www.broadcastengineering.com

NOVEMBER 2004

Broadcast Engineering®

THE JOURNAL OF DIGITAL TELEVISION

MASTER CONTROL SYSTEMS

The other side of automation

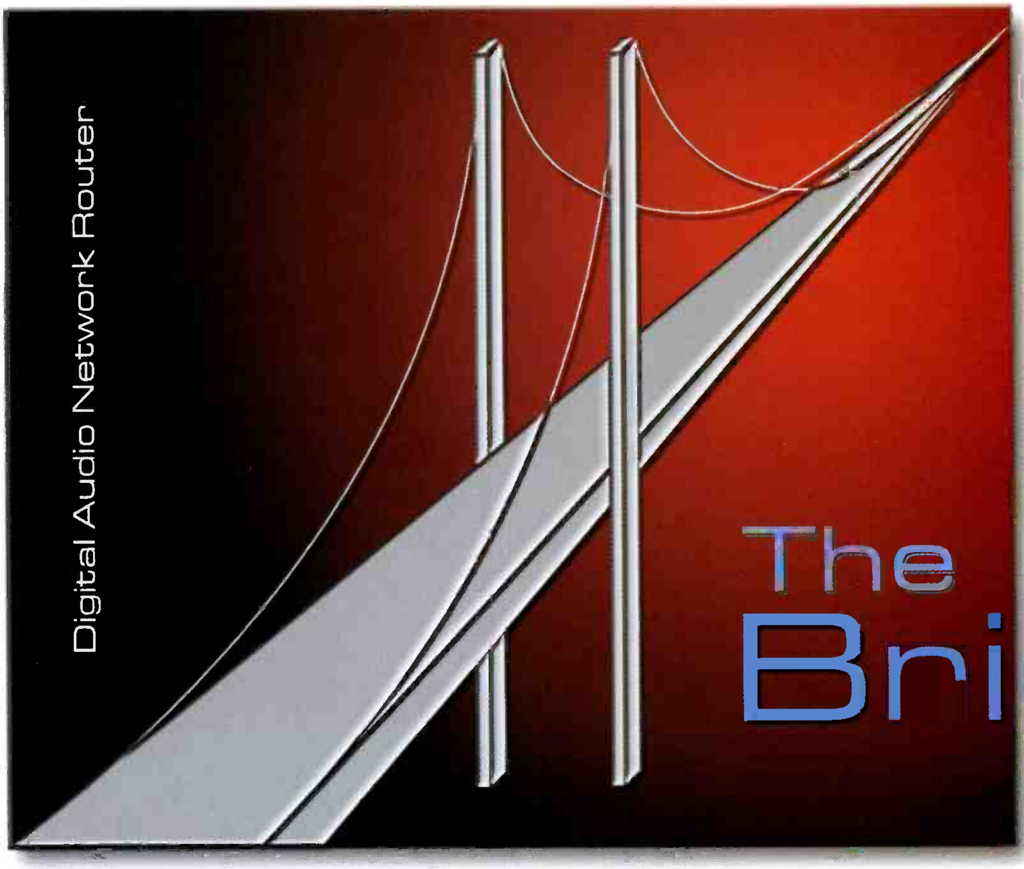
IT network troubleshooting

Looking for digital errors

Camera lenses

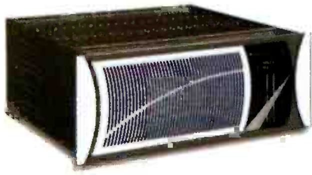
A tutorial for engineers

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.

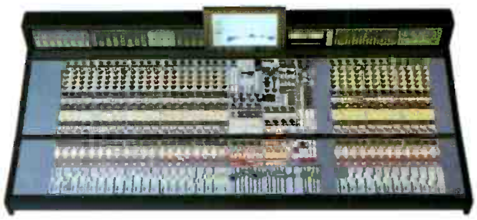


It's not just a Digital Console, It's an ENTIRE Audio Infrastructure

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

If Only Managing Digital Assets Were This Simple.

Make quick work of managing your station's media assets. Harris Media Asset Management solutions allow you to transform analog and digital media into an integrated digital library that offers fast search-and-retrieve access to exactly what you want, when you want it. It's a scalable and modular solution that grows with you, allowing you to add features and functionality as required. So you can ingest, index, find and retrieve with the click of a mouse. It's a proven system Harris has developed though our decade-long experience in maximizing media assets around the globe. And that can have a simply amazing effect on speed and efficiency throughout your operation.

do More»»

For more information about the simple-yet-powerful range of Media Asset Management solutions, call **1-408-990-8200,** or visit us on-line at **www.broadcast.harris.com/automation.**

www.broadcast.harris.com

HARRIS

Becau

This is technology you can touch. AirSpeed™, a revolutionary new breed of broadcast video server, accelerates your I/O by providing immediate access to incoming feeds. Affordable, reliable AirSpeed systems scale easily and play to air within moments of editing the story – with an interface you already know how to use. Call your Avid broadcast sales manager today or visit www.avid.com/airspeed.

