders can be processed and delivered quite easily. Some mix-ups have occurred by requests not being handled in a timely fashion, or lost entirely. Humans are still required in this process, with templating being a worthy consideration from the local station making their own updates."

Vizrt's Hersly is unequivocal on the subject.

"Centralization of graphics does not mean loss or impairment of local brand identity," Hersly said.

Centralized graphics creation at CNN provides his evidence.

"CNN Español and CNN International share the same database of graphic images and clips," he pointed out. "There's one graphics 'manufacturing center,' but the look on-air is completely different for both networks. CNN International fills in the graphic templates in Hong Kong, London or Atlanta, and Español does the same at a different location. But they both are sharing the same graphic asset database. For the November elections, they will be sharing the same real-time election data and have a different look and feel on-air."

That's a wrap

The production of news graphics is evolving in lock step with other information technology-centric advancements in the acquisition, editing and playout of local news.

Graphics templates are giving producers and journalists greater control over the content of news graphics, automating the generation of data-dependent news graphics such as stock closings and allowing stations and groups to rethink workflow and personnel requirements. Additionally, this new approach to news graphics may generate about a 20 percent reduction in overall graphics budgets.

Introduced last month in Amsterdam at IBC2004, version 4.0 of Vizrt's viz|content pilot offers full support of "Look Ahead" transition logic, enabling automatic transitions between multiple graphics layers.

However, protecting against a homogenized graphic look among stations in a broadcast group or network is critical if stations are to truly benefit from these new approaches to generating news graphics. ■

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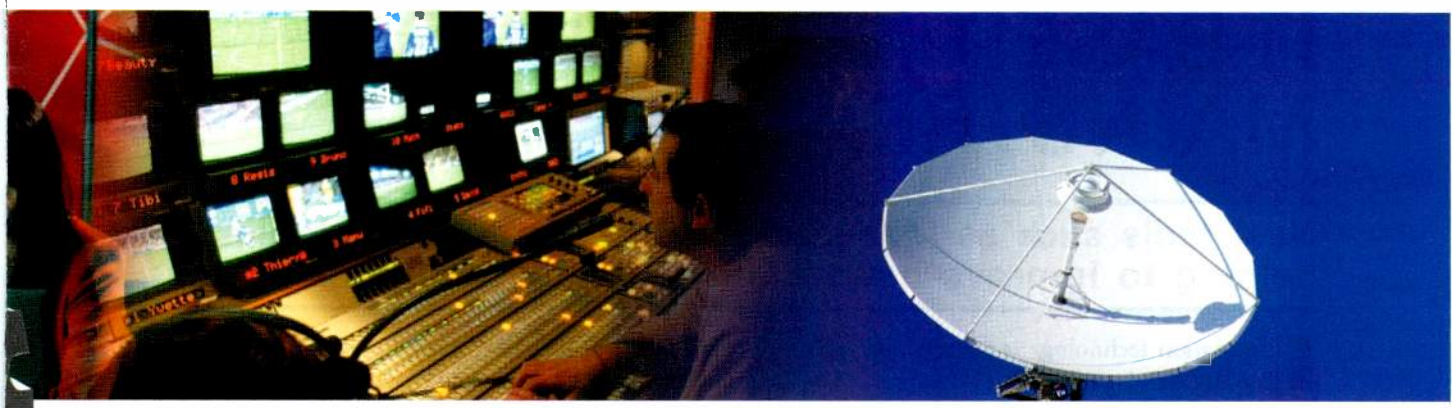

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IT-BASED NEWS GOES MAINSTREAM

New tools such as MXF and established IT technologies are helping to improve newsroom productivity and cut costs.

Information technology is transforming the landscape of newsrooms around the country, changing how news is created, stored and delivered.

Stations, station groups and networks are turning to digital solutions for news for three reasons: They increase newsroom productivity; they reduce the time to air; and they increase the return on investment in news technology.

From a more hands-on perspective, they are doing away with tape duping, giving journalists a high degree of control over edited packages and promoting a far more collaborative news creation environment where reporters and producers can spend more time on the content and less time tracking down the videotape.

More than 100 journalists at the new Südwestrundfunk, or Southwestern Broadcasting, studio in Stuttgart, Germany, use a tapeless digital newsroom designed by SGI Professional Services to reduce time-to-air and improve workflow.

"A newsroom is a place of challenge," said Chris Golson, SGI director of media marketing. "It is a place where stories must be processed as quickly as possible in order to bring 'the story to air,' all the while needing to overcome incredible burdens."

A digital newsroom, built on a solid IT infrastructure, increases the effectiveness of news organizations by allowing journalists to browse digital archives and edit source footage directly from their desktops while giving news directors the tools to better manage the workflow of their organizations.

Basic architecture

Whether a newsroom is starting from scratch — a so-called green field — or has been acquiring, editing and delivering news for years, certain factors should be considered in designing an IT-centric newsroom workflow.

"The basic architecture in an IT setting consists of a stable file system or systems, networking technology that may handle bandwidth and latency issues, and switching and a storage subsystem, which is flexible and scalable," explained SGI's Golson.

The centerpiece of IT in the newsroom is the newsroom computer system.

As Quantel's Joe Torelli said, "The NRCS (newsroom computer system) is the hub of the newsroom, and everything begins and ends at the NRCS."

From the NCRS, reporters and producers must be able to access news wires, browse low-res proxies of newly acquired and archived video, mark in and out points on the proxies, select and populate graphics templates, integrate voice-overs, and share all of this with others to collaborate on developing stories. What must remain transparent to the journalists is the variety of content, graphics and archive servers, switches, hubs and cabling that enable the transfer of content from reporters' stations to editing bays and then, ultimately, to playout. The technology must never get in the way of producing the story.

"The NRCS is the hub of the newsroom, and everything begins and ends at the NRCS."
— Joe Torelli, Quantel

When planning an IT-based newsroom system, network connection must be considered first, according to Quantel's Torelli.

"Many stations still are using hubbed 10baseT connections," he said. "This will have to be upgraded in order to work with LBR (low bit-rate) proxy material. Hubbed 100baseT will work in many instances, but a station should really consider switches instead of hubs for the newsroom computers. Because text is so small and video is so large, 10baseT can't handle the traffic. If a station is planning on upgrading the internal infrastructure, it should consider Cat-5E or Cat-6 for the cabling and replace hubs with switches. Glass can be used for long runs, aggregating clusters from switches back to the equipment room."

On the server side of the IT-centric infrastructure, news applications require a layer within a server system that controls how the essence is stored to ensure frame accuracy, according to Tim Slate, Leitch director of product marketing in the server group.

"Servers have a real-time aspect to them," he explained. "They must provide sufficient control over a storage system so when you record (file-based video content), it will remain frame-accurate. There is a certain amount of real-time criticality to server systems. At another level, a server has to expose all the content to the network, and it has to be easily accessible. There are different approaches. All create an interface between the video server's proprietary file system and a more open standard protocol."

Slate said that these include: Common Internet File System (CIFS), which allows video server content to be mounted as a shared drive by Windows, Apple OSX, Linux and Unix systems; Network File System (NFS), a less frequently used file system that allows video server content to be mounted as a shared drive by Linux and Unix systems; and File Transfer Protocol (FTP), which allows video servers content to be viewed and transferred to any system supporting the TCP/IP and the FTP protocol.

While servers and network architecture are important, at a more basic planning level, an effective digital newsroom requires forethought about how content will be stored, retrieved and played out.

"Managing these digital assets is something that needs to be designed from the get-go," said Tom McDonald, Dalet director of business development. "It can't be an afterthought."

MXF and metadata

Material eXchange Format (MXF) is becoming a critical component of managing digital assets in the newsroom and throughout the station. It is an industry standard format that serves as a digital wrapper describing the essence of a file, such as whether it's a video, sound or graphics clip, and associated information such as the length of the clip. That wrapper facilitates the efficient interchange of files among systems without needing to transcode those files from one proprietary file format to another.

Bruce Lane, Thomson Broadcast & Media Solutions director of applications engineering, explained, "MXF is designed to enable a file stored on one manufacturer's server to be accessed and distributed to another company's product without cross-converting the file and risk degrading the image quality. Thomson equipment supports this idea and includes this capability whenever possible."

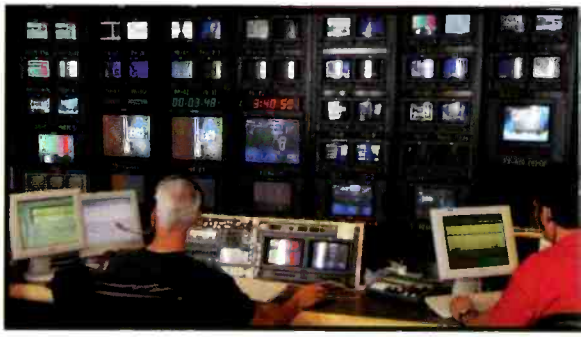
Over the past year, significant progress has been made on the standard, including its acceptance and implementation by several leading vendors. That, in turn, is making MXF a reality in newsrooms.

"MXF is an efficient wrapper to exchange video files between different manufacturers' products," said SGI's Golson. "Specifically, an SGI product can exchange video and audio files, such as IMX, with an Avid or Grass Valley product. Although not a panacea, as some think, it has been a wrapper that has successfully helped various manufacturers to work together."

When fully implemented, MXF will allow cross-platform access to the same material without file conversion. Newsrooms with a mix of acquisition formats, servers and archive systems will find the full MXF implementation a crucial component of glitch-free, seamless file sharing.

"That is the goal but is not yet the reality," said Quantel's Torelli. "Once that happens, you may be able to select the best of breed production/playout server and possibly the best of breed graphics creation device, best of breed editing and compositing. Right now, unless one company makes best of breed products in each of the categories, you can't accomplish any cross platform without file conversion."

Quantel offers the same architecture across capture, browsing, editing, graphics generation and playout without having to make new files, he added.



Avid Technology's iNews is used at a FOX affiliate for newsroom automation of nightly newscasts.

Still, it's a standard, and that's a start. With MXF, it's possible to extract some basic metadata, and that's essential if IT-centric newsrooms are to deliver on their promise.

Jim Frantzreb, Avid senior product marketing manager, said, "To the extent that metadata can be brought across to the asset management system or just to the editor, that is a powerful thing, and we are seeing this is actually happening."

While MXF is one avenue for metadata to enter a digital newsroom, it certainly isn't the only source. Videotape labels, files from tapeless cameras, server ingest stations, and satellite, microwave and fiber feeds are some of the many sources of metadata streaming into the typical newsroom.

At its most fundamental level, metadata describes the basics of journalism — namely who, what, where and when. However, it can encompass far more complex information, such as instructions for creating a 3D move with a graphics system.

"Today, you need a newsroom system

(Continued on page S14)

Pathfire is **CONNECTING** content providers and broadcasters, providing intelligent and flexible distribution and media asset management solutions.

Pathfire's integrated solutions deliver, manage and move digital content and metadata from ingest to playout, enabling our customers to streamline operations and significantly reduce costs. Our industry-leading hardware and software solutions connect, control and move digital files required for today's station operations.

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(Continued from page S11)

that allows metadata to be maintained from ingest to archive — through editing, production, the newsroom computer and playout," said Dalet's McDonald.

In describing Dalet's solution, McDonald said, "Every element that enters the system has an asset management form. When that's complete, the asset becomes searchable. Once a comment is entered, it becomes part of the asset management system right away. So if the editor is required to put what edit bay was being used, you know it."

Sharing metadata and moving it around with the essence of the file helps journalists to work more efficiently by being able to locate and retrieve the footage and other elements they need to complete their stories.

However, most journalists don't work in newsrooms where there's a sole source for IT equipment. That elevates data interchange to a critical level for successful newsroom systems.

To accommodate data interchange, Leitch keeps its own set of metadata on its servers.

"When it's transferred," explained Leitch's Slate, "we do a wrap and unwrap and parse out the metadata, sort of like an XML script."

Leitch's servers then can recognize the sort of device generating the incoming metadata by its IP address and "know that this is the way that device does metadata fields," Slate said.

In that way, the metadata appears in a manner that the Leitch server can accommodate. "That's fairly easily handled," Slate explained, and it's likely to become more robust with time.

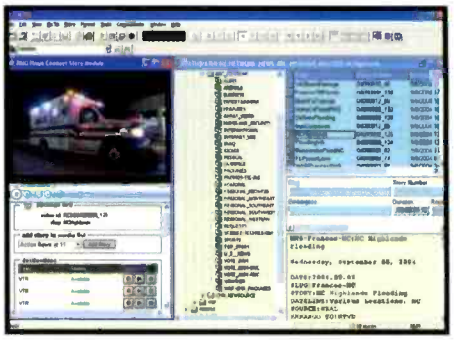
Still, for all its potential, the effectiveness of metadata in streamlining news production and playout is only as good as the commitment on the part of news operations managers to make it mandatory that metadata is entered into the digital workflow with the essence.

Fortunately, advancements in acquisition formats are adding an element of automation to this process in newer systems by capturing GPS positioning information, camera parameters, and even fluctuations in lighting and audio levels that can be used to generate metadata in the field.

Archiving strategies

One look at most stations' tape libraries is enough to make a news director swallow hard when trying to plan for archiving assets in a digital format. What should be archived, and what should be discarded? How much archiving can the station afford? What opportunities to sell archived footage will be lost if news tape libraries aren't stored on an archive system? Answering those basic questions will help determine which direction a news archive will take.

"Ideally, everything should be archived. But, unfortunately, that's not realistic," said Joe Fabiano, Pathfire CTO. "The more you can reuse content without going through the expense of re-acquiring the material, the better the ROI on the content. "It should be remembered, however, that the value of an archive is directly proportional to the quality of the metadata, the speed of searches and a visual inspection capability, so a 'customer' can see what they have found rather than reading about it and then finding out later that what they pulled up didn't match their expectations. In addition, as storage costs continue to decline, the opportunity for large digital archives increases. Especially in the case of "spinning media, maintaining online archives for content will become cost-effective very soon."



Pathfire's News Connect lets journalists search and move metadata, as well as output content from their newsroom desktop applications.

There are perhaps as many approaches to what to archive and what to discard as there are television news operations in the United States. Even though storage prices are plummeting, there still is the human capital required to transfer linear footage to a digital, file-based, archive system.

"The human cost of transferring material on tape to nonlinear storage is still very expensive," said Avid's Frantzreb. "The best proposal I have heard is to figure out the stuff you know you will always need and move to that first. Then move over material that has been accessed over the past year — stuff you might want to use, and draw the line right there. Throw out the rest."

Dalet's McDonald agreed that stations must draw the line somewhere, or they will never get started reaping the benefits of digital archiving.

"The key is to stop the bleeding now, rather than worry about archiving for the last five or 10 years," he said. "The sooner you move, the sooner you stop that bleeding. You stop the money from being spent — or the tape library from growing any further. Then you can worry about getting somebody to generate the needed metadata from the last three or four years."

