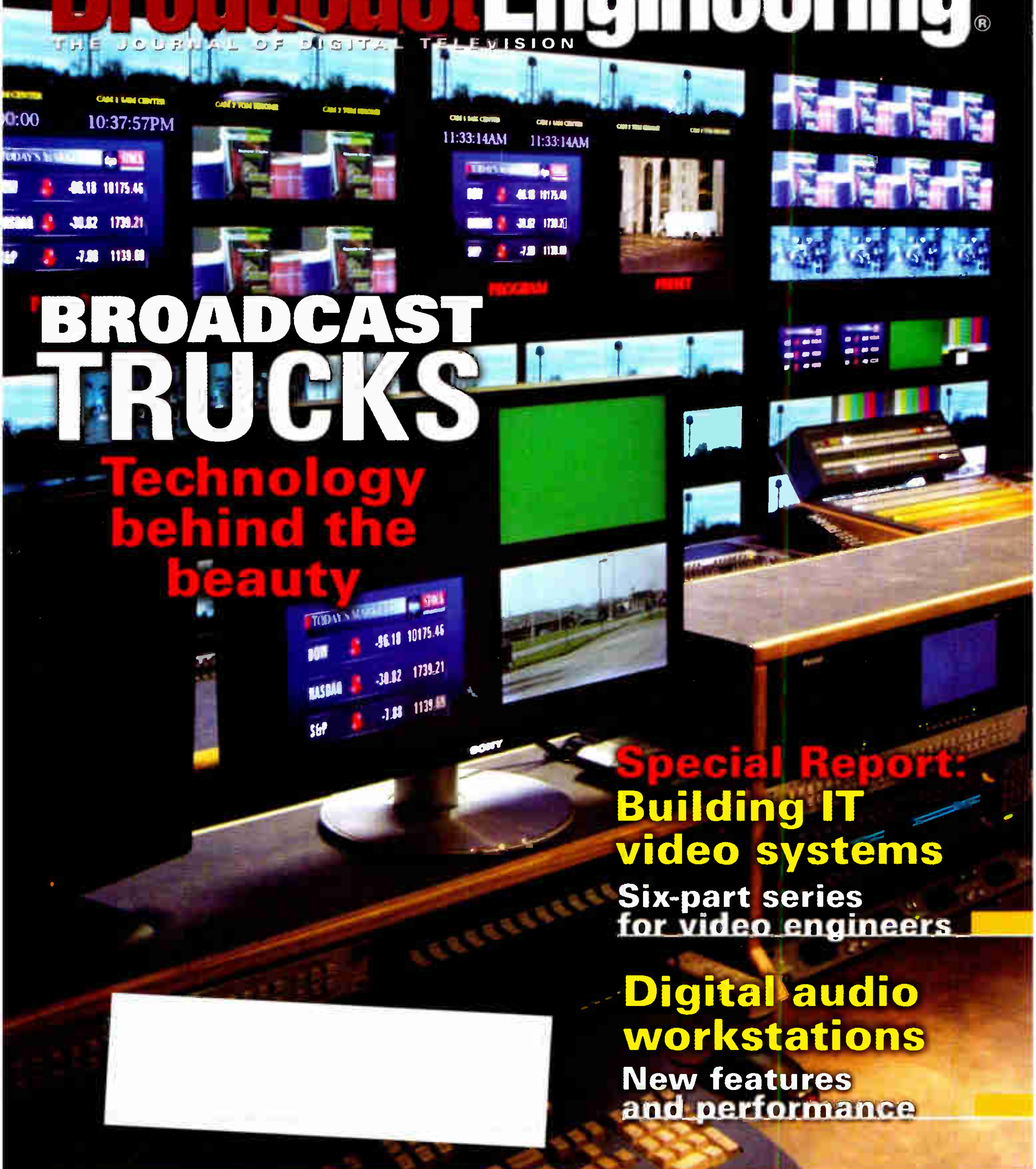
www.broadcastengineering.com

JANUARY 2005

BroadcastEngineering®

THE JOURNAL OF DIGITAL TELEVISION



BROADCAST TRUCKS

Technology behind the beauty

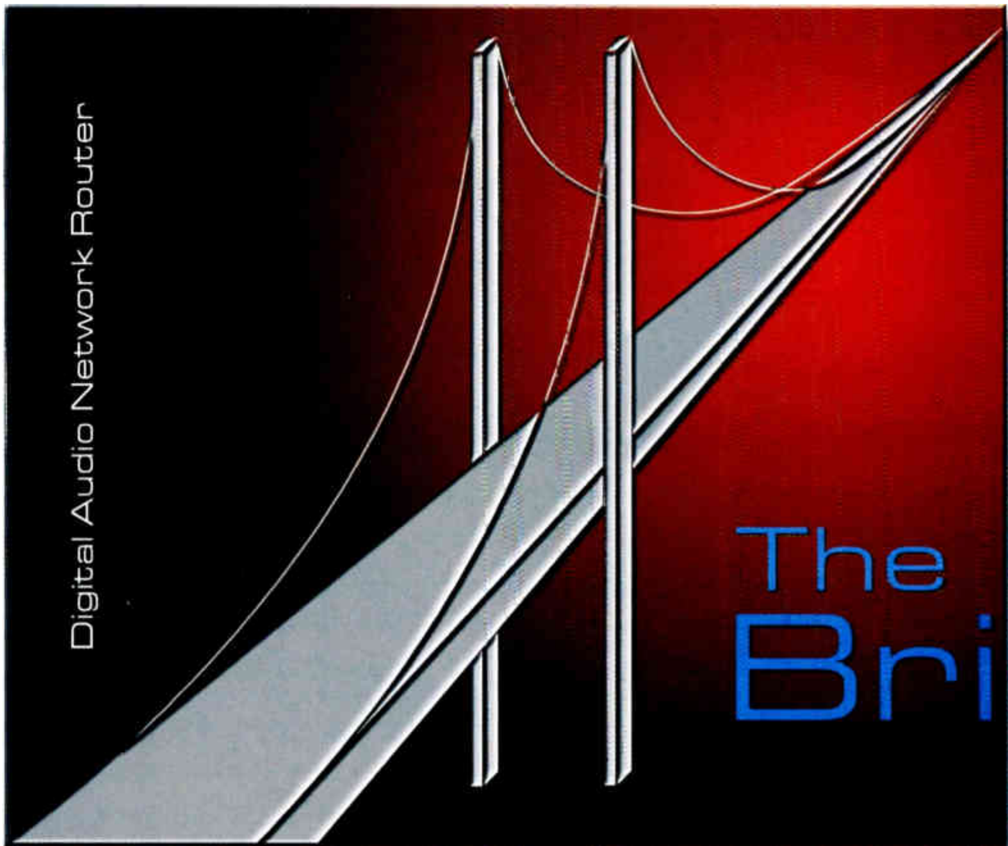
Special Report: Building IT video systems

Six-part series for video engineers

Digital audio workstations

New features and performance

A PRIMEDIA PUBLICATION



The Bridge

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.

It's not just a Digital Console, It's an ENTIRE Audio Infrastructure

You Can Start with a simple AES router with analog and digital inputs and outputs. From there you can add logic I/O cards and scheduling software; you can link multiple master bridge cages together to achieve thousands and thousands of I/O ports; you can create a custom system that includes multiple smaller remote satellite cages— with everything interconnected via CAT5 or fiberoptic links.

But That's Just the Beginning: you can also add mix engine cards, interface to your automation system; you can choose from two different WHEATSTONE series control surfaces (D-5.1 or D-9), each specially configured for production room, on-air or remote truck applications. We also provide a full complement of Ethernet protocol remote router control panels, as well as a complete family of plug-in modules that interface the routing system to existing Wheatstone digital and analog standalone consoles.

The D-9 is Compact yet Powerful: It can route, generate and monitor 5.1 surround signals and produce simultaneous 5.1 and stereo master signals for your dual broadcast chain. The console also provides extensive, rapid communication paths throughout your entire Bridge system. Motorized faders and control setting storage and recall make show-to-show transitions fast, easy and accurate.

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.

Wheatstone

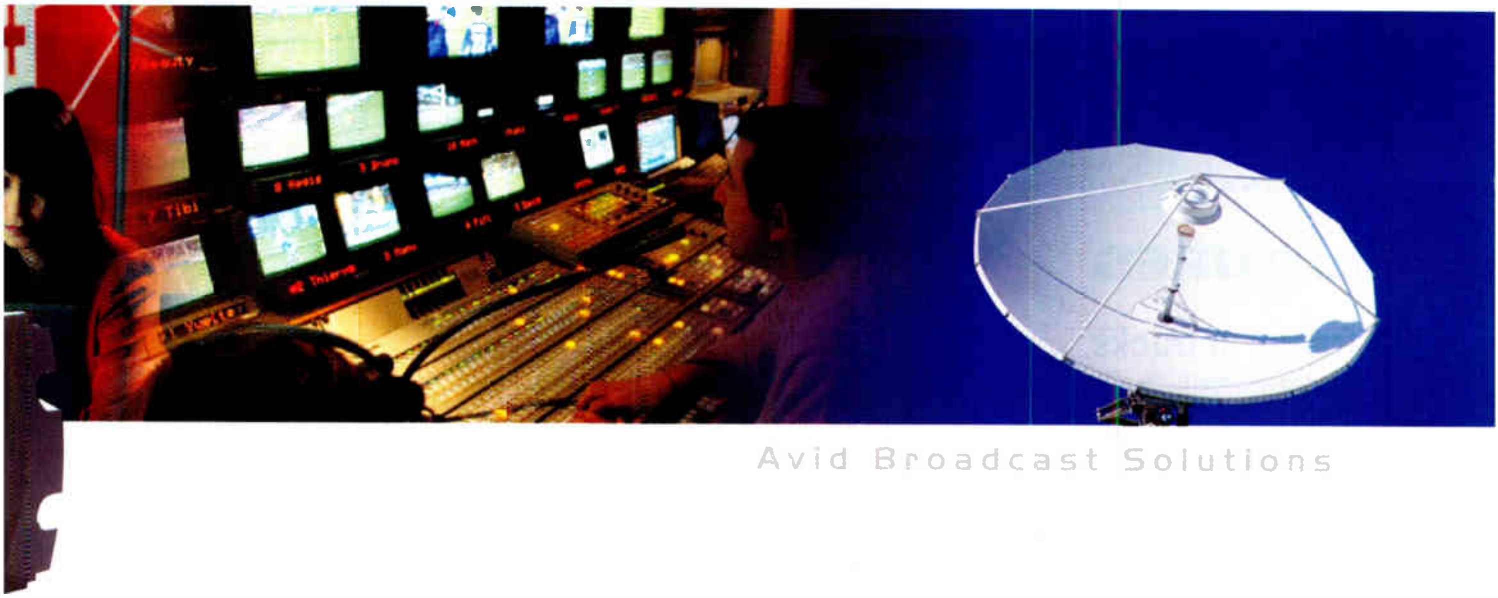
the digital audio leaders

600 Industrial Drive, New Bern, North Carolina, USA 28562
tel 252-638-7000 / fax 252-635-4857 / sales@wheatstone.com

www.wheatstone.com

Made in USA

World Radio History



Avid Broadcast Solutions

Be first.

se it's only news once.

From ingest to playout, nothing stands in the way of a great story.

To be a leader, you have to stay on top of the news, the competition, and the latest technology. That's why Avid has become a leading choice of news organizations around the world for innovative editing, media asset management, networking, storage, and newsroom systems. Integrated, all-digital, end-to-end broadcast solutions from Avid continue to set the pace in versatility, reliability, and price/performance, so broadcasters can focus on today's news – and not worry about tomorrow's technology.

www.avid.com/broadcast

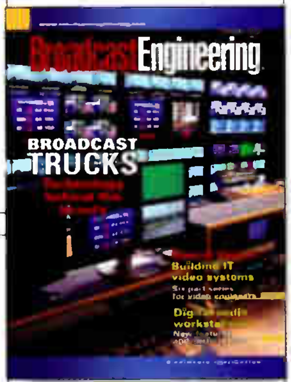
make manage move | media™ Avid®

JANUARY • VOLUME 47 • NUMBER 1 www.broadcastengineering.com

Broadcast Engineering
THE JOURNAL OF DIGITAL TELEVISION

CONTENTS

FEATURES



BEYOND THE HEADLINES

ON THE COVER:
For mobile system integrators, 2004 was an exciting year. Vendors carefully tested out HD for several months. Today, many have fully embraced it.

DIGITAL HANDBOOK

(Continued on page 8)


HJ22ex7.6B
22x Tele
NEW
HJ21ex7.5B
21x EFP
HJ40x10B/HJ40x14B
Portable Long/Tele
(w/Image Stabilizer)
HJ11ex4.7B
11x Wide
HJ17ex7.7B
17x Standard
NEW
HD
SD
• PRIME TIME • REALITY TV • SPORTS EVENTS • ENTERTAINMENT
• COMMERCIALS • DOCUMENTARY • NEWS EVENTS • WORSHIP
• SURVEILLANCE • B2B
reativity
Canon has more ways to enhance production content.
Creative content is everything, which is why Canon has a portable lens selection that meets the needs of everyone. From SD to HD, tape to tapeless, studio to outdoor, Canon engineers a portable lens family having extremely high optical performance, broad optical flexibilities, and powerful digital empowerment. To capture attention-getting, high-impact video, creativity begins with "C"anon portable lenses.
J17ex7.7B
17x Standard
J11ex4.5B
11x Wide
J22ex7.6B
22x Tele
NEW
NEW
J35ex11B
Portable Long
J35ex15B
Portable Tele
Canon's e-series portable lenses feature highly useful control tools to customize digital functions.
eIFxs
eHDxs
Find out more at canonbroadcast.com
1-800-321-HDTV (Canada: 905-795 2012)
Maximize Your Camera's Performance.
Canon KNOW HOW®
©2005 Canon U.S.A., Inc. Canon and Canon Know How are registered trademarks of Canon Inc. in the United States and may also be registered trademarks or trademarks in other countries

JANUARY • VOLUME 47 • NUMBER 1
www.broadcastengineering.com

BroadcastEngineering
THE JOURNAL OF DIGITAL TELEVISION

CONTENTS

Systems Design & Integration

New Products & Reviews

Departments

Freezeframe

RF UPDATE

By what date must stations have fully implemented the ATSC A/65B PSIP standard? Readers submitting winning entries will be entered into a drawing for *Broadcast Engineering* T-shirts. Enter by email. Title your entry "Freezeframe-January" in the subject field, and send it to: editor@primediabusiness.com. Correct answers received by March 1, 2005, are eligible to win.

To The Power of Maxell

▸Tim McGuire

A champion of the arts, guardian of the creative spirit and head of three creative service companies, Tim McGuire is blown away by the power and performance of Maxell Professional Media. "Our clients demand the best and that is what Maxell delivers from product quality to customer service." That's why Tim's editorial boutique, Cutters, uses Maxell Digital Betacam for mastering, archiving and duplication. The Maxell line of Professional Media also includes HDCAM, DVCPROHD, D-5, MPEG-IMX, DVCPRO, Betacam SP, Betacam SX and DVD-R Plus Series. **You can email Tim at tim@cutters.com. To learn more about Maxell Professional Media, call 1.800.533.2836 or visit maxell.com.**

cutters

another country
visual sound

SOL

maxell

Expanding Memory & Mobility ▸

Recordable Media   Data Storage   Portable Energy   Technological Partnerships

Wanted:
Good HD audio engineer

While I'm not a regular sports fan, I've found myself surfing by the last few weeks of football games. What I've heard literally hurts my ears.

The one caveat to the following comment is that I'm getting reception via Time Warner Cable. So, it's possible (likely) its equipment could affect some aspects of the problem. However, because the results have been so across-the-board in terms of various HD programs and networks, I'm beginning to question the audio expertise of my fellow broadcast engineers.

As a regular *Broadcast Engineering* reader, you've probably seen photos and read the stories about some of the audio technology being installed in today's HD broadcast trucks. These trucks have about every audio goodie an engineer could want. There is probably a quarter-million dollars in just the audio console! Given all this technology, wouldn't you think it's possible to be able to deliver a consistent level of quality in the audio feed of the typical HD football game?

Granted, today's audio feeds are a whole lot better than what we had two years ago. Back then, the audio in HD trucks was really just an afterthought. But come on! How hard is it to get the surround mics fed into the proper channels? Or, why hasn't the mixer done a mono check? If he had, perhaps someone would have noticed that the color man's mic is out of phase.

Although not all HD sporting events suffer from these types of problems, many still do. And, I'll admit that it is possible for downstream problems to occur that can ruin even the best mix — but a mic phase reversal isn't caused at the cable headend.

Another issue is the amount of surround sound used in the broadcasts. CBS typically has more surround than does FOX. While I like the sound of the CBS mix better, I'll leave the decision on the amount of surround to the creatives. However, one piece of free advice to FOX: If you won't decrease the amount of trashy graphics and the annoying noise used as you fly them in, please drop the audio level a bit. These A/V effects obscure and detract from both seeing the game and hearing the announcers. What's next? Adding an extra "swish" every time you switch between cameras?

The worst problem with today's HD audio feeds is inconsistent levels between the live feed and network or local station breaks. On the CBS and FOX feeds I examined last Sunday, both exhibited easily noticeable audio level shifts when the program switched between the game site back to network origination or between remote sites.

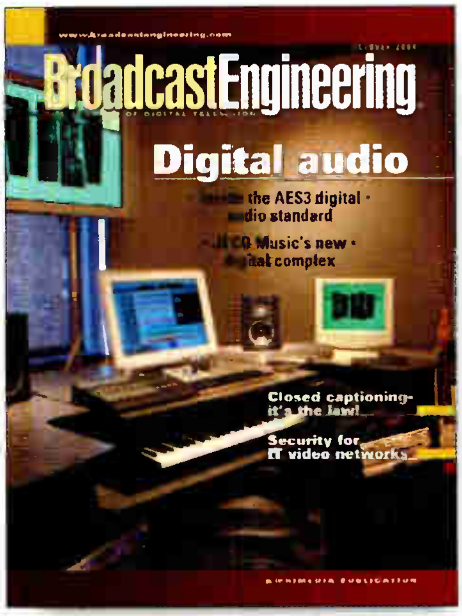
Granted, this is armchair quarterbacking, but it looks to me like the network MCR guys are improperly matching audio levels between the remotes and network commercial playout. The result is that we home viewers set our volume controls to enjoy the game, but then get blasted when the first monaural commercial comes along. How about adjusting dial norm on those encoders to help level out the differences? You've got the technology, so use it.

Next month: Is it my glasses or is that HD image fuzzy? Why can't HD camera operators FOCUS?!

Brad Dick
editorial director

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

World Radio History



Selected file-sharing

Brad,

Our post-production facility has many networked computer-based editing and media management systems. In the administration of these bread-and-butter production systems, I have one hard-and-fast rule — no Internet connections. Oh, sure, we have lots of "connected" workstations, separated from the production workstations with physical space. Only "sneakernet" is used to transfer files between these two worlds. I had an Internet-connected DVD workstation that was destroyed by an e-mail virus a few years ago, which confirmed my policy. And, our office network has been attacked on numerous occasions, requiring us to implement some of the firewall and anti-virus techniques described in October's issue.

I would like to see an article on ways to enable isolated networks to still share files with Internet-enabled networks, on a selective basis. As an example, a client sends us a logo graphic file to use in a spot. We download it on the office network, dump it to a disk (or jump-drive or firewire drive or whatever) and connect that to the production network. How about a separate connection to that office network, with a way to temporarily enable a file-transfer connection, just for the amount of time needed to transfer the info? This, effectively, isolates the production system from the Internet, while still enabling us to be "connected" to the outside world.

Ed Fraticelli

Brad Gilmer responds:

There are several things you can do to "cautiously connect" your broadcast network to the Internet. At a high level, one approach would be to build two independent networks, one for the broadcast network and one for the business/Internet. You can then control what crosses over between the two networks based upon things like protocol, MAC address of the source or destination computer, or some other parameters.

Another thing you can do is use dual-homed hosts — servers with two NIC cards. You plug one NIC card into the broadcast network and one NIC card into the business/Internet network. The server can be configured to make its data available on both networks. Also, most servers can be configured to be a router, routing permitted traffic between the two networks. While you can use the server to do both jobs, I suggest you use the server to deliver its content to both networks, but use a separate router to control the traffic moving between the two networks.

Pixels

Dear Michael Robin,

I bought both of your books, but I'm struggling against the pixels. Are the pixels that you sample really displayable pixels, or just samples?

If they are samples, can you never reach more real display pixels than half the samples (Nyquist)?

Peter Tavenier
Holland Railconsult

Michael Robin responds:

If you are sampling an analog video signal, the horizontal resolution, (expressed in LPH) is equal to the maximum video frequency multiplied by the resolution factor. You can't do better! The CCIR 601 maximum allowable frequency is 5.75MHz (lower than the 6.75 Nyquist frequency) so the resulting resolution, at best, is approximately 455LPH. If, on the other hand, you have a concatenation of conversions back and forth between analog and digital, as in a broadcasting studio, the end result cannot be better than what the resulting analog frequency response allows. This will definitely be lower than 5.75MHz.

If you are talking about samples, CCIR 601, 720 active horizontal samples equals 360 sinewaves during an active line, or a resulting frequency of 6.75MHz. So, because the maximum video frequency is 5.75MHz, we have no hope of ever displaying so many pixels on an active line. What we can hope to see is about 613 pixels per active line.

Bear in mind that we live in a mixed analog/digital world! BE

October Freezeframe:

Q. Name the company and product name of the first videodisk recorder for ENG applications.

A. NEC Diskcam

Winner:

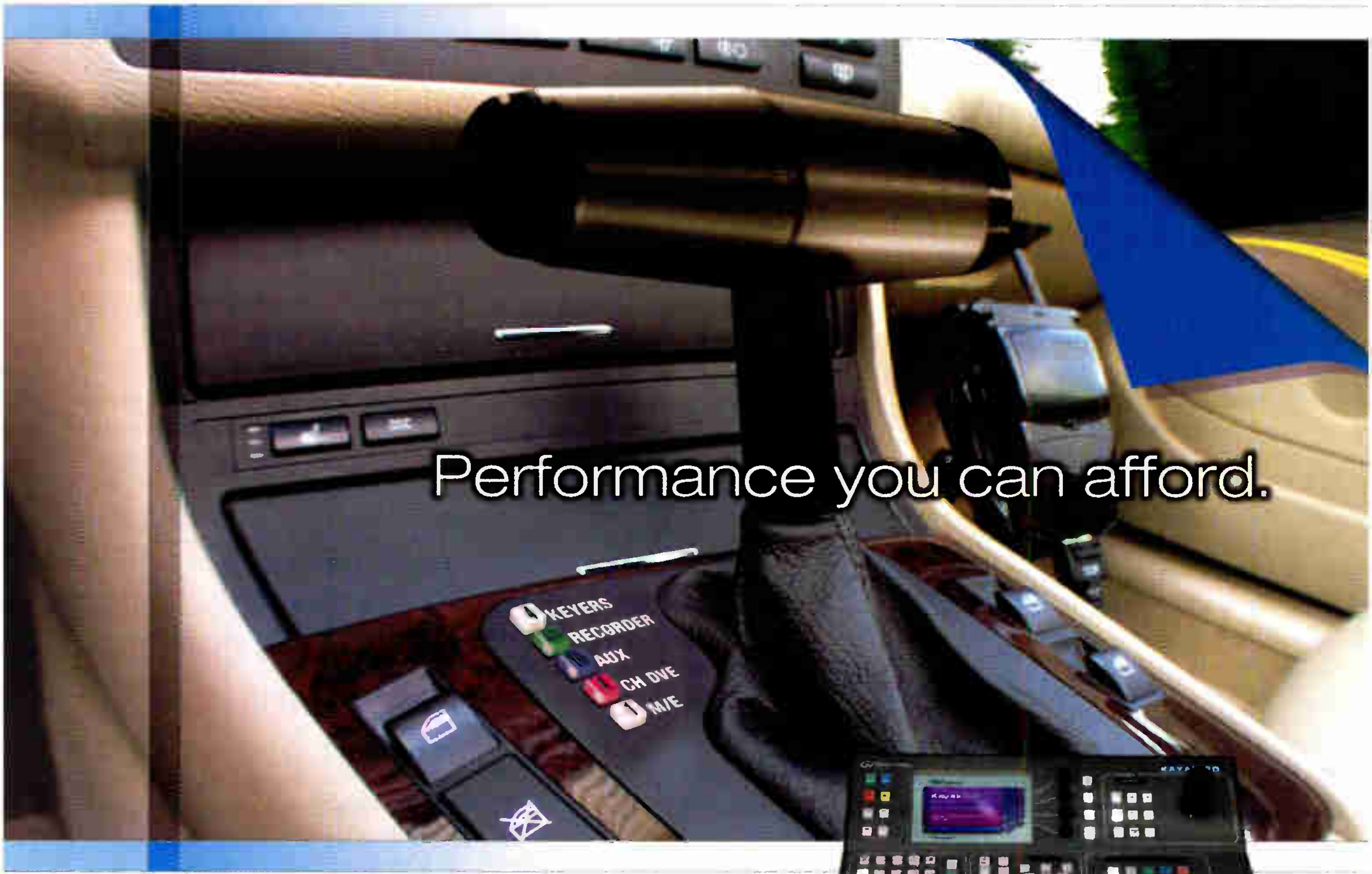
Tom Alderson

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*

AFFORDABILITY THROUGH INNOVATION
Sophisticated Switching
in an Affordable 1 M/E System



KayakDD™ Digital Production Switcher

With handling you'll love and a price you can afford, the Grass Valley™ KayakDD digital production switcher offers superior image quality in a compact system with more power than any other 1 M/E switcher.

Leveraging many of the features found in our Kalypso™, Zodiak™ and XtenDD™ switchers, the KayakDD can handle everything from live studio and mobile productions to small corporate studios and editing applications.

With four keyers, two backgrounds, a utility bus, and up to four chroma keyers, the KayakDD switcher gives you more power in one M/E than any other switcher in its class. To create even higher levels of production value, the KayakDD switcher supports up to four transform engines for sophisticated digital video effects. Other options include a 4x4 second RAMRecorder™ for internal clip and still storage and RGB color correction—all packed into a compact 2RU frame. The intuitive 19" control panel, combined with our MaKe Macro™ editor, makes it easy to create complex sequences and trigger them with the push of a button.