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®

NOVEMBER 2004 • VOLUME 46 • NUMBER 11 www.broadcastengineering.com

BroadcastEngineering
THE JOURNAL OF DIGITAL TELEVISION

CONTENTS

FEATURES

BEYOND THE HEADLINES

ON THE COVER: Modern master control rooms have different paradigms for monitoring and control. (Pictured: TNTinHD, courtesy Turner Broadcasting.)

DIGITAL HANDBOOK

(continued on page 8)


now on the streets of
new york
NY 1 NEWS
THE ONLY LOCAL NEWS
WORTH WATCHING
NY1 making big news with P2
Around the clock, around the block, news here happens in a New York minute. That's why NY1 News has taken Panasonic P2 to the streets, covering national events like the Republican National Convention, where reliability is paramount. P2 gets breaking news on-air faster by eliminating digitizing and providing seamless connection of camera original-quality DVCPRO data directly to laptop editors, servers and IT networks. With P2 and Pinnacle Edition non-linear editing, NY1 can cover New York's non-stop news with greater speed and efficiency. How about your city? To find out more about Panasonic P2 news solutions call 1-800-528-8601 or visit www.panasonic.com/broadcast.
Panasonic ideas for life
© 2004 Panasonic Broadcast

NOVEMBER 2004 • VOLUME 46 • NUMBER 11 www.broadcastengineering.com

Broadcast Engineering

THE JOURNAL OF DIGITAL TELEVISION

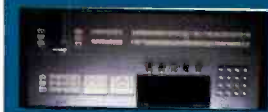
CONTENTS

Systems Design & Integration

New Products & Reviews

Departments

Freezeframe



Name the product shown in the photo above. What year was it introduced? Correct responses will be entered into a drawing for *Broadcast Engineering* T-shirts. Enter by e-mail. Title your entry "Freezeframe-November" in the subject field and send it to: editor@primediabusiness.com. Correct answers received by Jan. 1, 2005, are eligible to win.

Profanity-free-TV

Broadcasters. We are such a dirty, foul-mouthed, obscene lot.

At least that's what you'd think by some of the news lately. It seems to have started with shock jock Howard Stern. Long known for pornographic radio (if that's possible) and foul language, Stern has always been in the sights of indecency groups and the FCC.

Following in his steps is the duo Opie and Anthony. They managed to cram more sex talk into radio, and a local church, than anyone thought possible. The FCC has reviewed and fined both radio shows. In the case of Stern, his network (Viacom) has paid millions of dollars in fines for foul and obscene language broadcasts. The last single fine of $755,000 for sexually explicit content and other alleged indecency violations ended Stern's career at Viacom.

Television isn't far behind. Will we ever forget Janet Jackson's attempt to restart her career and promote her new CD by flopping her breast into the faces of an unsuspecting national TV audience during the Super Bowl half-time show? That incident really fired up the family viewing groups and, of course, those holier-than-thou types more commonly known as politicians.

While there have always been respectable people and certain groups that opposed what they define as indecent broadcasts, today it's gotten entirely out of hand. Broadcasters may now have no choice but to implement a permanent broadcast delay on all live television.

A recent incident is a perfect example.

NBC was broadcasting live the EA Sports 500 at Talladega. In a post-race interview, race car driver Dale Earnhardt Jr. uttered (oh my gosh) the "s" word, saying, "this don't mean s…"

The uttering of that one word launched a series of complaints to the FCC from the Parents Television Council (PTC).

Laura Mahaney, PTC director of external affairs said, "I don't know why they [television broadcasters] haven't caught on yet that they need some kind of tape delay."

"Good grief," as the Peanuts character Lucy would say. I say, get a life!

It was one word — and a quite common one at that. What kid over the age of 24 hours hasn't heard it? Since when is one word such a big deal?

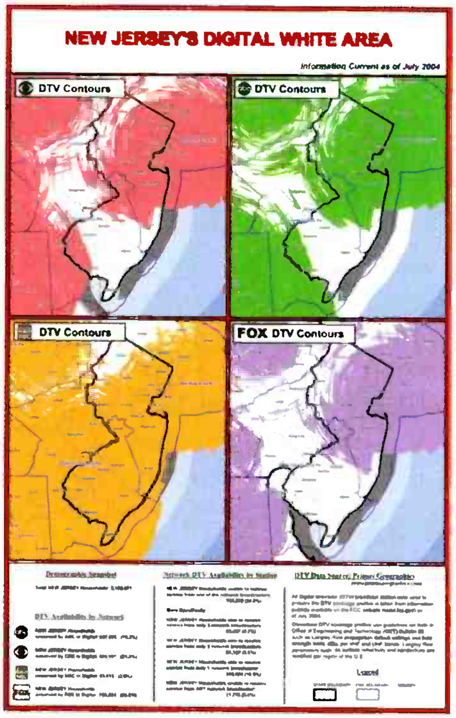
It seems the radio DJs and programmers have decided they would rather flee than fight. They are all moving to satellite, where the FCC, at least so far, doesn't give an "s" what programmers do. So we can have Howard Stern, Anthony and Opie, Dale Earnhardt and Joe from "The Sopranos" saying all the words they want without fear that the FCC will hunt them down. You see, it's satellite. It's not RF, or at least not the "public's spectrum," and besides you have to pay for it to get it.