Browsing

Any archive is only as good as the ability of its users to search for and find what they need. Looking up key words is OK, but actually seeing shots is far better, and browsing proxies can do just that, according to Geoff Stedman, Omneon Video Networks vice president of marketing.

"In a file-based world, there's a need for a high-res archive, but

equally important is having a browse proxy of that material," he said. "The proxy can be shipped around without tying up network bandwidth. Journalists can use a browse copy when writing their stories. For archival purposes, it means finding assets faster by looking through low-res proxies and instantly being able to call up the high-res footage. Archives take up valuable space. So archive the high-res, but never archive (the) browse (proxy). Keep all of those clips in low-res on a server that can be accessed quickly. Once you have a browse feature, a journalist can be looking at archive material while someone is going to find the high-res tape, and while the journalist is looking at shots, they can be de-archiving from tape."

Rights management

If video, audio, graphics and metadata are files, who decides who can access archives, edit material and play to air? Certainly, not everyone in the newsroom wants nor needs those rights.

Effective asset management gives news directors the tools to set up those privileges.

"The idea is to have asset management built-in and rights management built-in," said Dalet's McDonald. "These are the things that must be considered when moving to a digital newsroom. We can arrange it so that when you submit a story, it can't go to air till it gets approved by a news director. It can be submitted for approval, and certain people can override that."

Rights management equals content protection, so it becomes essential for digital newsrooms to establish security procedures.

"When you make it so journalists and high-res editors can access this content, it also has to be secure," said Leitch's Slate. "You must implement security procedures. There are user log-ins and user passwords and levels of security to give rights to certain users and to a certain level of content and what they can do with it."

Craft editors in India use Leitch's full-resolution NewsFlash II to build a news story.

Beyond protecting content, rights management gives news directors and managers a way to track expenses and revenue.

"It's nice to be able to see who gets paid and how much, time limitations and new ways of protecting your material." said Avid's Frantzreb. "These are tools not just to keep track of material you are purchasing, but to track and protect your original content downstream."

One step at a time

The stark contrast between IT-centric newsroom technology and what came before can be a little overwhelming. Thinking about video as files, storage as servers rather than VTRs with tape, and playback to air from disk rather than a news cart system requires a new way of thinking about how news is created and broadcast.

However, adopting an IT-based model for the newsroom does not require wholesale abandonment of existing legacy equipment. According to Sai Koppala, Proximity vice president of sales and marketing, legacy integration is possible and potentially desirable.

"Several vendors claim that if you replace existing CGs with all of their latest CG equipment across all of your stations, you can get this capability (efficient digital workflow)," he said. "This is true. But, the reality is that most groups have a mix of vendor products. Because we integrate with various vendors, we can provide similar benefits as a one-vendor solution at a lower cost."

Historically, Proximity has focused on integrating systems, graphics format conversion and video transcoding.

"With that ability, we can manage media across different systems, different formats and different devices," he said. "The key is providing a single window into the assets of a cable or TV station."

Apple Computer also has focused on tightly integrating with other vendors offering components of digital newsroom solutions.

"With Final Cut Pro HD and Xsan, Apple's enterprise-class SAN system, broadcasters can make a smooth transition to an IT-based nonlinear workflow, giving them an easy way to repurpose and share media in a networked environment," said Richard Kerris, Apple Computer senior director of pro applications marketing.

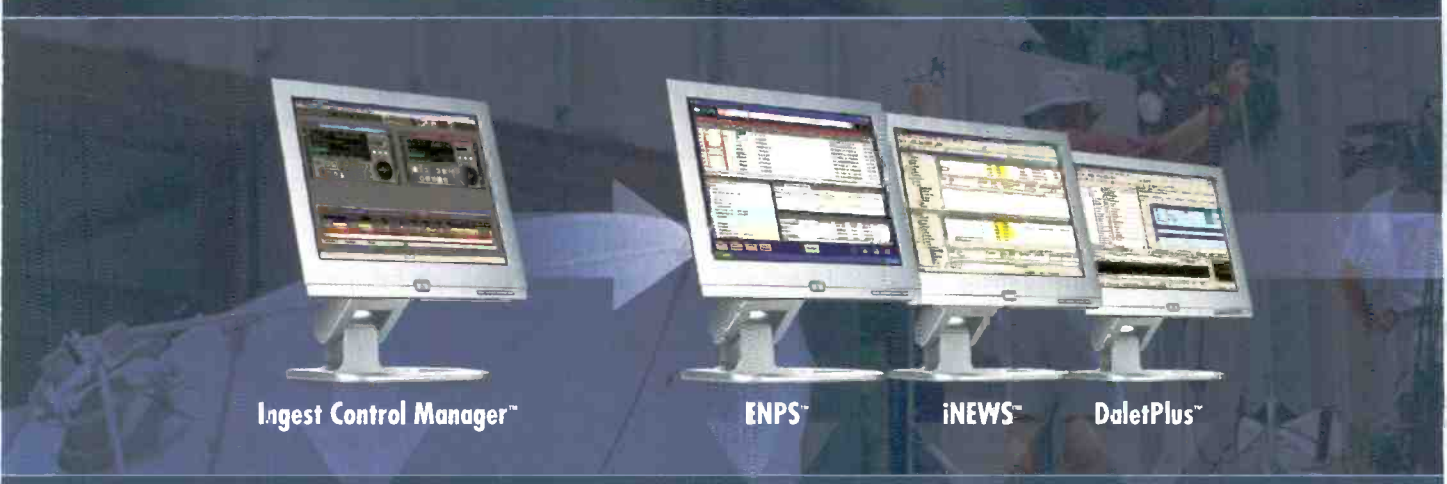
Fade to black

The day video went from a signal to a file was the day all the strengths of information technology came within the grasp of newsrooms. Certainly, there continues to be an incredibly large installed base of videotape-dependent news. By some estimations, at least 70 percent of news is still tape-based one way or another.

And, somewhere at this very moment, a journalist is still fighting for tape to write a story and get a sound byte. But those days are numbered. Those activities will sooner or later evolve to an affordable IT-centric way of creating news.

NEXIO NEWSNET™

INGEST



Shared Storage enables all users and devices

Ingest Control Manager is NewsNet's front-end component that places both manual and automated device control into a single, intuitive user interface — allowing maximum resource efficiency when dealing with incoming feeds and field tapes.

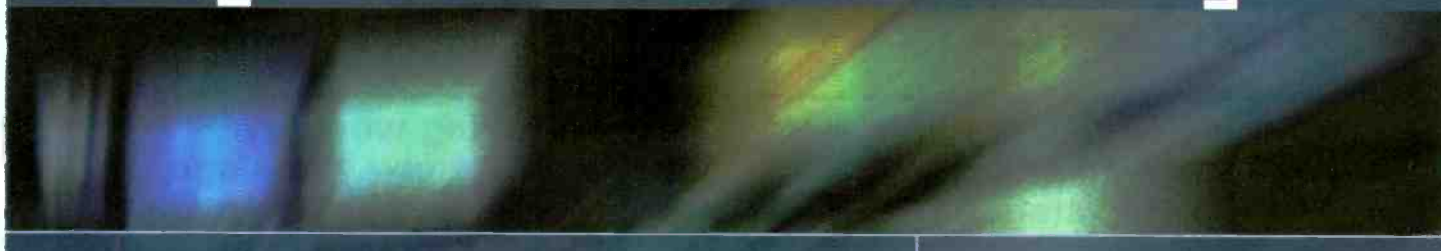
Newsroom Computer Systems Compatibility
NewsNet seamlessly links your preferred Newsroom Computer System with Leitch's own interactive play-to-air tools for sequencing broadcast news stories. Leveraging the flexibility of the **MOS** (Media Object Server) protocol, NewsNet provides a high degree of control within the overall news production process.

The Server That Accelerates News

NewsNet is designed around the NEXIO™ video server platform and today's advanced Newsroom Computer Systems. Our NEXIO video server system enables centralized shared storage and high-speed Fibre Channel connectivity with multi-format video I/O, editing, file transfer gateways, EDL conforming and much more. All connected devices have simultaneous access to all content — all the time — no file transfers required between discrete servers.

NEXIO's scalable design enables broadcasters to select only those exact components required for their news workflow, with the ability to add functionality as needs dictate. NewsNet enables broadcasters to deliver a superior product to air — quicker and more reliably than ever before.

[Instant Impact]



EDIT

PLAY-TO-AIR

access to all clips – all the time

High-resolution Editing
Within the NewsNet workflow, NewsFlash is synonymous with speed and immediate access to news content — providing users with an enhanced toolset for intuitive, high-resolution craft editing using DVCPRO 25™, DVCPRO 50™ and MPEG-2.

Low-resolution Proxy Editing
NewsFlash Preditor is a low-resolution browse and editing system based on the NewsFlash user interface for easy transition to "high-res," specifically designed for use with Newsroom Computer Systems. Using MPEG-1 video created at the point of ingest, NewsFlash Preditor allows users to share content and create frame-accurate edits (including voiceovers) – right from the desktop.

Remote Editing
NewsNet fully supports "remote" editors, including our VelocityQ™ and those from third-party manufacturers.

Playout
Rundown Manager is a MOS-enabled gateway and play-to-air system designed for bi-directional communications between NewsNet, NEXIO servers and Newsroom Computer Systems. This ensures that changes to the rundown are instantly updated on the playlist, and changes to clip status on the server are instantly updated in the NRCS. With simple controls, a customizable GUI, powerful redundancy and playout failover capability, Rundown Manager is an ideal tool for accurate and reliable news clip playout.

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LEITCH

A NEW ROI EQUATION FOR NEWS

Today's IT-centric news systems are improving workflow and creating efficiencies hardly imaginable a few years ago. As a result, stations have the luxury of deciding between cost reductions or creating new news profit centers to maximize their ROI.

The digital news systems that are replacing tape-based newsgathering, production and playout offer newsrooms substantial savings through improved workflow efficiencies and the opportunity to enhance station revenues.

Seen in this light, the return on investment (ROI) equation of digital newsroom systems is easy to understand. The workflow efficiencies generated from the elimination of tape as an origination and production medium, the collaborative work environment promoted in a digital newsroom and the ability to access digital assets quickly all change the financial equation of a news department.

An editor at KABC-TV in Los Angeles relies on digital news production tools from Thomson to edit stories.

Simply put, with a digital workflow, stations can choose to cut costs through workforce restructuring or produce more sellable news products and improve their bottom line.

Show me the savings

IT-centric digital newsrooms offer several savings to stations looking to restructure the costs of newsgathering and production.

"There are three key cost benefits that help boost the return on investment by going tapeless: streamlined quality control, lower monitoring and maintenance costs, and reduced media and parts expenses," said Bruce Lane, Thomson Broadcast & Media Solutions director of applications engineering.

When combined with the ability to generate the same amount of news with fewer people through improved efficiencies, those benefits make the ROI of server-based news systems noteworthy.

According to Tim Slate, Leitch director of product marketing for the server group, it all comes down to a streamlined, efficient way of gathering and creating the news.

The production control room of India's Sahara Pariwar network controls Leitch servers feeding seven news channels.

"At Leitch, the whole point is about workflow," Slate said. "How do I get stuff in from the field, and how do I quickly turn it into a news story, something that is timely with high production value?"

The shared storage editing approach illustrates how digital news systems can improve workflow. In this scenario, a news director makes an assignment, and story segments are put into the newsroom system and filter down to the server system.

"The ID names are put into the rundown," Leitch's Slate explained. "When material from the field comes in, it can be edited to fill that hole and be associated with the on-air program."

This approach creates a better workflow, allowing stations to produce a greater volume of stories at a higher level of quality or fill the same news holes with fewer people, he said.

The benefits of an IT-centric workflow in the newsroom are quantifiable too. Avid Technology, for example, uses an ROI calculator to illustrate for customers the cost savings they'll realize in using nonlinear servers for playout and production in terms of equipment

costs, maintenance cycle and expendables such as videotape.

"The calculator takes the number of years a station wants to amortize the investment and calculates the human cost savings as well if there are any to be had," explained Jim Frantzreb, Avid senior product marketing manager. "Running a station's number through the calculator can be enlightening because the human costs are not always the most expensive. All costs of both the legacy and the new environment need to be considered, and while a nonlinear solution will generally be shown to be a compelling investment, it's hard for some to get their heads around the fact that computer-based systems have different life spans and support needs from VTRs."

The expense of transmissions from the field is another area in which IT-centric news opens the door to savings.

"Everyone is looking for more cost-effective ways to move content from one location to another," said Joe Fabiano, Pathfire CTO. "Satellite trucks, occasional satellite and fiber feeds, microwave trucks, and facilities are all expensive and can present maintenance difficulties. At the same time, broadband connectivity is becoming more and more affordable. Stations are looking for ways to easily and affordably move both live and store-and-forward content across these broadband pipes."

"There is an ROI there. News is a business, and (stations) shouldn't be ashamed of it being a business." – Tom McDonald, Dalet

Show me the money

Greater workflow efficiencies in news production leave station management and news directors with a fundamental choice to make. Should the station reduce its news staff and produce the same amount of news with fewer people? Or, should it explore other avenues to increase revenue by producing more news with the same size staff?

Stations choosing the latter alternative will find several opportunities to pursue. The first place to look is inward.

"Where do you put your ROI — into another news show?" asked Tom McDonald, Dalet director of business development. "For instance, do you move head count around to bolster a morning show? There is an ROI there. News is a business, and (stations) shouldn't be ashamed of it being a business."

Interest in ROI is highest at the time of the initial purchase of an IT-centric news system, and over time, as a station looks to consolidate operations or add a second channel, interest in the ROI of the system waxes, said Geoff Stedman, Omneon Video Networks vice president of marketing.

"It's important to justify the investment in the first channel, and then be able to expand without having to completely re-invest for a second channel," he explained.

One emerging opportunity from within the station is the Web.

"We do have a system that does do this for a television station's Web news content, where all the Web news content — including hyperlinked video — is produced as a byproduct of news for TV transmission." said Avid's Frantzreb. "Stations can create news stories and link to various video created for air or slightly edited versions for the Web. There is a process where the content gets refreshed, and it doesn't require a staff that's bigger than one or two people."

As viable revenue models emerge for stations' Web sites, the Internet will evolve from largely a vehicle whose primary value is re-enforcing the brand identity of a local station or news operation to a legitimate source of advertising income.

Looking outside the station reveals other sources of revenue.

"I think as long as the repackaged model allows for a strong local presence, in some form or another, this will continue to be a viable option," said Pathfire's Fabiano. "There will always be organizations looking for a more efficient way to use packaged news from other outlets. There will also always be organizations that have discovered the correct formula to produce high-quality, revenue-generating news products. The second group will always be available to service the first."

At the same time workflow enhancements are being realized in news operations, stations are undergoing a wholesale conversion to DTV. As of Sept. 26, 1307 U.S. television stations are transmitting a DTV signal. A small number of stations has launched 24/7 local news on one of their multicast stations.