Give it a run.

To learn more about the KayakDD digital switcher and what it can do, contact your local distributor or visit: **www.thomsongrassvalley.com/kayak**

A THOMSON BRAND

grass valley

The sense of Congress

BY CRAIG BIRKMAIER

Don't you just love the way Congress fixes things? Listening to the politicians, the pundits and the mass media, you'd think that our elected representatives have the unique ability to gather a sense of what best serves the public interest and then to codify this into legislation that will fix any problem. Of course, you'd be wrong.

Take campaign finance reform, for example. This legislation was supposed to close the door on soft money, which was being funneled through the political parties. We were told that it would help curtail the dramatic growth in spending on political campaigns. Just a few election cycles back, we crossed the billion-dollar threshold on spending for congressional and presidential races. In 2000, we passed the $2 billion milestone. In 2004, according to *USA Today* (see Web links), we passed the $3 billion milestone — actually $4 billion when all election costs are counted. This includes more than $400 million in soft money funneled through the 527 loophole. Guess it's back to the drawing board for campaign finance reform.

Ditto for telecommunications reform. Congress "fixed" it in 1996 with the most comprehensive overhaul of telecommunications regulations since the original Telecommunications Act was written in 1939. The 1996 act authorized the FCC to loan broadcasters a second channel for the transition to digital television. It also instructed the FCC to establish regulations for the DTV transition, including a schedule to assure the timely return of the analog spectrum — valuable spectrum that is to be used to enhance public-safety communications and to be auctioned for new telecommunications services when broadcasters are forced to give it back.

A resolution with no definition

It should come as no surprise that things did not work out as planned when Congress overhauled the Telecommunications Act in 1996. We've got tons of dark fiber in the ground, but the last mile is still copper. The attempt to open up local exchanges to create more local competition for traditional telephone and new high-speed data services failed. The cable industry has resisted attempts to unbundle the set-top boxes needed to access new digital TV services, and cable rates keep climbing faster than inflation rates. The politicians are no closer to getting the analog TV spectrum back from broadcasters than they were in 1996.

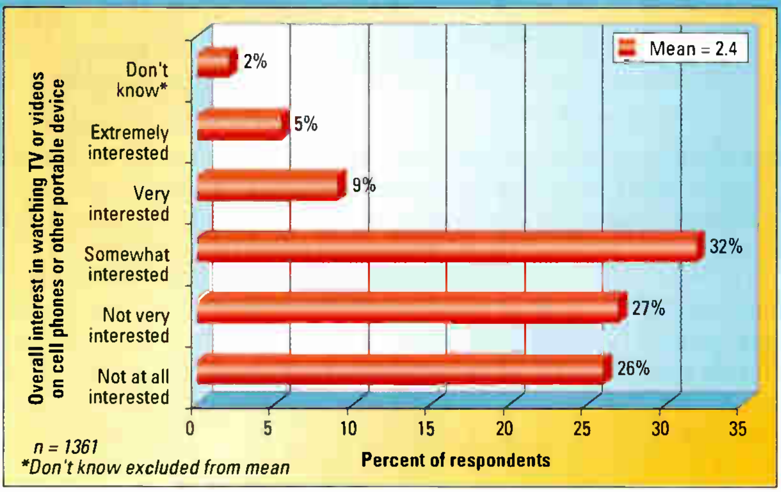
The politicians are no closer to getting the analog TV spectrum back from broadcasters than they were in 1996.

As expected, the cries to get the spectrum back are growing louder now that the election is over. The FCC has been working on a revised plan, acknowledging the reality that the analog spectrum will not be returned on Dec. 31, 2006 — the deadline they set in 1997 when they launched the DTV transition plan. It now appears, however, that the FCC is going to dump this one back in the lap of Congress, which has announced its intentions to look at telecommunications reform, again, during the next session. Just for dramatic effect, Congress attached a "Sense of Congress" resolution to the

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

Lack of interest in TV on cell phones

Consumers fear it could contribute to inconsiderate behavior



SOURCE: Lyra Research www.lyra.com

intelligence reform bill passed by the lame duck Congress in December. The resolution calls on broadcasters to meet the Dec. 31, 2006, deadline set by the FCC. Unfortunately, this resolution provides no definition as to how this is to happen; it does not enjoy the same force of law as the little rider they put on the Balanced Budget Act of 1997.

Just months after the FCC set the DTV transition schedule, those sensible folks in Congress "fixed" it. No broadcaster would be forced to return the analog channel until 85 percent of the homes in their market were capable of receiving the DTV signals of every broadcaster in the market. To be included in that 85 percent, the home would need to have at least one set with an off-air DTV tuner, or a digital multichannel service that carries the DTV signals of all of the broadcasters in that market.

Have our elected representatives lost their senses? Do they understand that they have the power to put the teeth back into the 2006 deadline by simply repealing the 85 pecent rule that Congress passed in 1997? Of course they do. Do they have the resolve to do it? No way. They have another expensive election to pay for in 2006.

Two more years!

There's no reason to get too excited about DTV reform. Mark your calendars: Congress will pass another major telecommunications reform bill in the summer or fall of 2006. The next year-and-a half will be marked by numerous Congressional hearings, while the FCC continues to interpret the divergent views of Congress and federal appeals courts on issues too numerous to enumerate here. For broadcasters, the top issues are:

Digital must-carry of the entire 6MHz DTV program multiplex without downconversion.

Ownership caps and media cross-ownership issues.

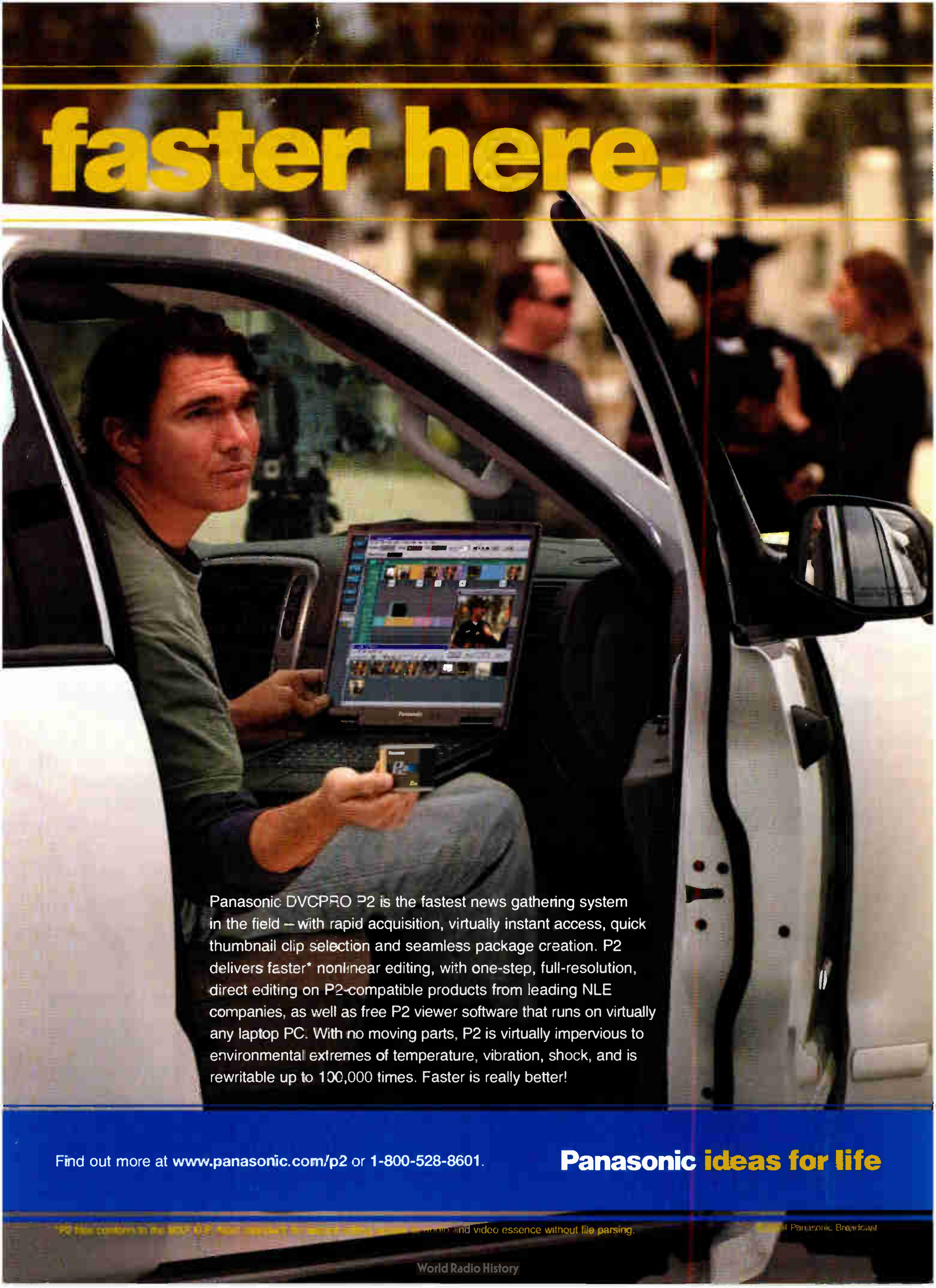
Delaying FCC plans to allow spectrum sharing for low-power WiFi devices in the TV spectrum.

Leveling the playing field with respect to indecency limits.

Just months after the FCC set the DTV transition schedule, those sensible folks in Congress "fixed" it.

Implementing the Broadcast Flag and limits on consumer video recording rights.

The FCC may try to move on some of the issues listed above this year. A federal appeals court just ordered the FCC to explain why it has not issued its final rules on DTV carriage by cable systems. It is likely that whatever the FCC decides, it will face immediate


faster here.
Panasonic DVCPRO P2 is the fastest news gathering system in the field – with rapid acquisition, virtually instant access, quick thumbnail clip selection and seamless package creation. P2 delivers faster* nonlinear editing, with one-step, full-resolution, direct editing on P2-compatible products from leading NLE companies, as well as free P2 viewer software that runs on virtually any laptop PC. With no moving parts, P2 is virtually impervious to environmental extremes of temperature, vibration, shock, and is rewritable up to 100,000 times. Faster is really better!
Find out more at www.panasonic.com/p2 or 1-800-528-8601.
Panasonic ideas for life
and video essence without file parsing.
Panasonic Broadcast

legal challenges. Any move by the FCC will frame the key issues. But, ultimately, Congress will need to legislate a solution to address the issues raised by the courts.

Lower courts have ruled in favor or new consumer digital technologies ranging from CD burners to portable MP3 players.

In March, the Supreme Court will hear a controversial case to determine whether file-sharing software companies can be held legally responsible for copyright infringement on their networks. The case focuses on Morpheus and Grokster, each of which are popular peer-to-peer, file-swapping applications that are widely used to trade movies, music and software.

At the core of the case is an interpretation of the 20-year-old Sony-Betamax decision that made VCRs legal despite their ability to copy TV shows and movies. That decision set out rough guidelines under which devices used to make illegal copies of copyrighted material could be distributed without the manufacturer being responsible for the resulting piracy, as long as the product was also capable of "substantial non-infringing uses."

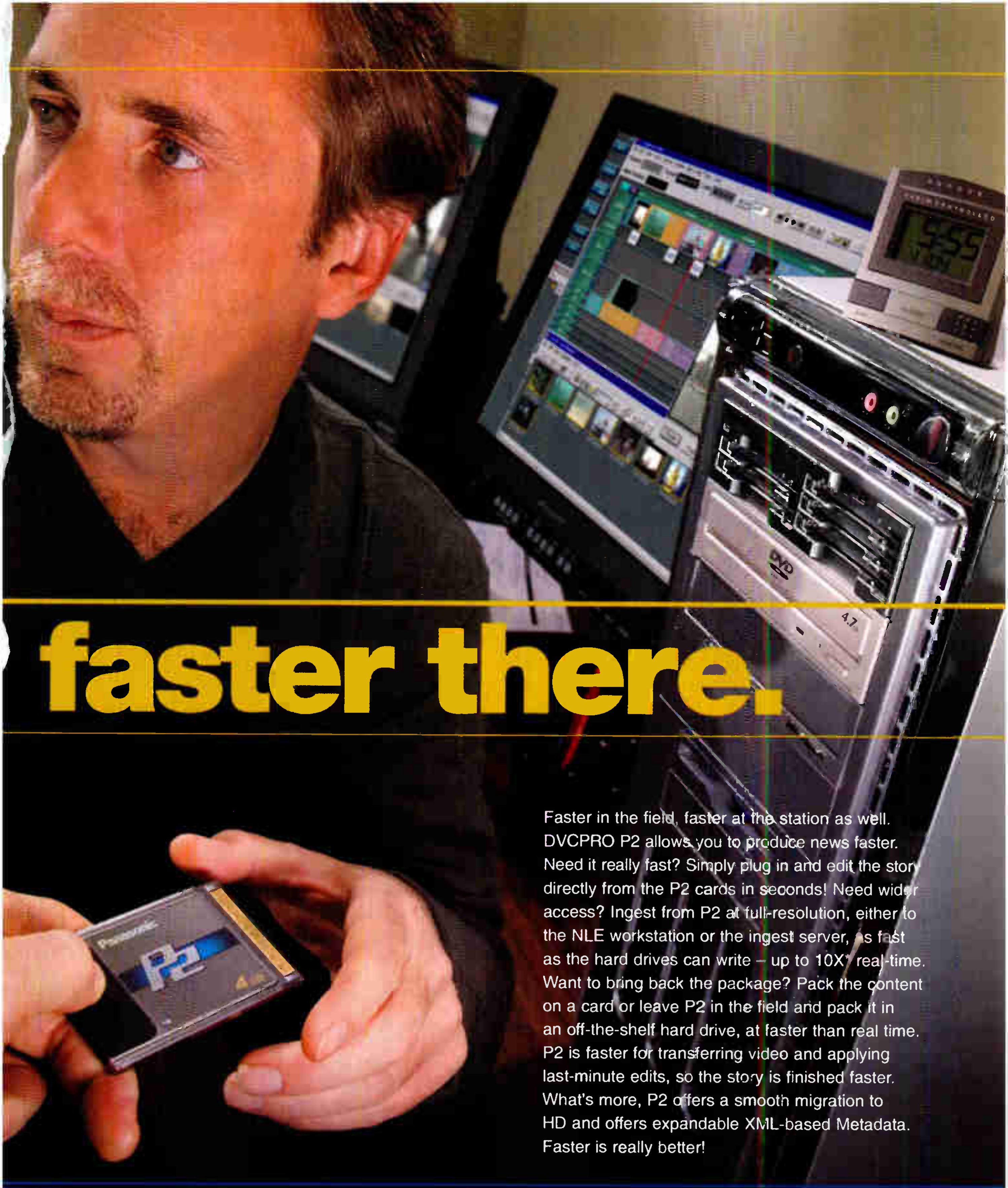
Based on this precedent, the lower courts have ruled in favor of new consumer digital technologies ranging from CD burners to portable MP3 players. In choosing to hear this case, the Supreme Court has opened the door to speculation that it might modify the personal recording rights established by the Sony-Betamax decision. Or the court could decide that file-sharing networks must block the sharing of copyrighted files in a manner that parallels the Broadcast Flag, which limits the ability of consumers to make and share copies of free-to-air digital TV broadcasts.

In December, Senator Daniel K. Inouye (D-Hawaii) told the Honolulu *Star-Bulletin* that he and Ted Stevens (R-Alaska) will hold six meetings across the country to let the public weigh in on possible changes to the Telecommunications Act. As the

Web links

USA Today on 2004 election costs:
www.usatoday.com/news/politicselections/nation/2004-11-02 election costs_x.htm?POE=NEWISVA

FREEVIEW DTV service:
www.freeview.co.uk


faster there.
Faster in the field, faster at the station as well. DVCPRO P2 allows you to produce news faster. Need it really fast? Simply plug in and edit the story directly from the P2 cards in seconds! Need wider access? Ingest from P2 at full-resolution, either to the NLE workstation or the ingest server, as fast as the hard drives can write – up to 10X* real-time. Want to bring back the package? Pack the content on a card or leave P2 in the field and pack it in an off-the-shelf hard drive, at faster than real time. P2 is faster for transferring video and applying last-minute edits, so the story is finished faster. What's more, P2 offers a smooth migration to HD and offers expandable XML-based Metadata. Faster is really better!
Find out more at www.panasonic.com/p2 or 1-800-528-8601.
Panasonic ideas for life
* Speed may vary depending on a station's total system configuration.
© 2004 Panasonic Broadcast

ranking democrat and chairman, respectively, of the Senate Commerce Committee, they will preside over the planned rewrite of the act.

Also in December, President Bush told the Commerce Department to create a spectrum task force that will have one year to produce a report on how to improve the management of the nation's airwaves.

Meanwhile, the real DTV transition will continue. Cable will push customers into digital services as they attempt to limit the loss of subscribers to DBS. HDTV programming will continue to proliferate on cable, DBS and HD-DVD. Consumers will continue to buy new HD-capable

In December, FREEVIEW, the free digital service that provides more than 30 free digitalTV channels, broke into the top 10 of all DTV deployments in the world.

displays and will continue to show little interest in receiving HDTV off air. And broadcasters will continue to protect the NTSC "sacred cow" while they look for a business model that can survive the DTV transition. That business model should be obvious. It's called free TV.

In December, FREEVIEW, the free multichannel successor to the failed On Digital subscription DTV broadcast service, broke into the top 10 of all DTV deployments in the world. The other nine are paid multichannel services including large cable systems in the U.S. and DBS systems around the world. About 25 percent of the FREEVIEW set-top receivers being sold are for second sets.

Unfortunately, the notion of free-to-air digital multichannel services has gained little traction with U.S. broadcasters. USDTV recently announced that it has 10,000 subscribers in three U.S. markets for its multichannel DTV subscription service, which costs $20/mo. At NAB2004, Emmis Communications announced that a coalition of 12 broadcast groups would work together to pool DTV spectrum to deliver a $25/mo. subscription service package to compete with USDTV. The coalition has invited other broadcasters to join, but the initiative has failed to gain traction with broadcast networks and groups. BE

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

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

EVS BROADCAST EQUIPMENT

Quantel

PINNACLE SYSTEMS

DAYANG
Production Automation Archiving Networking

LEITCH

Avid

grass valley
A THOMSON BRAND

faster everywhere.

DVCPRO P2 is off to a fast start and Panasonic wants to thank the television stations across the country that have made P2 purchases. In addition, P2 keeps getting faster thanks to Panasonic's P2 Alliance Partners. By making the conscious decision to partner with virtually all NLE system developers, P2 is evolving quickly and is supported by a wide range of applications. Discover what news professionals are finding out: the faster you get P2, the better.

KRON-TV, San Francisco, CA
New York 1, New York, NY
KWCH-TV, Wichita, KS
WKRG-TV, Mobile, AL
Entravision Station Group
KALB-TV, Alexandria, LA
KCBD-TV, Lubbock, TX
KFOX-TV, El Paso, TX
KFTV-TV, Fresno, CA
KIRO-TV, Seattle, WA
KTNV-TV, Las Vegas, NV
KTRE-TV, Lufkin, TX
KTVI-TV, St. Louis, MO
KTVU-TV, Oakland, CA
KXLN-TV, Houston, TX
Tamberelli-Rental, New York, NY
WNYW-TV, New York, NY
WPXI-TV, Pittsburgh, PA
WBNS-TV, Columbus, OH
WDEF-TV, Chattanooga, TN
WEWS-TV, Cleveland, OH
Wexler Rental, Los Angeles, CA
WFLA-TV, Tampa, FL
WFTV-TV, Orlando, FL
WHIO-TV, Dayton, OH
WJBF-TV, Augusta, GA
WLOX-TV, Biloxi, MS
WNYO-TV, Buffalo, NY
WSOC-TV, Charlotte, NC
WTOV-TV, Stubenville, OH
WTVQ-TV, Lexington, KY
WWOR-TV, Secaucus, NJ

Find out more at **www.panasonic.com/p2** or **1-800-528-8601**.

Panasonic ideas for life

À la carte
gets negative response

BY HARRY C. MARTIN

In late November the Media Bureau released its report detailing the (few) pros and (numerous) cons of an à la carte pricing model for cable and satellite (multichannel video program distribution, or MVPD) programming. Last May, members of the House and the Senate requested that the FCC weigh in on the potential for à la carte pricing in MVPD markets to reduce rates and increase viewer control over channel and content selection. In response, the bureau conducted a symposium and solicited public comments on the positives and negatives. As a result of its research, the bureau gave the model a less-than-warm reception.

According to the bureau, an à la carte model would *not* lower subscription costs or promote viewer choice. It concluded that the outcome of such a model would be an increase in the subscribers' monthly bills, in addition to a dwindling supply of channels from which to choose.

The bureau's thinking goes like this: Under an à la carte system, MVPD providers would would have to implement a complicated new system for tracking and billing for millions of individualized, household-by-household program selections. This would cost more than continuing to offer the tiered programming bundles currently available, and the additional costs would be passed on to subscribers. Only those customers purchasing fewer than nine networks would actually see their cable or satellite bills reduced. The average MVPD subscriber, who regularly watches 17 channels, would get hit with a rate increase somewhere between 14 percent and 30 percent.

The bureau also concluded that the model would have a detrimental impact on the diversity of programming options. Under the system, networks would no longer be assured of inclusion in a basic programming tier, and many niche market providers would have to bump up marketing efforts in order to attract viewers. And, while these same special interest networks would thus be incurring (presumably) greater promotion costs, they would also likely be taking a corresponding hit in their advertising revenue. The loss of ad revenue, combined with increased marketing and operational costs, could drive many niche market networks out of business. This would reduce the options available to viewers. Some observers say that this is what has happened in Canada, which has an à la carte pricing model.

The bureau's negative assessment of à la carte pricing extended to both a mandatory approach and a partial, voluntary one. The same cost increases would apply whether the model were mandated or introduced as an option alongside tiered programming. Either way, these cost increases would be passed on to subscribers.

Rather than focus on à la carte as the solution to high prices, the bureau recommended that Congress provide incentives for increased market competition. The bureau noted the emergence of USDTV as an alternative to cable and satellite and the entry of phone companies into the video marketplace (e.g., SBC/Microsoft) as positive developments in this direction. With regard to viewer control over channel and content selection, it suggested that VOD technology and digital video recorders (e.g., TiVo), as well as the V-chip, ultimately offer better means to improving viewer control.

The bureau also addressed the practice of tying the acquisition of rights to a popular program network to the purchase and carriage of less popular program networks, say, for example, in the context of retransmission consent negotiations. Interestingly, it concluded that tying arrangements may well be counter to the public interest because they can lead to less-than-optimal use of channel capacity. However, the bureau ultimately punted, recognizing that Congress established the retransmission consent process, and that it might be imprudent for the bureau to conclude that the process is not working as intended.

With these considerations obviously in mind, the bureau also suggested that if there is a problem, it ought to be addressed in the context of antitrust laws. BE

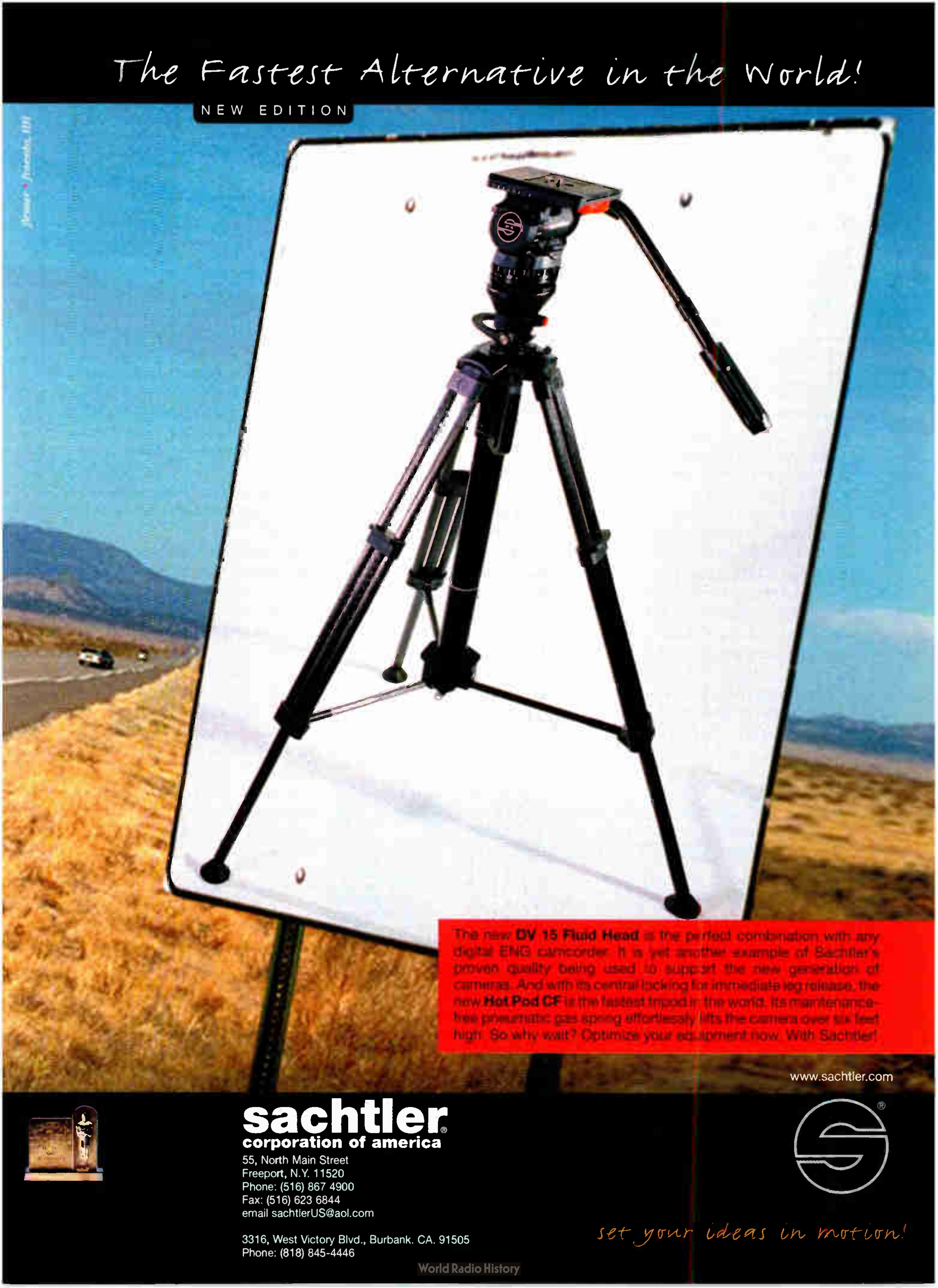
Dateline

Feb. 1 is the deadline for TV, LPTV and TV translator stations in Arkansas, Louisiana and Mississippi to file their license renewal applications. Also on Feb. 1, TV stations in those states must file biennial ownership reports and EEO program reports and begin broadcasting their renewal post-filing announcements.