What I can't figure out is this: Would it be okay for NBC and the other networks just to delay the over-the-air broadcasts and censor them, but let all the hells and damns and other words go out uncensored on cable and satellite?

After all, those are "paid" channels and that seems to be the FCC's criteria on regulation. Then Ms. Mahaney and her ilk could simply give up their cable and satellite systems and just watch OTA broadcast. Sure, they might go from having 200 channels to five, but heck, they'd have profanity-free-TV.

Brad Dick
editorial director

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



DTV viewers

So, the Digital Transition Coalition says, "Thirty-nine million U.S. households can't get complete DTV service."

What is more important is that the "Digital Transition Coalition" can't even get their maps right. CBS and NBC national maps are swapped. And, it probably didn't really hurt their cause to completely omit NBC in the largest geographic market in the United States (Utah).

By the way, how can the DTC call itself a "group of consumer organizations," when we all know who is REALLY behind it, and what he wants to sell?

KEN W. ENGLISH
KSL-TV/KSL-DT

Editors' note: Additional information on this issue can be found in the Sept. 27 issue of "Beyond the Headlines," at broadcastengineering.com/newsletters/bth/20040927/dtv-service-incomplete/.

How can the DTC call itself a "group of consumer organizations," when we all know who is REALLY behind it?

Defining "judder"

Dear Mr. Robin,

I recently ran across one of your past articles on the Internet and became interested in the section on temporal resolution. I'm not familiar with the term "movement judder," and I would like to learn more about it. Actually, I am interested in the whole subject of interline flicker and would appreciate any references you could provide.

SAM SCHWARTZ

Michael Robin responds:

The term "judder" is relatively recent and generally refers to the difficulty that film and television media have in portraying smooth and rapid motion. One old and still annoying example is the film "wagon wheel effect." Interlaced video suffers from interline flicker, most visible with synthetic video signals such as those produced by character generators. With the exception of such signals, interline flicker is relatively unnoticeable. The vertical resolution rarely exceeds 70 percent of the active video lines, and the watching distance is on the order of six times the picture height. This renders such artifacts invisible. A Google search will reveal a wealth of articles concerning movement judder. As far as interlace in general is concerned, I would refer you to classical television books, such as "Fundamentals of Television Engineering" by Glenn M. Glasford, published by McGraw-Hill in 1955 (!) and "Television Engineering Handbook" by Donald G. Fink published by McGraw-Hill in 1957 (!). Things have not changed much since these books were written.

July Freezeframe:

Q. In 1986, NHK announced a high-sensitivity camera pickup device called the HARP. It was updated to the Super-HARP in 2001. What does HARP stand for and how much more sensitive was each version than a conventional Saticon?

A. HARP stands for High-gain Avalance Rushing amorphous Photo-conductor. HARP was 10 times more sensitive, and the Super-HARP 100 times more sensitive, than a Saticon tube.

August Freezeframe:

Q. What do the following acronyms stand for? ACATS, DVD, MPEG, VADA, THX

A. **ACATS:** *Advisory Committee on Advanced Television Service*
DVD: *Digital Versatile Disk*
MPEG: *Motion Picture Experts Group*
VADA: *Vertical Ancillary Data Area*
THX: *Tomlinson Holman's eXperiment or George Lucas' first film THX1138 (either is correct)*

July Winners:

Patrick O'Brien, KATC-TV
Augusto Villasenor, Globecomm System
Fred van Let
Eddie H. Sills

August Winners:

The following people got four out of five correct:

Olumide Ojerinde
Mike Dunlap
Michael L. Scheumann, SCO ENGINEERING
Alex Oluchi
Mark Ferrell, Time Warner Cable

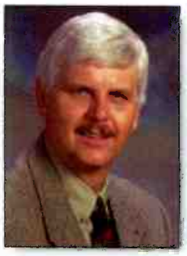
Test your knowledge!

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*

A studio in a box?

BY CRAIG BIRKMAIER



My how things have changed. Imagine what this column would be about if it had been written just a decade ago. How might one have described a TV studio in a box? The box could have been a remote truck or a bunch of travel cases, loaded with cameras, character generators, tape decks and other production components needed to produce a television program. For those applications needing only minimal audio and video mixing capabilities, you might even have found an all-in-one box that could get the job done. One thing that you would not have seen was a claim that a personal computer could be configured as a studio-in-a-box.

By the early '90s, PCs were making major inroads into audio production, and beginning to compete with dedicated systems for video paint and character generation applications. Nonlinear editing was beginning to emerge, as an offline process to create edit decision lists. The ability to use a computer to produce a complete television program was predicted, but broadcasters and traditional video equipment suppliers were, shall we say, skeptical.

Some things have not changed as dramatically as some predicted. Broadcast-quality cameras and video recording systems are still big-ticket items from the handful of companies that remain standing. The introduction of DV camcorders has helped to democratize video production. However, until recently, those without the money to buy an expensive deck to play the tapes weren't able to capture clips for use as compressed video files. Composite, S-video, analog component video and SDI (SMPTE 259M/292M) still served as the interconnections for a professional video production system. This was true even in a one-man professional project studio — the equivalent of a studio-in-a-box.