Joe Torelli, Quantel director of applications engineering, cautions stations that committing to a 24/7 local multicast operation might be too big of a task to generate additional revenue from savings realized by adopting a digital workflow.

"For a typical over-the-air station to do this, serious number crunching needs to be done to be able to convince the audience that this is a viable source of local news," he said. "If you have three or four stations in a market doing this, it isn't going to last."

Also, part of the issue whether to launch a DTV multicast news channel is the limited audience with DTV receivers.

"While the number of eyeballs that can tune into the DTV channels is still relatively low, this is a potential large growth area for local stations," said Pathfire's Fabiano. "It's still uncertain whether or not individual stations or markets will

(Continued on page S22)

Viz|Trio™

Yes, it is a CG!

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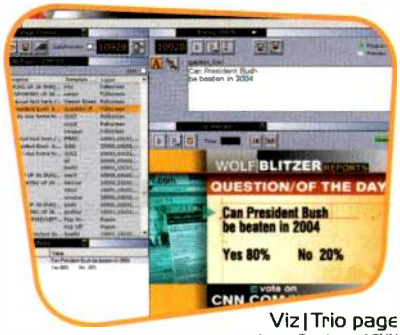

Viz|Trio page
Image Courtesy of CNN

Output
Image Courtesy of CNN

Output
Image Courtesy of WQAD

Viz|Trio is an affordable, yet very powerful, real-time 3D and 2D character generator. It contains an advanced 3D authoring system that gives access to true 3D objects and animations. The superior 3D renderer Viz|Engine™ is the output engine for Viz|Trio. Sophisticated timeline control and full control of top range 3D features are just some of the benefits. All these advanced features, with an easy to learn user interface that any experienced CG operator will quickly adapt to.

Viz|Trio generates real-time 3D animations and transitions, and has multi-layer graphics control accessible through multiple client stations. Multiple Viz|Trio clients can prepare graphics simultaneously, without tying up the on-air graphics channel during the preparation process.

Real-time data feeds are supported, allowing graphic content to be updated instantly while on-air, even when an animation is running.

Vizrt's character generator can be entirely standalone, or can be the starting point for any TV station or professional video facility that wants to begin building a fully integrated and efficient core graphics system, benefiting every aspect of its programming and operations.

Four independent video input sources are available; two live video channels and two built in clip channels with playback of DVCPRO25/DVCPRO50 and MPEG-2 clips. Three of the video input sources may be used simultaneously as background or live video textures, with internal keying. Clip playout can be controlled from the animation timeline.

The system contains no proprietary hardware and operates with standard, rack mountable PC hardware for quick and easy updates. It is compact and simple to install, making it ideal for remote broadcast use. It is available in all SD and HD video formats.

Viz|Trio supports dynamic content entry in a WYSIWYG manner. In addition to the all basic CG features, it has unique "Look Ahead" transition logic. With this feature, operators perform transitions between graphics automatically, using just one video output channel with key. When graphic elements are put on-air, stylish 3D animations are triggered instantly, ensuring smooth transitions. The use of the control room production switcher may be minimized and the flow of the production is greatly simplified.

Key Features and Benefits

- Genuine real-time 3D graphics.
- Advanced 3D authoring system.
- Intelligent transition logic enables output with effects between graphics to be created on one channel only (no need for mix off/on).
- 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.
- Optimizing workflow: various screen layers, content creation and playout divided between operators.
- Seamless newsroom integration with all major newsroom systems: iNews, Octopus, ENPS, Dalet+, OpenMedia, Newstar, Pronews, and other systems that supports MOS 2.8.
- Operates on standard, rack mountable PC hardware and laptops.
- WYSIWYG display of graphics, without use of the on-air playout unit.
- Advanced multilayer logic reduces number of pages needed for composite graphical elements.
- 4 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.
- Supports all SD and HD formats.
- Local (VGA) and external (SD/VGA) preview channels (multiple configurations available).
- Import of 3D objects from: Wavefront™, 3Dstudio™, Autocad™, VRML2.0™, Maya™ and Softimage™.
- 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, Chroma Keying.
- Intelligent Interface™ support and powerful native API.

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

Viz|Weather™

Excellent for local forecast!

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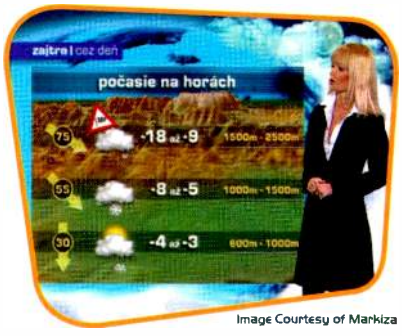

Image Courtesy of Markiza


Image Courtesy of TV2

Viz|Weather is a complete 3D real-time weather solution with countless visualization possibilities, with easily accessible and up todate accurate weather data. The graphics and animations are driven by the weather data and may be controlled, switched and manipulated in seconds. Viz|Weather was designed for and by meteorologists and weather presenters..

Weather Data

Plug and play weather data, easily accessible and available online globally from many weather data providers, trigger 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 for local real-time weather data of less than 1km resolution, giving accurate local forecasts for broadcasts as well as for transportation control, large outdoor sports events, etc.

With the Vizrt's Particle Generator functionality you can create a visually true copy of the forecasted weather development: The shape and movement of 3D clouds may be broadcast showing the true speed of the various cloud layers.

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's 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 whereever 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 other external data providers.

Visualization

Viz|Weather is designed in Vizrt's 3D design application, Viz|Artist™, and all Viz|Artist's design and animation capabilities are available in the weather solution.

Viz|Weather uses the same graphics engine as other Vizrt graphics solutions and operates off the same playlist as the other systems. Sound effects may be triggered automatically from the weather data to enhance the video presentation.

Viz|Weather's template based solution is easy to use and efficient for workflow. The pre-defined templates free up meteorologists, weather presenters and graphic designers to focus on the weather situations and present it in the best possible way and with an on-air look and branding consistent with the station's style.

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

Key Features and Benefits

- Fast and easy to use.
- Real-time weather data with constant Updates from weather data services
- State-of-the-art 3D graphics & animations using tools in Viz|Artist and powered by Viz|Engine™.
- Weather data available for all types of graphics, tickers, weather presentations and virtual sets.
- Weather symbols, 3D maps isobars, radar maps, temperatures, wind speeds and direction displayed automatically in real-time.
- Template based: Requires 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).

Supported Data Types

- Point data: temperature , sysmbol, wind speed, wind direction.
- Model data: isobars, isotherms, precipitation, cloud-scans.
- Satellite imagery.
- Manual input data: fronts, pressure systems (HL), text, splines.
- Most other data may be added as needed.

(Continued from page S19)
support a completely local 24/7 news channel. But, there are possibilities to partner with larger organizations, networks, to provide a combination national/local channel."

Perhaps a more viable option is leveraging existing news personnel to produce news products that can be sold to independents without newsgathering and production capability or partnering with a local cable channel to deliver an all-local news channel.

The Swedish broadcaster Sveriges Television has replaced its videotape-based news facility in Stockholm, where an SGI Media Server is now the centerpiece of an all-digital news production workflow.

"You are going to see more major network affiliates providing news for the independents as the first stage of a partnership that would help shorten ROI for converting to digital," said Quantel's Torelli.

Cable component

One station that's found success in a cable news arrangement is WJLA-TV in Washington, D.C., according to Paul Turner, Omneon Video Networks vice president of marketing.

"It produces a cable news program and the main WJLA news feed from the same facility using the same material repurposed for the two audiences," he said. "It is significantly more efficient and now produces two stations' newscasts with a marginal increase in station personnel over the single-channel approach. Using MOS-based technology with template-based graphics, it can put the same asset into a different template with different fonts and logos."

For stations that are part of media groups or those with close affiliations with local newspapers, another area where digital newsroom ROI may be realized is in converged operations between the media entities.

"More and more, local newsrooms are partnering with other media," said Pathfire's Fabiano. "The partnerships can be with the station's own Web site or with outlets outside of the organization like local newspapers, radio or cable. These partnerships allow newsrooms to cover stories more fully. They allow for a more diverse group of on-air personalities. For example, putting a camera in a local newspaper or radio newsroom can easily add reporting coverage to an important local interest story. Further, the cross-media partnerships even allow for more diverse sponsorship opportunities."

The role of new IT-centric workflows at local stations complements convergence, said Tom McDonald, Dalet director of business development. A digital environment facilitates convergence of multiple media. That would be impossible in an analog world," he said. "The story content, text, video and still photos all have metadata attached, and with a collaborative environment and thanks to the Internet and software and hardware that facilitates it, these multiple media outlets can benefit from each other's reporting."

Content: The new ROI factor

There's more to consider when determining ROI than simply the cost of the IT hardware and software that facilitates a digital news environment and enhanced revenue opportunities.

In the minds of an increasing number of station managers and news directors, digital news assets are being considered in the ROI equation. According to Omneon's Turner, news directors want know if the clips on their servers will be reusable in five or 10 years.

"The question in many customers' minds is: 'In seven years, can I replay it? Will someone, somewhere be able to play it back?' There's a need to have a methodology to facilitate reuse of assets," he said. "The ROI is not strictly focused on the equipment and software but the value of the asset and the accessibility of that asset. How fast can I get to the asset and get it into my story?"

At the center of this concern is a recognition that stale news clips begin to regain value as they make the transition from old news to history. "There's value to clips at two points," Turner said. "There's a lot of value right after it is captured. Then it gets overtaken by other events. But, say after six months, it begins regaining value in retrospective value."

Fortunately, the growing acceptance of MXF in the industry indicates clips stored on a server won't be stranded as new technology overtakes the old, thus helping to ensure that clips stored today will be available to support a later ROI transaction.

The last hurrah

Has tape-based news reached its zenith? Probably, but the medium will be an important part of news for the foreseeable future. While it ushered in unprecedented changes for news, videotape wasn't without limitations. Generational degradation, linear access, time-base errors and drop outs are only a few of its downsides. Those disappear in an IT-based newsroom.

Additionally, IT-centric workflow is far more efficient than working with tape — so much so that fewer people can produce the same volume of news. What's left for stations to decide is whether to cut costs or grow revenue with the increased capacity. ■

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HIGH-DEFINITION NEWS

With barely enough time to catch their collective breaths from the DTV transition, station newsrooms must now take on HD. Fortunately, there are some strategies to make that transition a little easier.

Signs abound of the steady progress U.S. TV stations are making in their transition from analog to digital service and ultimate switch-off of their NTSC signals.

Among the indicators are FCC approval of a channel re-assignment and band repacking strategy, a commission proposal to reconsider how the 85 percent DTV audience mark should be counted to include cable viewers in the total and the passage of the 1300 mark for total number of TV stations on the air with a DTV signal.

Collectively, stations and home viewers have poured billions into making DTV a reality, and while HD is the ultimate goal for many, it probably won't become a reality in the newsrooms of many stations for a few years.

Audiences need to grow. Stations need to catch their breath from the ongoing DTV transition, and someone needs to figure out how to make more money from local HD production.

Still, high definition is progressing, and given the prominence of local news as a brand identifier and revenue generator, HD in the newsroom is inevitable. Already a few stations, including KUSA-TV in Denver and WRAL-TV in Raleigh-Durham, NC, are pushing the boundaries with their own HD newscasts.

The availability of lower-cost HD production equipment and more total HD programming, at some point, will tip the scales, and the trickle toward HD news will become a flood.

"As the cost of DLP and LCD display technology come down, entertainment and sports programming will dictate the need for HD, with news being last," said Joe Torelli, Quantel director of broadcast applications.

Added Hugo Gaggioni, Sony Electronics CTO, "One element of broadcast that can't be disregarded: Sports is moving along in HD, and people are buying sets. As networks are pushed more and more for HD, ENG and news have been forced to feed HD into the chain."

Above: Denver's KUSA-TV broadcast operations engineer Phil Haman monitors the station's HD transmissions from his position at master control.

Below: When KUSA-TV launched its HD news operation in April, the station took its first step toward HD acquisition from the field with a high-definition ENG camera and microwave link mounted to its news chopper.

That raises an interesting question for news departments. If HD news production is the ultimate goal, what steps must be taken now to ensure a smooth transition from the production of news content that today will be viewed on ordinary NTSC television sets but will soon be file footage in a future HD newscast?

Up, down and all around

Making the transition from producing news for today's NTSC audience to doing high-definition newscasts is likely to be a gradual process. Two considerations along the way will be aspect ratio and signal conversion.

"(To) upconvert makes the most fiscal sense initially," said Quantel's Torelli. "Once camera technology allows pricing to be

(Continued on page S30)