On Feb. 1, TV stations in Indiana, Kentucky and Tennessee must begin broadcasting their pre-filing renewal announcements.

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

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



The Fastest Alternative in the World!
NEW EDITION
The new DV 15 Fluid Head is the perfect combination with any digital ENG camcorder. It is yet another example of Sachtler's proven quality being used to support the new generation of cameras. And with its central locking for immediate leg release, the new Hot Pod CF is the fastest tripod in the world. Its maintenance-free pneumatic gas spring effortlessly lifts the camera over six feet high. So why wait? Optimize your equipment now. With Sachtler!
www.sachtler.com
sachtler®
corporation of america
55, North Main Street
Freeport, N.Y. 11520
Phone: (516) 867 4900
Fax: (516) 623 6844
email sachtlerUS@aol.com
3316, West Victory Blvd., Burbank. CA. 91505
Phone: (818) 845-4446
set your ideas in motion!

Gamma correction

BY MICHAEL ROBIN

The cathode ray tube (CRT), the display device used in most computer displays, video monitors, television receivers and oscilloscopes, was invented by German scientist Karl Ferdinand Braun in 1897. It features a phosphor-coated screen that emits a visible light when struck by a beam of electrons emitted by a heated cathode. The electrons are concentrated into a beam, and this beam is deflected by a magnetic field to scan the viewing end (anode), which is lined with phosphorescent material. When the electrons hit this material, light is emitted.

In a television CRT, the entire area of the tube is scanned in a fixed pattern called a raster. A picture is created by the video signal modulating the intensity of the electron beam. In modern television sets, the beam is scanned with a magnetic field applied to the neck of the tube by a magnetic yoke, a set of coils driven by electronic circuits. Color CRTs use three different materials that specifically emit green, blue and red light closely packed together in strips (in aperture grille designs) or clusters (in shadow mask CRTs). There are three electron guns, one for each color, and each gun can reach the dots of only one color.

The transfer characteristic

In the early days of television, it was discovered that CRTs do not produce a light intensity that is proportional to the input voltage. The relationship between the video signal and the CRT-generated light (the transfer function) is nonlinear and is usually described as a power law:

$$\text{Light intensity} = \text{Volts}^{\gamma}$$

Gamma (γ) has a value of 2.8 (PAL and SECAM) or 2.2 (NTSC). The transfer function is commonly referred to as gamma curve. It is caused by electrostatic effects inside the electron gun.

Because most sensors used in television cameras produce output voltages proportional to the scene light intensity, a correction for CRT gamma must be applied somewhere in the system. Figure 1 on page 26 shows how a nonlinear CRT display is compensated by a pre-correction of the original signal. In this drawing, the input and the output are both scaled to the range of 0 to 1, with 0 representing black and 1 representing maximum white (or red, etc.).

Historically, the gamma correction is effected in the camera. This has a positive effect on visibility of the transmission-generated noise in the reproduced picture. This is due to the fact that the human eye is more sensitive to noise in the dark areas, where the gamma behavior of the CRT reduces its visibility. Essentially, the gamma pre-correction acts as a "pre-emphasis" compensating the "de-emphasis" effect of the CRT. In a color television camera, the green, blue and red signals are pre-distorted to match the reference characteristic of the CRT as follows:

$$G_{transmit} = G_{pickup}^{1/\gamma} = E'_G$$

$$B_{transmit} = B_{pickup}^{1/\gamma} = E'_B$$

$$R_{transmit} = R_{pickup}^{1/\gamma} = E'_R$$

E' is the conventional symbol of a gamma-corrected video signal.

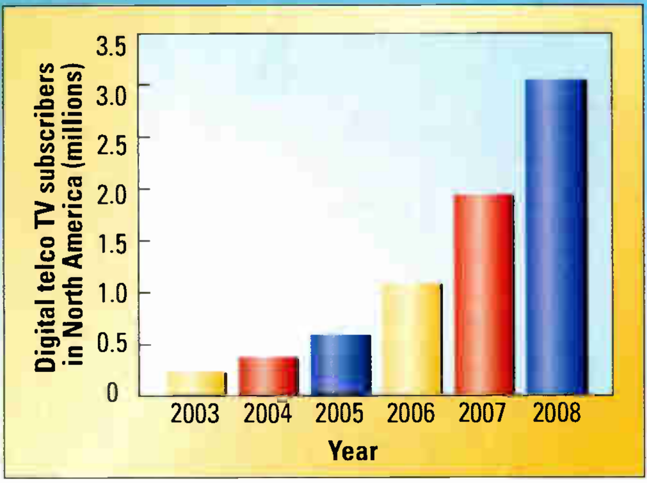
Early cameras using tubes were notoriously unstable. In a multicamera studio, each camera had to be optimized using a gray-scale backlit test-picture source. After each camera was optimized, the cameras had to be matched to produce identical signals.

FRAME GRAB

A look at tomorrow's technology

Digital telco TV reaches millions of subscribers

3 million people will receive IP video services by 2008



Source: In-Stat/MDR www.instat.com




Please stand by.

Designed and engineered for control.

Avoid the high costs associated with unexpected on-air "wardrobe malfunctions," explicit language, or colorful gestures... learn from the valuable two-second lesson that set off an intense media blitz that changed the broadcast industry.

Setting the new performance standards for the broadcasting industry.

Trust the experts.

Prime Image
Performance by definition.

Tel (408) 867-6519
Fax (408) 926-7294
www.primeimageinc.com

Features

- Up to 10 seconds delay standard
- Up to 30 seconds additional delay available
- 10-bit video processing
- Primary and auxiliary/alternate video inputs
- 24-bit audio processing
- AES/EBU digital or analog audio
- 4 auxiliary/alternate audio inputs
- Audio and video can be switched together or independently
- Fits in standard 2U-high rack space

These camera adjustments used to take a long time, and it was usual to let them heat up and achieve constant temperature. It was not unusual for the cameras to be switched on in the morning and adjusted at 12.00 for the evening news show. The gamma compensation was marginal at best, but that's all that the technology had to offer at the time.

Contemporary methods

The appearance on the market of solid-state cameras resulted in more stable and predictable performance and the possibility of an improved CRT gamma pre-correction. The ANSI/SMPTE 170M-1994 Standard (SDTV) and ITU-R BT.709 Standard (HDTV) reflect this situation by redefining the CRT electro-optical characteristic and the compensating opto-electronic characteristic of the reference camera.

The CRT electro-optical transfer characteristic is divided into two regions identified as follows:

• The region where Vr varies between 0.0812 and 1. In this region, the CRT transfer characteristic is expressed as:

$$L_T = [(V_r + 0.99/1.099)/1.099]^{\gamma}$$

• The region where V_r varies between 0 and 0.0812. In this region, the CRT transfer characteristic is expressed as:

$$L_T = V_r/4.5$$

where:

V_r is the video signal level driving the reference CRT reproducer normalized to the system reference white.

L_T is the light output from the reference reproducer, normalized to the system reference white.

$$\gamma = 2.2$$

The opto-electronic transfer characteristic of the reference camera is similarly divided into two regions identified as follows:

• The region where L_C varies between 0.018 and 1. In this region, the camera transfer characteristic is expressed as:

$$V_C = 1.099 \times L_C^{(1/\gamma)} - 0.099$$

• The region where L_C varies between 0 and 0.018. In this region, the camera transfer function is expressed as:

$$V_C = 4.500 \times L_C$$

where:

V_C is the video signal output of the reference camera, normalized to the system reference white.

L_C is the light input to the reference camera, normalized to the system reference white.

$$\gamma = 2.2$$

While superior to earlier standards, there still remains a nonlinearity problem in the region of near-black because the CRT curve cannot be perfectly compensated. This has a main effect of the crushing of detail near black (e.g. shadows) and the reduction of saturation of dark colors. These effects are commonly referred-to as "the video look."

Depending on the camera design, the gamma correction may be fixed, variable or missing altogether, e.g. in inexpensive consumer products. Various cameras available on the market offer the operator an additional transfer characteristic control called the "knee." The knee function is used to overcome clipping problems by attenuating or compressing highlights that might otherwise overload the

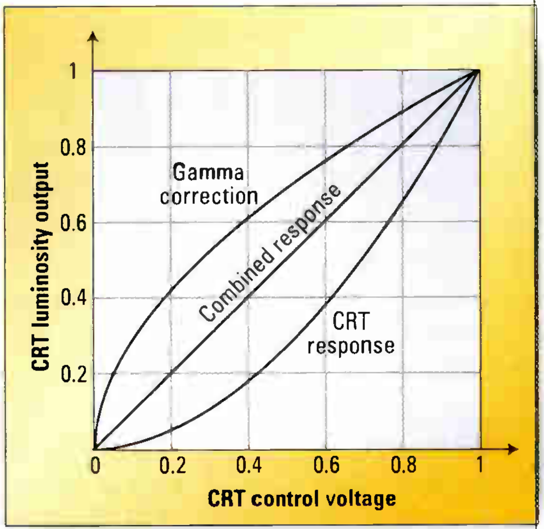


Figure 1. Correction of a CRT nonlinear transfer curve

system. Essentially, the transfer characteristic follows the prescribed curve up to a "knee break-point." Above that level, the gain is considerably reduced.

Depending on the camera design, the knee curve function operates before or after the gamma-correction. Thus, it may be curved or flat. Used by an astute operator, the gamma and the knee controls may be used to create the elusive "film look." Try to standardize this!

Plasma and LCD displays

Unlike CRT displays, plasma and LCD displays feature a linear transfer characteristic. Early uses of plasma and LCD displays were with laptop computers. With rare exceptions, such as computers used in editing suites, their linear transfer characteristic was ignored.

However, the side-by-side display of the same television picture on a plasma and CRT display revealed that the CRT displayed correct blacks, while plasma displays were unable to display true blacks, turning them into grays. The availability of large plasma displays for home use forced the manufacturers to consider the problem, and they came out with a handy remote-selected black level rendition left to the choice of the user. This function, when selected, forces a nonlinear transfer curve on the plasma display, making its response similar to that of a CRT. Leaving the choice in the hands of the viewer brings back memories of the "hue control," which, when left in the hands of an inexperienced viewer, all but ensured the display of people with green faces.

In a few years, plasma displays will replace aging CRT-display television sets. Given the large quantity of television archives encoded with gamma pre-correction, we are faced with an incompatibility problem that cannot be ignored. Neither the removal of the gamma pre-correction in cameras nor modifying the response of plasma display offers an ideal solution. Suggestions anyone? **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.*

Send questions and comments to:
michael_robin@primediabusiness.com

SONY

HDemystified.

"We wanted to stay on the forefront of HD, but being a public station made it difficult," says Connecticut Public Television's VP of broadcast operations, Haig Papasian. The answer was a Sony HD Select™ system. "Sony was very helpful. They're not in just one area of the television business. They're in all of it. Sony and our system integrator worked very well together to help us. I've never met a bunch of more agreeable, willing-to-work-for-you guys."

Jay Whitsett, vice president of programming, agrees. "Some products at NAB are just vaporware. Not so with the Sony gear. When we did shootouts, we'd bring in a variety of vendors but Sony always came out on top. And I will ditto that on the service part, which has been excellent. They bend over backwards."

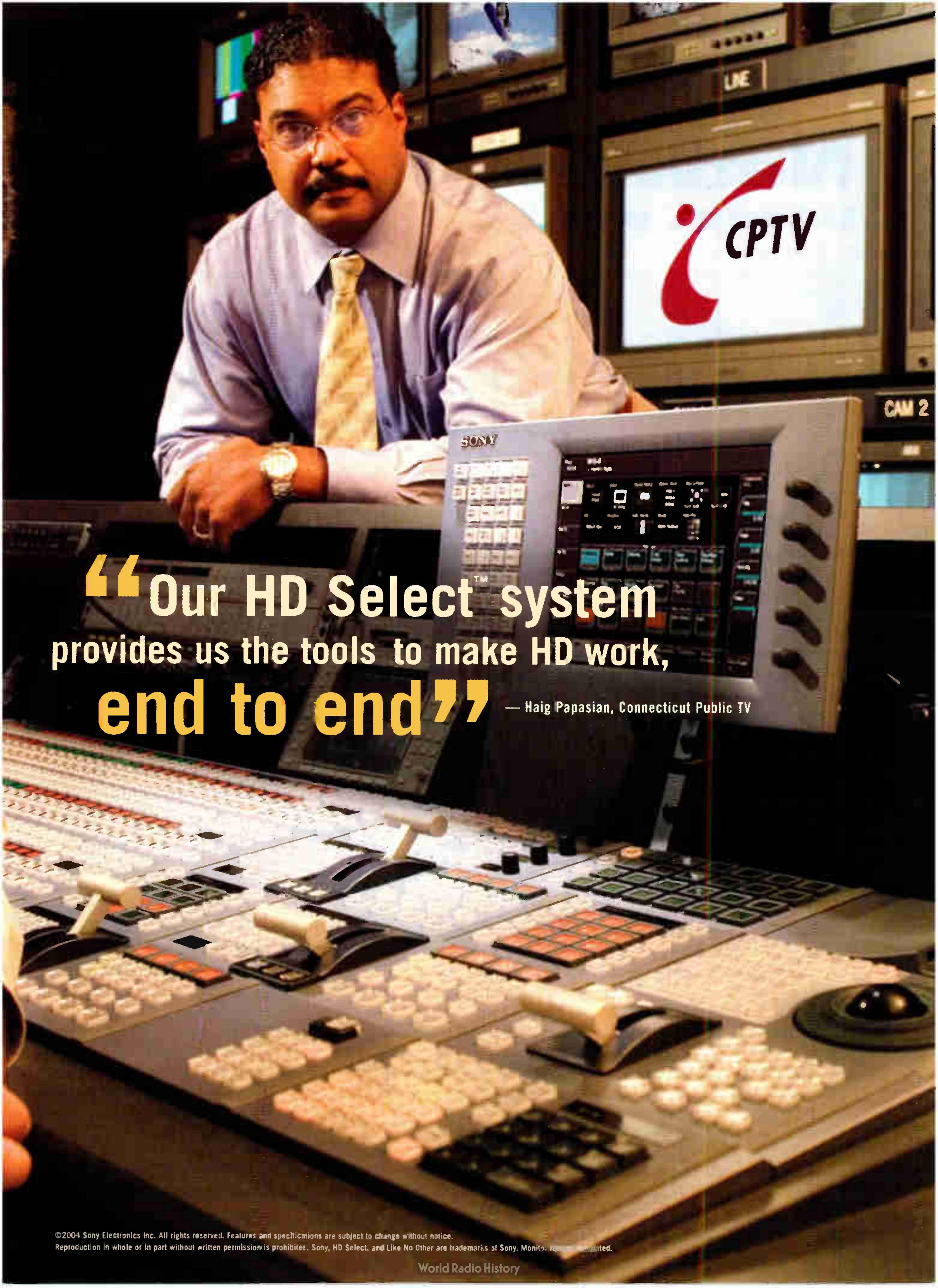
If your own HD challenges extend beyond the box, go with a total HD solution from the company best qualified to provide it. An HD Select system from Sony.

To learn about the HD Select Program and to find out how you can download five free songs,

VISIT WWW.SONY.COM/HDSELECT1

OR CALL YOUR SONY REPRESENTATIVE TODAY.

LIKE NO OTHER


CPTV
SONY
CAM 2
"Our HD Select™ system
provides us the tools to make HD work,
end to end"
— Haig Papasian, Connecticut Public TV
©2004 Sony Electronics Inc. All rights reserved. Features and specifications are subject to change without notice.
Reproduction in whole or in part without written permission is prohibited. Sony, HD Select, and Like No Other are trademarks of Sony.
World Radio History

DIGITAL HANDBOOK

Networking
tutorial, part 1

BY BRAD GILMER

Frequently, all that is required to establish a connection to the Internet is to plug a cable into an available Ethernet jack and turn it on. After a few minutes, the computer is fully configured and ready to go. As with many things, however, there is a lot going on behind the scenes.

For the purpose of this discussion, let's assume you are plugging the computer into a corporate LAN connected to the Internet. Let's further assume that the corporate LAN uses private IP addressing as described in the Internet Engineering Task Force (IETF) Request for Comment (RFC) 1918 (available at *www.rfcs.org*). Given this information, you know that the network is likely to be in the range of 10.xxx.xxx.xxx, 172.16.xxx.xxx, or 192.168.xxx.xxx. You could just try some addresses and see if you can establish a connection. There are several problems with this method. First, you might never find the right network address range. Second, if you pick an IP address out of thin air, you could pick an address that has already been allocated to someone else. When this happens, both computers stop talking, with potentially catastrophic results.

What is needed is a system that coordinates the assignment of IP addresses on the network. Ideally, it would allow computers to obtain IP addresses automatically. The system should allow for both fixed IP addresses and dynamically assigned IP addresses. This is exactly what Dynamic Host Configuration Protocol (DHCP) does. (DHCP is more fully described in RFC 2131.)

If you have your network configuration set to obtain an IP address automatically, when your computer is connected to a network it begins a series of exchanges with a DHCP server. The server's task is to assign IP addresses according to a predetermined plan established by the administrator of the network.

I used a packet-sniffing tool (Ethereal) to capture an Ethernet conversation between a computer on the network and a DHCP server. (See Figure 1.) The conversation between the DHCP client (the computer requesting an IP address) and the DHCP server (the computer responsible for assigning IP addresses) follows a specific pattern. First, the client sends out a broadcast message asking DHCP servers to reply with an offer of an IP address. This is a DHCP Discover message. The DHCP standard allows multiple servers to reply with an offer. The Discover message can contain suggestions to the servers for an IP address and other IP parameters. Note that this is only a suggestion.

The second step in the process is for DHCP servers to respond to the Discover message with an Offer message. The Offer message contains, among other things, the IP address and the domain name server address the DHCP server is offering. It also contains a lease period. The lease period is an important part of the assignment process.

Imagine that you are a user with a laptop coming to a facility for a meeting. You plug in your computer and obtain an IP address for the local network via DHCP. When the meeting is over, you leave the facility and never return. It would be a big problem if the DHCP server reserved that IP address forever. The solution to the problem is simple — the DHCP server "leases" you an IP address for a specific period of time. Once the lease expires, the IP address becomes available for others to use. If you are a permanent network user, your computer periodically renews its lease.

During the third step in the DHCP negotiation process, the client sends a DHCP Request message back to the DHCP server requesting a specific IP address. The request also includes something called the server identifier (usually the IP address of the DHCP server) as a check to confirm that the request is being made of the correct DHCP server. (More than one DHCP server can offer an address to the client.)

In the fourth and final step, the DHCP server sends a DHCP ACK message, acknowledging the IP address assignment. Figure 2 illustrates the complete negotiation process.

The DHCP process uses a protocol called BOOTP. This protocol was based upon Reverse Address Resolution Protocol (RARP), which was one of the first attempts to allocate

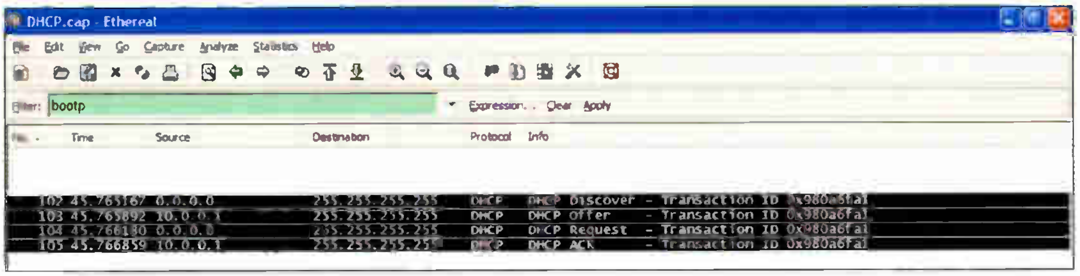


Figure 1. A screen capture of an exchange between a desktop computer and a DHCP server

network addresses dynamically. BOOTP (DHCP) rides upon User Datagram Protocol (UDP). As a result, delivery of DHCP messages is not guaranteed.

In Figure 1, the source address of the client is 0.0.0.0. This is because the client does not have an IP address yet. However, it does have a Media Access Control (MAC) address that uniquely identifies the client computer. The source and destination MAC addresses are sent with every DHCP message. This allows computers on the network to determine who sent the message and where it is intended to go. Messages targeted at the DHCP server are sent as broadcast messages with the special address of 255.255.255.255. Any messages with this destination address are intended to be "read" by all network devices. More than one DHCP server could respond to a DHCP Discover message, so these messages should be sent to everyone. Once the DHCP ACK message has been sent, the client may begin using the assigned IP address.

There are two ways that a DHCP address can be put back into the pool. One way is for the lease to expire. The other way is for the client to send a Release message to the DHCP server. The last line of Figure 1 shows that the client is now using the address it was assigned (192.168.1.101). The client sends the Release message to 192.168.1.1, which is the address of the DHCP server. The client saved this address when it received the DHCP ACK message.

Once you have obtained an IP address on an internal network, you may still have problems accessing the Internet. Many corporations have firewall rules that limit the type of traffic permitted to be exchanged between the Internet and computers within their facilities.

There are many other things that can be done with DHCP servers. If you would like to learn more, I encourage you to read the DHCP RFC (RFC 2131). A search for "DHCP tutorial" on your favorite Web search engine will yield many resources as well. **BE**

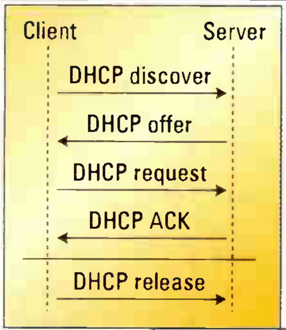


Figure 2. The DHCP negotiation process involves four steps — Discover, Offer, Request and Acknowledge. Release is a command issued later to release the IP address allocation.

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

Send questions and comments to: brad_gilmer@primediabusiness.com

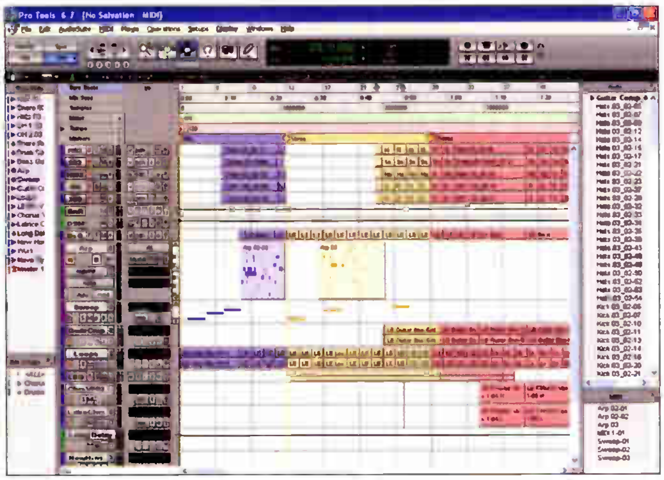
The DAW market diverges

BY DAN DALEY

At a time when convergence seems to be the operative notion in the digital domain, the digital audio workstation (DAW) market has experienced a significant divergence — split between a hardware- and software-based approach. While last October's AES revealed that the software component has become more pervasive, the show displayed a wealth of both types of systems.

A bit of context is useful. The last two years produced a slew of acquisitions by major brand names of audio software programs:

- Adobe purchased Syntrillium.
- Pinnacle Systems acquired Steinberg Media Technologies.
- Sony Pictures DTV purchased Sonic Foundry.
- Apple acquired Emagic.



Software-based interfaces are becoming an industry standard for audio production, making upgrades easier. Pro Tools photo courtesy of Digidesign.

Hardware systems have responded by getting smaller, faster, cheaper and better. It also has lubricated its upgrade paths — perhaps the biggest drawback to dedicated hardware systems in the past.

With a hardware-based system, mixers only have to do a major systems upgrade about every six years.

The interface is the consistent point of contention in the software versus hardware debate. Hardware-based systems have a familiar, dependable operator interface. If you're doing a relatively limited set of tasks, such as mixing sound for a sitcom, a hardware system works well. It dedicates movements for every task, which makes the process incredibly simple and allows you to focus on the task at hand, not on pull-down menus and mouse moves. Mixers who use hardware-based systems don't need a lot of upgrades.

But software-based systems residing on host computers perform better in another way that is critical for contemporary facility operations. Computers connect more easily to internal network systems like LANs, making it easier to move work around and through facilities, and to connect to increasingly large SFX and other audio databases. It's also easier to burn nonlinear media such as CDs and DVDs, which act as backup media for software-based systems.

This underscores another critical difference between the two domains. The software-based DAW is increasingly diffused with what has become a universe of third-party plug-in processors in which hardware-based systems simply can't participate. Like anything to do with digital, it's a double-edged sword.

Roy Latham, a mixer who has done much work on long-form animated projects, says he transitioned to Pro Tools primarily for the wide variety of plug-ins, many of which mimic the operation of vintage (and expensive) hardware-based processors. But he acknowledges that managing the myriad bundles of plug-ins can become a career in and of itself.

But third-party development is extending well beyond DSP plug-ins. The more complex operational aspects of Pro Tools can be integrated with QuickKeys software and a Kensington four-button TurboMouse.

The case can be made strongly for hardware- or software-based DAWs. The more specific the task and the more it keeps its operations within certain parameters like mixing, the better the hardware-based approach might be. When post projects require a lot of flexibility, or there is a constant need for multiple signal processors, the software approach seems to come out ahead.

Surprisingly, it might be a perceptual criterion that ultimately makes the decision for some users. Mixers say that clients have come to expect the use of Pro Tools.

Lathan says that it is a standard of sorts, and that expectation has tended to push the entire software-based array of systems. He adds that software systems do crash, which is something that his Fairlight rarely did. But you build that into your work-flow. He said that when he gets a crash, he just goes to lunch while it reboots. BE

Dan Daley is a journalist and author who covers business and pro audio technology.