Broadcast station infrastructures evolved down a uniquely broadcast-centric path, even as facilities upgraded from analog to digital. Crosspoint-oriented routing switchers

WealthTV, a high-definition network, uses Apple Final Cut Pro editing with Apple Xserve Raids. Photo courtesy A. F. Associates. Photo by Carmen Shettino.

emerged as the primary means of signal interconnection, with separate physical layers for switching audio and video streams. The notion of moving files between processing systems was for all intents and purposes meaningless. Broadcasters have built their digital infrastructures to mirror the analog infrastructures they were upgrading. The assumption behind this decision was that the purpose of a TV station was to deliver a single program stream to the transmitter.

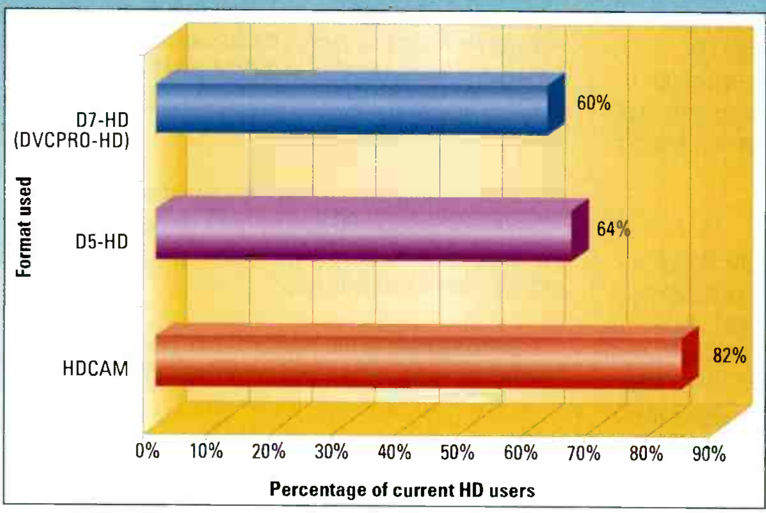
The philosophy behind this traditional view of television as a bunch of video streams was not fundamentally flawed. The fatal flaw was the notion that data networking and video networking would remain separate and unique.

The requirement to produce live broadcasts has driven the design of signal routing infrastructures for broadcast. Unfortunately, broadcasters have applied this philosophy to areas where switching and mixing baseband video/audio signals is not required. DTV master control is an excellent

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

One in five U.S. studios use HD in production

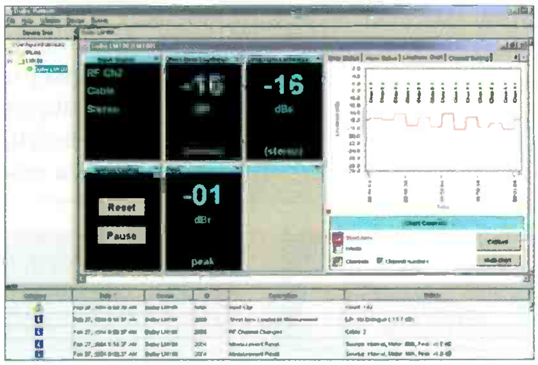
HDCAM takes the lead in HD formats most used



SOURCE: Trendwatch www.trendwatch.com

Automate Loudness and Event History

The award-winning Dolby® LM100 Broadcast Loudness Meter gives you the unprecedented ability to measure the subjective loudness levels of your television broadcast and cable channels accurately. Now we're making it even easier—our new LM100 Remote Software Application automates collection of this loudness data on your analog and digital services. To further maintain a high standard of audio quality, the software also includes an event log that continuously monitors and records several types of input status, alarm, and error conditions.



LM100 Remote Software Application

Once you've measured and analyzed television loudness, you're ready to control it—and make your viewers happy. For complete information on the Dolby LM100, the new remote software application, and for dealer information, visit our website.

www.dolby.com/professional

DOLBY®

example. The rapid migration to video servers built from commodity IT components has helped to reveal the fundamental flaws in the traditional view of video system design.

A decade later, broadcasters and traditional equipment vendors are beginning finally to acknowledge the role of packet-based IT infrastructure in both traditional broadcast facilities and in new IT-based video production facilities.

Open Studio, or closed?

In the mid-90s, a new movement emerged called Open Studio. The initiative has had a profound impact on the evolution of video production. A series of open conference forums encouraged vendors of computer-based tools and traditional video production tools to work together to help facilitate the digital revolution. In the early years, these forums were quite entertaining as the two factions tore into one another, each claiming that the predicted convergence of video and computing would never happen.

But it did happen. By 1995 the first nonlinear editing system with online-quality output reached the market. Due to increases in CPU speed, memory and storage, these systems soon evolved to handle uncompressed video streams and, more recently, both compressed and uncompressed HD production. In just a few years, online nonlinear editing has largely replaced tape-based online editing systems.

Rather than encouraging this convergence, however, most of the traditional video equipment vendors turned to a proprietary view of the future of television studio design.