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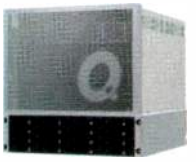
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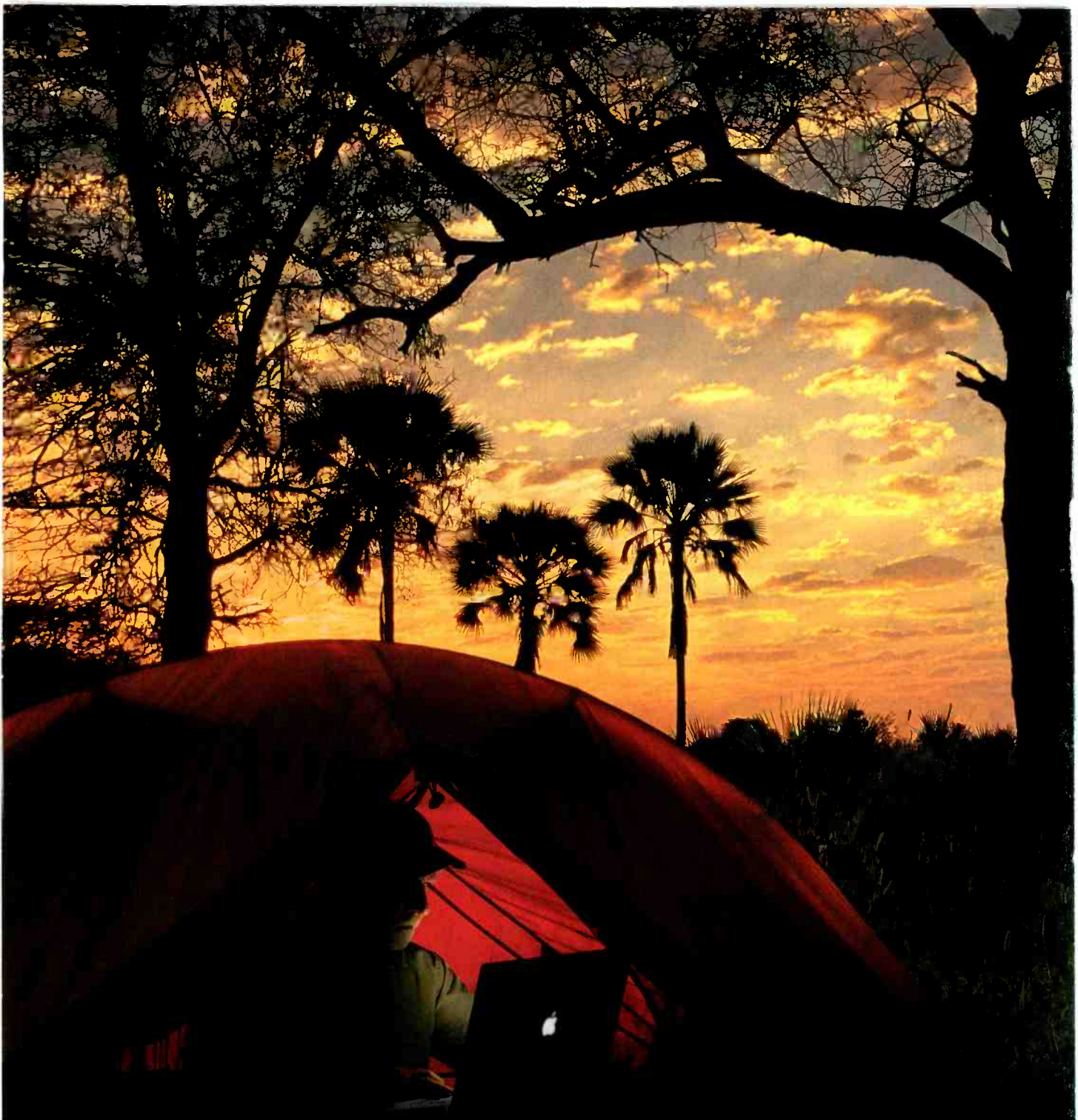
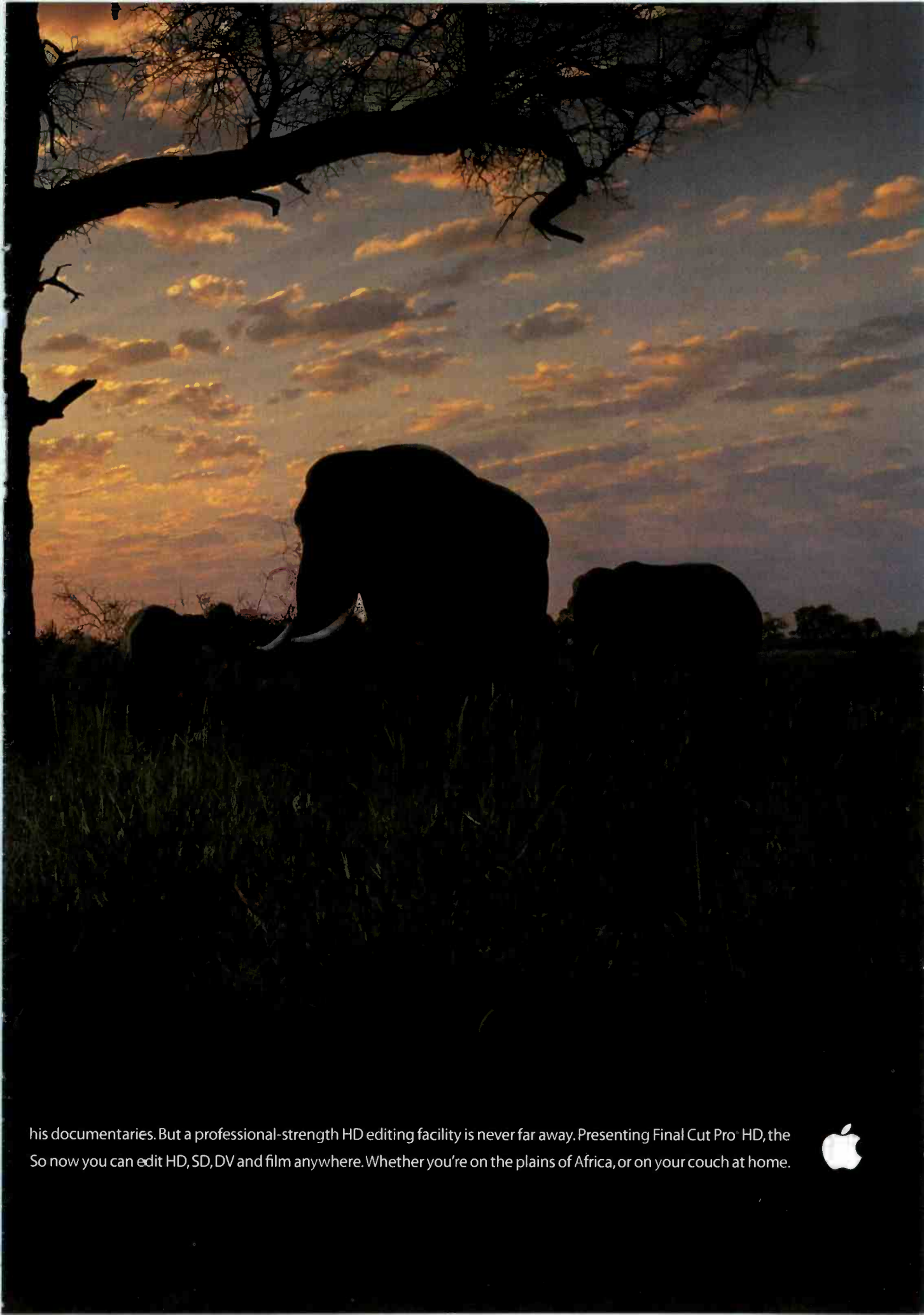


Mark Shelley's HD edit bay. Mark Shelley travels to the ends of the earth to shoot best way to capture, edit and output high-quality DVCPRO HD footage with no generational quality loss.



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So now you can edit HD, SD, DV and film anywhere. Whether you're on the plains of Africa, or on your couch at home.

(Continued from page S26)
more flexible and editing technology allows simple board swaps (from SD to HD support), then (HD news) can make sense."

Torelli pointed out that Quantel's product range already supports such SD to HD board swaps.

The reason to upconvert is simple: Doing so extends the life of today's equipment and allows a station's news operation to integrate SD with newer HD equipment.

"(It) saves the broadcaster from making a total changeover," explained Bruce Lane, Thomson Broadcast & Media Solutions director of applications engineering. "Such a changeover may exceed the budget and be too much to handle at one time. Further, all historical archive media is in SD, and as we migrate to formats, we will always have to integrate HD materials with those that preceded them."

KUSA-TV takes both HD and SD feeds from its news studio cameras to feed separate, simultaneous standard- and high-definition newscasts to Denver

Additionally, those stations upgrading their equipment today must remember that HD news production is right around the corner and plan accordingly.

"They must capture at the highest quality today so that when it comes time to upconvert, they get the best possible look," said Theresa Alesso, Sony general manager of the optical and network solutions group.

However, upconversion isn't the only issue. Downconversion of HD news footage also may soon play an important role in maintaining service to an SD audience while preparing for eventual high-definition news acquisition and production.

"Some folks are looking at acquisition in HD, even if they aren't going to air with HD and downconverting for today's use," explained Tim Slate, Leitch director of product marketing in the server group. "But they are getting acquisition in HD for archival use so when the transition happens, they'll already have archive material. And if acquisition is in the $3000, $4000, $5000 range (as it is with several HD prosumer camcorders), it becomes a no-brainer. Just shoot it in that format."

Low bit-rate HD camcorders are so affordable, they may even fill the role of "disposable" technology that DV camcorders have created, allowing ENG crews to drop the camera and run if necessary.

"We will be getting to the point that we got to with DV," said Paul Turner, Omneon Video Networks vice president of product management. "The camcorder is no longer an asset. The price of these HD camcorders is dropping like a rock. You can buy an HDV camcorder for $3200, and the video ends up on a mini DV cassette, which is very portable. The media becomes the asset, not the hardware."

For stations planning to upconvert, there's more than resolution to consider. The difference between HD's 16:9 and NTSC's 4:3 aspect ratios means that during this transitional period, it may make sense to begin acquiring SD footage from the field in the wider aspect ratio.

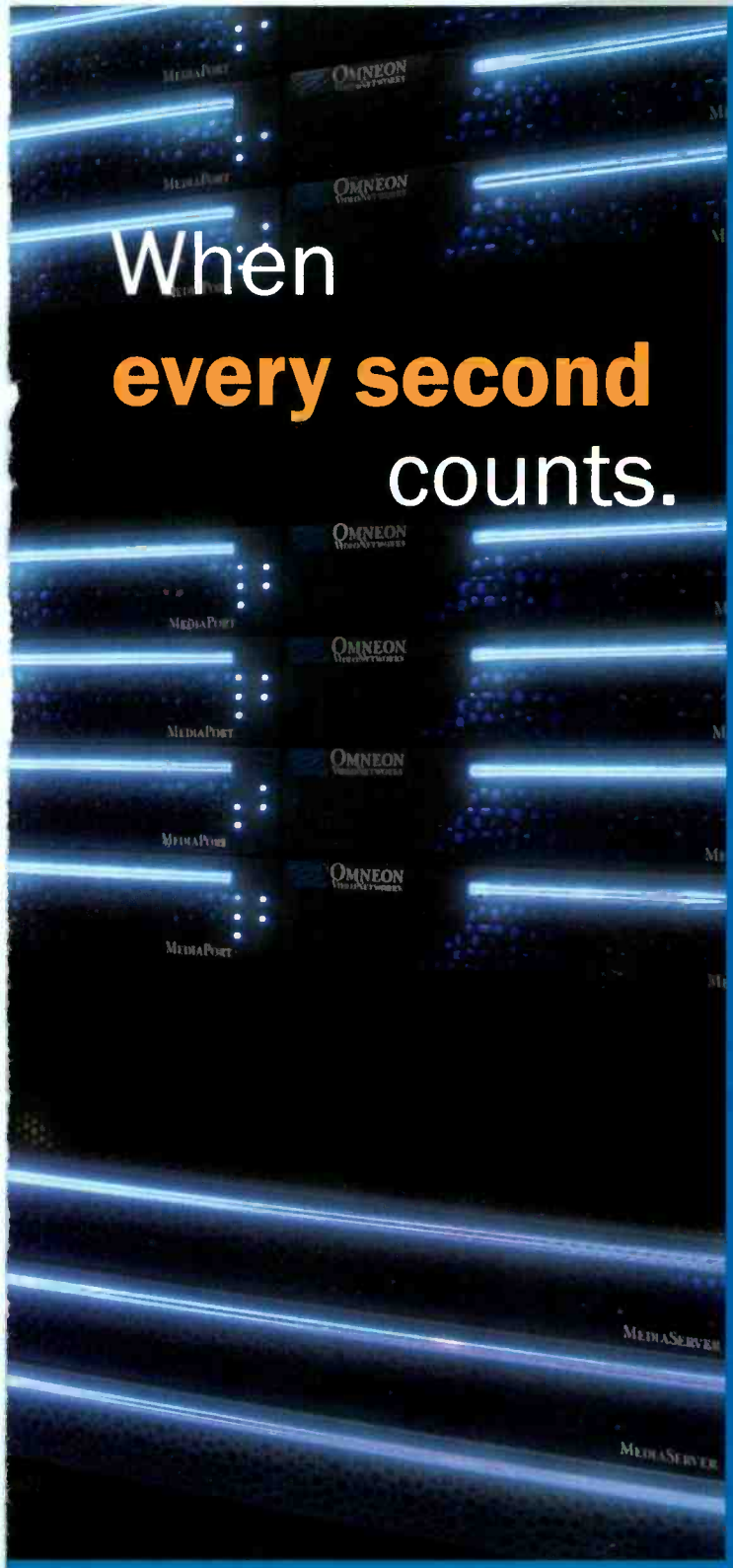
"Letterboxing news is not going to go over well, particularly with the luddites."
— Joe Torelli, Quantel

"This is a clever way to do it, and it should be considered as the first method of converting," said Quantel's Torelli in referring to shooting 16:9 SD. "KOMO in Seattle is using Quantel server-based news production and shoots everything in SD 16:9, but they run a graticule in the viewfinder to protect 4:3. They center-cut on output so that 4:3 goes to the viewers who don't have 16:9 screens. Those with 16:9 see what the photographer saw in the viewfinder, with lots of space on the sides. Something may be lost with this method, but it is the safest way to not alienate the viewers. Letterboxing news is not going to go over well, particularly with the luddites."

A look ahead

While a few stations are on the air with HD news, they currently are the exception, not the rule. To date, HD ENG acquisition has remained limited. However, low-cost prosumer alternatives may fill the SD-HD breach in field acquisition. And, even today's more expensive professional ENG cameras can be expected to both drop in cost and soon provide HD capture.

Ultimately, HD news acquisition and production will become mandatory as viewers who have grown accustomed to HD sports and entertainment programming expect their local news in the same quality. Fortunately, for stations struggling to make the analog to digital transition, that day appears to be a few years off. ■



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TAPELESS ACQUISITION AND NONLINEAR NEWS

Sony's Professional Optical Disc format offers news operations a way to benefit from IT developments in the field.

New tapeless alternatives to traditional ENG acquisition formats promise to have as big of an impact on how television news is gathered and produced as they do on newsroom budgets and allocation of newsgathering resources.

That's because tapeless formats leverage technology from the vast computer market to deliver workflow benefits and cost structures that were impossible when videotape was the only practical acquisition and editing medium for television news.

ENG crews from New England Cable News use Sony's Professional Optical Disc to acquire footage without tape.

In terms of costs, tape represents a recurring expense because it's a consumable. To ensure the quality of on-air news programming, an individual tape is used a limited number of times. When it's used up, it's time to buy fresh stock and begin the usage pattern again. Unlike videotape, tapeless alternatives offer thousands of playback and record cycles, radically transforming the media consumption equation.

When it comes to workflow, tapeless media foster and neatly fit into a nonlinear newsroom workflow. Stored as files on tapeless media, video, audio and metadata become seamlessly available for editing and playout.

Professional Optical Disc

Sony's new Professional Optical Disc format records high-resolution original and lower-resolution proxy video and audio files using blue laser technology. The format allows ENG crews to transfer proxies to a laptop to begin field editing or to send them to producers in the newsroom at rates faster than real time over an IP network.

Tapeless acquisition also offers significant financial benefits. Compared to tape, its $1.29 per GB price is a bargain, but the savings don't stop there.

"In regard to the cost of ownership — or cost benefit from going from tape to tapeless — for small and mid-size news operations, the savings can be $50,000 to $150,000 per year in recurring tape costs,"

"With the Professional Optical Disc, there are two moving parts: the laser and the seek motor." – Theresa Alesso, Sony

said Theresa Alesso, Sony general manager of the optical and network solutions group. "A local station recycles tape six to 10 times, depending on format. We have a Professional Optical Disc, and it can be used up to 10,000 times."

According to Alesso, Professional Optical Disc delivers an attractive solution for archiving news content as well.