The XDCAM System:

As the industry leaders migrate to tapeless, they're utilizing Sony's XDCAM™ Professional Disc™ system. After all, Professional Disc media is the only nonlinear media you can afford to use in acquisition, postproduction, program exchange and archiving. The XDCAM system also has proven interoperability with all the popular NLEs and servers, plus proven appeal with over 3,500 XDCAM products already delivered worldwide.

And now Sony offers the new 24PsF progressive scan option card, plus we will soon deliver the PDW-D1 XDCAM drive, which plugs directly into your compatible PC via the i.LINK® interface.

So make the move to the XDCAM Professional Disc system.
And find yourself in very good company.

Professional Disc | XDCAM Professional Disc System

Get your FREE DVD on the XDCAM system at www.sony.com/XDCAM

LIKE NO OTHER

LPTV and translator worries

BY DON MARKLEY

Since DTV's infancy, many operators of translator systems or LPTV stations have worried about their ability to continue operating. Western state operators who routinely depend on large networks of translators to serve small valley markets are particularly worried.

New ATV operation requirements have exacerbated translator operators' problems. David Hershberger of Axcera, LLC has discussed these new problems at length in technical papers presented at NAB conferences and other meetings. Visit *www.axcera.com* or contact Mr. Hershberger directly at *dhershberger@axcera.com*. The company has done a significant amount of work in this area and offers numerous solutions.

Timing is everything

The problem with single- or multiple-frequency translator networks lies with the timing signals. ATV modulators require the synchronization information that is included in the trellis code. But facility transmitters remove the trellis-code data before transmitting the signal, depriving translators of the timing data. The

WPSX-DT's 1kW booster in Altoona, PA, is part of the world's first Distributed Transmission (DTx) network.

solution is to modify the SMPTE310 data stream. The translators are designed to cadence sync using information contained in the distributed transmission packets to synchronize their symbols, timing and pilot frequencies. GPS receivers at each translator location obtain the timing reference. Basically, for two-channel systems, the main transmitter sends out both the main signal and the SMPTE310M signal to the translators. The translators then operate sharing the same channel. The ability of standard consumer receivers to handle multipath makes the whole thing work. When a receiver obtains more than one signal, it simply treats them as multipath. Fifth-generation decoders announced last spring can handle multipath signals equal in strength to the primary signal.

The FCC finally came out with a Report and Order establishing the new rules for translators and LPTV stations. The entire document is available on the commission's Web site. Search for MB Docket No. 03-185, and you'll get all 120+ pages.

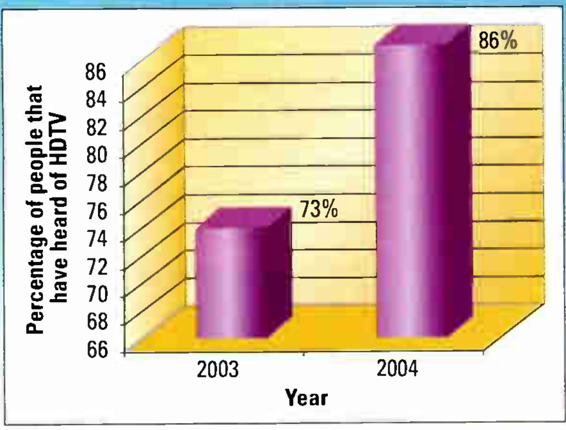
In plain English

For a great overview of many of the main issues covered by this FCC document, the law firm Fletcher, Heald and Hildreth, P.L.C. publishes a Memorandum to Clients. You can obtain that document by visiting the firm's Web site at *www.fhhlaw.com*. The document is unusually clear and easy to understand. Even engineers can understand it. What's more, the authors have sneaked some humor into it — most unlawyer-like. The October issue (No 04-10) is quite helpful for deciphering some of the LPTV issues. Most importantly, it reveals that existing analog translators

FRAME GRAB A look at the consumer side of DTV

Awareness of HDTV has grown

86 percent of people have heard of HDTV



SOURCE: Leichtman Research Group *www.leichtmanresearch.com*

can rebroadcast converted DTV signals in an analog format. Conversely, digital translators can receive analog signals and transmit them in a digital format. It seems that the commission feels that this policy will get the most signals to the greatest number of people.

The new rules also contain all the normal stuff like power levels, interference prediction and masks. Here, Fletcher, Heald and Hildreth accept the fact that they, as lawyers, don't understand this technical stuff — a rare and gracious admission.

Coping with changing rules

Because many translators operate outside of the core channels, many operators have expressed concern about their ability to continue operating. But the new FCC rules make it quite clear that they can continue, at least for the time being. The commission's main requirement is that translators must not interfere with primary facilities. Many of those channels have already been sold, and the commission expects all LPTV stations now on channels 60 through 69 to move to other channels by the time full DTV conversion takes place. That conversion is scheduled to occur between 2006 and 2009.

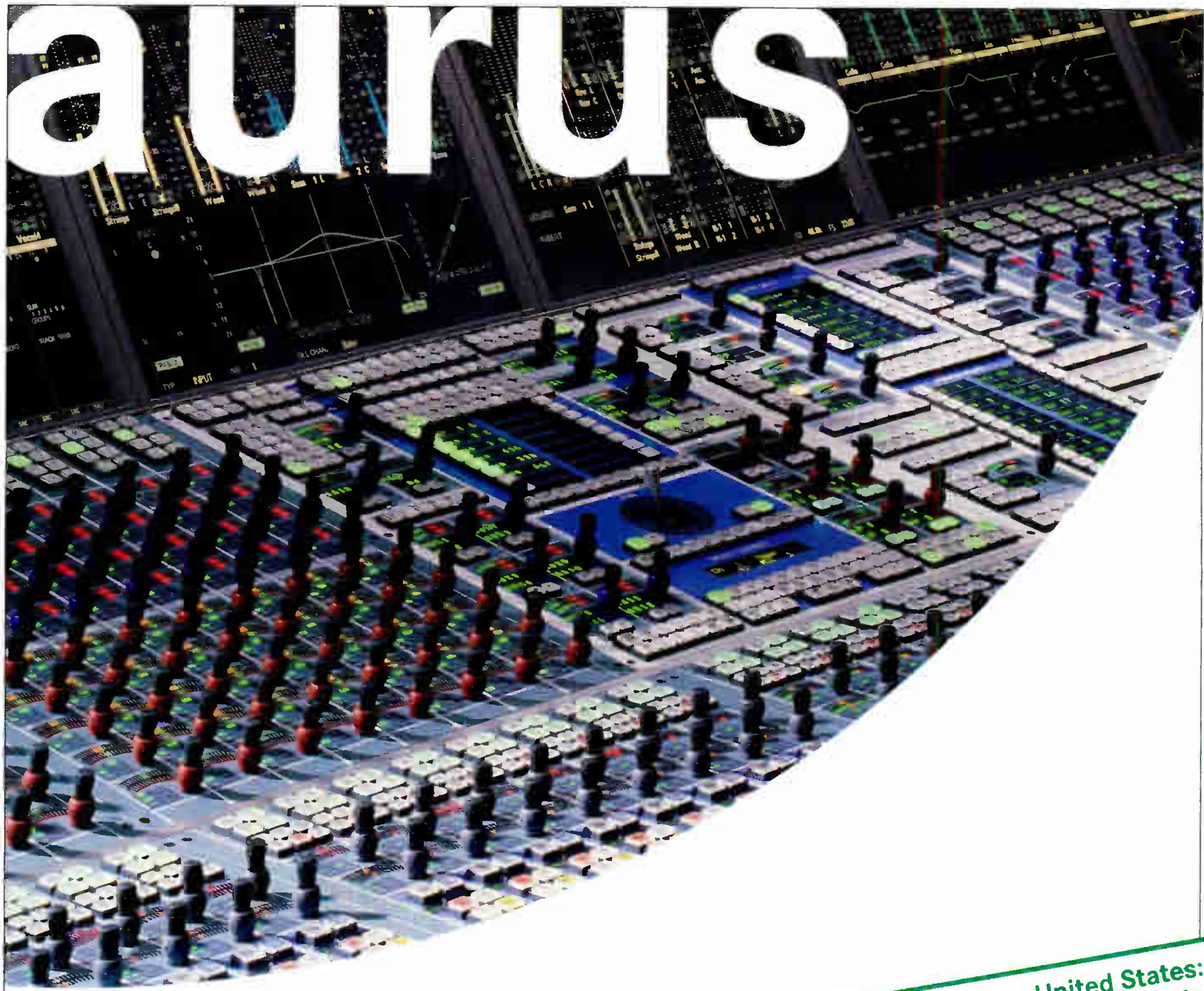
The commission has stated that a digital transmitter can retransmit over the same channel on which it receives. This brings up the distributed-network problems discussed earlier. Without discussing the legal problems involved in authorizations, the on-channel DTV operation does seem to be the same as an on-channel booster. But, as before, the timing signals rear their ugly heads. The question here is whether the primary station will agree to transmit the 310M signal to give everyone the necessary timing signals. The commission hasn't completed the full rules for DTS operation, but it's working on them. I've been told that this isn't a real problem and can be resolved in a reasonable fashion.

To allay the fears of the Class A crowd, the commission will allow existing Class A LPTV stations to "flash cut" to DTV without losing their protected status. An interesting term, "flash cut." It gives you the impression that a giant arc of electricity will appear, a deep voice will shout "Shazam!" and your station will be operating in DTV. The giant arc does sometimes occur, but it's usually just a transmission-line center conductor vaporizing.

We'll talk a bit more about the actual technical rules in a future issue. BE

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

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



AURUS now in the United States:
The Guthrie Theaters, Minnesota

We made it a masterpiece
You made it a unique success

Thanks to all our clients, who made AURUS one of the most successful digital high-end consoles in just one year:

BELGIUM VRT Flemish TV, Brussels (OB Vans K2, K3) **GERMANY** Anhaltinisches Theater, Dessau · Deutsche Welle TV, Berlin · E.T.A. Hoffmann-Theater, Bamberg · Friedrichstadtpalast, Berlin · TV Home Shopping Europe AG, München · HR Hessischer Rundfunk, Frankfurt (OB Van FÜ 1) · Informations- und Medienzentrale der Bundeswehr, St. Augustin · MDR Mitteldeutscher Rundfunk, Leipzig · NDR Norddeutscher Rundfunk, Hannover · Schaubühne, Berlin · WDR Westdeutscher Rundfunk, Düsseldorf (OB Van FÜ-Sat, Synchronstudios 1/2) · WDR Westdeutscher Rundfunk, Köln (Studio B1/2, Studio at the Philharmonie) **ITALY** RAI Italian Broadcast Service, Rome (Saxa Rubra TV 1) · ETABETA Outside Broadcaster, Rome **JAPAN** New National Theatre, Tokyo · iMedio Post Pro Studio, Osaka **LUXEMBOURG** Grand Theatre de la Ville **POLAND** TVP Telewizja Polska, Warsaw (OB Van, TV-Studio) **RUSSIA** Kremlin Palace, Moscow **SLOVAKIA** National Theatre, Bratislava **SWEDEN** SR Sveriges Radio, Stockholm (OB Van) **SWITZERLAND** Schauspielhaus · Zurich **UNITED STATES** The Guthrie Theaters, Minnesota

SALZBRENNER STAGETEC® MEDIAGROUP

www.stagetec.com sales@stagetec.com

SYSTEMS DESIGN SHOWCASE

HBO serves up secure, tapeless playout

BY MICHAEL GROTTICELLI

Since the HBO Communications Center was built in 1983 as a distribution center working out of a futuristic, custom-designed site, the Home Box Office (HBO) network has always forged new technological ground. That's because its business model demanded it: Over the years, the company has experienced incredible growth, expanding from four channels to a bi-coastal network of 28 standard-definition and four high-definition channels and on-demand distribution.

With such a large responsibility, the facility has to remain operational 24 hours a day, while providing responsiveness to industry change. In this case, 99.99 percent reliability is not good enough: HBO strives for 99.999 percent, which equates to no more than five minutes of downtime, per channel, per year.

When the network chose the technology that serves as the heart of the network's playout systems, it selected established players in both the broadcast and computer industries. This combination provides a high degree of system reliability and technology innovation.

The network considered moving to a server-based model back in the mid-1990s, as its tape-based systems began to reach their seventh year of online usage, but the cost of storage was prohibitive.

When the time came to move from tape formats in SD and HD to a tapeless distribution system, HBO chose Grass Valley Profile XP Media Platform servers, Grass Valley Storage

An operator monitors HBO's 32 internal channels on Barco VGA monitors, Panasonic plasma displays and Vivaldi monitor display hardware in the master control suite of the HBO Communications Center.

Area Network (SAN) systems and Venus routers from Thomson, combined with Sun Microsystems 6800 mid-level series servers and Hitachi 9980 storage systems.

Systems must be online 24 hours a day

The HBO Communications Center is a study in the tight integration of traditional broadcast and forward-looking, computer industry systems now available to support network operations.

The facility is protected by redundant power distribution that can keep it up and running for 18 days without outside fuel refills. During the massive East Coast blackout in 2003, for example, the facility continued to operate uninterrupted.

Beginning in 2002, HBO has so far transitioned eight of its channels to the new Sun-Thomson solution. The plan is to have the remaining channels playing from this architecture next year. When complete, HBO will move the same amount of content from the Sun architecture to six Grass Valley PVS 1100 Profile XP Media Platform servers as approximately 75

Digital Betacam VTRs.

HBO online storage starts with redundant Sun 6800 mid-level servers, on two separate floors, holding 50TB of storage each. The storage, provided by Hitachi, equals about 5000 hours, or one year's worth of content. Files are moved between storage arrays at 350MB/s.

These systems are linked to two Grass Valley Open SAN systems, consisting of two Profile servers each that serve the on-air channels directly. Each feature file is encoded as an MPEG-2 file and stored on hot-swappable Ciprico 146GB drive arrays.

Each SAN system is dedicated to four HBO channels, holding about four days' worth of content. Ensuring reliability, one SAN system serves as a backup to the other. Content is moved from the Sun server to the Grass Valley Profile servers via FTP file transfer at about 30Mb/s, with burst rates slightly higher. As a particular feature is readied for air, two copies are stored on the Profile servers about one day before the feature is to air. This process ensures that the content will air at the predetermined time because the servers work in tandem. There is no human intervention as the FTP process moves about 1TB of data per server per day.

HBO wrote custom Java-based applications that enable the Profile servers to automatically duplicate a file and maintain replication after quality control. Written to be compatible with Thomson's Grass Valley ContentShare software inside the Profile servers, the programs were recognized by the Java community with a special Enterprise Design award. The award was presented by Sun CEO Scott McNeeley personally to HBO last year. As a final disaster-recovery option, HBO intends to create a third copy of a file and send it to the network's production facility in New York City, 50 miles away.

In addition to an advanced server infrastructure, the HBO facility includes a main master control (MC) suite and three control rooms. The MC suite monitors a total of 32 channels internally and is equipped with a full wall of Barco VGA monitors,

Multiple Grass Valley Open SAN systems from Thomson, consisting of two Profile servers each, hold about four days' worth of content each for four HBO on-air channels. Each movie file is encoded as an MPEG-2 file and stored on hot-swappable Ciprico 146GB drive arrays.

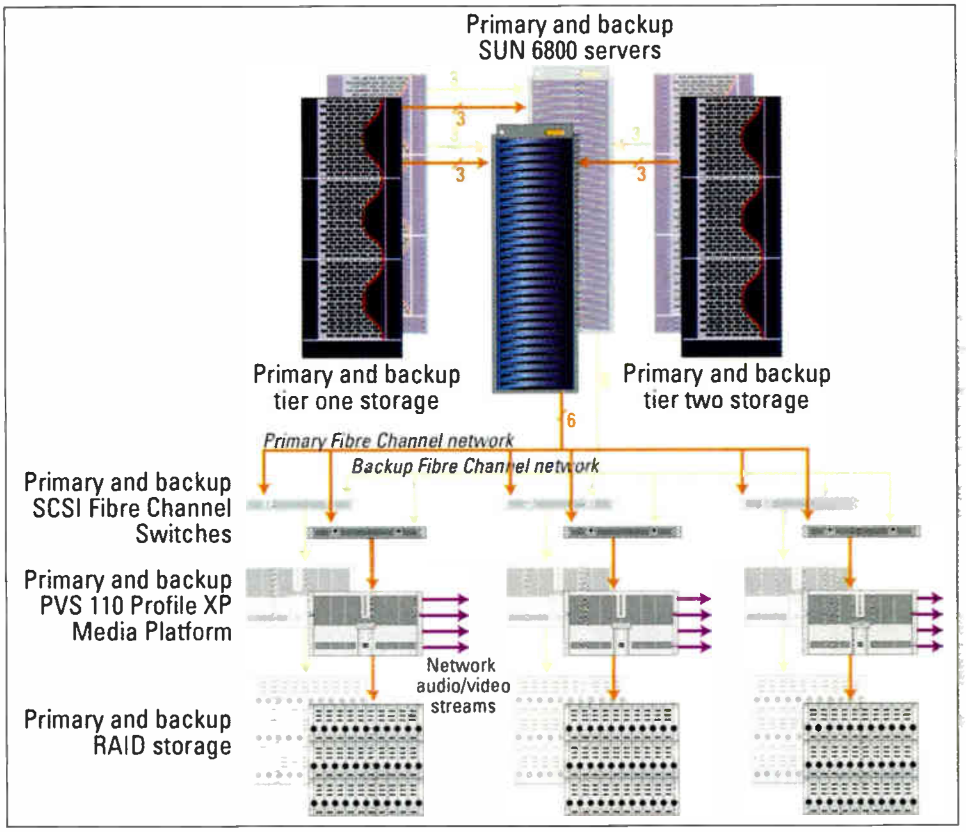
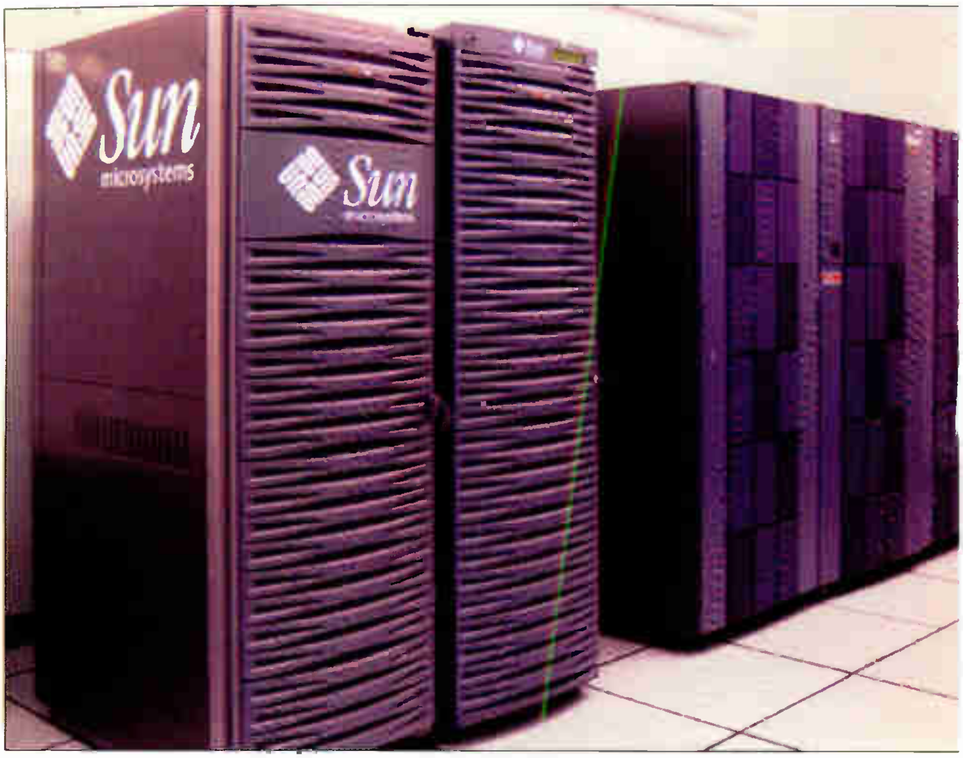


Figure 1. Storage at HBO includes Sun 6800 servers for offline content (top) and Grass Valley Profile XP Media Platform servers (using RAID arrays) for programs airing that day.

ys, a ng sys- four Panasonic plas tor dis- New Point Techn ontrol room tem and Band West Coast play hard ates both its SD a second control The and its 12 East and fo a third "breakaway" ndles all live events. telecast, the West Coast ken away" from the delay systems three to four hours prior to the event under automation.

Tiered storage

HBO is developing a multi-tiered storage infrastructure using Java-based software that directs the content into two tiers. Tier 1 serves as online storage — content that's to be used immediately — while Tier 2 storage is used basically as an archive.



Two Sun Microsystems 6800 series mid-level servers, located on separate floors for redundancy, provide offline storage for approximately one year's worth of content. Content moves between storage arrays at 350MB/s.

Custom Java applications automatically encode incoming files and quickly distribute them to the proper channel — reducing the chance of human error.

Design team

HBO:
Bob Zitter, exec. VP, CTO
Charles Cataldo,
sr. VP, broadcast op./eng.
Elmer Musser, Jr.,
VP, broadcast eng.
Kenneth Chin, TD, broadcast eng.

Most features now come into the facility on a Digital Betacam cassette, but the network is quickly moving toward a true file-to-file conversion approach that, in the future, will eliminate the use of videotape completely. As files are ingested into the system, approximately 15 Java applications help handle the material and reduce human error. Incoming files are automatically encoded and distributed to the proper channel with-in minutes. Interestingly, once a feature has reached its end-of-play cycle, it is not archived at all. When the feature's licensing agreement window has expired, a new file is overwritten on the drive to replace it.

On-demand distribution

All distribution of on-demand content comes from the HBO Communications Center in Hauppauge, NY, from which HBO distributes approximately 150 to 200 hours of content to cable systems across the United States. HBO has been working with encoding manufacturers and automation providers — as well as developing its own applications — to employ electronic workflow processes that will better support the growth expected in HBO's on-demand service.

The be. facility anc. ing to the h. Hitachi and Pro... SAN systems has ...O's digital velopment of electron... nov- chitectures that increase and allow HBO to put a. safeguards in place to conti. mission-critical distribution.

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

Equipment list

Barco:
CRT-based VGA monitors
Vivaldi monitors
Chyron Maxine CG
Cipirco 146GB drive arrays
Thomson:
Grass Valley Profile XP Media Platform servers
Grass Valley OpenSAN systems
Grass Valley Venus routers
Hitachi 9980 storage systems
New Point Technology alarms
Panasonic plasma displays
Sun Microsystems 6800 mid-level series servers

On Air with System 5-B

KNBC Local News
Los Angeles

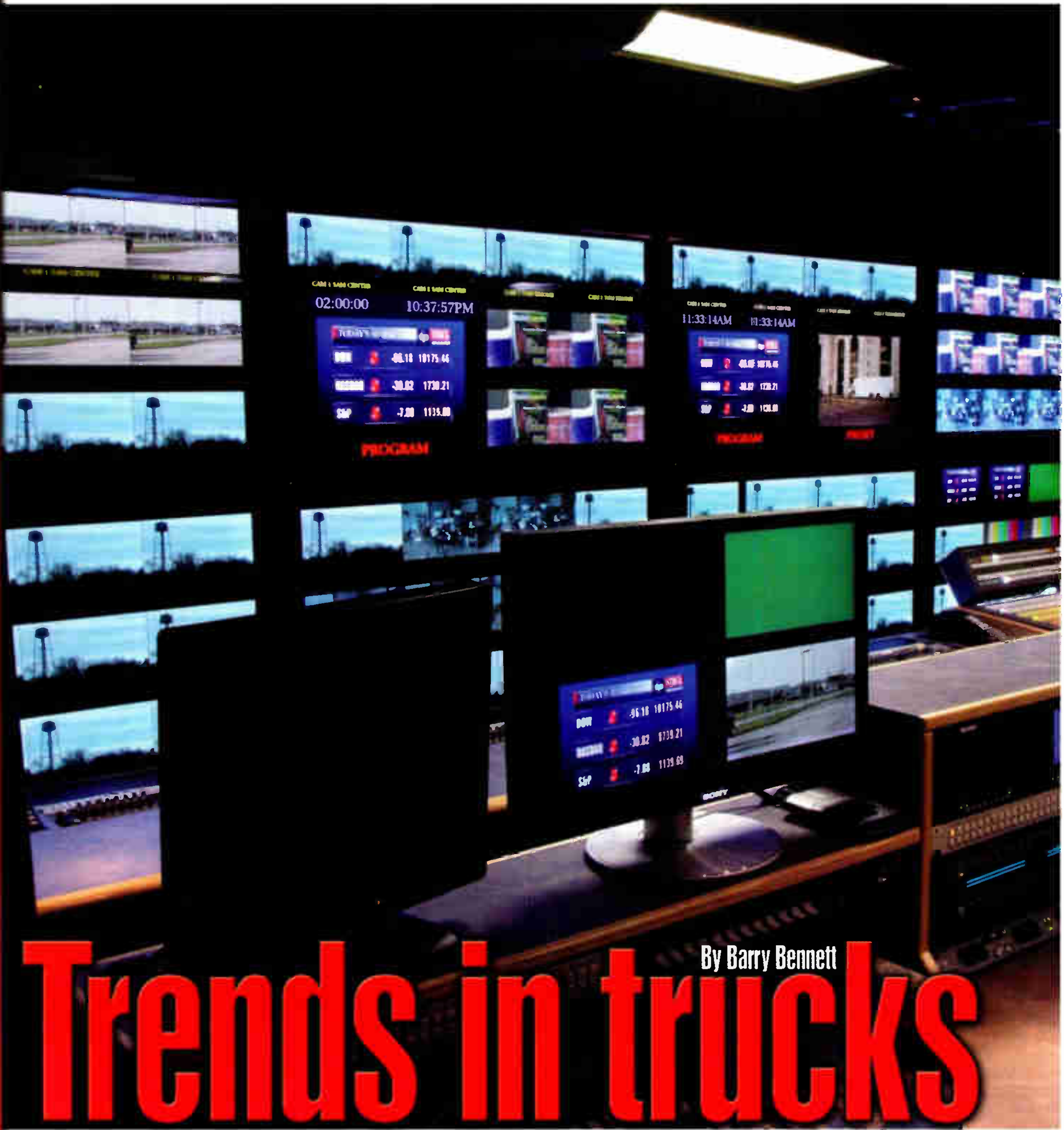
Digital Audio for Broadcast

System 5-B has been designed to simplify the process of broadcast audio mixing. With an easy to learn surface and powerful control features, such as a built-in 768x768 digital router, the System 5 is the perfect choice for studio or remote based audio applications.