In December of 1996 the first Open Studio Conference was held, with the goal of helping all parties work together to create the appropriate infrastructure for convergence of video and computing technologies. The conference succeeded in creating some lasting partnerships between traditional video equipment and computer technology vendors. Over the years, these partnerships have made advances that demonstrate the power of using commodity IT components to deliver digital, even HD, streams to end users in a variety of applications.

Several days after the 1996 Open Studio Conference, a meeting of the Society of Motion Picture and Television Engineers set the stage for the formation of the SMPTE/EBU Task Force for Harmonized Standards for the Exchange of Program Material as Bit Streams. Their first report outlined five areas of investigation: compression, physical link and transport layers for networks, wrappers and file formats, metadata, and file transfer protocols. (See Web links for a PDF version of the report.)

The final report of the task force was issued in 1998 (see Web links for URL). At this year's NAB, the SMPTE and Pro MPEG Forum celebrated the completion of some of the work called for in the SMPTE/EBU task force report. This includes the Media Exchange Format (MXF) and the Advanced Authoring Format (AAF). These new SMPTE standards tie together with the development of a Metadata Dictionary and SMPTE registry for metadata terms. Along the way the SMPTE also developed the SDDI standard, which allows the transport of packet data over a SMPTE 259M SDI link.

During the seven years that the SMPTE worked on these standards, the world did not stand still. While the Pro

Web links

SMPTE/EBU task force user requirements:
www.smpte.org/engineering_committees/pdf/tfhs_out.pdf
SMPTE/EBU task force final report:
www.smpte.org/engineering_committees/pdf/tfrpt2w6.pdf

UTAH-400

It Just Keeps Getting Better ...and Better

The UTAH-400 High-Density Digital Routing Switcher, already the world's most advanced switcher, now offers even more:

Automatic crosspoint redundancy in all matrix sizes
The UTAH-400 allows you to protect your critical signal paths against interruption with *AUTOMATIC* internal redundancy.

Three Frame Sizes -- 64x64, 144x144, and 288x288
You can use the UTAH-400 for any digital router application from the smallest utility router to the largest central matrix.

In any size, all UTAH-400 systems offer the same set of world-class features -- and the industry's lowest prices:

- Full time Input / Output Signal Monitoring
- Reduced Power Consumption and Rack Space Requirements
- SD/HD Compatibility

US UTAH SCIENTIFIC

New Directions in Digital Switching

4750 Wiley Post Way, Suite 150, Salt Lake City, UT 84116 USA
Ph: 801.575.8801 • Fax: 801.537.3099 • Email: sales@utahscientific.com

MPEG Forum held numerous interoperability demonstrations, the traditional video equipment vendors did little to make their products interoperate. Meanwhile, IT-based solutions have come to dominate the infrastructure used in many non-broadcast video production facilities. Standardized IT solutions including the various flavors of Ethernet (10/100/1000BaseT), IEEE 1394 and Fibre Channel provide the interconnection infrastructure used for PCs and packet data routing systems. DVI provides the display interconnect needed to deliver uncompressed HDTV rasters to computer (and consumer) HD-capable displays. In the place of tape and optical-disk-based video recording systems, many programs are now recorded directly to magnetic hard disk arrays.

Postmortem

The Open Studio initiative was quietly retired by the dawn of the new millennium. Not because of the quality of work done by SMPTE or any other standards group. The simple truth is that it was no longer needed. Computer-based video production systems have won the day — all that is left is for the technology to trickle down to the holdouts, those who bought into the video-centric view of studio infrastructures. Open Studio has given way to OpenDTV, where there is still much work to be done. Does anyone really know when the analog TV transmitters will finally be turned off?

Thus the following announcement (as reported by *Broadcast Engineering*) at the recent IBC Exhibition and Conference comes as no surprise. It came in the context of a SMPTE IBC tutorial on the standards they have spent the past seven years developing.

Given the rapid uptake of IT technology by the television industry, the adoption of digital content delivery and the associated desire to protect content through encryption schemes, the need has never been greater for standards and procedures to assist in the transition from a linear world to an IT-centric environment.

Speaking during IBC2004, SMPTE President Gavin Schutz emphasized that the society and other organizations must address networking technology and its ramifications on workflow. Those working in the industry increasingly must re-educate and re-train to transition from the old to the new, he said.

Maybe we are finally beginning to make some progress in the real DTV transition. 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

BEYOND THE HEADLINES

DTV transition
rules for translators and LPTV

BY HARRY C. MARTIN

The FCC has established rules for converting low-power television (LPTV), translator and Class A TV stations to DTV. From the FCC's viewpoint, there is no reason for so-called "secondary" television services to continue broadcasting in analog once full-service stations have completed the jump to digital.

Some central features of the regulatory future of these non-full-service television services follows:

- Current LPTV and TV translator license holders will be given two options. They can either "flash cut" to digital broadcasting on their currently authorized channels or temporarily operate on two channels — their current analog channel and a to-be-assigned digital companion channel (if one is available).
- As long as they broadcast a stream of free over-the-air programming, LPTV and TV translator stations will be allowed to offer ancillary services (such as pay-per-view, Internet access, etc.) in any extra bandwidth.
- No firm date has been set for final conversion of LPTV, translator and Class A stations to digital and turn-off of all analog broadcasting. However, the commission has made it clear that the final date will be as soon as possible after the full-service cutoff.
- Conflicting applications for new digital channel authorizations will be subject to auction.
- Contour protection methodology for predicting interference between analog LPTV and TV translator stations will be replaced with DTV interference prediction methodology.
- After the current license holders have received authorizations to convert, the FCC will open the process up to the public for any leftover channels and areas not served.