"It offers archival life of 50 years and can be read over 1 million times," she explained. "Acquisition to archive, shelve it if you choose."

Professional Optical Disc also records and plays back video, audio and proxies with far fewer moving parts than a typical videotape machine.

"From a maintenance standpoint, analog Betacam SP camcorders have 29 moving parts. SX and DVCAM have fewer moving parts," Alesso said. "With the Professional Optical Disc, there are two moving parts: the laser and the seek motor. Those two are covered by a seven-year power train warranty. There's no labor charge or parts charge for seven years."

According to a recent survey Sony conducted of ENG equipment users, average ENG equipment usage totals 2.5 hours per day, 300 days per year.

"Given that usage, the Professional Optical Disc will need a new laser by year six," Alesso said. "Four thousand hours (of life) is very conservative. There are 4000 hours of life for the camcorder and 6000 hours for the deck. In year six, users will have a free swap out of laser and motor.


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So they don't have to go into their pocket until year 12 (to replace the laser)."

That favorable maintenance schedule and cost of ownership equation stands in stark contrast to tape-based operations. According to Paul Turner, Omneon Video Networks vice president of product management, replacing tape heads alone is a costly expense.

"Eight months ago, the tape head budget for replacement tape heads at a mid-size station in the UK was $150,000 in raw cost for the heads," Turner said. "Tape requires special storage, tooling, special training as well as consistent support. These are very real costs that have no impact whatsoever in getting the story. It is an incidental cost, and that's for a relatively small newsroom."

Sony's XDCAM PDX-350 relies on blue laser technology to write high-res video and audio, as well as low-res proxies and metadata to a removable optical disc.

Added Geoff Stedman, Omneon Video Networks vice president of marketing, "Add the machines and spare machines that you must have on hand because you can't afford the downtime. In addition to the hard costs that can be eliminated, it's also important to recognize the soft cost benefits of tape vs. tapeless operations. When you move to tapeless, the productivity you can gain and the speed to get the story to air — all of those things — go up. Journalists can begin working on their edits instantly instead of waiting for a dub. And two or three journalists can work simultaneously — even on the same material."

Sony recently partnered with six companies at IBC2004 to demonstrate the ability of its Professional Optical Disc system to do FTP and streaming transfers as well as mount directly with nonlinear editing systems.

Metadata

Part of the reason a tapeless acquisition format such as Professional Optical Disc is so valuable in an IT-centric news workflow is its built-in ability to record metadata along with video, audio files and proxies. Gone is the need to scribble information on a tape label, as is the need to input metadata during an ingest session back in the newsroom. With Professional Optical Disc, the metadata is already there.

"In the analog and digital world, any information created in the field was separated from audio and video material," said Hugo Gaggioni, Sony CTO. "With optical, any production-related information is attached in the same disk; the A/V, control and metadata information are all tagged together. When you archive an original shoot, all that metadata is part of the essence. For future use of the material, one can retrieve original annotations and all creative aspects of the shoot in the field."

Whenever a user of a Professional Optical Disc recorder presses the record button or turns on the camera, which results in a new audio or lighting level, the optical disc recorder collects metadata. A producer watching the video can annotate metadata while a shooter is collecting footage. The producer can comment on anything seen occurring in the field of view, and those comments are collected on the optical disc as part of the metadata.

Workflow

Tapeless acquisition changes the ENG equation radically. Instead of sending a reporter and a shooter into the field in an expensive news van, tapeless acquisition allows the team — or even an individual — to acquire the necessary content and perform an edit in the field with low-resolution proxies, while high-resolution material is being sent via a wireless or wired network back to the station, where it can be conformed to the proxy cut.

Professional Optical Disc offers file transfer, wireless transmission, IT interfaces, and traditional analog and digital composite and component interfaces for exporting and sending content.

"The nonlinear workflow extends to the field," said Jim Frantzreb, Avid Technology senior product marketing manager. "It's now possible to create stories in the field and have them virtually finished by the time a reporter gets to station. If editing in the field is impossible, content can be sent back from any available network connection. Now that there is a file-based workflow, stations can much more efficiently tie in remote sites, ENG trucks, bureaus or sister stations in a different city; browse a representation of their media; and transfer it to their site over standard network links."

From a workflow point of view, tapeless solutions such as Professional Optical Disc give news directors a way to maximize their station's presence in the community because far less ENG equipment is needed to report from the field.

"Every station wants more acquisition devices in the hands of people to acquire," said Sony's Gaggioni. "From that perspective, the use of DV tape and inexpensive acquisition devices provided a suitable solution based on tape. We believe the use of optical will fill that role, and we are just at the beginning of our introduction of optical products using blue laser technology. We will improve dramatically as the years go by." ■

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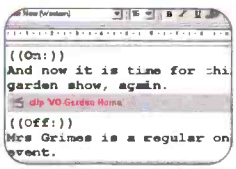

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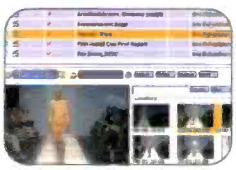

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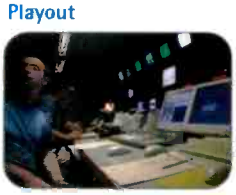

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The solutions you choose for the transition to server-based news production and automation should take advantage of the latest IT and storage technologies, not ignore them. Single-vendor, first-generation solutions use dated workflow models, multiple operating systems and require extensive file transfers. Cost is high, metadata is lost and system maintenance is expensive.

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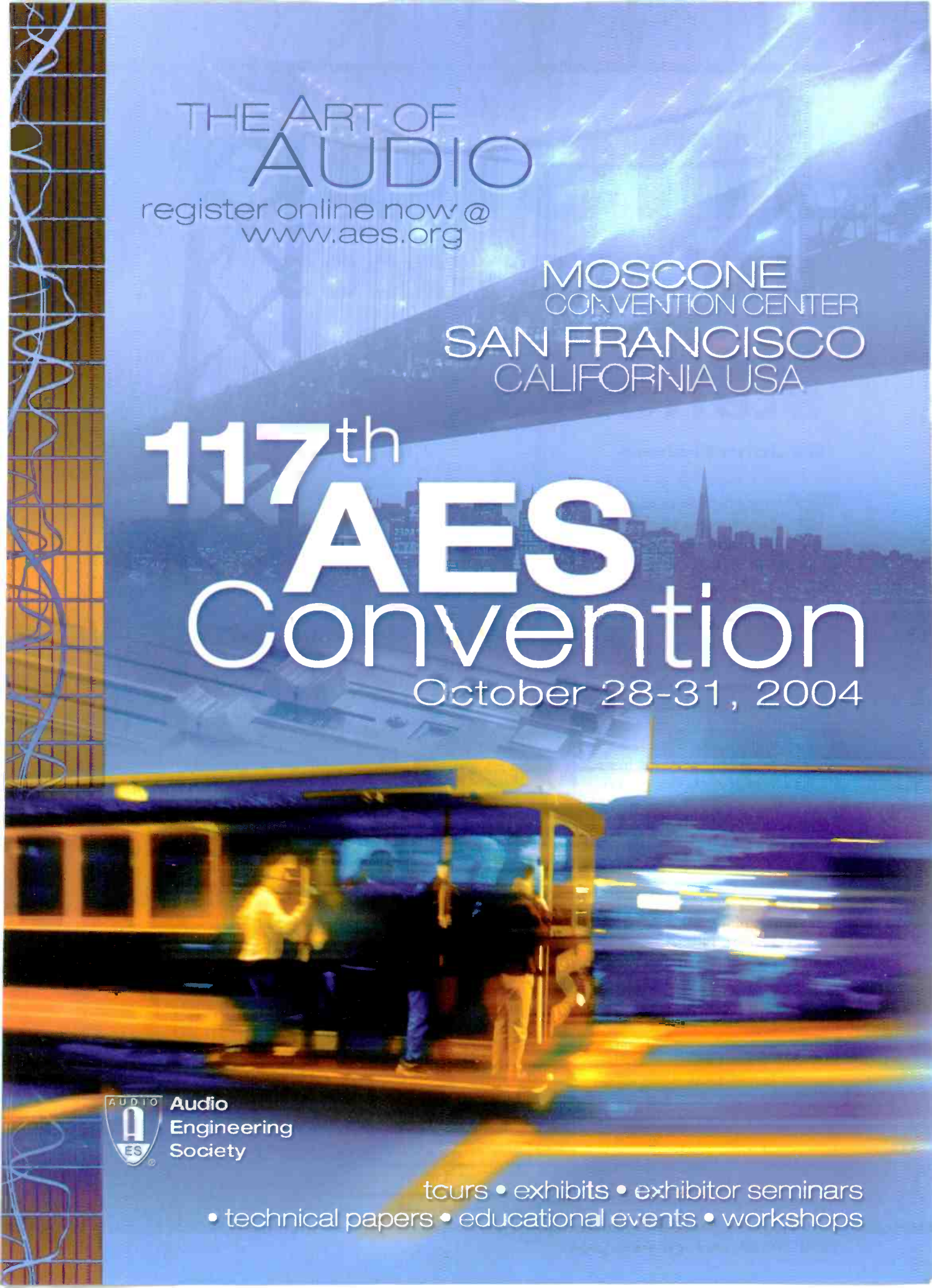
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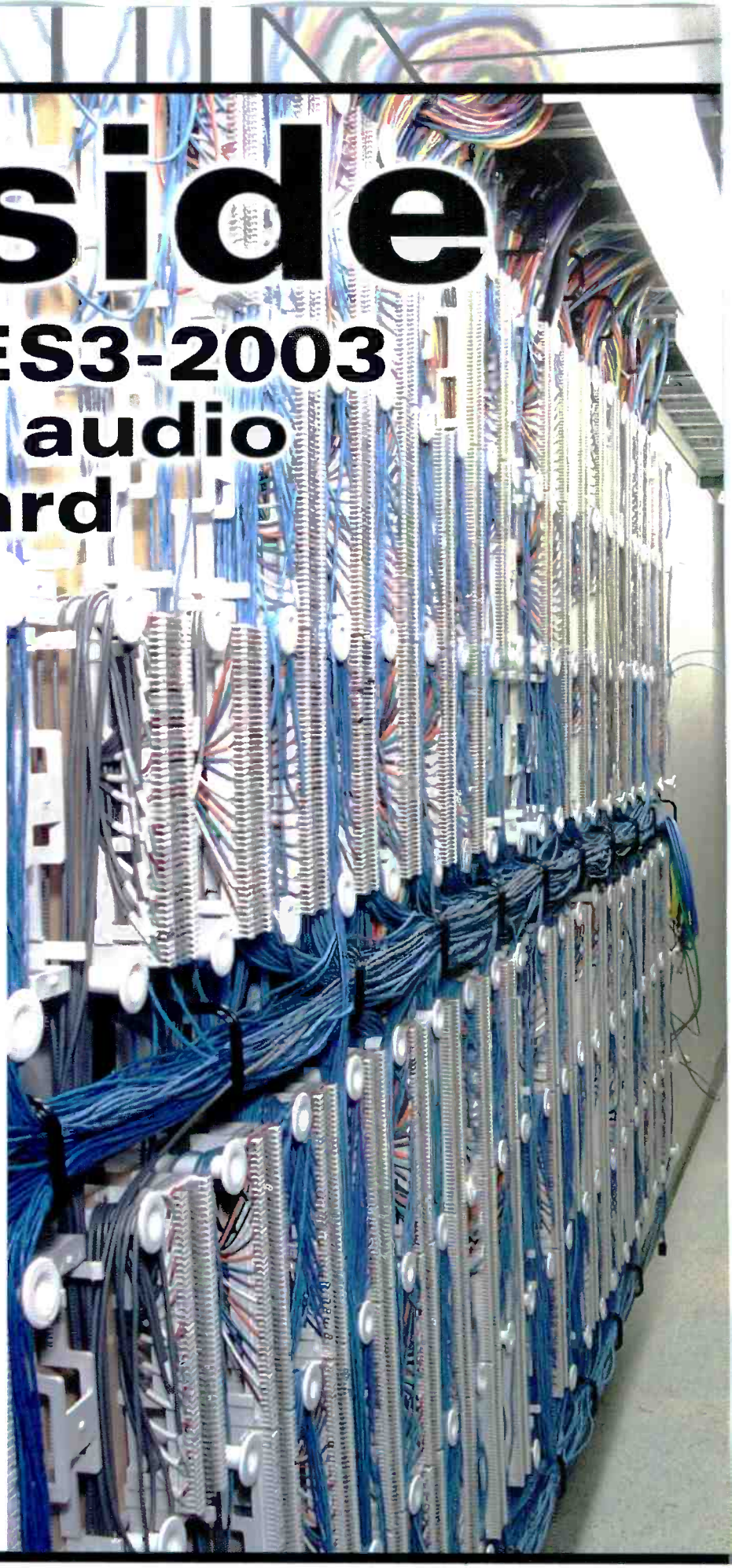
Inside the AES3-2003 digital audio standard

By John Freberg



The AES3-2003 standard defines the serial transmission of two-channel uncompressed digital audio. Most facilities employ three or four AES3 dual-audio channels to achieve their multichannel audio goals. AES3 multiplexes two channels of digital audio with additional bits for status, error detection and user data. Transmission is one-way, from one transmitter to one receiver. The standard specifies bi-phase-mark channel coding, so AES3 audio is not sensitive to polarity reversals in cabling and connectors. The synchronous coding scheme also facilitates clock-signal recovery from the AES3 bit stream.

AES3 details

Data structure. Figures 1 and 2 illustrate AES3's block/frame/subframe structure. Figure 1a shows that the subframe consists of 32 time slots. The first four time slots contain a preamble. The remaining 28 time slots contain one audio sample up to 24 bits, plus four additional bits labeled "validity," "user," "channel status" and "parity." Figure 1b shows that, for sample word sizes of 20 bits or less, the standard reserves four time slots for auxiliary data.

Payload data in a subframe can assume any bit pattern, so the preamble must be uniquely distinguishable. For

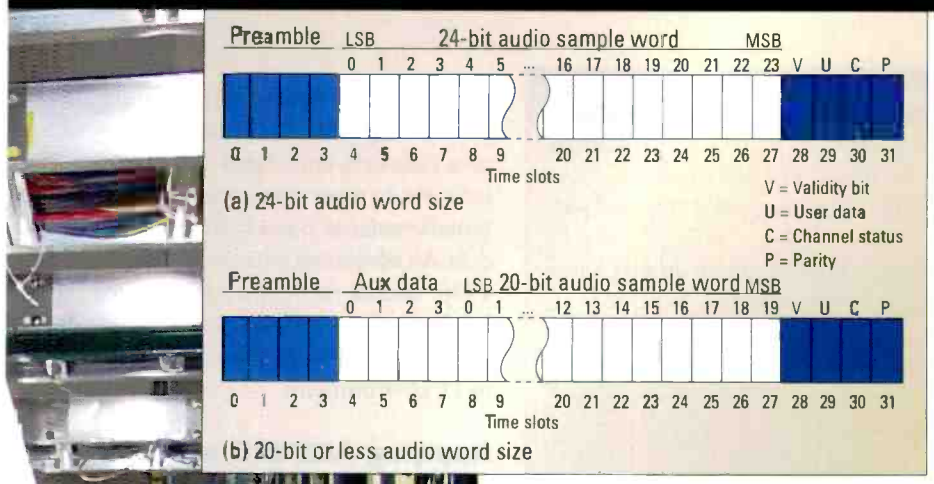


Figure 1a. An AES3 subframe consists of 32 time slots. Figure 1b. For sample word sizes of 20 bits or less, the standard reserves four time slots for auxiliary data.

this reason, preambles violate the biphase-mark rules used for audio data. Three different preamble patterns are defined: X, Y and Z (see Figure 2). X delineates the start of subframe 1 (left channel/channel 1); Y delineates the start of subframe 2 (right channel/channel 2); Z is sent after every 192 frames, in place of X, to signify the start of a new block.