Be Sure

www.euphonix.com

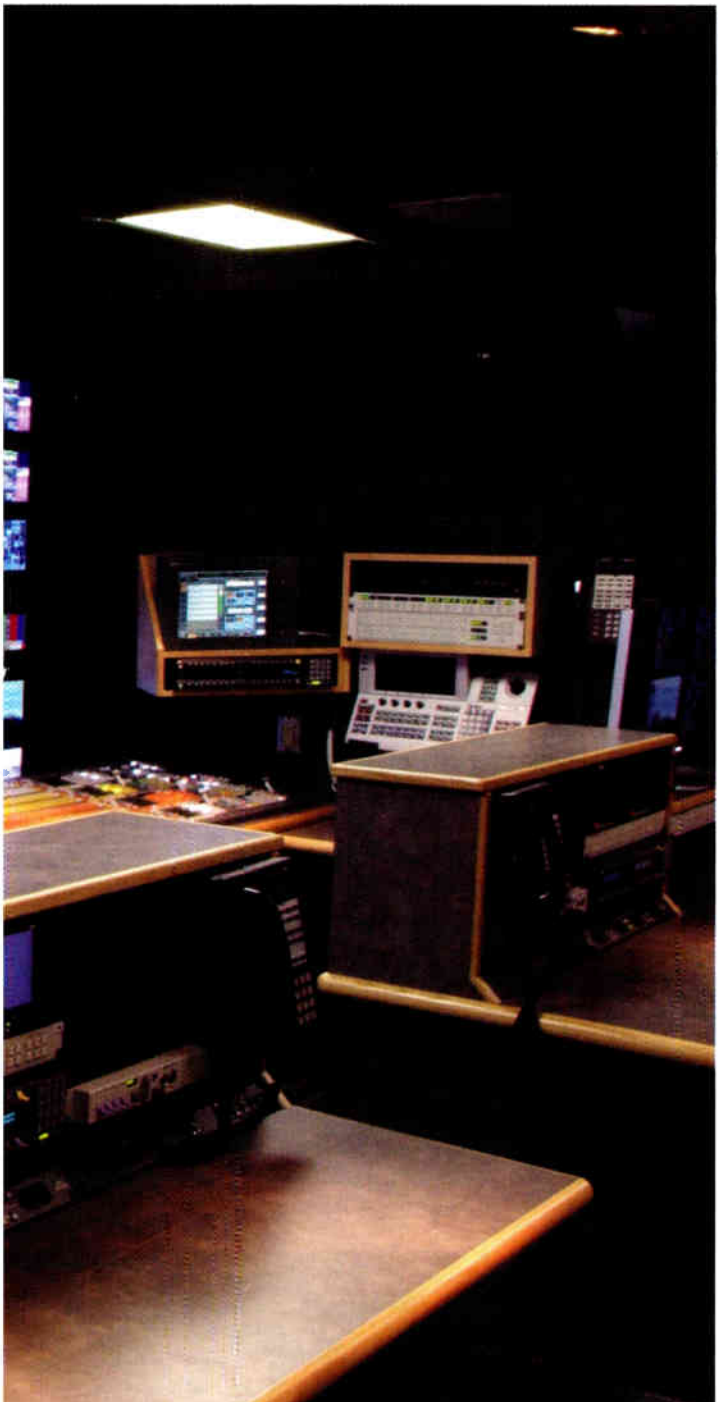
Euphonix



Trends in trucks

By Barry Bennett

For mobile system integrators, 2004 was an exciting year. Vendors carefully tested out HD for several months. Today, many have fully embraced it. Sure, HD is still more expensive than other formats, but are there any other options in this digital age? The TV production industry's continuing migration to all digital, specifically HD, has not been lost on the remote truck business. Some would say that the industry is, in fact, being driven by this business. It's more than a trend; it's a landslide. In large-scale sports and entertainment production, HD has clearly emerged as the format of choice and a competitive necessity. If you don't have an HD unit (or several) in your fleet soon, you're going to be left behind.



This virtual monitor wall, which was recently completed for Lyon Video in a large truck, saved 30in of floor space and about 1000lb.

Formats

The primary video flow in trucks is now purely digital. And, within the digital domain, many of today's trucks use HD as the primary signal path. They use SDI-601 mostly as a monitoring layer or, in trucks with multiple routers, to route it to the onboard SDI legacy gear.

NTSC usage in new production vehicles is dwindling rather quickly. But remote truck designers must still incorporate some NTSC into the vehicle design. For the most part, NTSC has assumed a monitoring function in today's large-scale remote vehicles. One practical application of NTSC monitoring is long-haul feeds where the cable distance within an arena may exceed the distance limitations of digital video over coax (although fiber-optic cable is also always an option). New trucks may also need NTSC video or SDI-601 digital video to provide feeds to the outside world, such as the local arena where the remote truck is parked. These signals may also serve as feeds to and from older trucks, which may need to share cameras on a multi-truck remote. This situation will probably continue for several years until all venues have upgraded to digital.

A truck operator might argue that the arenas and other trucks should have the appropriate conversion gear to use his or her pristine HD signals. But, practically speaking, the operator must provide all signals in all formats. Today, virtually all A- and B-grade production vehicles use SDI or HD signals. Like dinosaurs, analog trucks will become extinct, probably fairly soon. But, even when this occurs, NTSC in an HD truck will still find some limited utility, such as in local-area feeds as mentioned above, possibly satellite transmission, and perhaps the inevitable VHS copies of the show. The truck operator may still be called upon to provide all formats for some years to come.

Most, if not all, professional production equipment can now produce video in the majority of the various HD flavors. A discussion of these various formats is beyond the scope of this article. It's sufficient to say that it didn't take long for manufacturers to build obsolescence protection into their equipment. And, to me, it seems fairly obvious that this has been one of the driving factors in the current migration to HD production vehicles.

It would be difficult to justify a multimillion-dollar expense for a specific HD format truck if, even as it were being built, clients were demanding a different HD format for their production needs. This single difficulty was likely the reason that the last couple of years were rather sparse in large-scale remote vehicle construction. Manufacturers have responded well with multistandard equipment, enabling truck operators to put together a truck with a lifespan measured in years instead of months.

Intelligent terminal equipment

It takes little more than the flip of a switch (or the click of a mouse) to convert cameras, switchers, etc., from 1080i to 720p or to any other HD format. Manufacturers offer intelligent terminal equipment that can switch just as easily; some are even auto-sensing. Need cropped downconverted outputs? No problem. Just click the mouse. How about letterbox? Same answer. If you are an information junkie, your DA can now tell you every parameter of every input and output on the card. Wow! Talk about information overload.

This customized tape production bench has a monitor wall that includes flat-screen and tube monitors but is still only 11in deep.

Technologies like smart DAs, IP-enabled monitoring devices and networked card cages are now fully implemented in remote trucks. Couple this with the almost complete implementation of programmable production equipment, and your truck has now taken on the role of being little more than a rolling computer with chairs and the occasional human-interface device. It is technically feasible for an engineer in San Francisco to set up a truck on-site anywhere in the country — perhaps even from a laptop computer in an airport or hotel room. What is perhaps even more useful to the mobile production industry is that an engineering specialist located at a desk somewhere can dial into any part of a truck and perform advanced troubleshooting or reconfiguration in near real time.

Of course, an even more obvious benefit of this IP and computer power is the ability to virtually set up a truck simply by loading a file or a set of files from the truck's server. Now you can set up an entire show from a computer keyboard, or restore a previous show from disk, and do it in minutes instead of hours.

These features are powerful. But along with such power comes some risk. Make sure that your IP-enabled truck is secure from the sinister forces that seem to lurk around every corner in the Internet universe. It is entirely possible for the casual tourist to hack into your truck and, for example, start switching cameras for his or her own amusement, right in the middle of a show. The system operator would be well-advised to keep all critical IP communications that exist within the truck inside the truck. Even so, don't overlook the various sources of possible trouble presumed to be on the safe side of your firewall. Theoretically, someone could insert an infected switcher, DVE or Chyron disk and either unknowingly or maliciously unleash any sort of horror that can plague any computer system. Careful network security design is crucial in today's facilities. Make sure to restrict the outside world's access to the truck's critical network paths.

Monitoring

Trucks are enjoying (perhaps, more accurately, have enjoyed) a migration from tube monitors to various forms of flat-panel monitors. The two flat-panel types most commonly used in trucks today are LCD and plasma panels. Recent design advances in flat-panel technology have all but eliminated the need for tube monitors (with the possible exception of the video operator position and, in some cases, the EIC).

Future generations of flat-panel displays will doubtless improve enough to eliminate these last few holdouts. Several recent truck designs employ LCD monitors for video shading, with good results. Flat panels still can't quite match a tube monitor's colorimetry accuracy, so a truck may need at least one tube monitor. But, as the flat panels improve further, the QC station tube monitor will likely fade into history. And, before too long, home viewers will all be watching shows on the same flat panels that now serve in trucks.

Production monitoring

The maturity of multi-screen display engines, combined with advances in large flat-panel display technology, has enabled completely virtual monitor walls in today's remote units. A monitor wall consisting of multiple 50in plasma or LCD panels and a screen-splitting system is an impressive sight. It also saves approximately 1000lb and up to 4ft of floor space compared to the same size wall built with discrete tube monitors. One recently completed large truck project took full advantage of this space savings. The designers incorporated an entire second production room into the truck with no apparent loss of floor space. This raises many interesting possibilities for the future of truck design.

The virtual wall introduces a further benefit: All tally and operator information can be on-screen. Want UMD displays? No problem. It's all virtual; just type and click it into existence. Resize your monitors at will, with or without tally and UMD for each virtual screen. Mix 16:9 with 4:3 images. Dedicate one entire 50in monitor to program video. As the saying goes, "Have it your way."

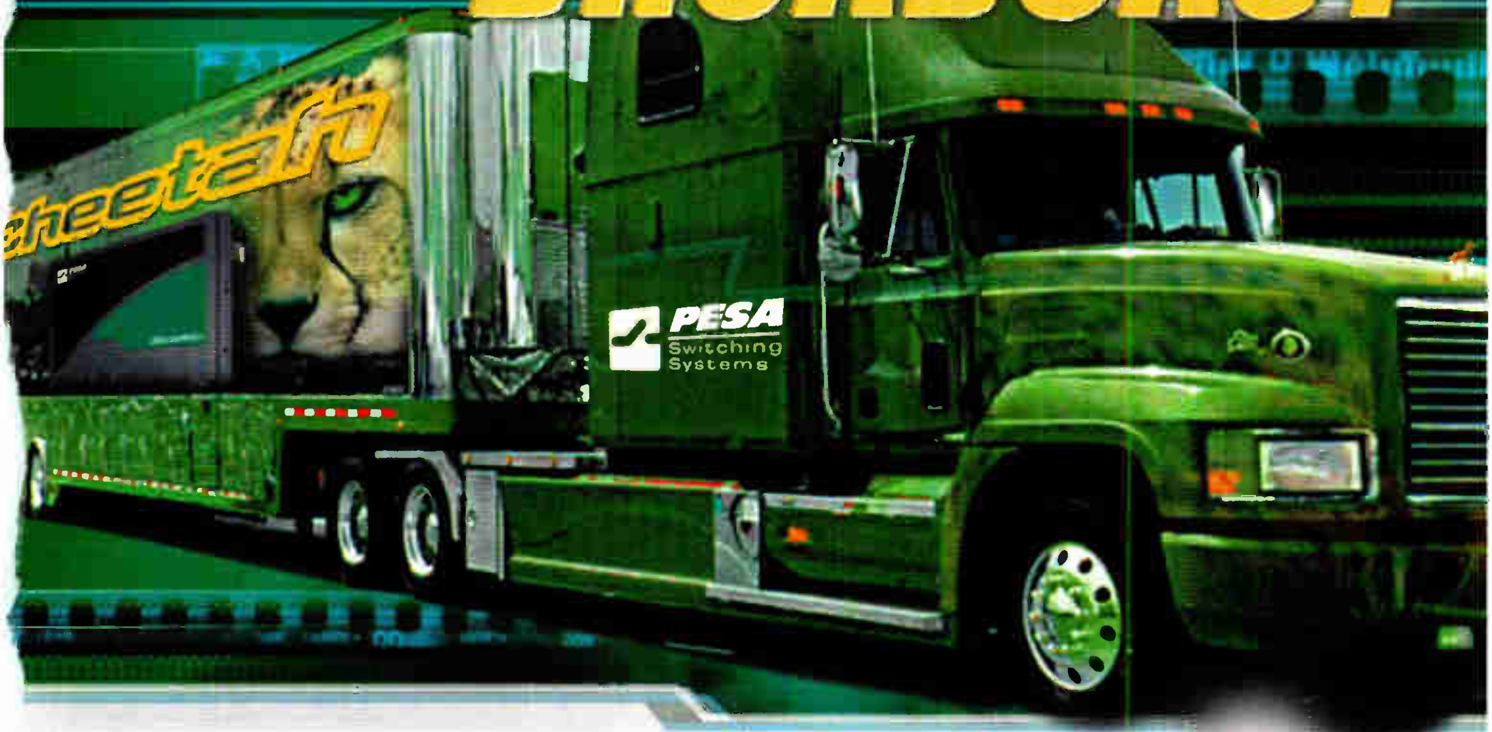
You can also display clocks, countdown and even audio levels in one or multiple locations on your virtual monitor wall. And you can save your show setup on disk for the next time. Have a few default-monitor setups ready for your most anticipated monitor layouts, and you'll have the truck up and running at a remote location in no time. Setting up the production room becomes as easy as a couple of computer clicks.

Scopes versus rasterizers

Traditional tube-type monitoring for waveform and vector display is also giving way to flat-panel technology. The new display device may take the form of a traditional instrument that looks like a waveform monitor but replaces the tube with a built-in flat-panel display. Or it may take the form of a

Flat-screen implementation allowed this entire second production room to fit within the standard large-truck footprint of Mira Mobile's recently completed unit.

DRIVING THE FUTURE OF MOBILE BROADCAST



ADDED mobility with the new Cheetah

PESA understands mobile video production. This is proven by our commitment to offer one of the most flexible routing switchers in the world. The Cheetah SD/HD multi-rate digital routing switcher is the perfect solution for mobile truck applications. When size matters, the Cheetah is your answer. When flexibility is a concern, the Cheetah flexes. Features include an optional 10-bit D to A output card capable of supporting legacy analog equipment and our new HD to SDI output conversion card providing the greatest cost and space-saving solution ever. When the road to success depends on the right equipment, Cheetah is your next right turn.

35 Pinelawn Road • Suite 99E • Melville, NY 11747 USA • Tel: +1 (631) 845-5020 • (800) 328-1008 • Fax: +1 (631) 845-5023

For More Information On These and Other Products Visit WWW.PESA.COM

- ANALOG AND SD/HD DIGITAL VIDEO
- SIZES FROM 64x64 UP TO 512x512
- NEW ADVANCED 3500PRO CONTROL
- OPTIONAL 10-BIT D TO A OUTPUT CARD
- OPTIONAL HD TO SDI CONVERSION OUTPUT CARD

PESA Switching Systems

rack-mount box of electronics coupled with a display device, generally an LCD monitor. Packaging this instrument to fit in a traditional waveform slot allows a more traditional approach to waveform monitoring while taking full advantage of the benefits of flat-panel displays.

As flat panels become the accepted standard for QC stations such as video and transmission, the standalone rasterizer coupled to a 15in, 17in or larger LCD or plasma display will become a powerful tool. The video monitor may also be the waveform monitor, and the display could be placed anywhere in the monitor screen. Where space is a critical concern, you can locate the rasterizer's electronics off-axis from your viewing area (or anywhere in the truck, depending on the operator's need for access to the display controls). Actually, because the rasterizer is an IP-enabled device, it offers numerous remote-control options.

The operational requirements will dictate how designers engineer these devices into a particular truck. Having worked as a video engineer, I like the concept of the waveform monitor integrated directly into the shading monitor. With this configuration, the operator need not take his eyes off the show to see the waveform displays. This same technology can apply to the audio system for monitoring purposes. The main program video monitor in the audio room can be a flat-panel LCD with a rasterizer display of truly bewildering capability.

An interesting future

The remote broadcast industry finally is seeing the benefits of recent technical advances. Technical solutions that have been in the works for several months have produced many exciting implementations this year.

This video shading area uses a multi-display rasterizer for video QC monitoring.

The promises of yesterday are rapidly becoming the realities of today.

It's safe to say that the new generation of large-scale remote trucks will continue to evolve as the technology improves. But, eventually, someone must pay for all these new toys. Fortunately, the price of this equipment is dropping. We seem to have reached a point at which the truck operator can justify the additional expense of the new technology. The future will be interesting, indeed. **BE**

Barry Bennett is a truck system integrator at Bennett Systems in Sunbury, OH.


[King of Processors]
X75™ HD
Up/Down/Cross Converter,
Synchronizer...and More
X75 HD
Standard Definition
Embedded Audio
Fiber Interface
Analog
Web Server
NTSC/PAL-M/PAL/SECAM
Dolby E/AC-3 decompression
Synchronization
Processing Amplifiers
Up/Down/Cross Conversion
Aspect Ratio Conversion
Metadata Transparency
Noise Reduction
Logos
High Definition
Multi-Channel Audio
AES/EBU
Digital
DVI-D and DV
Streaming
1080i/720p
Production/Editing
News
Broadcast
Mobile
Satellite
Up/Down/Cross Conversion with Synchronization Starts With eXtra Processing Power
LEITCH X75
HD
Master Your Move to HD with the X75 HD
www.leitch.com/X75
LEITCH
www.leitch.com

[X75 HD] Up/Down/Cross Converter, Synchronizer...and More

The Right Choice for Transitioning to HDTV

Combining HD frame sync video and audio processing capabilities and up/down/cross conversion, all in a space saving 1RU package the X75HD i the definitive all in one solution for broadcasters making the transition to HDTV

More Than Just a Synchronizer

- Up/Down/Cross Conversion with AV Synchronizer
- Audio Embedder/De-Embedder for SDI and HD-SDI
- Bi-Directional Standard/High-Definition Converter
- Analog Video Processor with Auto-Switch Time Base Corrector
- Logo Generator Inserter with SD memory card
- Integrated optional Dolby® E/AC-3 decompression
- Video Processing Amplifiers
- VITS Inserter and Closed Captioning transcoder
- Video and Audio Test Signal Generators
- Digital Noise Reducer with Digital Bandwidth Filtering Option
- Audio Limiter Option
- DV (IEEE 1394) Converter Option
- Auto-sensing, multi-standard device (PAL-B/PAL-M/NTSC/SECAM/NTSC) for worldwide use
- Redundant Power Supplies

More Functionality with Less Equipment

With capabilities that far exceed a high-definition processing synchronizer, the X75HD allows broadcasters to do more with less equipment. Video processing features include level/color control; 3D adaptive color decoding; noise reduction; frame synchronization and time base correction for non-synchronous signals; and up, cross, and down-conversion with aspect ratio conversion for hybrid standard and high-definition facilities.

The X75HD's 16 channels of internal audio processing include level control, analog-to-digital and digital-to-analog conversion, and embedding and de-embedding for both SDI and HD-SDI serial digital signals for interfacing any audio signal in a professional environment. Integrated Dolby® decompression and voice-over brings even more functionality.

Infinitely Flexible I/O

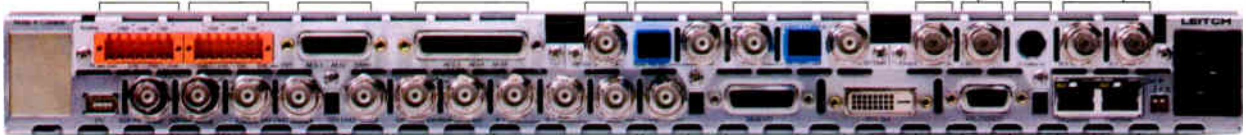
The exceptionally flexible X75HD is able to up, down and cross-convert from up to seven input video formats — more than any similar product currently on the market — to almost any output video format. In addition, the X75HD features auto-detected inputs with auto-changeover and user-selectable alarms for reduced downtime.

Providing separate connections for all video input and output formats, the X75HD allows for convenient front panel selection between multiple input devices — all of which may be connected simultaneously. Video input formats include HDTV optical fiber, HD-SDI, SDI, DV, composite video, component analog video (Betacam®) and Y/C (S-VHS/Hi-8). Ten outputs of the same signals are provided, as well as streaming video and audio over Ethernet, RGB, DVI-D, and PAL-B/PAL-M/SECAM/NTSC composite video output.

Exceptional Signal Quality

Full 10-bit processing for digital video is used for up, down and cross-conversions using a motion-adaptive de-interlacing technology. Included composite analog video outputs for PAL-B and NTSC are 12-bit wideband digital over-sampled for ultra-flat frequency response and exceptional signal-to-noise performance. The optional analog composite input offers 12-bit processing with the highest performance 3D adaptive comb filtering available in the market.

With the optional Digital Noise Reduction feature, convenient front panel controls permit adjustments for both spatial and temporal noise reduction. In addition, the Digital Bandwidth Filtering feature offers 2D filtering with separate horizontal and vertical bandwidth adjustments, providing entropy reduction prior to encoding or MPEG pre-processing applications.



Effortless Control

Control and monitoring of signals passing through the X75HD is enabled using IP over Ethernet, and instant operator control from the local or remote control panels allows for easy manipulation of video and audio signals. Using two Ethernet ports per unit (one for control, monitoring and video thumbnails, and one for video and audio streaming) makes PC control and monitoring over large networks entirely manageable.

A built-in Web Server and optional SNMP (Simple Network Management Protocol) are industry standard means of controlling and monitoring the X75HD over Ethernet. Leitch's CCS Command and Control System Pilot and Navigator software further enhance the remote control aspects of the X75HD for any application.

Limitless Applications

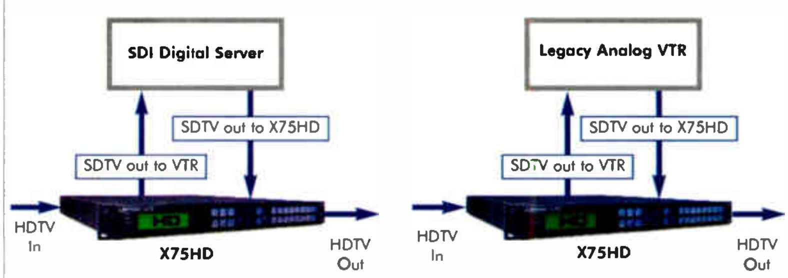
Expanding video processing to include "anything in" to "everything out" and simultaneous up and down-conversions, Leitch's new X75HD is equally suited for use in analog, digital, or high-definition hybrid facilities.

The X75HD provides a simple solution for even the most complex applications. For production and editing, the X75HD provides conversion to and from any signal type for HDTV productions. In news environments, it can time base correct any tape format — analog, digital or HDTV. For broadcast, the X75HD can perform up-conversion for HD output, down-conversion for monitoring/logging, and cross-conversion for programs that are recorded in other than the native format for the station. As a switcher, the X75HD can switch between SD and HD inputs with clean and quiet outputs with voiceover. In mobile environments, the X75HD's fast operator controls provide automatic input select to the proper HD output format, making the X75HD an easy choice for live events.

M-PATH™ Multiple Path Processing Supports Bi-Directional Processing

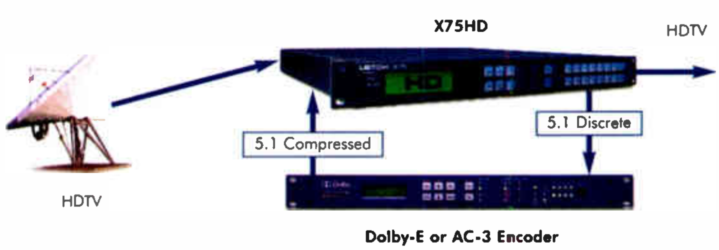
Leitch's exclusive M-PATH™ feature provides multiple directional connectivity between analog, digital and high-definition tape transports or routing systems. Enabling simultaneous converter and frame synchronizer operation, M-PATH mode routes HTDV optical fiber or HD-SDI and converts and synchronizes directly to the SDTV analog and SDI video outputs, which feed the inputs of analog composite and component and digital tape machines and routing systems. The analog or digital outputs of tape machines or routing systems can be simultaneously connected to one of the synchronizer's SDTV analog or digital inputs where it can be processed and output via the HDTV optical fiber and HD-SDI port. Audio signals are handled in a similar fashion, with eight channels of processing in each direction. Analog (two stereo pairs), AES/EBU (five inputs and five outputs) and embedded HD-SDI and SDI audio are also supported.

M-PATH — Simultaneous UP and DOWN Conversion Example



Simulcast — Switching Between SD/HD with SD and HD Output

Compressed/Embedded Audio — Audio Processing for Discrete Embedded and Compressed Audio



[X75 HD] UP/DOWN/CROSS CONVERTER AND SYNCHRONI

Building IT systems

By Fred Huffman

Turner Broadcasting monitors all on-air functions with display solutions for its all-digital network operations center. Photo courtesy of Barco.

Within the past few years, information technology (IT) equipment and software have become critical components in broadcast systems. Like information systems (IS), IT has its roots in management information systems (MIS). This technology, which was once just a computer in accounting, has become pervasive in content creation, distribution and delivery.

Products in today's broadcast systems are almost 100 percent digital. There is great commonality between the products in computer and communications systems and the products in modern broadcast systems. It doesn't take rocket science to build one; you can do it with the same basic knowledge, practices and skills that engineers use to build traditional broadcast systems.

This article is the first of six articles on using IT in broadcast and production environments. The objective of the series is to acquaint engineers and technical managers with IT and show them how they can use it in broadcast engineering and technical operations. The series will cover local network equipment, storage, cabling, inter-facility networks and testing of systems used to create, distribute and deliver content.