There is a possible fly in the ointment. LPTV and TV translator stations by nature fit into the interstitial spectrum between full-service television station allotments. But the allotments for full-service stations are still in a state of flux. A complicated multi-round process was just announced by the FCC for the "repacking" of all full-service stations into channels 2 through 51. Channels 52 through 69, previously available for broadcast use, will be used for commercial wireless and public safety uses instead. This will displace some LPTV and translator stations and limit the DTV options of many others.

Will there be any space left over for LPTV and translators? It's too early to tell, and it's premature for LPTV or translator licensees to panic. Realistically, it will be a year or two before the FCC finalizes plans for LPTV and translators, let alone implements them. January 2006 is the expected date for the third and final round of full-service station channel selections. The FCC cannot make any final plans for LPTV and translator station channels before then.

Finally, the commission declined to establish digital TV booster licenses. Boosters are transmitters on the same channel that fill in areas within the primary station's service area that might not receive the station's signal because of terrain or other obstructions. Not authorizing DTV boosters is understandable, because there will soon be a new fast-track proceeding at the FCC to allow full-service TV stations to use distributive transmission systems (DTS) technology. Near the end of its recent periodic full-service DTV order, the commission announced that it was approving the use of DTS technology "in principle." DTS technology replaces the primary transmitter with a number of smaller synchronized transmitters placed throughout the station's service area (think cell phone technology). As a result, it is the equivalent of many booster stations. **BE**

Dateline

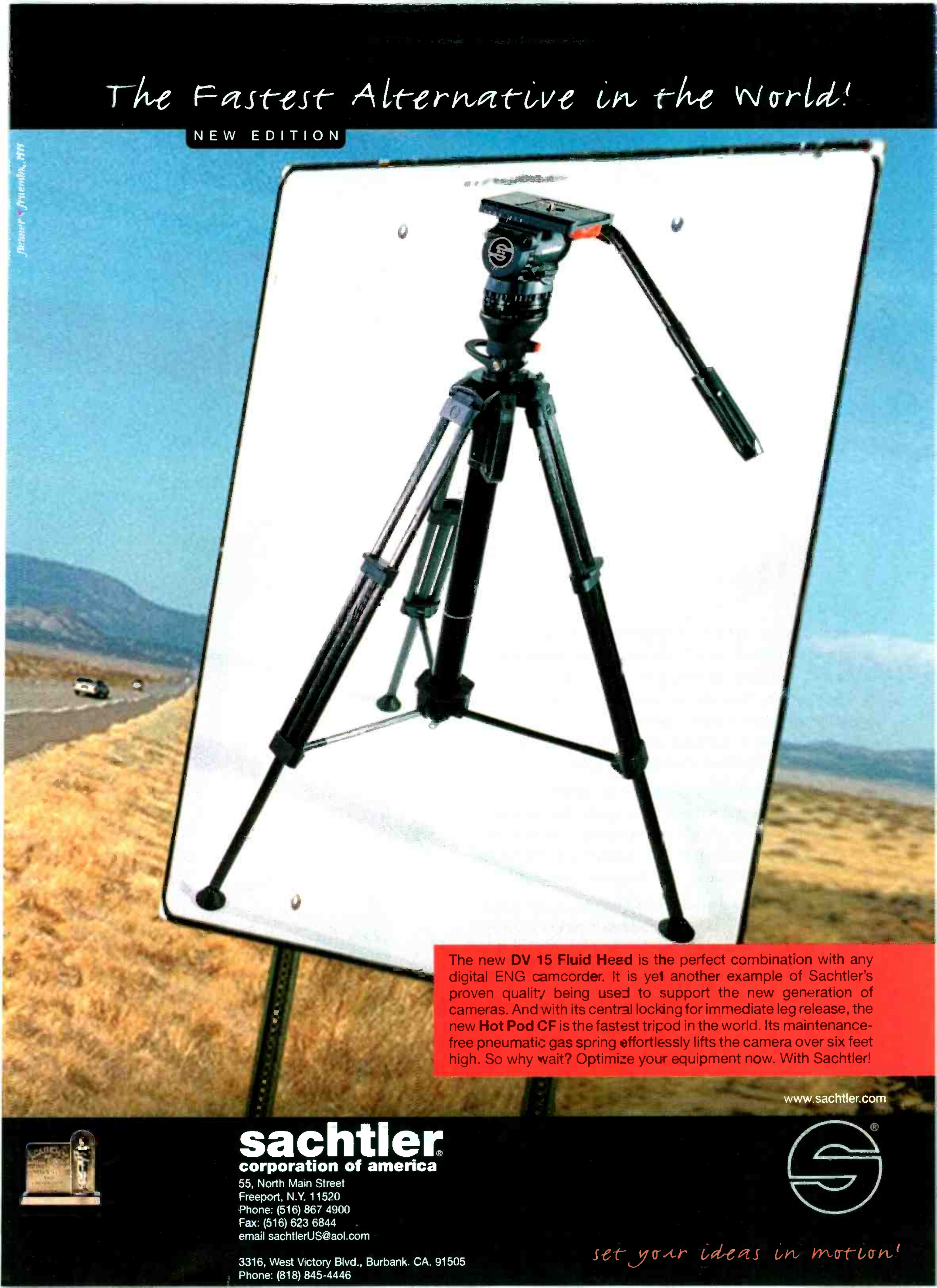
Television, LPTV and TV translator stations in Alabama and Georgia must file their renewal applications, biennial ownership reports and EEO program reports with the FCC on or before Dec. 1.