Two subframes make up one frame, and 192 consecutive frames make up one block of AES3 data. AES3 audio equipment transmits frames at the audio sampling rate; audio sampled at 48kHz is transmitted at 48,000fps.

Sampling rates. The AES3 bit stream derives its timing directly from the audio sampling clock of the source equipment. Receivers automatically synchronize to the incoming bit streams. AES3 transparently supports the all of the common sampling rates (32kHz, 44.1kHz and 48kHz).

Validity and parity bits. The validity bit indicates whether the preceding sample word contains audio data suitable for conversion to an analog audio signal. Usually, this bit is set to logic 0. If it is set to logic 1, the sample word contains non-audio data, and the receiving equipment should not convert it to audio.

The parity bit implements an even-parity check on the subframe payload data. When a subframe arrives, the receiver examines the payload data. If the number of ones and zeros is not even, an error has occurred and the receiver knows that it must take some corrective action.

Channel status data. Each subframe contains one channel status bit. For a block of data, there are 192 status bits per audio channel. These 192 bits are organized as 24 eight-bit bytes. The bytes (numbered 0 to 23) and the bit positions within those bytes determine numerous parameters.

Receivers use channel status information to configure themselves automatically to match a received AES3 bit stream. The receiver reads the status bits and sets its operating modes appropriately. Some examples of information carried in the channel status data are: sampling frequency, word length (16 to 24 bits), audio mode (stereo pair, mono, two separate channels, etc.), special operating modes for sampling frequencies above 48kHz, time of day, pre-emphasis indicator, synchronization (locked to reference/unlocked).

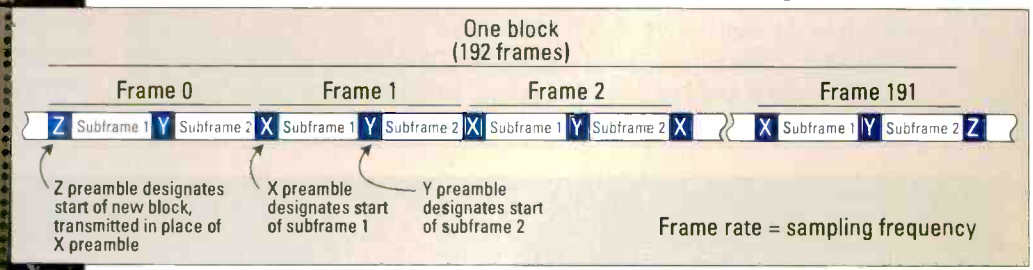


Figure 2. One block of AES3 data comprises 192 consecutive frames.

User data. The AES3 standard provides a user-defined, non-audio-data capability at a rate twice the sampling frequency (e.g., 48kHz = 96kb/s). One user data bit is available in every subframe, so there are two utility data channels of 48kb/s. AES3 does not specify uses of this data capacity, so you are free to develop your own applications. Some potential uses come

The AES3-2003 digital audio cable distribution at WTTW's new Digital Broadcast Operations Center in Chicago employs 66-terminal blocks for wire termination.

Need more information?

Just as SDI has become the primary interconnection for digital video, AES3 has become the primary interconnection for digital audio. A practical understanding of its capabilities and limitations has become a required part of the engineer's knowledge base.

Additional information on the AES standard is downloadable for no charge from the Audio Engineering Society Web site, *www.aes.org*:

- AES3-2003; The core standard
  www.aes.org/standards/b_pub/aes3-2003.pdf
- AES-3id; Implementation using 75Ω coaxial cable
  www.aes.org/standards/b_pub/aes-3id-2001.pdf
- AES-2id; Guidelines for use of the AES3 interface
  www.aes.org/standards/b_pub/aes-2id-1996.pdf
- AES5-2003; Preferred sampling frequencies
  www.aes.org/standards/b_pub/aes5-2003.pdf
- AES11-2003; Synchronization of audio devices
  www.aes.org/standards/b_pub/aes11-2003.pdf
- AES18-1996; Recommendations for the user data channel
  www.aes.org/standards/b_pub/aes18-1996.pdf

You can find additional valuable information on system design in the following references:

- The Video Engineer's Guide to Digital Audio, John Watkinson, NVISION, 1995. ISBN 0-9640361-3-4
  www.nvision1.com/Sales/pdfs/theguide.pdf
- The Book, An Engineer's Guide to the Digital Transition, NVISION, 1996. ISBN 0-96-40361.
  www.nvision1.com/Serv/RefLib/thebook.pdf
- The Book II, More Engineering Guidance for the Digital Transition, NVISION, 1999. ISBN 0-9640361-7-7.
  www.nvision1.com/Serv/RefLib/thebook2.pdf
- Digital Audio Plant Integration: A Tutorial for Designing Digital Audio/Video Broadcast and Production Facilities, NVISION white paper, 2000
  www.nvision1.com/Serv/Support/bulletins/digaudio.pdf

to mind: audio source identification, asset management information, intercom channels, embedded device controls, etc. In most cases, you'll need external interfaces to insert and read user data. An additional document, AES18-1996, makes recommendations for implementing an HDLC packet structure for user data to provide a bridge to IT environments.

Applying AES/EBU in media facilities

Cabling plant. AES3 describes an impedance-matched, terminated transmission system using twisted-pair (AES3-2003) or coaxial cable (AES3-id). AES3 audio has a baseline data rate of approximately 3Mb/s. Frequency components of the signal can extend as high as 30MHz. Due to wide tolerances allowed in the AES3-2003 waveform, cable bandwidths of 6- to 10MHz work reliably.

Typically, AES3-2003 provides reliable operation on 110Ω twisted-pair cable up to 100 meters long without equalization or amplification. Peak-to-peak signal voltages on the cable are between 2V and 7V. The standard specifies XLR connectors with pin 1 wired to cable shield and pins 2 and 3 carrying the signal. In practice, AES3-2003 is reasonably tolerant of cabling

characteristics. Short lengths (less than 50 feet) of conventional audio cable usually work without difficulty. Patch cables and temporary installations are acceptable, but you may find conditions that won't work. Standard audio cable is not suitable for permanent AES3 installations in large plants where significant cable lengths are common. Induced jitter and propagation delays associated with audio cable can render AES3-2003 unusable in complex systems.

When upgrading to a digital installation, you can reuse some audio cabling components such as patch bays and terminal blocks, but use caution. For example, consider the length and type of cable used for pigtails on patch bays. Type-66 blocks and other telco-style terminals generally work well for AES3-2003. Audio routers using hard contacts usually work because there are no electronics to limit bandwidth. But don't expect to reuse your analog, DA-based audio routers. The limited bandwidth of the amplifier modules typically will not pass the AES3 signal.

AES3-2003 over CAT-5 data cable works well, and the standard recommends it. CAT-5, CAT-5e, CAT-6, CAT-6e and CAT-7 cables have 110Ω characteristic impedance and support runs significantly longer than 100 meters without additional equalization or amplification. RJ-45 connectors are recommended, so the full range of structured wiring components are available for AES3-2003 use. For any future facility upgrade, it's worthwhile to consider using structured data cabling systems and abandoning all conventional audio cabling. Also, you can save a lot in time and equipment by simply reusing any existing data-networking cable.

Video installations frequently implement AES3 on 75Ω coaxial cable because it is familiar to video engineers. With good coax, amplifiers and equalization, cable lengths up 1000 meters are possible. Generally, cable lengths up to 300 meters offer trouble-free operation without any equalization or amplification. Nominal peak-to-peak voltage on the coax is 1V, and standard BNC connectors are fine. You can frequently reuse existing analog video routing switches, amplifiers and equalizers for digital audio, but use caution. Bandwidth, delay, ringing, oscillation, crosstalk and stability characteristics of active electronics can disrupt proper operation. If the current equipment requires constant attention to maintain video performance, don't try to reuse it for audio. Also, any device that attempts to insert video-sync pulses is not suitable for AES3-id use. Converting between balanced and unbalanced feeds is easy. Use simple resistive networks and commercially

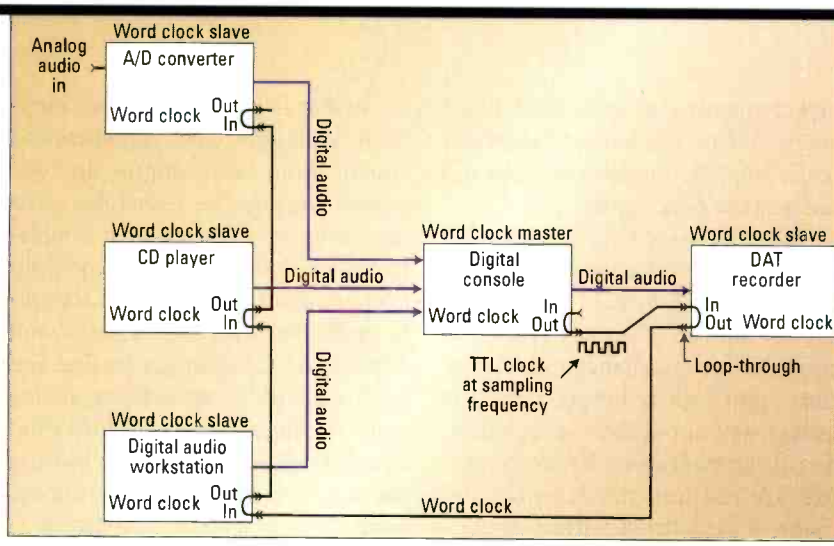


Figure 3. In a typical word clock application, equipment uses a TTL-level square wave referenced to the sampling frequency at coaxial loop-through connectors. Word clock is separate and distinct from AES3, and is not widely supported in modern video equipment.

available baluns for the connections. This allows you to repurpose older equipment creatively.

Sampling-rate standardization. Slight variations of sampling frequency between devices can lead to jitter and framing errors. Failure to observe proper AES3 audio frame timing can result in problems ranging from relatively minor pops and clicks to a complete loss of audio as the interfaces attempt to resynchronize themselves. The solution for this problem behavior is to force all AES3 equipment to use a common sampling frequency. Generally, there are two methods available for synchronizing multiple digital audio devices: word clock and digital audio reference signal (DARS).

Word clock is separate and distinct from AES3. Equipment supporting word clock uses a sampling-frequency-referenced TTL-level square wave at coaxial loop-through connectors. In master mode, the equipment's internal sampling clock is output at the word clock connectors. In slave mode, equipment will sync its sample clock to the signal present at the word clock input connector. Additional equipment is daisy-chained and finally terminated with a 75Ω resistor. Figure 3 shows a typical word clock application. Word clock is not widely supported in modern video equipment.

DARS is recommended in AES11-2003 for synchronizing digital audio equipment. It is simply a standard AES3 bit stream derived from a master reference. DARS is fully compliant with AES3 standards, so all cabling options apply to DARS. You can distribute DARS throughout a facility to deliver a sync reference to AES3 devices, similar to house reference for video. DARS will function with just the preamble components of the AES3 signal, but can also carry audio, channel status and user data. This allows distribution of digital silence and/or reference tones over DARS. AES11-2003 recommends a separate input connector for the DARS reference signal. Newer equipment provides external AES3 reference loop-through connectors, making sync distribution relatively simple. Older AES3-compliant equipment frequently lacks a separate DARS input or loop-through. If you can get a DARS feed to the first device in a studio, such as a digital audio workstation, the remaining downstream devices will automatically synchronize through their regular AES3 inputs. Playback-only devices like CD players pose a different problem. Few

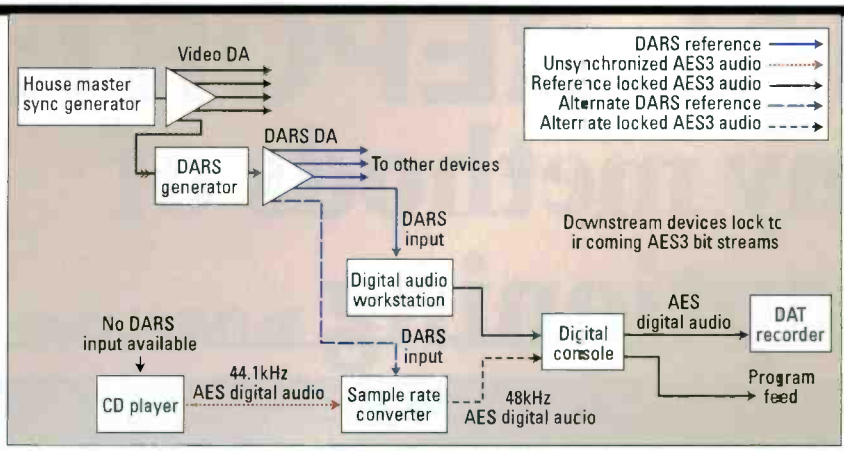


Figure 4. In a simple DARS system, the DARS generator provides an AES3 bit stream locked to the house sync generator.

have DARS inputs, so they cannot sync to a reference. In this case, the solution is to use a sample-rate converter (SRC) that can be synced to a reference. The SRC reclocks the playback stream and interpolates the audio samples to provide a new AES3 bit stream at the synchronized sample rate. This is illustrated as the alternate DARS path in Figure 4. Many digital audio workstations and mixing consoles provide sample-rate converters on every digital input to accommodate a mixture of sample rates and devices.

Figure 4 illustrates a simple DARS system. The DARS generator provides an AES3 bit stream locked to the house sync generator. DARS is distributed over the cabling to a studio or control room. A digital audio workstation is the master device, since it has multiple AES3 inputs. The workstation locks to the reference and its AES3 outputs are also locked. All the devices downstream from the workstation will synchronize in a daisy-chain fashion. Many other approaches to DARS distribution are possible.

Even a properly synchronized digital video and audio plant does not guarantee lip sync. Lip sync is a book-length subject in itself, and proper synchronization is just the first chapter.