Building a system

Digital technology allows broadcasters to create virtual channels and to compress content to fit within a transmission channel's capacity. These two characteristics impact picture quality and sound fidelity. Knowing what is required at the reception point, the

System Configuration Made Easy

The Eclipse digital matrix intercom gives you amazing flexibility and responsiveness by combining a powerful communications platform with a highly intuitive interface and configuration program.

Just choose a station and the image appears on your PC screen. Select labels, drag and drop on the desired keys, and save your configuration. Up to 4 full-system configurations can be stored in the Eclipse frame for rapid changes.

Other Eclipse benefits include:

- Amazing port density—36 ports in 1-RU
- Intelligent linking among Eclipse systems
- Excellent audio with 24-bit sampling
- LAN or Internet access to system frames
- Built-in redundancy for failsafe use

Eclipse. News made easy.

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

Clear-Com
COMMUNICATION SYSTEMS

task becomes defining the parameters for an entire system.

On a conceptual level, building an IT system is no different than building a broadcast system. The differences are in the functions, capabilities and limitations of hardware, software and applications hosted on the system. If you are a successful broadcast-system builder, you can handle IT systems. Where appropriate, you can integrate it with network services to reduce operating cost while creating new revenue.

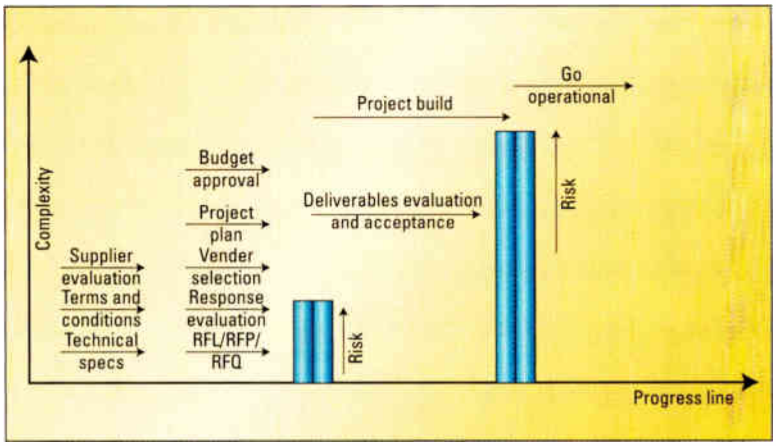


Figure 1. Building an IT system from start to finish involves different levels of risk along the way.

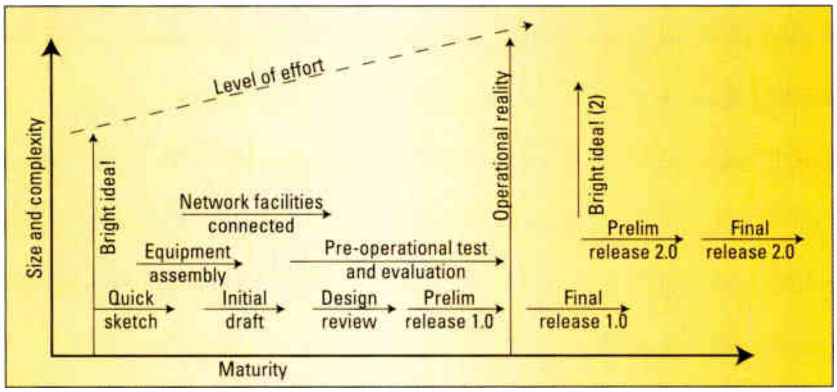


Figure 2. The effort needed to document a project from concept to completion varies with the project's size and complexity and changes as the project progresses.

Keep in mind three rules of thumb. First, the sole reason someone builds an IT system is because he believes it will make money. Second, great ideas turn into money only after someone builds something. Third, the most important aspect of successfully building a system is risk management. Figure 1 shows the process of building an IT system from start to finish, and the level of risk the builder encounters during the process.

Building a system from start to finish is carried out in two phases: planning and design, followed by construction or implementation. The typical approach to new projects involves working with finance and program planning or news to create a plan, often called a capital appropriation, capital-spending request or something similar.

Most organizations have a project-approval process that supports a capital-spending request. Typically, this process runs under a one- or two-page accounting department form. The form is likely to be supplemented by additional pages containing technical and financial details sufficient to convince management to approve the project. The level and content of detail required varies. Expensive projects require a lot of detail and evidence convincing of its value. This phase is considered complete when management signs off on the proposal. This means that the finance and accounting departments recognize the commitment and direction of management and operate accordingly. It also means that the engineering, purchasing and other departments can take the required action to complete the proposed project.

Designing the system

The most effective and efficient design starts when someone proposes the project. Even if your organization currently operates similar systems, a certain amount of design must be

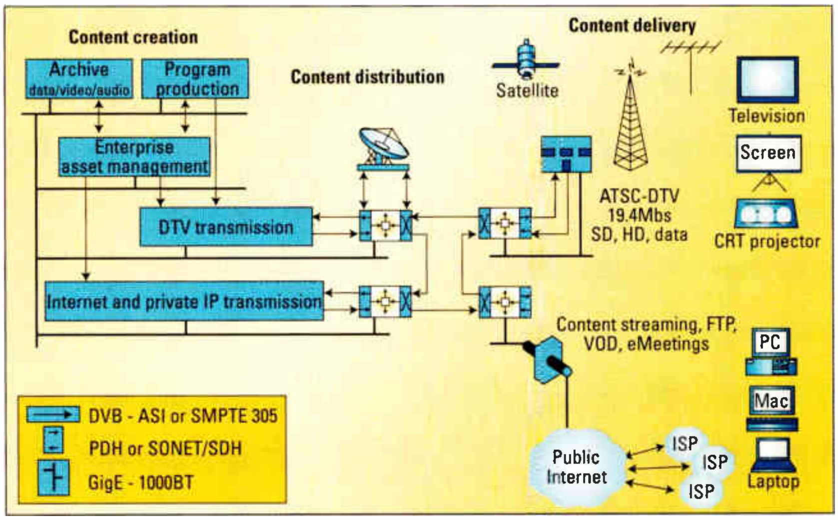


Figure 3. This high-level block diagram shows the architecture of a DTV system and where the proposed project fits within that architecture.

undertaken before costs can be estimated and a budget prepared. Properly documented, this work can dovetail with construction, test and operational plans.

Documenting the system

How many times have you been asked to fix a problem, only to find out that the documentation for the system or component is insufficient, incorrect, out of date or nonexistent? Someone once said that the difference between craftsmanship and engineering is documentation. Moving from a bright idea to operational reality requires a certain level of documentation. At least, there should be a block diagram, a list of system components or a parts list, cable and wiring lists, and a layout of the rack(s) and floor. Some cases may require a technical operations manual that you can use to describe system software, utilities and application software. Supplementing this, of course, are user manuals provided by equipment and software suppliers. Documentation is absolutely necessary to support a capital appropriation request and to front-end design documents.

Someone once said that the difference between craftsmanship and engineering is documentation.

Figure 2 on page 60 lists the documentation process and requirements for a successful project. It highlights all the activities and work required to document a system build from concept to operational reality. Most importantly, it shows how documentation matures as a project reaches completion. The project's zenith — its most desirable state — is when it is complete and operational. At that point, the documentation turns into a final release that matches the final configuration and normal operational status of the system. Lastly, notice that the documentation effort level varies directly according to the size and complexity of a project. It also increases as the project matures. Ideally, project documentation is most valuable when it is carried out in a seamless fashion from the initial idea through operational reality almost without regard to the state of maturity. Conducted properly, the documentation will support the next great idea when it becomes necessary to upgrade, change or replace the system.

Defining the system

It's important to know where the proposed project fits in the overall architecture of the business. Is the project a part of a national, regional or state-wide network? Perhaps it is a growth facility such as an editing suite or studio production system. High-level block diagrams can offer perspective and clarify where the proposed project fits in the overall architecture. As an example, Figure 3 on page 60 is a high-level block diagram showing the architecture of a DTV

CALREC
TOTAL SOLUTION
TOTAL COMMITMENT

total commitment

to broadcast

Different applications require different solutions. Most manufacturers' limited awareness of this fact just creates problems.

Calrec solves them.

Whatever your requirements, Calrec have a solution available right now.

Specialists in broadcast console design for over 30 years, Calrec provide all the broadcast features your programme needs, now and in the future.

Calrec's unique family of digital production consoles all share the same high levels of resilience, all have hot-swappable cards and panels and all operate independently of the on-board PC.

In short, all Calrec consoles share the same comprehensive broadcast specifications essential for live to air production. It's no wonder they have the finest reputation for quality and reliability.

Calrec. Total commitment, total solution.

Calrec Digital Broadcast Console Users:

- Clear Channel
- CNBC
- KJRH Ch 2 Tulsa
- KNSD-TV Ch 39 San Diego
- KXAS-TV Ch 41 Dallas
- KXTX-TV Ch 39 Dallas
- Maryland Public Television
- NBC Olympics
- NBC Television Network
- NEP Supershooters Inc.
- Trio Video
- Univision Network
- WTVJ Ch 6 Florida
- WVTM-TV Ch.13 Birmingham
- WXYZ Ch 7 Detroit

- Powerful, flexible feature set to meet all programme needs
- Embedded control system allowing for power-up and operation without the PC
- Automatic redundant DSP control processor and PSU systems
- High input headroom, excellent audio performance
- Hot-swap cards and modules throughout ALL cards and panels are removable and insertable under power
- Full system reboot in less than 20 seconds

CALREC AUDIO LTD, NUTCLOUGH MILL, HEBDEN BRIDGE, WEST YORKSHIRE, HX7 8EZ, UK TEL: 01144 1422 842159 EMAIL: enquiries@calrec.com WEB: www.calrec.com
South and Mid West States - TEL: (615) 871 0094 EMAIL: ericj@redwoodweb.com
North East States and Canada – TEL: (212) 586 7376 EMAIL dsimon@studioconsultants.com
Western States – TEL: (818) 841 3000 EMAIL: jschaller@audiospec.com

system. It illustrates key components and operational signal flow for all three stages in the signal chain: creation, distribution and delivery. The drawing also illustrates both intra- and inter-facility networks. If the proposed project is a content-creation system, for example, the high-level diagram can highlight that aspect of the architecture.

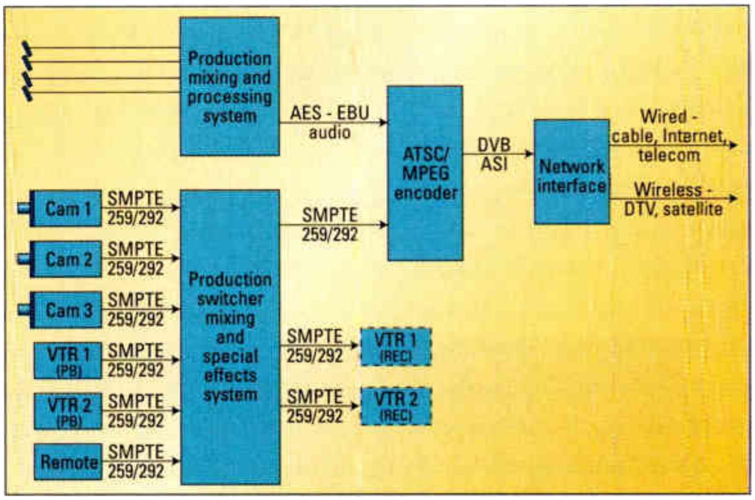


Figure 4. This functional block diagram of a content-creation system shows the level of detail necessary to support a capital-appropriation request and to front-end design documents.

Figure 4 shows a simple block diagram of a proposed content-creation system. In this particular project, the system uses uncompressed SD and HD video and digital audio, offers digital recording and playback and can compress content for live transmission or feeds across a digital network where the cost of bandwidth is a constraining factor. This is the level of detail typically required to support a capital-appropriation request and to front-end design documents.

If the proposed system or project has not been defined previously, that's task number one. It's imperative to write out a description of the system, accompanied by block diagrams, an equipment list, and rack and floor layouts. Organizing a spreadsheet or database to house wiring lists and circuit IDs round out a documentation package that you can store electronically, print when necessary and easily maintain when changes occur. Documenting exactly what the system will do and the key things it will not do is critical to gaining acceptance by those using it to perform the intended functions.

IT considerations

When proposing to integrate IT into a broadcast or production facility, it's important to consider how the facility will transport the content. This includes

Winning Strategies

Master Your Move to HD with Integrated Multi-dimensional HD Servers and Shared Storage

High-Definition NEXIO™ Server Systems

Make the move onto integrated high-performance platforms running our flexible software architectures.

HD NEXIO™ — server integrates the first software-based agile codec for high-definition video, allowing baseband high-definition record and playback, while supporting up and down conversion of content for simulcast applications from the same shared storage file system.

Digital Turnaround Processor™ (DTP) — uses patented software for real-time compressed video processing, enabling broadcasters to overlay motion graphics and logos on pre-compressed high-definition and standard-definition streams.

MPEG-2 Transport Stream (MTS) — server provides ASI input/output interfaces with the ability to de-multiplex a multi-program transport stream (MPTS). Stores individual programs and re-multiplexes any new MPTS created by seamlessly splicing individual HD and SD clips, thereby bridging the gap in workflow between SD and HD broadcasting.

Master Your Move to HD with NEXIO Server Systems

Canada	+1 (800) 387 0233
USA East	+1 (800) 231 9673
USA West	+1 (888) 843 7004
Latin America	+1 (305) 512 0045

LEITCH.

www.leitch.com

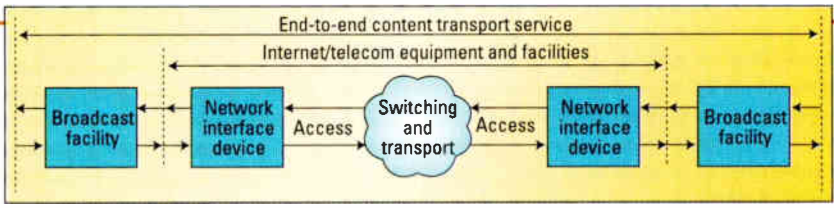


Figure 5. Inter-facility content-transport links are usually provided by telcos, cable networks or other outside service providers.

A key to effectively using IT technology in any broadcast or production environment is to understand where IT can and cannot be used effectively. Some of these aspects will be covered in the next article in March's issue. BE

Fred Huffman is a systems engineer for the Torino Olympic Broadcast Organization. He is author of "Practical IP and Telecom for Broadcast Engineering and Operations," published by Focal Press.

investigating topics such as transport modes and media, service providers, traffic levels and bandwidth requirements, and interfaces and standards.

Type of material	Content creation (Before compression)	Content distribution (After compression)	Content deliver (Before decompression)
HDTV	1.2 - 1.5Gb/s	20 - 150Mb/s	12 - 20Mb/s
SDTV	270Mb/s	8 - 30Mb/s	4 - 10Mb/s
Streaming video	270Mb/s or analog		300 Kb/s - 6Mb/s

Table 1. Displayed is the range of payload bit rates across the program content food chain.

Transporting content

Moving content around during the creation process and through distribution and delivery requires some type of vehicle. There are two ways to move content: physically on tapes, disk packs or on other portable media, or virtually through network connections. Content can move within the same facility (intra-facility) or between two or more facilities (inter-facility).

Intra-facility links are typically baseband wire, coax or fiber. Inter-facility links are usually provided by outside vendors, typically telcos, cable or other networking providers. An example of an inter-facility link is the typical STL. (See Figure 5.)

Traffic levels and bandwidth requirements

Content coming from the production process is typically digitized. Real-time transmission requires a minimum bitrate of 270Mb/s and can be as high as 1.485Gb/s. Carrying these kinds of signals between two points involves coax, twisted pair, fiber and combinations of various kinds of networks. Distributing and delivering it brings compression into the picture. Table 1 shows the range of bitrates required to carry content payloads in real time. Assuming a network capable of carrying these bitrates, the same transmission channel can be used to transfer files, or move content in non-real time.

Interfaces and standards

Interfaces between system elements are typically standardized. The most common interfaces are covered in SMPTE or AES/EBU standards. Compression is typically MPEG-1, MPEG-2 or MPEG-4. In the United States, ATSC and FCC standards also are applicable. Table 2 shows the characteristics, interfaces and payload bit rates found in DTV systems.

Application	Analog B/W	Sample rate	Bits/ sample	Coding scheme		Interface	Payload bitrate
Audio				*Coding*	*Channels*		
Studio mastering	20-20,000Hz	48KHz	16-20	AES 10-1991	56	BNC	125 Mb/s
Digital VTR	20-20,000Hz	48KHz	16-20	AES 2/3-1985	2/4	BNC	384-768Kb/s
Live broadcast	20-20,000Hz	48KHz	16-20	AES 2/3-1985	2/4	BNC	192-768Kb/s
	20-20,000Hz	48KHz	16-20	MPEG-2	2/4	BNC	192-768Kb/s
Video				*Sub-sample*	*Frame rate*		
Digitized NTSC	~6MHz	13.5MHz	8-10	4:2:2 YUV	29.94	SMPTE 259	143Mb/s
Digitized PAL	~8MHz	13.5MHz	8-10	4:2:2 YUV	25	SMPTE 259	177Mb/s
SD720x480/576	~15MHz	27MHz	8-10	4:2:2 YUV	29.94	SMPTE 259	270Mb/s
HD1920x1080	~30MHz	74.25MHz	8-10	4:2:2 YCbCr	29.94	SMPTE 292	1485Mb/s

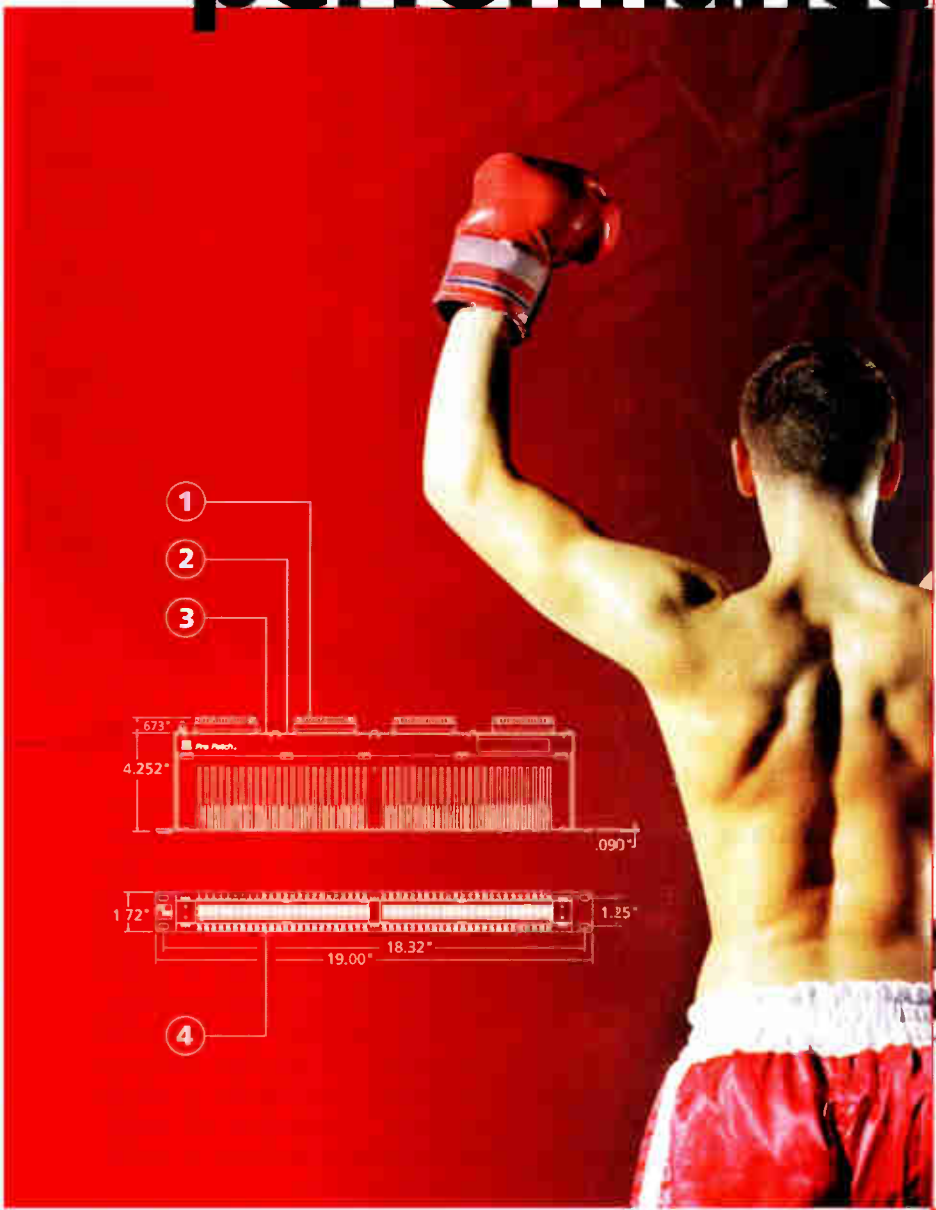
Application	Analog B/W	Sample rate	Bits/ sample	Coding scheme		Interface	Payload bitrate
Audio				*Coding*	*Channels*		
Digital VTR	20-20,000Hz	48KHz	16-20	AES 2/3-1985	2/4	BNC	384-768Kb/s
Live broadcast	20-20,000Hz	48KHz	16-20	AES 2/3-1985	2/4	BNC	192-384Kb/s
	20-20,000Hz	48KHz	16-20	MPEG-2	2/4	BNC	192-384Kb/s
Video				*Sub-sample*	*Frame rate*		
Digitized NTSC	~6MHz	13.5MHz	8-10	MPEG-2 MP@ML	29.94	SMPTE 259	10-12Mb/s
Digitized PAL	~8MHz	13.5MHz	8-10	MPEG-2 MP@ML	25	SMPTE 259	10-12Mb/s
SD720x480/576	~15MHz	27MHz	8-10	MPEG-2 MP@ML	29.94	SMPTE 259	10-50Mb/s
HD1920x1080	~30MHz	74.25MHz	8-10	ATSC	29.94	SMPTE 292	30-60Mb/s

Application	Analog B/W	Sample rate	Bits/ sample	Coding scheme		Interface	Payload bitrate
Audio and speech				*Coding*	*Channels*		
CD	44.1KHz		16			RCA	176Kb/s
Digital audio player	44.1KHz		16	RDAT		RCA	176Kb/s
Dobly surround					6	RCA	448Kb/s
Dolby stereo					2	RCA	192Kb/s
PC music (stereo)		22.1KHz	16	WAV	2	RCA	88.4Kb/s
PC music (mono)		10.5KHz	16-20	AES 2/3-1985	1	RCA	10Kb/s
Telephone speech		8KHz	16-20	ITU G.703	1	RJ11	64Kb/s
Internet speech		2KHz		ITU G.723	1	RJ45	16Kb/s
Audio conference							
Video				*Sub-sample*	*Frame rate*		
Digital STL				MPEG-2MP@ML	29.94	BNC	10-34Mb/s
DVD				MPEG-1 and -2	29.94	RCA	4-6Mb/s
PC based training				MPEG-1	15-30		1-2Mb/s
Video conferencing				ITU H.263	15-20	RJ45	384-768Kb/s

Table 2. Listed above are the characteristics, interfaces and payload bit rates found in DTV systems.

ADC®

performance by design.



ADC's new **Pro Patch™ Programmable Audio Patching System** offers unprecedented reliability and flexibility. Its modular design allows individual front jack access for circuit and ground configurations without having to take the entire panel off-line or remove it from the rack.

1. Light-weight, High density design (2x48)
2. Vibration & Shock Resistant
3. MIL-STD-202F tested and qualified
4. Gold crossbar contacts provide self-cleaning action

Performance is inherent in every one of our copper and fiber audio, video and data products which are built to provide unmatched performance and withstand the rigors of real world use.

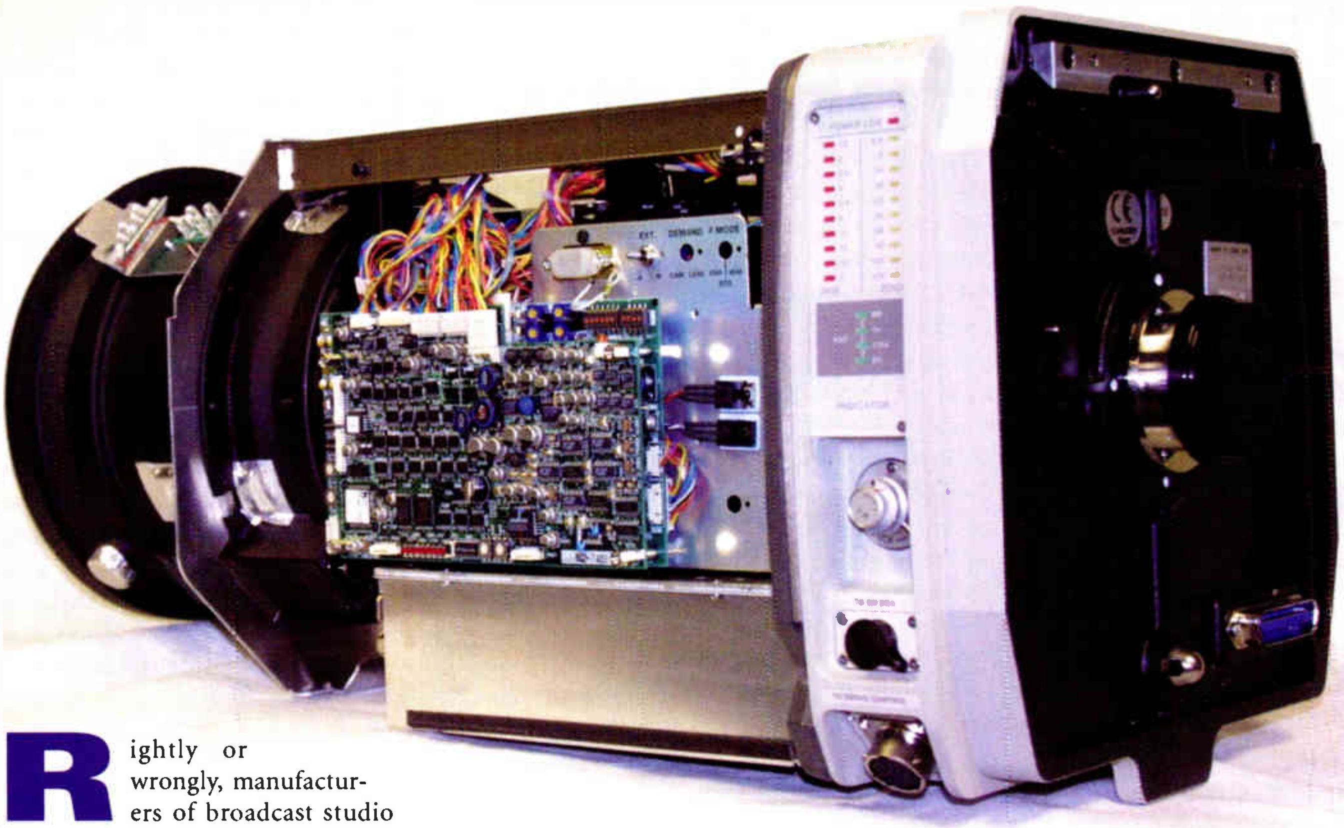
ADC offers outstanding pre/post-sale engineering and support as well as competitive pricing and the longest product warranty in the industry.