Television stations in Arkansas, Louisiana and Mississippi must begin their renewal pre-filing announcements on Dec. 1.

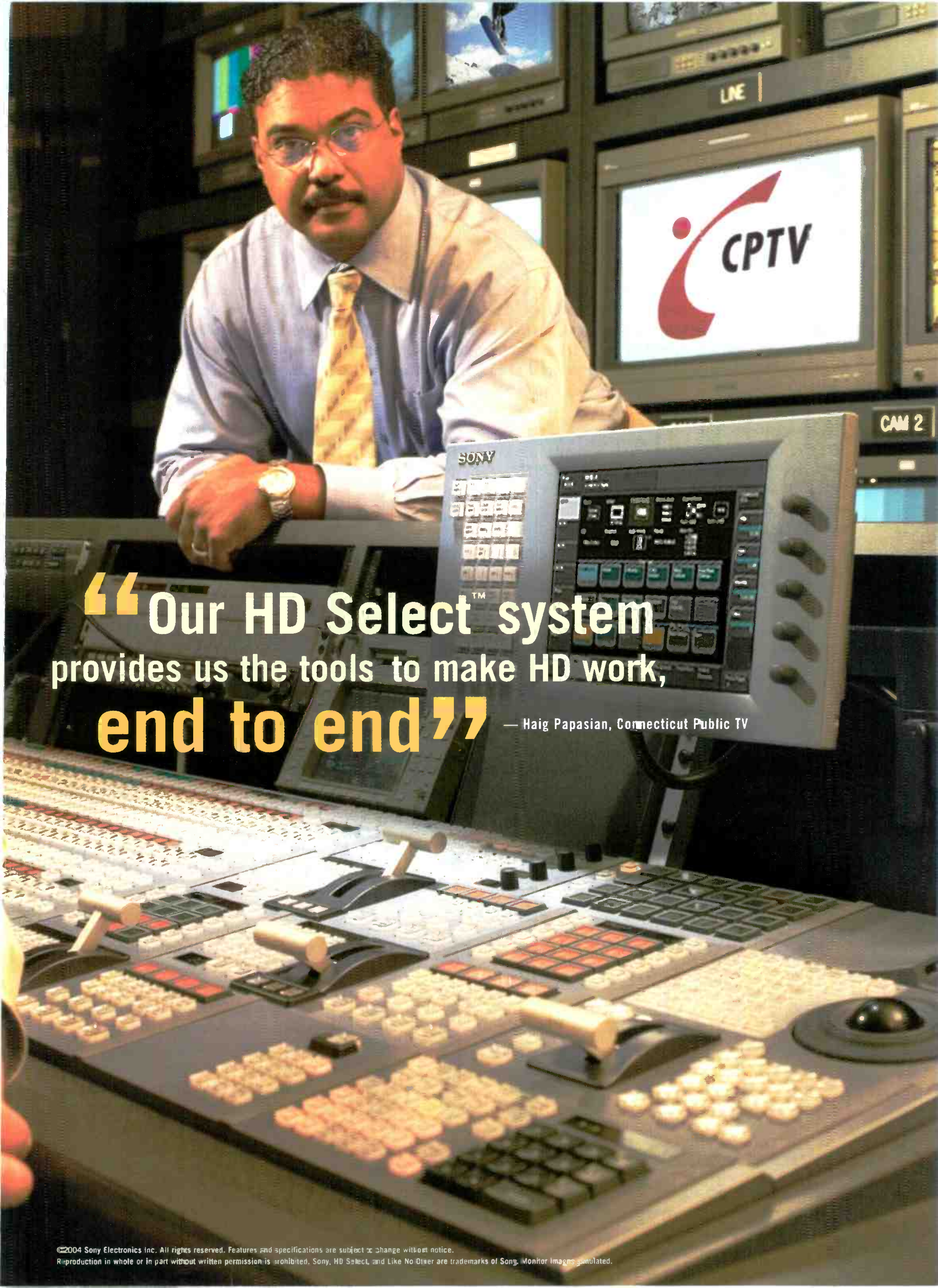
TV stations with at least one in-core channel must file their DTV channel election forms (FCC Form 382) in mid-December 2004. (The options under this form include (1) which in-core channel the licensee/permittee elects (for those with two in-core channels); (2) whether it will select its one in-core channel (for those with only one in-core channel); or (3) whether it will release the in-core channel(s) it has in order to make an election of a new in-core channel in a subsequent round.