Routing and switching. When a router switches audio with video, the vertical interval should coincide with the start of subframe 1. If the switch point occurs within the audio sample data, a loud pop or click usually results. Additionally, other AES3 devices downstream of the switch may lose sync on the bit stream. Interesting things may occur as the devices attempt to stabilize on the new reference. Even if the AES3 bit stream is properly synchronized to the video, objectionable artifacts can still occur. Any discontinuity between the last audio sample from the pre-switch source and the first audio sample of the post-switch source can result in a pop or click in the audio. Modern DSP-based routing switches digitally fade the pre-switch bit stream audio level to zero, wait for a subframe 1 boundary, switch to the post-switch bit stream, and fade the new audio up from zero. This "V-fade" approach guarantees a silent switch.

Compressed/embedded audio, AES3 and future trends. Some SMPTE standards implement AC-3 and Dolby E compressed audio streams over AES3 channels. Dis-embedding, decoding, recompression and re-embedding are additional complexities to consider to support discrete, multiplexed, multichannel, compressed and embedded audio tiers in systems design.

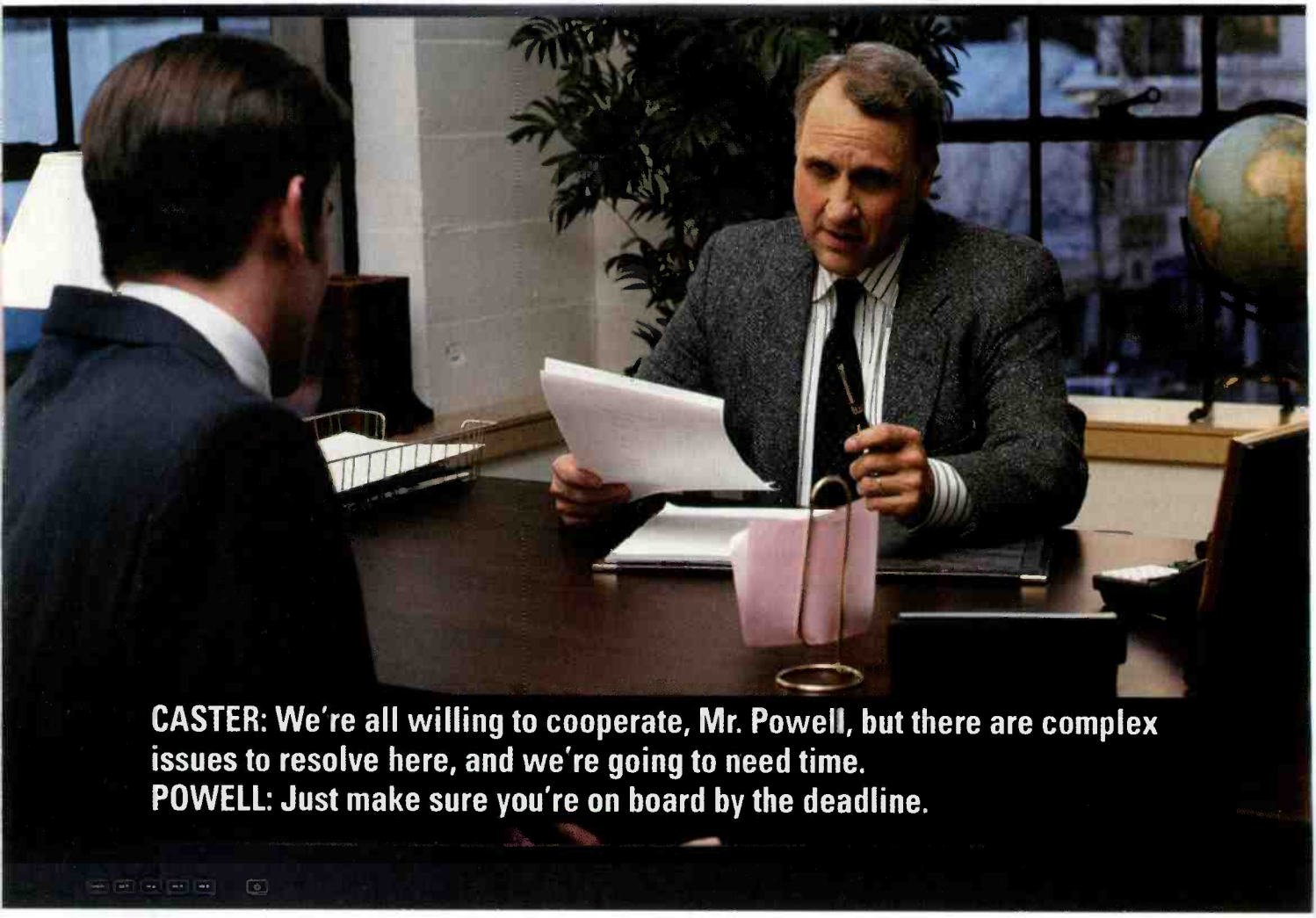
Integration of AES3 digital audio with digital video is not trivial. Armed with a basic understanding of the standard, you should begin planning at your plant's earliest design stages.

Note: The author would like to thank WTTW's director of engineering operations Fred Engel and engineer Michael Tompary for their assistance in preparing this article. BE

John Freberg is the principal of The Freberg Engineering Company in Homewood, IL.

SPECIAL REPORT: The many methods of closed captioning

By Philip J. Cianci



The FCC has adopted a time table that will require 100 percent of all non-exempt programming to be closed captioned by Jan. 1, 2006. And, to borrow a phrase from a popular TV sci-fi series, resistance is futile.

As the broadcast industry transitions to digital services, the complexity created by multiformat programming means that broadcasters need to look carefully at how they will handle closed captions (CC). What was once the relatively simple act of inserting CC data into line 21 of an NTSC signal has now — as has every other aspect of DTV infrastructure — expanded exponentially in complexity.

Workflow scenarios

When implementing CC, there are many workflow issues to consider. Are the VTR feeds already closed captioned? If not, should this task be handled in-house or by a captioning service? Does the video signal need to be converted between NTSC and ATSC, or between SD and HD? All this can be confusing. These circumstances will each dictate the production workflow and the equipment necessary to produce compliant CC programming. And broadcasters

As the broadcast industry transitions to digital services, broadcasters need to look carefully at how they handle closed captions. Photo design by Robin Morsbach, associate art director.

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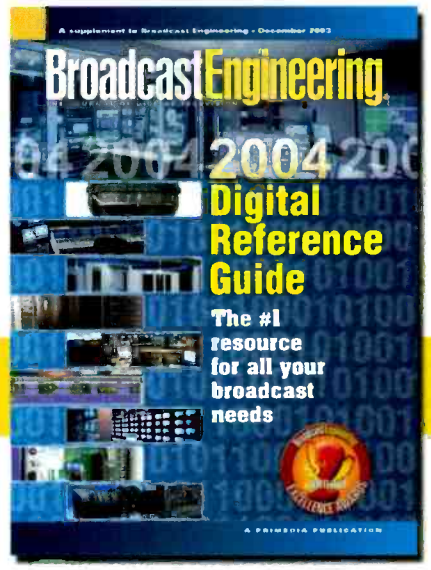

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Closed-caption features	
Field 1:	Two caption channels, CC1 and CC2 Two text channels, T1 and T2
Field 2:	Additional channels CC3 and CC4 Text channels, T3 and T4 Extended data services (XDS)
Display modes:	Roll up: captions wipe on the left and roll up with next line Paint on: one line of text is wiped on the screen then disappears Pop up: complete sentences are assembled, then popped onto screen
FCC rules	
47 CFR Part 15.119 Decoder requirements, analog television	
47 CFR Part 15.122 Decoder requirements, digital television	
47 CFR Part 79 Programming requirements	
Standards	
Consumer Electronics Association/Electronic Industries of America	
CEA-608-B Line 21 data services	
CEA-708-B Digital television closed captioning	
CEA-CEB-10-A-2002 EIA-708-B Implementation guidance	
EIA-SEB8 Consideration of EIA-608-B data within the DTV (EIA-708-B) construct	
Advanced Television Systems Committee	
A/53 ATSC digital television standard	
A/52 ATSC digital television audio standard	
A/54 Guide to the use of the ATSC digital television standard	
A/65 PSIP (Rev. A and Amend. No. 1)	
Society of Motion Picture and Television Engineers	
SMPTE 333M-1999 Television DTV closed-caption server-to-encoder interface	
SMPTE 334M-2000 Television Vertical ancillary data mapping for bit-serial interface	
SMPTE 341M-2000 Television Format for non-PCM audio and data in an AES3-caption data type	
SMPTE 337M-2000 Format for non-PCM audio and data in an AES3 serial digital audio interface	
SMPTE 341M-2000 Format for non-PCM audio and data in AES3-caption data type	
Society of Cable Telecommunications Engineers	
ANSI/SCTE 20 2001 (Formerly DVS 157) methods for carriage of closed captions and non-real-time sampled video	
ANSI/SCTE 21 2001 (Formerly DVS 053) standard for carriage of VBI data in cable digital transport streams	
ANSI/SCTE 43 2004 Digital video characteristics standard for cable television	

Table 1. Closed-captioning features, rules and standards

must adhere to many implementation details. Table 1 lists relevant CC features, FCC rules and technical standards.

The obvious place to start is with an analysis of your production workflows. There are three general production scenarios to consider: live remote feeds, live studio shows (both of which require online or real-time captioning) and preproduced segments or shows (which can use offline captioning). For a remote feed, captioning at the point of origination or ingest allows you to record the program with captions on tape. If that show is ever to re-air, the captions will air with it. For a live show, the program audio is decoded from the signal, converted and fed over a telephone line to a CC service. An additional telephone line returns the CC text stream though a modem connection to the CC encoder. Figure 1 illustrates the online signal flow of a captioning service provider.

A preproduced segment or show already on tape needs to be closed-captioned offline. This is a two-step process. First, a closed-captioning service provider produces a CC data file. Next, either the program production facility or a commercial encoding service completes the process by dubbing the captions to the program and producing media that is ready for air. Captioning offline allows synchronization of the displayed CC text with the dialog and eliminates any temporal incongruities between scenes and captions. For example, the video might show a soccer ball flying into the goal, but the CC

What was once the relatively simple act of inserting CC data into line 21 of an NTSC signal has now expanded exponentially in complexity.

showing the dialog describing the shot ("SCORE!") wouldn't appear until a moment later, when the director cuts to a network tease.

Myriad technical standards

SMPTE, SCTE, EIA and the ATSC have adopted individual technical standards regarding CC implementation. Two standards, originally developed by the Electronic Industries of America (EIA), define implementation specifications for compliant CC. Today, the Consumer Electronics Association (CEA) administers these standards. Their designations have become technical jargon. So-called "608 captions" refer to the CEA-608-B NTSC standard; "708 captions" refer to the CEA-708-B DTV Closed Captioning (DTVCC) standard.

The NAB has published an excellent white paper entitled "Implementing Closed Captioning for DTV." It is available at the NAB Web site: *www.atsc.org/news_information/papers/2004/Implementing_Closed_Captioning.pdf*. The recently approved SMPTE engineering guideline "EG 43-2004 Proposed SMPTE Engineering Guideline — System Implementation of CEA-708-B and CEA-608-B Closed Captioning" is available (for a fee) at the SMPTE Web site. Go to *www.smpte.org/smpte_store/standards/index.cfm?stdtype=eg&scope=0* to search for engineering guidelines by number. Both papers describe system design methodologies used to create and distribute closed captions within a broadcast facility. They emphasize how to simultaneously caption NTSC and DTV. They also explain the relationship between the various CC standards and production and distribution workflows.

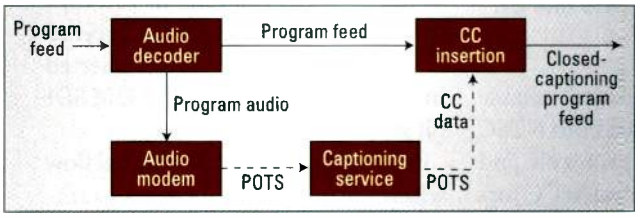


Figure 1. Live/online closed-captioning signal flow using a captioning service and plain old telephone service (POTS). Using this method, there is a two- to three-second delay between dialogue and the appearance of closed captions.

Nuts and bolts

CEA-608 defines how line 21 carries the CC information in an NTSC broadcast. This standard encodes CC information as seven bits plus one parity bit at 120 characters per second and produces a data rate of 960 bits per second. CEA-708-B defines coding of DTVCC in an ATSC A/53 specified bit stream. This standard significantly enhances DTV display and formatting features. Document CEA-CEB-10-A discusses implementation details. CEA-708-B defines caption distribution packets (CDPs) that hold DTVCC data, 608 caption data, caption service information and (optionally) time code. This facilitates decoding digital cable signals and inserting 608 captions into line 21 of the NTSC output of an STB.

The caption service descriptor (CSD) is part of the caption service information data field in the CDP; it signals the presence and format of captions. It is defined in the ATSC A/65 PSIP standard. In the ATSC transport stream, the event information table (EIT) and the program map table (PMT) contain the CSD. CC data packets have a unique packet ID (PID) and are allocated a data rate of 9600 bits per second.

For HD-SDI SMPTE 292M and SD-SDI SMPTE 259M, the CDP data is embedded in the vertical ancillary (VANC) data. VANC data can be switched, routed and stored and will remain associated with program content. This ensures persistence of CC data as long as material is in SDI format.

Infrastructure implementation

An NTSC/DTV simulcast facility

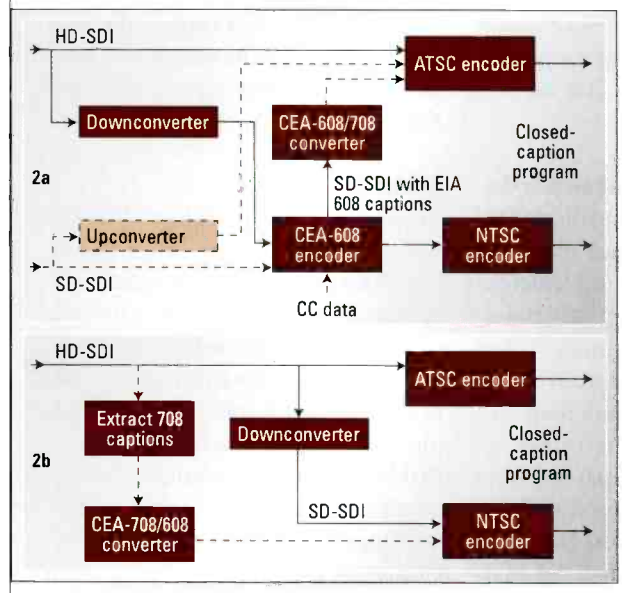


Figure 2a. The dotted lines trace an SD-SDI feed. If the upconverter is removed in the signal flow for the insertion of closed captions into a raw HD-SDI feed, the SD-SDI signal will be encoded as ATSC SD. Figure 2b. The signal flow for a VANC 708 closed-captioned HD-SDI feed and conversion to NTSC with 608 captions inserted into line 21.

must adopt an efficient and reliable infrastructure to support both NTSC 608 and DTVCC 708 protocols and to be able to convert between CC formats. Facility engineers must determine where they will locate the CC encoder in the signal flow.