Contact us today and find out why ADC means "performance by design".

Call today for fast delivery!

For a free copy of ADC's 12th edition broadcast product catalog, call 1.800.366.3891 ext. 20000. Or visit adc.com/broadcast.

HDTV lenses, MTF and picture sharpness



By Larry Thorpe and Gordon Tubbs

Rightly or wrongly, manufacturers of broadcast studio cameras and lenses decided long ago to radically simplify published specifications. This has probably saved the sanity of many a chief engineer perusing competitive specification sheets. But it has also obscured intractable realities that lens and camera designers must still confront.

Manufacturers of modern television cameras traditionally offer a horizontal-resolution specification and, sometimes, a separate specification for vertical resolution (with little correlation between the two) to describe the lens' contribution to picture sharpness. This is a legacy of the "specmanship" long practiced by camera manufacturers. For example, HD camera manufacturers typically specify a depth of modulation at a reference spatial frequency of 800 TV lines per picture height (TVL/ph) or 27.5MHz (for the 1080-line system). Some manufacturers separately quote a horizontal limiting resolution — the highest horizontal spatial frequency at which the depth of modulation is at least 5 percent.

These published specification numbers are important in establishing a simple way to determine whether a given HD camera meets its resolution performance specification. But the numbers tell little about a camera's picture-sharpness performance. Long ago, engineers established that visual picture sharpness must be correlated with what is called the modulation transfer function of the lens-camera system.

Modulation transfer function

A typical multiburst resolution chart contains groups of vertical black-to-white "picket fence" bars and lines that challenge the spatial frequency response of lens-camera systems. Thick, widely-spaced bars represent low spatial frequencies, while thin, closely spaced lines represent high spatial frequencies. When aimed at such a resolution chart, a modern lens-camera system can easily reproduce the full contrast of the bars that represent low spatial frequencies of about 50TVL/ph. The resulting full-amplitude video signal level acts as the reference contrast level.

For the higher-frequency lines on the chart, the system reproduces lower contrast levels. When aimed at a multiburst chart that contains frequencies ranging from the 50TVL/ph reference all the way up to, say, 1000TVL/ph, the lens-camera system

produces a corresponding video envelope on a waveform monitor. It is as if the lens-camera system is modulating the contrast level over this frequency range. A graph can represent this change in reproduced contrast vs. frequency with spatial frequency on the horizontal axis and contrast on the vertical axis. (When expressing spatial frequency, video engineers prefer TVL/ph; optical engineers prefer line-pairs per millimeter.) Such a graph represents a form of transfer function for the contrast modulation, and is, therefore, called the modulation transfer function (MTF) of the lens-camera system. (See Figure 1.)

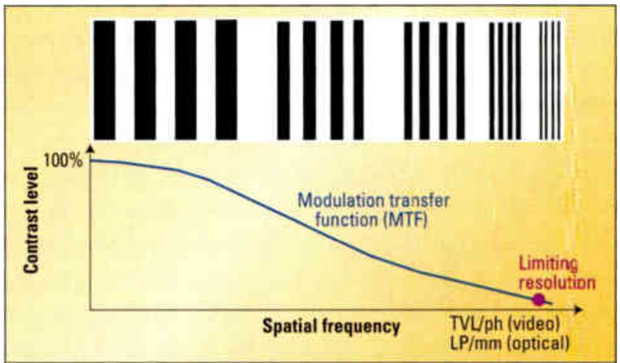


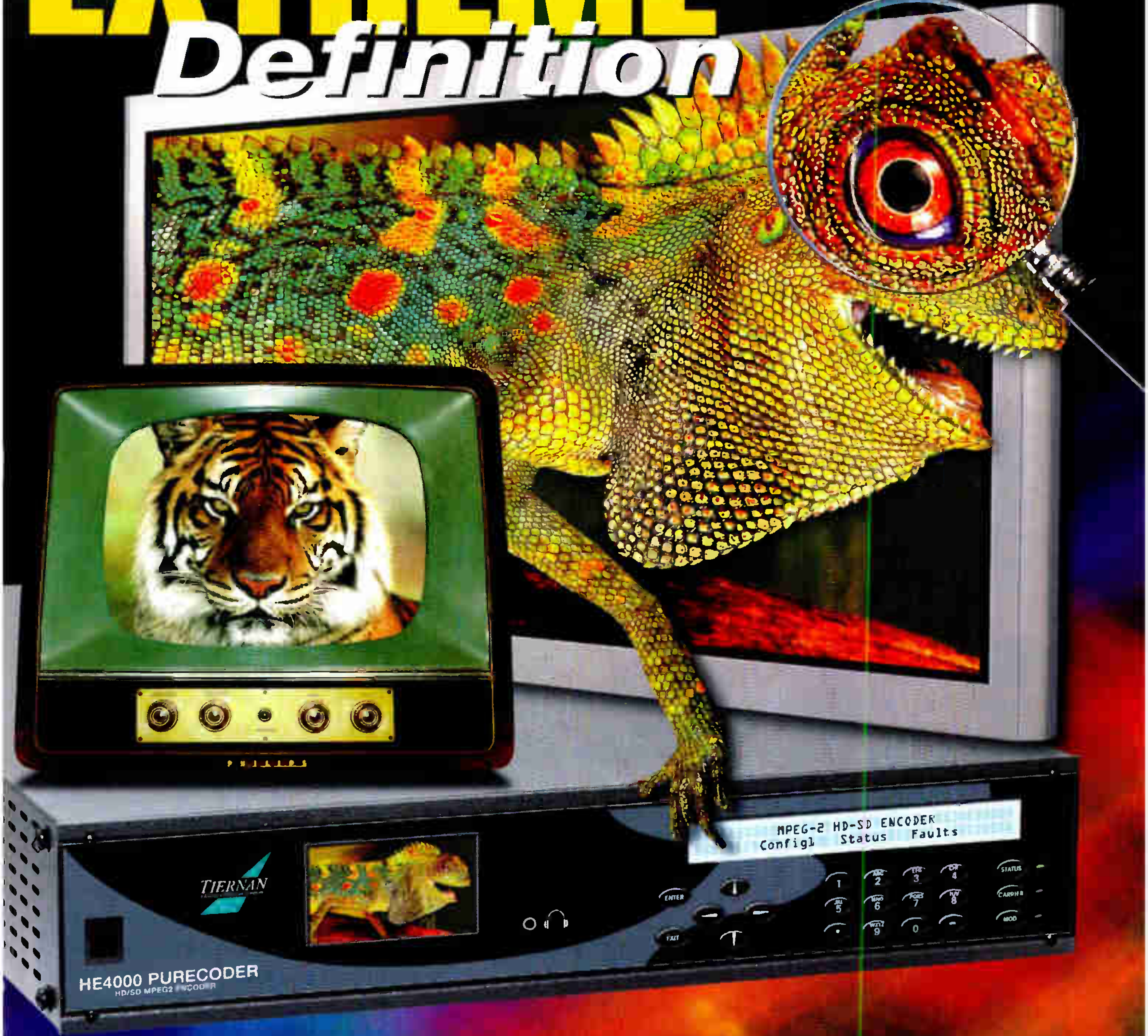
Figure 1. MTF represents the change in the contrast level produced by an imaging sytem in response to a range of spatial frequencies as they pass through the system.

Lens-camera MTF and picture sharpness

The MTF concept is one of the seminal works in the science of imaging. The most important result of that work was the revelation that visual picture sharpness for any system involving distant viewing (such as television or cinema) is proportional to the square of the area under the MTF curve. The implication is that the shape of the MTF curve over the useful passband of the camera is of vital importance to perceived picture sharpness. Indeed, it is much more important than the limiting-resolution specification.

Because the lens-camera system comprises two distinct components, the picture sharpness of any HD lens-camera system is ultimately determined by the shape of the lens' MTF curve multiplied by the shape of the camera's MTF curve. The shape of that composite MTF curve below 800TVL/ph — in the all-important range of 200TVL/ph to 600TVL/ph — is, in fact, the best objective way to determine the visual picture sharpness of a lens-camera system. Studio-lens designers must always consider this and include optical innovations that enhance the lens'

EXTREME Definition



HE4000: HD AND SD Encoder

- HD and SD Encoding Simultaneously
- Front Panel Monitor
- Advanced "PUREPEG" Technology
  - •Enhanced Low Bit Rate Performance
  - •Absolute Finest Picture Quality
- Satellite and Terrestrial Interfaces
- 1 MB/s to 160 MB/s

TIERNAN

Phoenix: 602-437-9620
San Diego: 858-458-1800
UK: 44-1420-540233
America: 858-458-1800
Singapore: 65-6225-4016
Beijing: 86-10-65831975
www.radn.com
www.tiernan.com

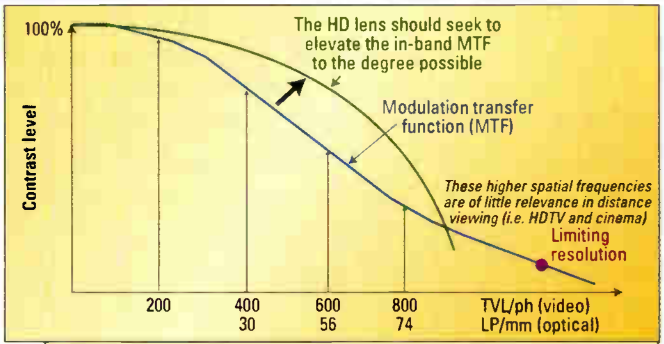


Figure 2. This MTF curve for a generic 1080-line HDTV lens-camera system emphasizes the importance of an HD lens design that optimizes the MTF over the critical 200- to 600TVL/ph range.

ability to reproduce contrast over this spatial frequency range. (See Figure 2.) Because MTF is all about spatial-frequency contrast levels, it is important to note that the lens' inherent optical contrast performance (the degree to which the lens can distinguish between different brightness levels and its ability to reproduce a true black with no light contamination) is inextricably bound up in the lens-camera sytem's overall picture-sharpness performance.

1080- and 720-line HDTV cameras

HD lenses do not distinguish among different HDTV production standards. They are all high-definition lenses, so similar optical MTF criteria apply to all of them. Figure 3 shows the MTF curve of a typical 1920x1080 HDTV studio camera operating with a typical high-performance HD studio lens. Contemporary 1080-line HD

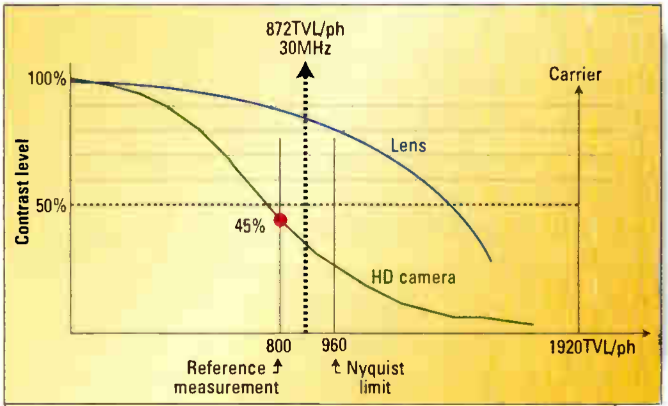


Figure 3. Here, the MTF characteristic of a typical 1080-line HD camera combined with a typical HD lens is measured at picture center. Generally, manufacturers only publish this specification at the reference 800TVL/ph spatial frequency.

Technical Excellence, Advanced Features, An Affordable Price

Sometimes it takes a new company to turn advanced technology into reality. In the server business, the new name is 360 Systems. In truth, we've spent the last 33 years designing advanced digital technology into broadcast products.

Now, the Image Server 2000 delivers a level of technical excellence unique to the broadcast industry. Its true next-generation design includes an exceptionally broad set of features, and a high standard for reliability. But most important, the Image Server 2000 establishes a new, reasonable price for broadcast video servers.

Join the hundreds of broadcast professionals who made the Image Server 2000 their first choice. Visit www.360Systems.com for the complete story on the next-generation Image Server 2000.

Sales line: (818) 735-8221
E-mail: Servers@360Systems.com

360 Systems® BROADCAST

What Can an Image Server 2000 Deliver at $11,999?

- Three video channels
- 12 audio channels
- SDI and composite video
- AES digital and +4 analog audio
- 100 hours of RAID-5 storage
- MXF file transfers over Gigabit Ethernet
- Premium quality video to 50 Mb/sec
- VDCP, Odetics, P2 and GPI control
- On-screen GUI for full control, plus trimming, segmenting and playlisting
- Only 3½" of rack space

NEW Multi-Format Server Option

- Import and play DV-format video
- Play TARGA graphics with Key-and-Fill
- Control by Ross Synergy™ switchers

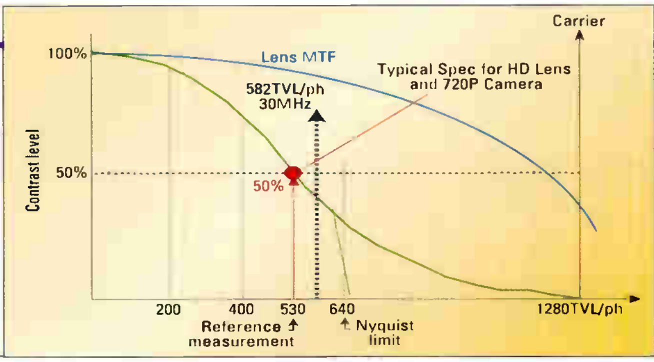


Figure 4. This graph shows the MTF characteristic of a 720/60p HD camera in combination with a typical HD lens measured at picture center. Generally, manufacturers only publish this specification at the reference 530TVL/ph spatial frequency.

cameras generally claim to reproduce a depth of modulation in the 40 percent to 45 percent range at the accepted reference spatial frequency of 800TVL/ph when used with a "typical" HDTV lens. But these camera specifications make no reference whatever to the all-important depth of modulation at spatial frequencies of 200TVL/ph, 400TVL/ph or 600TVL/ph.

The attenuation in a 720/60p system is less severe than in 1080i systems because of the tradeoff of spatial resolution for enhanced temporal resolution. As Figure 4 shows, the lens' MTF is high across the horizontal passband of this HD system, which is why it typically achieves a 50 percent depth of modulation at the reference spatial frequency of 530TVL/ph (or 27.5MHz in the video domain). This is one reason why 720-line 60p systems exhibit good subjective picture sharpness.

Lens realities in the MTF domain

You can't accurately establish the actual picture performance of an HD camera without including its associated HD lens. And, here, the technical plot thickens considerably. An HD camera's resolution performance remains essentially constant all over the picture raster. It is irrevocably determined by the spatial sampling of the imager, the optical low-pass filter and the electronic filtering employed prior to the camera's A/D converter. But the very nature of optical physics within the modern zoom-lens system dictates that its resolution performance is dynamic in three respects:

1. Optical design constraints, manufacturing tolerances and the complexities associated with the concatenation of multiple optical elements within the studio lens system produce an MTF behavior that cannot be constant over the picture raster. There is an inevitable falloff in MTF from the center of the frame out to the four corners of the frame.

2. Operating the lens' iris to control its aperture for different scene lighting conditions produces a variation in MTF. This is the result of fundamental optical physics associated with diffraction.

3. Most importantly, the alteration of the lens's focal length during zoom operation further alters its MTF.

can be staggeringly large. Thus, only an optimum overall compromise is possible. It is testament to the sophistication of powerful modern computer-aided design techniques that some lenses achieve excellent spatial MTF (with special attention to the 200TVL/ph to 600TVL/ph region).

This dynamic nature of MTF is an inescapable technical reality for all lenses, regardless of manufacturer. Numerous constraints imposed by optical physics are in play here, and different lens manufacturers make their own proprietary design optimizations. Accordingly, there certainly are systemic differences in the necessary compromises made by each lens designer. These differences are what broadcasters need to explore in any HDTV lens testing before making a purchase decision.

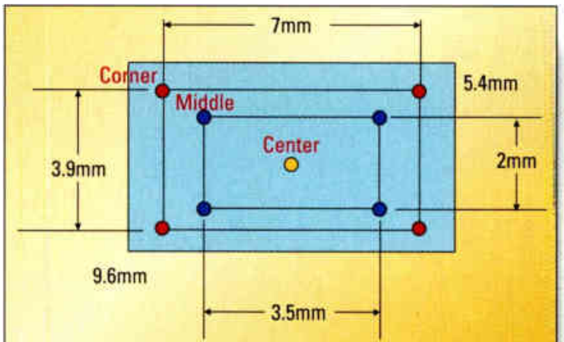


Figure 5. To manage the optical variables that occur during zoom-lens operation, lens designers consider multiple points on the image plane in their optimization calculations.

To manage these variables, lens designers must consider more than just the performance at the center of the lens. One approach is to consider several points on the image plane, including some on the periphery. For example, Figure 5 shows nine separate spatial reference points used by Canon's lens designers within a 16:9 image plane. These points include the "picture center," the "middle" (four points) and the "corner" (four points).

These points are used in conjunction with computer optimization programs to achieve the highest total MTF possible at all nine points for the lens' numerous optical elements. But this task is complicated by the fact that the optimization must also seek the highest MTF when the lens iris is being operationally exercised to alter the lens system's optical aperture. The task is further complicated if optimization also takes place when many of the optical elements are physically moved relative to each other while altering the lens focal length during a zoom operation. The sheer number of variables involved in such design optimization

Putting it in perspective

Picture sharpness looms large in any assessment of HDTV performance, and the lens plays a major role in sharpness reproduction. It also predetermines the lens-camera contrast performance and plays a significant role in the system's color reproduction. Designing an HD studio lens involves an extensive number of variables. But manufacturers have been successful in overcoming this and other formidable challenges to produce remarkably high-performance lenses. **BE**

Larry Thorpe is national marketing executive and Gordon Tubbs is assistant director of the Canon Broadcast & Communications Division.

Editor's Note:
Don't miss an expanded version of this article, available at:
www.broadcastengineering.com

A PRIMEDIA Publication

BroadcastEngineering

www.broadcastengineering.com

Editorial Director: Brad Dick, bdick@primediabusiness.com
Technical Editor: Donald Keller, dkeller@primediabusiness.com
Sr. Assoc. Editor: Susan Anderson, sanderson@primediabusiness.com
Assoc. Editor/Webmstr: Chevonn Payton, cpayton@primediabusiness.com
Asst. Editor: Angela Daunis, adaunis@primediabusiness.com
Sr. Art Director: Michael J. Knust, mknust@primediabusiness.com
Art Director: Robin Morsbach, rmorsbach@primediabusiness.com
Technical Consultants: Computers & Networking – Brad Gilmer
Antennas/Radiation – John H. Battison
Digital Video – Michael Robin
Transmission Facilities – Donald L. Markley
Legal – Harry C. Martin
New Technology – John Luff
Industry Watcher – Paul McGoldrick
New Media – Craig Birkmaier

Sr. VP: Peter L. May, pmay@primediabusiness.com
Group Publisher: Dennis Triola, dtriola@primediabusiness.com
Marketing Dir.: Kirby Asplund, kasplund@primediabusiness.com
Online Sales & Marketing Dir.: Samantha Kahn, skahn@primediabusiness.com
Vice Preisdent of Production: Lisa Parks, lparks@primediabusiness.com
Sr. Ad Prod. Coord.: Kathy Daniels, kadaniels@primediabusiness.com
Classified Ad Coord.: Mary Corcoran, mcorcoran@primediabusiness.com
Dir., Audience Marketing: Barbara Kummer, bkummer@primediabusiness.com
Group Show Director/LDI: Sharon Morabito, smorabito@primediabusiness.com

PRIMEDIA
Business Magazines & Media

COO: Jack Condon, jcondon@primediabusiness.com
Executive Vice President: John French, jfrench@primediabusiness.com
Corp. Comm/Mkg.: Karen Garrison, kgarrison@primediabusiness.com

Primedia Inc.: 745 Fifth Ave., NY, New York 10151
Chairman: Dean Nelson: dean.nelson@primedia.com
President and CEO: Kelly Conlin, kelly.conlin@primedia.com
Vice Chairman & General Counsel: Beverly Chell, beverly.chell@primedia.com

MEMBER ORGANIZATIONS
Sustaining Member of:
• Society of Broadcast Engineers
Member, American Business Media; Member, BPA International

BROADCAST ENGINEERING, ISSN 0007-1994, is published monthly (except semi-monthly in June and December) by PRIMEDIA Business Magazines & Media Inc., 9800 Metcalf Ave., Overland Park, KS 66212 (primediabusiness.com). Current and back issues and additional resources, including subscription request forms and an editorial calendar, are available on the World Wide Web at broadcastengineering.com.

SUBSCRIPTION RATES: Free and controlled circulation to qualified subscribers. Non-qualified persons may subscribe at the following rates (Prices subject to change): USA and Canada, 1 year, $70.00, 2 years, $135.00, 3 years, $200.00; Outside USA and Canada, 1 year, $85.00, 2 years, $165.00, 3 years, 245.00 surface mail (1 year, 155.00, 2 years, $295.00, 3 years, $440.00 airmail delivery). For subscriber services or to order single copies, write to *Broadcast Engineering*, 2104 Harvell Circle, Bellevue, NE 68005 USA; call 866-505-7173 (USA) or 402-505-7173 (outside USA); or visit www.broadcastengineering.com.

ARCHIVES AND MICROFORM: This magazine is available for research and retrieval of selected archived articles from leading electronic databases and online search services, including Factiva, LexisNexis and Proquest. For microform availability, contact ProQuest at 800-521-0600 or 734-761-4700, or search the Serials in Microform listings at proquest.com.

REPRINTS: Contact FosteReprints to purchase quality custom reprints or e-prints of articles appearing in this publication at 866-436-8366 (219-879-8366 outside the U.S. and Canada). Instant reprints and permissions may be purchased directly from our Web site; look for the RSiCopyright tag appended to the end of each article.

PHOTOCOPIES: Authorization to photocopy articles for internal corporate, personal, or instructional use may be obtained from the Copyright Clearance Center (CCC) at 978-750-8400. Obtain further information at copyright.com.

PRIVACY POLICY: Your privacy is a priority to us. For a detailed policy statement about privacy and information dissemination practices related to Primedia Business Magazines and Media products, please visit our Web site at www.primediabusiness.com.

CORPORATE OFFICE: Primedia Business Magazines & Media, 9800 Metcalf, Overland Park, Kansas 66212 • 913-341-1300 • primediabusiness.com

Pro-Bel's
Morpheus Velocity at Turner

BY JOHN MORGAN

Last year, Turner Entertainment Networks went live with technology that has significantly upgraded its ability to alter and manipulate the length and structure of commercial breaks during live sports events. In these events, exact timing is needed, and the duration of breaks is often not known until they are right upon the broadcaster.

The network's live events group chose Pro-Bel's Morpheus Velocity to meet the technical challenges presented by live events. The system has been used since last year on Turner Network Television (TNT), in connection with its NBA basketball and NHL hockey coverage.

Two years ago, Network Operations moved into a new, state-of-the-art facility. As part of that process, all of the operation's on-air video servers were connected to a central archive called Broadcast Inventory Manager (BIM), powered by Pro-Bel's MAPP asset management system. BIM consists of 22TB of fully redundant EMC CLARiiON arrays, two ASACA DVD libraries (for commercial and promotional backups) and two new StorageTek PowderHorn libraries. All commercials are centrally ingested and moved into BIM. Then, as on-air demands dictate, material is distributed from BIM.

Turner Entertainment Networks uses Pro-Bel's Morpheus Velocity automation system for easy manipulation of commercial breaks in live events.

In the deployment, Velocity is in essence the "thin client" application that sits on top of the Morpheus backbone. On the day of a live event, operators load a schedule into the software, which then queries the Morpheus database to see if any material required for air is missing. If any material is missing, requests are generated and issued to BIM, and the material is restored to the video servers from the CLARiiON arrays.

The system uses the same on-air schedule as the network's other, more traditional playout applications. Live event operators simply trim the schedule to include only the time period for the event before it is loaded into the Velocity.

The application itself runs on a Windows 2000 platform and communicates with Pro-Bel ICON hardware using IP. The ICON hardware controls the server(s) using RS-422 VDCP. The actual PC running the application is controlled remotely.

Considering that Morpheus Velocity is a new hardware and software system, the installation went extremely well. Installation of all hardware, including signal connectivity to Turner Studios (where the production room is) was completed by the end of September 2003. An installation engineer was on-site in September to commission the hardware and PC. In early December 2003, the network began playing out material off-air to identify any remaining issues.

This technology not only allows for manipulation of the commercial/promotional material at production's request (for the enhancement of the broadcast), but it also serves as a backup to the master control in the event of any problems.

> **Considering that Morpheus Velocity is a new hardware and software system, the installation went extremely well.**

The system allows operators to manipulate events within a commercial break seconds before it airs. Material can be moved using drag-and-drop functionality. Commercial breaks can be combined with a single keystroke or quickly split. Because changes within a live event happen unexpectedly and quickly, it is important to have an application that requires as few mouse clicks as possible. To this end, the new system provides many shortcuts to access commonly used functions.

This solution allows operators to plug into the network's video servers and eliminates the need to manually ingest the commercial promotional material into separate sport servers. This ensures more efficiency and accuracy of inventory for the live broadcast because the material can be ingested once and air multiple times. In addition, equipment can be modernized from a JPEG to an MPEG format and a second channel is available as a backup. BE

John Morgan is a project manager at Turner Entertainment Networks.