Figure 2a illustrates the generic signal flow for adding closed captions to an HD-SDI program stream. The HD is downconverted to SD, captions are supplied to a 608 encoder, and an SD-SDI captioned bit stream is fed to an NTSC encoder. Also, the 608 captions are converted to 708 captions and fed to the data input of an ATSC encoder. An alternate signal flow would be to feed CC data to a 708 caption encoder and eliminate the 608-to-708 conversion. The dotted lines represent the SD-to-HD upconversion signal flow.

As shown in Figure 2b, when the program is an HD-SDI closed-captioned stream, the 708 captions must be extracted from the VANC and converted to 608 captions, then inserted into the downconverted SD video and converted to NTSC.

If the source program is NTSC, CC information must be extracted from the vertical blanking interval (VBI) data and converted from 608 captions to 708 captions. The derived CDPs are reinserted in the VANC of the SMPTE 292M SDI bit stream.

Pay special attention to a signal flow where closed-captioned programming flows through graphics, processing or compression equipment. Such equipment might destroy the

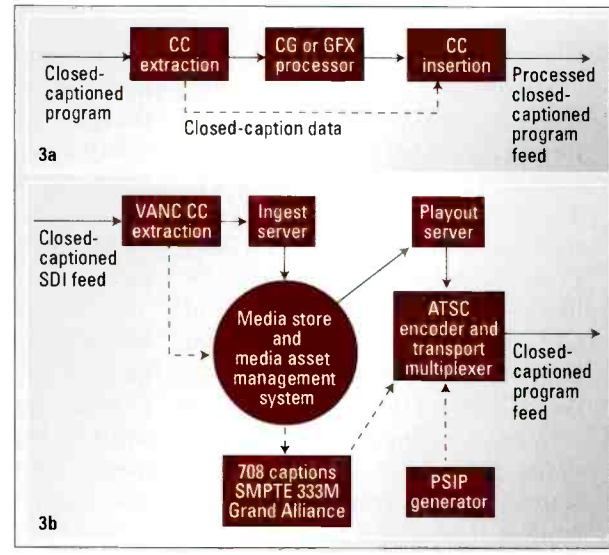


Figure 3a. CC bridging bypasses CG and GFX processors. Figure 3b. This diagram illustrates extraction of CC VANC data before ingestion and reinsertion into an ATSC transport stream.

CC data. In such cases, you must extract the CC data from the program feed and then reinsert it after processing. This technique is known as "bridging." Figure 3a depicts the generic bridging signal flow. The extracted CC data is fed to an appropriate encoder for the converted program feed.

It is important to consider how your ingest server will handle captions. Figure 3b is a conceptual diagram of a solution to caption persistence through the ingest/playout program stream. Once essence is in the compressed domain, the CC information may no longer be married to the source essence. It is stored on a server with appropriate descriptive metadata. The CC data must be extracted from the feed before ingestion, then stored and inserted at the proper time as the program leaves the facility. CC-related PSIP information is multiplexed into the ATSC transport stream.

Inside the boxes

Fortunately, broadcast equipment manufacturers have navigated the maze of standards, addressed these subtleties and designed turnkey systems that handle every permutation of CC workflow. Devices are available to handle all HD and SD formats and frame rates, including the popular 1080 24p format. Dual-function CC encoders can insert 608 captions into NTSC programs and 708 captions into DTV simultaneously, greatly simplifying infrastructure design.

Encoding equipment interfaces with CC data in a number of ways. When a facility uses a CC service, a telephone line and a modem connection supply CC data to the encoder. Other systems strip the CC data from the VANC and send it through RS-232 or a LAN connection to be reinserted further downstream. Equipment that performs the entire bridging process is available. Such units can strip and reinsert CC data, and require only a closed-captioned program input, simplifying system design.

The Twilight Zone

Even if the NTSC "sunset" comes to pass on schedule and analog TV broadcasting ceases to exist on Jan. 1, 2007, there are still two full years during which broadcasters will have to deliver simulcast analog and digital TV with closed captions. And, after the NTSC sun has completely set, broadcasters will still need to convert legacy 608-captioned material to DTVCC 708 captions. BE

Philip J. Cianci has been active in the television industry for 20 years. His work has included algorithm verification of closed-caption decoding in the Grand Alliance prototype decoder.

Building IT systems

BY JOHN LUFF

Few things in our industry are more certain than the growth of information technology-based systems in television and radio facilities. Equally certain is just how difficult and fundamental this change has proven to be, and how inadequately trained and equipped many among us are to take full advantage of the power and capability of IT systems.

There are some clear and defining differences between IT- and video-hardware-based systems. The most fundamental technological difference is the bidirectional nature of much IT technology, specifically networking. IT has begun to approach the sustained error-free speeds of baseband digital video (SMPTE 259M and 292M). In the next few years, the cost of interconnection for IT will drop, and it is unlikely that new videocentric interconnections will erupt onto the scene. 10G Ethernet can support high QoS video connections on technology that rivals SMPTE 292M in cost of implementation while offering bidirectional capability. But, for now, it certainly seems that most manufacturers in our market swath are not rushing to embrace new approaches. There is simply not enough infrastructure available to build a practical complete air chain using IT hardware.

The shift toward IT solutions such as Microsoft's IPTV Interactive Program Guide in broadcast operations requires a new perspective on managing content.

Broadcast Engineers has taken the issue to the first logical conclusion and developed a specific certification program for IT in broadcasting, Certified Broadcast Networking Technologist. According to the SBE, it has designed the certification to enable participants to demonstrate a basic familiarity with networking hardware in business and broadcast audio/video applications. Also, Microsoft administers a certification program that offers two levels that seem to apply in our industry:

- Microsoft Certified Systems Administrators (MCSAs) administer network and systems environments based on the Microsoft Windows platforms. Specializations include MCSA: Messaging and MCSA: Security.
- Microsoft Certified Systems Engineers (MCSEs) design and implement an infrastructure solution based on the Windows platform and Microsoft Servers software.

Neither certification will be required for remaining in the broadcast business after this transition has run its course. But, clearly, both establish a new level of training and expertise that demonstrates the effort to learn new skills applicable in our changing business. And, in the future, employers may require some evidence that applicants have sufficient training to be effective in their positions.

In the past, video and audio engineers largely learned their crafts from others in a chain of practical knowledge. Those seeking FCC licenses often learned from well-thumbed

What should we, the [IT] *non-cognoscenti*, be doing to prepare ourselves?

Don't get me wrong; we are moving rapidly in that direction. The author's systems design and integration company has explored MPEG play-to-air solutions using splicers and bit-stream-grooming technology. This kind of sweeping change could propel a movement to IT infrastructure. So far, however, even in this specialized world, the interconnection of choice is ASI. Technical issues aside, it fundamentally seems to be the chicken-and-egg conundrum at play (no infrastructure; therefore, no infrastructure). To date, most IT systems used in broadcast and production are employed in support systems, editing, server storage and asset management, routing control, graphics, video-audio file movement, and control circuits.

With that said, what should we, the *non-cognoscenti,* be doing to prepare ourselves? Training and education are at the top of the list. The Society of

volumes such as Schrader's "Electronic Communication." Often, we learned the most about hardware by attending training schools put on by Ampex, RCA and Sony. Little of that kind of in-depth training is now available in our industry. Now, the most effective route may be self-paced training sold by Microsoft, community college courses or, perhaps, trade schools. But the transfer of knowledge is less experiential today and much more akin to conventional academic pursuits. Those not learning regularly and continuously will be relegated to lower paid, less interesting jobs.

It is equally true that we learned technology by being operators first, and later moved to more engineering-oriented positions. That allowed us to learn by osmosis, if nothing else, the way broadcast stations were organized and operated. Station operations have, however, become more specialized. It isn't as easy for a camera person in a studio to move into more technical pursuits without specialized knowledge. The consequent stratification in our industry has meant that the truly skilled technical person must take the initiative to learn new skills to move to new areas and toward management. Look around the average station and you will see few technical personnel in the first years of their career. It might be the "graying" of broadcast engineering at work.

There is also a fundamental paradigm shift involved in this transition that is difficult to fully appreciate from the perspective of traditional broadcast engineering experience. The emphasis on networking and software "tools" instead of hardware and interconnection into "systems" that perform functions means that facility staff must think less about the physical layer and more about applications that interface over a common structure. Thus, it becomes critical that the underlying structural layer be extensible to new uses. As software-based systems take over for hardware solutions, the technical staff must understand less about reading a waveform monitor and more about the software tools needed to interchange files and formats.

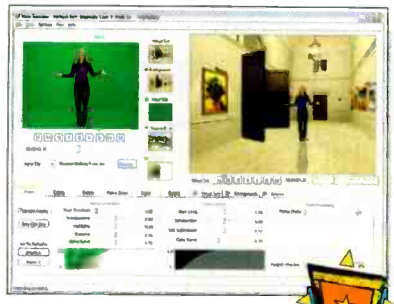
But the deterministic nature of communications in isochronous video systems is holding back this transition. In 1939, the camera that first acquired images at the New York World's Fair for live broadcast over the air scanned in perfect synchronization with the receiver a few kilometers away, phase-shifted only by propagation delay. Today, the entire notion of "live" is a bit more fuzzy; "live" now means not intentionally recorded for later delivery. One consequence is the potential for congestion on interconnection networks in a synchronous video system. The thought of defining quality of service was an oxymoron in a synchronous video system becasue each coax carried but a single signal. Now, "signals" may well compete for bandwidth on a larger pipe. Managing such a complex system requires an understanding of statistics and the way applications access the network.

Lastly, we now find ourselves increasingly managing metadata and operations databases. Due to recent FCC action, DTV tuners will expect to see PSIP. To generate PSIP, you must gather data from various sources, including listing services, traffic, automation and perhaps from DTV encoders. Understanding what bits must be delivered, where they come from and how they are processed before assembly in the PSIP generator will be critical. Understanding how a MAM system makes the decision to move media offline is important if you want to understand why something is not stored where you expected it. When automated actions become manual, you must know where the control over bits went awry and how to redirect the various applications and networks involved to heal the electronic wound.

As with all things in life, the key is knowledge. The acquisition and application of knowledge is rapidly becoming the key to the broadcast engineer's future. **BE**

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

Send questions and comments to: john_luff@primediabusiness.com



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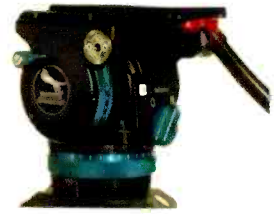

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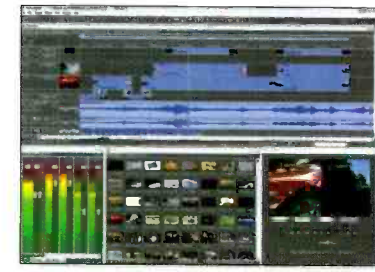

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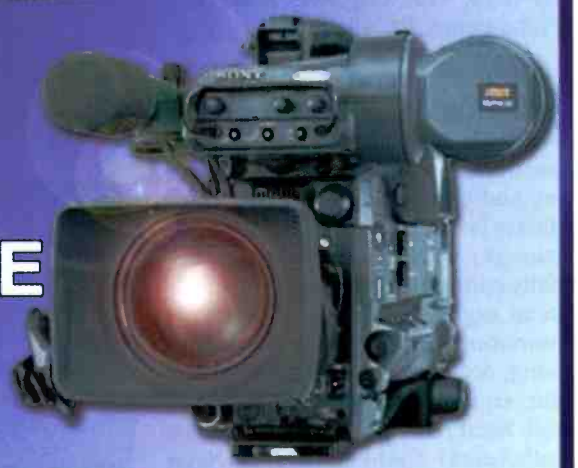

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Making change

BY PAUL MCGOLDRICK

All of us have problems with changing the status quo. We would be in denial if we said otherwise. But, when change comes gradually, sometimes we don't even notice it. In TV broadcasting, there is a change that now pervades the industry that most people either have not noticed or have intentionally ignored or denied.

Forty years ago, in the broadcast equipment market, the modus operandi for product sales was very different than it is today. In my initial days in the industry, an operations unit couldn't buy a product without approval from the engineering department. We tested products, measured and compared the results with the data claimed by the manufacturer and then (and some out there will have a hard time accepting this fact) we either recommended the product to operations or we flatly denounced it as unbuyable.

In some cases, we actually had to design and build the equipment ourselves, because what existed in the marketplace simply didn't meet our needs. And, sometimes, this resulted in major system developments that pushed the envelope of technology where no vendor could afford to go. That's what has made the intellectual property of BBC Technology (formerly BBC's R&D department) so hot as the development process continues to spin it out into the open market. Compare yesterday's radio amateur who made all his own equipment with today's counterpart who shops for the smallest Japanese box. That difference is paralleled in the professional market.

Twenty years on, the vendors and/or distributors still dropped in to demo the new product. But, increasingly, operations departments were making the buying decisions and engineering had little say in it — sometimes no say at all. Yes, the poor engineers would have to keep the purchased products working 24 hours a day, but the operating bells and whistles were more important. It was also becoming clear that the operators' bosses needed to be briefed on the products without their staff present because a demo that included all levels of staff turned into a "show how much the boss doesn't know" event. And, whenever that happened, the order was gone.

In some cases, we actually had to design and build the equipment ourselves.

Things have changed again today, but it wasn't clear to me just how much until after I had left NAB this year and digested what I had seen. Twenty years ago, the major players made their own programs in their own studio facilities, or at sporting venues, using their own equipment. How much of that do you see today? When you look at the number of vendors vying for a chunk of newsroom money (a service that, for small operations, is an absolute money loser) you have to wonder why you would want to be in that business.

But the rest of real programming (even "reality" programming) doesn't come from the big studios any more. The model has changed in both the business sense and the equipment sense. With the sheer plethora of distribution sources, with hundreds of channels on cable and satellite, there is not nearly enough original programming to go around. Yes, you can survive on a channel of game shows, or '60s family series, or even repeated soaps, but most people will switch channels when they recognize a program they have already viewed.

When a production company pitches a deal to one of the networks, the agreement consists of how much money is going to change hands, and when; and in what video and audio format they will deliver the program, and when. The production company has no choice in the format; it has to acquire suitable equipment to deliver what the network wants or the production company doesn't get the business. It has to determine what other equipment and facilities it needs and it has to mold its own budgets around that. It is buying in a different way.

The other buyers — the networks or the cable channels — are now distribution stations, with or without news operations, and they are increasingly automated. They also are buying in a different way.

If you are a vendor, the next time you think about your equipment sales channels, think differently. Where you once sold to operations the size of half dollars, now you're selling to dimes. And it takes many, many more of those to bring home the big bucks. BE

Paul McGoldrick is an industry consultant based on the West Coast.

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