Playout automation

BY JOHN LUFF

In an age where computers are embedded in everything from cell phones to PDAs, to the dashboard of your car, the concept of computer control over the playout of TV or radio programming seems entirely logical. To an entire generation, it must be hard to imagine a time when computers did not have such ubiquitous control over disparate aspects of our lives. Though I was not born in that generation, I guess I had something to do with their genesis, as my youngest daughter has followed my path into broadcasting. Still, I can see how the concepts of workflow automation in broadcasting may appear a bit obtuse, even to the latest generation in our industry.

The concept of workflow is the key to understanding how automation can and often does affect playout of programming. In the simplest terms, automation systems replicate the actions humans would do without their assistance. They collate the information needed to assemble a daily log, review its contents to be sure everything is present, go looking for missing tapes or programs, flag numbers that don't look right, make dub lists, and organize the purging of old content that is no longer needed. Automation rolls VTRs and servers, takes crosspoints on switchers, watches the clock and puts in the ID on the hour, keeps meticulous notes about what has happened, and puts the log in the out basket at the end of the shift. It does not figure out where bathroom breaks are but, short of that, an automation system is the computerized workflow equivalent of a human's actions.

It is entirely logical that it should be this way. There are many possible reasons for automation. It can be used to reduce errors or to allow more complex facilities to be controlled by fewer people (although not by zero people — yet). Or broadcasters might implement automation to assure the closed loop of communications between traffic, air operations and back to traffic, as well as deal with a host of housekeeping details. A good automation system provides such thorough workflow automation that a human can intuitively understand the process the automation system is using to find, cue, roll and log segments and interstitials. It doesn't exactly take a genius to recognize the obvious. Any good software that replaces repetitive tasks by human workers must in fact replicate at least the effect of the workflow that humans use naturally in the workplace. The first steps might be to define the task and gather the information needed to accomplish the task. Then the system might organize the work logically, perform the task by acting on outside devices and report the results for accounting and billing. I think a college professor might have told me something like that if I had really been listening in my Fortran class.

So, broadcast automation at the core is a pretty understandable process of duplication of human action. What is different about automation today is that the amount of information that must be presented to an operator is nothing less than staggering. As a result, the software now must do more than just the simple tasks of importing a traffic log, finding the media, keeping track of the media, cueing and playing, and reporting. It must also create a user interface that allows an operator to see and intuitively understand what is happening on perhaps a dozen channels at once. That is the first nontrivial exercise the code writer must face after he is taught what master control is all about. Think of the myriad of details an operator must be trained to take care of, and extrapolate that to the task of programmers of a modern system.

What is different about automation today is that the amount of information that must be presented to an operator is nothing less than staggering.

They must know the workflow in a broadcast station and what can go wrong and how to get out of a jam. In short, they need to know the workflow of a software development company and the workflow of their clients.

Today, playout automation increasingly interacts with other computers as sources of content, including scheduling, PSIP generators, DTV muxes and control systems, as well as switchers and other devices with rich control sets. Take, for instance, the automation of a "branding engine," a new term often mistaken for new-era master control switchers. Branding engines have crosspoints that require take commands, but they also contain rich display sets for background graphics, overlay pages, and audio and video clip files for logos and other content. Automation must gather the data from traffic, parse it correctly to figure out what commands are necessary to load and run the right elements, and then parse it again into the language of the interface to the branding engine. As these elements get more complex, the lingua franca is not static but, instead, becomes a family of languages needed to talk to similar devices from disparate manufacturers.

Out of this arises a need to have a rich language that can be used to define an API that all character generators, for instance, would understand from the outside. Indeed, a language is needed that all automation systems might use as the basis of simplifying the job of the many code writers from many companies involved. A consortium of manufacturers, including Pinnacle and others, is exploring MOS as the structure for standardizing the API. MOS is XML-based and well-defined. As such, the code can be human-readable, at least on one side of the interface, though the driver inside the controlled device is still a bit of a mystery. At least they theoretically need to write only one MOS driver to talk to a large number of automation systems.

HBO uses Harris ADC-100 automation across its operations. Photo courtesy of Nils Walter Studio.

As systems continue to grow more complex, it seems inevitable that items like archive, media asset management and WAN architectures will become a standard part of broadcast systems. The development of standard interfaces between automation and other devices will make it much easier to interface software modules for these systems into one holistic facility automation system. This holds the promise of reducing the complexity of large implementations and facilitating much more complex small installations in the future. Today, the cost of many software packages integrated together explodes when you take integration management and labor into account.

It is worth noting that we may be seeing movement away from RS-422 as the *de facto* interface between automation and controlled devices. IP communication has become so simple and cheap that it is practical to implement as a standard control on many devices. Certainly, it is simpler for a computer to spit out all the commands on one port via Ethernet. The ability to extend IP communications over WAN circuits is appealing for distributed environments like centralized broadcast operations. Servers, branding, character generators, clip players and, indeed, nearly all devices have embedded processors that facilitate communication via TCP/IP.

Finally, the ability to write complex graphical user interfaces using standardized tools is a tremendous boon to automation companies. For instance, it can allow users to customize the display for individual tastes, or spread the interface across two monitors, using tools that come with graphics cards and software embedded in operating systems. Viva simplicity! It gives us all more time to concentrate on the core issue of workflow. BE

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

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

CAMERA-MOUNTED DOWNCONVERTER AND DV ENCODER

Miranda DVC-800 series: Simplifies HDTV acquisition monitoring and improves workflow by allowing rough cut DV editing and the preparation of dailies on-site; operates with Sony HDCAM, Panasonic VariCam and Ikegami HD cameras; mounts between the camera and its battery; adds less than an inch to the overall length of the camera; has a minimal impact on battery life.
973-683-0800; *www.miranda.com*

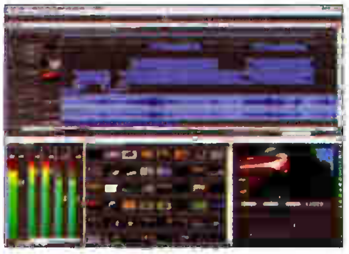
DIGITAL MULTIMETERS

Meterman Test Tools PM Series: Has UL safety ratings up to CAT III at 300V and CAT II at 600V; is 3/8in thick and weighs less than 3oz; meters measure ac/dc voltage, resistance, frequency and capacitance with an audible continuity beeper.
877-596-2680; *www.metermantesttools.com*

DIGITAL RECEIVER

Microwave Radio Communications RXL: Is available in 2GHz, 5GHz and 7GHz frequency bands; all connections are accessible from the rear of the receiver; includes easy-to-read front-panel indicators; can be controlled locally through its front-panel rotary preset switch or remotely over a customer-supplied RS-232 connection using the optional GUI software.
978-671-5700; *www.mrcbroadcast.com*

NONLINEAR HD/SD EDITING SYSTEM



Leitch VelocityHD: Features full-quality, dual-stream real-time HD performance, optional real-time HD/SD 3-D DVE, compressed and uncompressed (8- to10-bit) video, and real-time HD/SD color correction; is format flexible (1080i, 1080PsF, 720p).
800-387-0233; *www.leitch.com*

DEMO ROOM

SYNCHRONIZER

Crystal Vision SYNNER144: Combines synchronizer, tracking audio delay and embedder/de-embedder on one board; use with no piggyback, with input piggyback or with output piggyback; embed or de-embed analog or digital audio; works with two groups of embedded audio; includes a short minimum delay of 3.8ms.
954-788-3334; *www.crystalvision.tv*

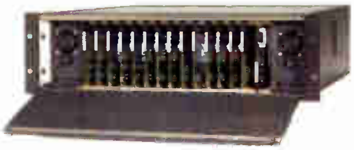
PORTABLE EDITING SOFTWARE

Avid Xpress Pro HD: Supports Panasonic DVCPRO HD acquisition and editing, Avid DNxHD editing and rendering, and real-time multicamera functionality; features DV50 capture and output over IEEE-1394, 24p and video effects output over IEEE-1394.
978-640-6789; *www.avid.com*

WINDOWS MEDIA EXPORT COMPONENT FOR APPLE'S MAC OS X

Telestream Flip4Mac: Provides encoding in Microsoft Windows Media 9 Series SD and HD on the Macintosh; select the Windows Media 9 codec from a list of available formats in the export function of QuickTime-based applications; versions include standard and Pro/HD.
530-470-1300; *www.telestream.net*

MPEG DATA ANALYSIS MODULE



Videotek SQM-355: Accepts and analyzes a single MPEG stream for compliance to Technical Report ETR 101-290; reports bit-rate values per program, PID and transport stream total/used/available to SQM monitoring and control software; serves as the checkpoint of any facility's operations center; detects signal path errors and reduces monitoring costs.
800-800-5719; *www.videotek.com*

MPEG OVER IP TEST AND MONITORING

Pixelmetrix DVStation-IP Portable: Supports 10-, 100- and 1000Mb/s Ethernet; once connected to an IP network, the device can be set to sniff out video traffic on any set of IP address pairs, extract the MPEG-2 transport stream and perform extensive MPEG-2 verification.
954-472-5445; *www.pixelmetrix.com*

Help Wanted

ENGINEERING MANAGER - WABC-TV is looking for an individual with a solid technical background to assist in the design, operation, and maintenance of server-based digital video and audio systems, graphics and editing systems, and their associated IT infrastructure.

The successful candidate will need to have several years experience providing Engineering and IT support to broadcast News and Master Control, On-Air operations at a major market television station. This position includes managerial responsibilities as well as the need to understand complex digital video, digital audio, and LAN systems, with a proven ability to diagnose and rectify problems quickly. Excellent communication skills are essential to understand users' requirements and provide new training on systems, project management experience, an Engineering degree, and experience working with labor contracts in a represented facility. This open position is for late afternoon / evening hours.

Please send your resume to: Bill Beam, Director of Engineer, 7 Lincoln square New York, NY 10023. No telephone calls, faxes, or emails please. We are an Equal Opportunity Employer.

Employment

Certification

Help Wanted

CHIEF ENGINEER (Boston, MA) - WERS-FM and Emerson College seek a highly motivated Chief Engineer for WERS' FM station, WECB (a carrier current FM station), and the College's Academic Audio Program. The successful candidate must possess a minimum of five years of experience as a chief engineer or equivalent in a mid-size or large broadcast market, including department management experience; strong FM transmitter and studio equipment repair experience (at component level); current knowledge of FCC Rules and Regulations and familiarity with state-of-the-art audio systems and equipment. This position has a first response requirement for emergencies on a 24/7 basis and includes "Engineer In Charge" status, when required, for broadcast or production events. This individual supervises an assistant engineer and contract help, works closely with WERS Management and audio faculty, and reports to the College's Director of Engineering. Candidates must possess a high level of experience with Mac and PC systems, Audio/Business/Editing/Remote Control and other software, interfaces and connected audio devices. Other maintenance experience required includes: Avid Editing, Pro-Tools and Cool Edit and analog/digital audio equipment. To apply, please send resume and cover letter to: Matthew Scher, TV, Radio and Film Dept, 120 Boylston Street, Boston, MA 02116. Email: matthew_scher@emerson.edu. Emerson College is an Equal Opportunity/Affirmative Action Employer focused on workforce diversity.

DIRECTOR OF NEWS OPERATIONS WPVI-TV seeks a manager to oversee our news photography, engineering and editing units. The ideal candidate is a seasoned television news manager with the ability to balance daily editorial and engineering needs in an aggressive, highly competitive newsroom. The job includes scheduling, procurement and making sure our equipment is always ready to roll. Send resume & cover letter **(no calls/faxes)** Cathy Simonds, News Business Manager, WPVI-TV, 4100 City Ave., Suite 800, Philadelphia, PA 19131 EOE

Help Wanted

Randstad North America, in partnership with Discovery Communications Inc., has excellent opportunities for you to join one of the most highly recognizable television networks at their brand-new multi-channel origination center.

Television System Engineers/ Digital Television Engineers

Northern Virginia/Washington, DC Metro Area

You'll provide hands-on maintenance for all broadcast television equipment and apply your thorough understanding of digital test equipment and experience with video servers and broadcast automation systems in a master-control environment. Excellent written/verbal communication skills are essential. Weekend and/or shift work may be required as this is a 24/7 operation.

Interested? Submit your resume and cover letter to: **Randstad North America/ Discovery Communications, Attn: Nicole Collins, 8045 Kennett Street, Silver Spring, MD 20910. E-mail: Nicole_Collins-cw@Discovery.com. Fax: 240-662-1443.** EOE

randstad work solutions

Discovery COMMUNICATIONS

Help Wanted

KCPQ/KTWB-TV - A Tribune Station
Department: Engineering
Position: Assistant Chief Engineer

KCPQ/KTWB-TV, Tribune Broadcasting's Seattle regional operating center seeks Assistant Chief Engineer. ACE is responsible for management of all on air operation for multiple stations, and for maintenance of all broadcast equipment comprising the regional operating center.

A Bachelors degree in broadcast technology or equivalent experience preferred. Requires minimum 10 years experience in broadcast engineering and strong knowledge & experience with HDTV technology/MPEG digital video, satellite and microwave delivery systems, & non-linear editing. Prefer prior experience with Louth. Requires experience with live news broadcasts and remotes. Candidate must be knowledgeable of FCC compliance requirements and possess excellent communication skills. Strong managerial skills necessary.

No phone calls please. EOE.

Please submit resume' to: Recruiter, KCPQ/KTWB-TV, 1813 Westlake Ave. N., Seattle, WA 98109, Fax: 206-674-1344.

Help Wanted

WGBO/Univision 66 Chicago is looking for a self-starter "hands on" television Chief Engineer with a minimum of 5 years experience as a Chief or Assistant Chief Engineer. Candidate must have a good track record as a proven project manager, staff developer and administrator. Experience in all areas of television broadcast maintenance, including UHF transmitters, ENG systems, studio equipment and FCC Rules & Regulations is required. The Chief Engineer will assist in preparation and administration of capital and operating budgets and be responsible for equipment purchases and installations. Candidate will act as liaison between engineering and all other departments, including growing news, production and creative Services departments, for daily operations, major events and special projects. Candidate must have excellent managerial, organizational, communications and interpersonal skills. College degree or equivalent industry training as well as computer literacy required. Send resume and cover letter to: WGBO Univision 541 North Fairbanks Court, Suite 1100; Chicago, IL 60611; Fax: (312) 467-5821 or E-mail: avelazquez@univision.net. **UNIVISION IS AN EQUAL OPPORTUNITY EMPLOYER**

Help Wanted

TURNER STUDIOS

TURNER STUDIOS, the state of the art digital television complex serving the production needs of the Turner Entertainment Networks in Atlanta, Georgia, is seeking highly motivated, client service oriented Engineers to join our team!

We are currently accepting resumes for:

- **Data Systems Manager**
  Project and Workgroup Management
  Digital media workflow and systems
  Render, Storage, Security, Server
- **Production Engineers**
  - Audio
  - Editorial
  - Effects
  - Router
  - Studio

  Design, install, maintain
  SD & HD Production and Post
- **IT Specialists**
  Workstation, application, server support
  Digital media management and workflow
- **Remote Engineers**
  Field Operations is looking for an experienced EIC / Maintenance Engineer to work with us on our HD mobile units.

Successful candidates will be motivated self-starters, detail and deadline-oriented team players, with strong interpersonal, communication and customer-service skills. Minimum 3-years industry experience with strong background in television engineering and cutting-edge post-production technology.

Please send resumes to
Jeff Sharpe - Director of Engineering
Fax - 404-878-4014
Email - jeff.sharpe@turner.com

For more information, please visit:
http://www.turnerstudios.com
http://www.turnerjobs.com

For Sale

For Sale

For Sale

AcousticsFirst™
Toll-Free Number: **888-765-2900**
Full product line for sound control and noise elimination.
Web: http://www.acousticsfirst.com

Ad Index

Broadcast Engineering is not responsible for errors in the Advertisers Index.

	Page #	Advertiser Hotline	Web site Address
Accom Inc.	61	650-328-3818	accom.com
ADC Telecommunications Inc.	67	1-800-366-3891	adc.com/broadcast
Avid Technology	4, 5	978-640-6789	avid.com/broadcast
Axcera	69	724-873-8100	axcera.com
Azden Corp.	31	516-328-7500	azden.com
Broadcast Microwave Services	40	858-391-3050	bms-inc.com
Calrec Audio Ltd.	63	011 44 1422 842159	calrec.com
Canon USA Broadcast Lens	7	1-800-821-HDTV	canonbroadcast.com
Clear-Com Communications Systems	59	510-496-6666	clearcom.com
DMT USA	39	856-423-0010	dmtonline.us
Dolby Labs Inc.	15	415-645-5000	dolby.com/tvaudio
Ensemble Designs	45	530-478-1830	ensembledesigns.com
ESE	27	310-322-2136	ese-web.com
Euphonix	47	650-855-0400	euphonix.com
Evertz Microsystems Ltd.	IBC	905-335-3700	evertz.com
Fischer Connectors	77	800-551-0121	fischerconnectors.com
Hamlet Video	81	866-4-HAMLET	hamlet.us.com
Harris Corp./Broadcast Div.	3	1-408-990-8200	broadcast.harris.com/automation
Ikegami Electronics Inc.	33	201-368-9171	ikegami.com
Leitch Inc.	BC, 53-56	800-231-9673	leitch.com/x75
Leitch Inc.	65	800-231-9673	leitch.com
Marshall Electronics Inc.	52	800-800-6608	lcdracks.com
Maxell Corp. of America	9	800-533-2836	maxell.com
Miranda Technologies	11	514-333-1772	miranda.com/kaleido
National Association of Broadcasters	57		nabshow.com
Network Electronics	46	800-420-5909	network-electronics.com
Nucomm Inc.	70	800-968-2666	nucomm.com
Omneon	26	408-585-5105	omneon.com
Panasonic Broadcast	17, 19, 21	800-528-8601	panasonic.com/p2
PESA Switching Systems	51	800-328-1008	pesa.com
Prime Image Inc.	25	408-867-6519	primeimageinc.com
Pro-Bel	74	631-549-5159	pro-bel.com
Quantel Ltd.	16	203-972-3199	quantel.com
Quartz USA	72	888-638-8745	quartzus.com/qmc
Radyne ComStream	71	602-437-9620	radn.com
Rohde & Schwarz	20	888-837-8772	rohde-schwarz.com/usa
Sachtler Corp. of America	23	516-867-4900	sachtler.com
Salzbrenner Stagetec Media	41	+49 9545 440-0	stagetec.com
SMPTE	83		smpte.org/conferences
Solid State Logic Ltd.	79	212-315-1111	ssl-broadcast.com
Sony Business Systems	28-29		sony.com/hdselect1
Sony Business Systems	34-37	1-800-686-7669	sony.com/xdcam
TBC Consoles Inc.	18	888-CONSOLE	tbcconsoles.com
Telecast Fiber Systems Inc.	62	508-754-4958	telecast-fiber.com
Thomson/Grass Valley	13	530-478-3000	thomsongrassvalley.com/kayak
Utah Scientific	75	801-575-8801	utahscientific.com
VertigoXmedia	64	877-4-VERTIGO	vertigoxmedia.com/know
Wheatstone Corporation	IFC	252-638-7000	wheatstone.com
360 Systems	73	818-735-8221	360systems.com

Sales Offices

US/CANADA

WEST
George Watts III
(360) 546-0379; Fax: (360) 546-0388
georgeww3@aol.com

EAST
Josh Gordon
(718) 802-0488; Fax: (718) 522-4751
jgordon5@bellatlantic.net

EAST/MIDWEST
Joanne Melton
(212) 462-3344; Fax: (913) 514-9249
jmelton@primediabusiness.com

INTERNATIONAL

EUROPE
Richard Woolley
+44-1295-278-407
Fax: +44-1295-278-408
richardwoolley@btclick.com

EUROPE
Tony Chapman
+44-1635-578-874
Fax: +44-1635-578-874
ARCintect@aol.com

ISRAEL
Asa Talbar
Talbar Media
+972-3-5629565; Fax: +972-3-5629567
talbar@inter.net.il

JAPAN
Mashy Yoshikawa
Orient Echo, Inc.
+81-3-3235-5961; Fax: +81-3-3235-5852
mashy@fa2.so-net.ne.jp

CLASSIFIED ADVERTISING OVERLAND PARK, KS
Jennifer Shafer
(800) 896-9939; (913) 967-1732
Fax: (913) 967-1735
jshafer@primediabusiness.com

REPRINTS
FosteReprints
(866) 436-8366;
International inquiries,(219) 879-8366

LIST RENTAL SERVICES
Marie Briganti, Statlistics
(203) 778-8700 x146
(203) 778-4839
primedia@statlistics.com

Customer Service: 913-967-1707 or 800-441-0294

BROADCAST ENGINEERING & World Edition
Jan. 2005, Vol. 47, No. 1 (SSN 0007-1994) is published monthly and mailed free to qualified persons by Primedia Business, 9800 Metcalf Ave., Overland Park, KS 66212-2216. Periodicals postage paid at Shawnee Mission, KS, and additional mailing offices. Canadian Post Publications Mail Agreement No. 40597023. Canada return address: DHL Global Mail, 7496 Bath Road, Unit 2, Mississauga, ON L4T 1L2. POSTMASTER: Send address changes to *Broadcast Engineering*, P.O. Box 2100, Skokie, IL 60076-7800 USA. CORRESPONDENCE: Editorial and Advertising: 9800 Metcalf, Overland Park, KS 66212-2216 Phone: 913-341-1300; Edit. fax: 913-967-1905. Advert. fax: 913-967-1904.

Not all of us
are adult enough

BY PAUL MCGOLDRICK

Reality TV is about something other than just reality. Once you've made people eat squirming bugs or jump between airplanes, and stripped them of all human decency and degraded them before a national audience, what else can you do to shock viewers?

Obviously, the FCC has made it clear that it will impose record fines to make sure the airwaves remain squeaky clean. So anything truly outrageous will have to appear on cable. What do you think it will be? With Howard Stern off to satellite radio, anything visual on the cable system is going to be *really* bad. (And why isn't the content from a satellite system subject to FCC perusal? Do they use a different kind of RF that we don't know about?)

> It seems to have a let's-see-how-far-we-can-take-it attitude . . . with a little "shock and awe" thrown in for ratings.

The end of Puritanism (which the rest of the world thinks is the motto of the United States) perhaps came with the airing of shows like "The Graham Norton Show," "Coupling" and "British Men Behaving Badly" on BBC America. These shows are direct and in your face about sex, but somehow they come across differently than the lewd programming of a character like Benny Hill. And nudity is hardly something new on European TV. In the 1970s, Italian video pirates started a national addiction to the female anatomy.

The network that broadcast many shows of recent ilk, like "The Graham Norton Show," is Britain's Channel 4. It seems to have a let's-see-how-far-we-can-take-it attitude, and it has fired the first shots in a downhill slope toward voyeurism, with a little "shock and awe" thrown in for ratings.

The program that really got viewers to the phones was when Channel 4 broadcast an autopsy — live. It was the first time since 1832 that the British had seen a public autopsy. Conducted by German professor Dr. Gunther von Hagens, it was a well-shot, well-lit show, with taste certainly in the eye of the individual viewer.

Death was also the subject of a documentary, "Beyond Love," in which the heroine had a fetish for corpses.

The documentary "Animal Passions" was about a man who made love to his pony; the act wasn't depicted, but it was described in its minutiae.

Things got a little sicker (from my point of view, at least) when Channel 4 broadcast a show called "Sex Inspectors." On the show, couples making love (live) were observed by sex experts who gave advice and recommended different sex toys to help improve the couples' orgasms.

Recently, the channel has created a bit of a stir by advertising on its Web site for a terminally ill volunteer who will subject his or her body to a two-month experiment. The show will exploit the manner in which the human body deteriorates — all in front of the camera, of course.

This macabre proposal, just for reality TV, does have a real counterpoint. The University of Tennessee runs a facility that examines the deterioration of corpses under various circumstances. Directed by a forensic anthropologist, Dr. William Bass, and known locally as the "body farm," it serves to find the solution of many otherwise inexplicable deaths.

But this is a little different from Channel 4's proposal to make the natural process public. Is this any worse than when Channel 4 showed a man eating a dead baby's flesh?

These are just some of the wonderful pieces of programming that are coming your way. Just as derivatives have sprung up around "reveal" programs like "Changing Rooms" (with the U.S. version known as "Trading Spaces"), there are certain to be even stranger versions of these questionable Channel 4 productions. These types of programs seem to be good for both viewer numbers and attracting advertisers.

I've never quite gotten into the habit of using adult language or shopping at adult stores, so I guess I have a bit of growing up to do. And, beyond all the strange output from the UK, I have even bigger problems with Comedy Central's first animated reality show, "Drawn Together," which I find even more real than reality itself — if that's possible. **BE**

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

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

[King of Processors]
X75™ HD
Up/Down/Cross Converter, Synchronizer...and More
Standard Definition
Embedded Audio
Fiber Interface
Analog
Web Server
NTSC/PAL-M/PAL/SECAM
Dolby®E/AC-3 de-compression
Synchronization
Processing Amplifiers
Up/Down/Cross Conversion
Aspect Ratio Conversion
Metadata Transparency
Noise Reduction
Logos
High Definition
Multi-Channel Audio
AES/EBU
Digital
DVI-D and DV
Streaming
1080i/720p
Production/Editing
News
Broadcast
Mobile
Satellite
X75 HD
King of Processors
SHIPPING NOW!
Up/Down/Cross Conversion with Synchronization Starts With eXtra Processing Power
The X75 HD eXpands video processing to include "anything in" to "everything out" and simultaneous up and down conversions. Aspect ratio conversion, 3D adaptive decoding, TBC, SD/HD logos and noise reduction are all part of the vast array of X75 video capabilities.
For surround sound applications, 16 channels of audio processing with embedded SD/HD, analog and digital interfaces are provided. Integrated Dolby® decompression and voice-over brings even more functionality.
▪ Less equipment required for your SDTV and HDTV video processing applications
▪ Multiple paths of processing for video and audio
▪ IP-enabled for control, monitoring and streaming including SNMP
Master Your Move to HD with the X75 HD
www.leitch.com/X75
Canada +1 (800) 387 0233
USA +1 (800) 231 9673
Europe +44 (0) 1344 446000
France +33 (0) 1 42 87 09 09
Italy +39 02 3655 3450
Hong Kong +852 2776 0628
China +86 10 6808 6301
Japan +81 (3) 5423 3632
LEITCH
www.leitch.com