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!


LINE
CPTV
CAM 2
SONY
"Our HD Select™ system
provides us the tools to make HD work,
end to end"
— Haig Papasian, Connecticut Public TV

Compression basics

BY MICHAEL ROBIN

The goal of video compression is to represent an image with as few bits as possible. Compression is achieved by removing the redundancies in the video signal. This article will deal with the MPEG-2 video compression concepts. The MPEG-2 standard was developed for the delivery of compressed television for home entertainment. It is a set of defined compression and systemization algorithms and techniques with well-defined rules and guidelines allowing variations in the values assigned to many of the parameters and providing for a broad range of products and interoperability. They are integrated into an MPEG "toolkit" or syntax, which addresses a variety of cost versus performance standards described in Levels and Profiles.

A further extension of MPEG-2, called the 4:2:2 profile, has been developed to record and transmit studio-quality video.

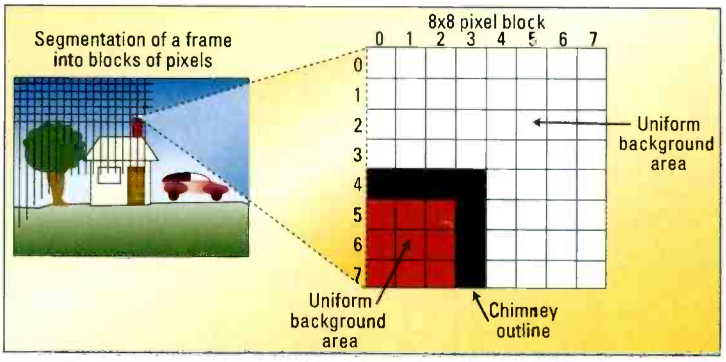


Figure 1. Formation of an 8x8 block

The MPEG tools

MPEG is best described as a collection of bit-rate reduction and compression methods that are available to the designer. These tools are:

• *Discrete cosine transform (DCT):* DCT is a lossless, reversible mathematical process that converts spatial amplitude data into spatial frequency data. As shown in Figure 1, the image is divided into blocks of eight horizontal pixels by eight vertical pixels (8x8 block) of luminance (Y) and corresponding color-difference (C_B and C_R) samples. A block of 8x8 pixels is transformed into a block of 8x8 coefficients describing the amplitude at a particular frequency. The upper left corner represents the DC component. Moving across the top row, the horizontal spatial frequency increases; moving down the left column, the vertical spatial frequency increases.

Essentially, the signal is converted into one value for the DC component and 63 values for 63 frequencies, a process equivalent to a spectrum analysis. The video signal has most of its energy concentrated at DC and the lower frequencies of the spectrum. The DCT process results in zero or low-level values for some or many of the higher spatial frequency coefficients. It in itself does not result in a bit-rate reduction. The DCT process merely converts the source pixels into a form that allows an easier compression. The coefficients are read out in a zigzag fashion, starting with a DC and ending with the highest frequency.

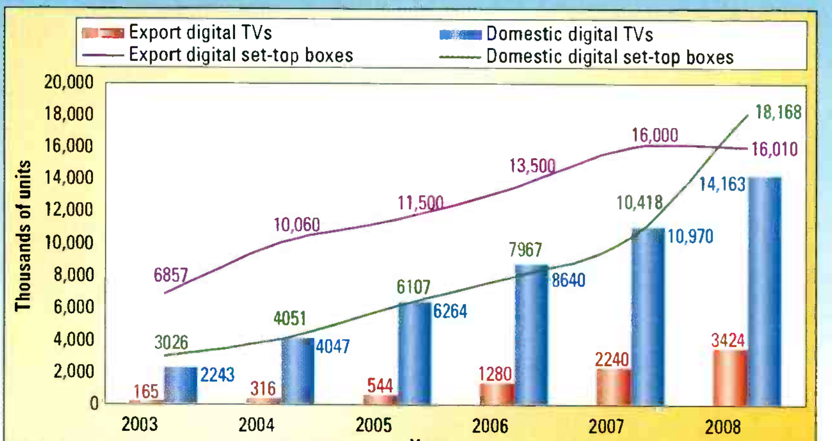
• *Requantizing:* This lossy process assigns more bits to low-frequency coefficients and less bits to high-frequency coefficients. In addition, it can be used to maintain a constant bit rate if necessary.

FRAME GRAB

A look at tomorrow's technology

China's digital production to increase

DTV and D-STB output will hit 18 and 34 million units* in 2008



*Note: Numbers represent total of export and domestic

Source: iSuppli Corporation www.isuppli.com

• *Run length coding (RLC)*: The process of quantizing results in non-zero coefficients followed by a string of zero values. The RLC transforms this sequence by sending a unique code word instead of a long string of zeros, thus reducing the bit rate.

• *Variable length coding (VLC)*: This process allocates short code words to frequently occurring values and long code words to infrequently occurring values.

• *Buffer*: The buffer helps achieve a constant bit rate, as required by recording and transmission of data.

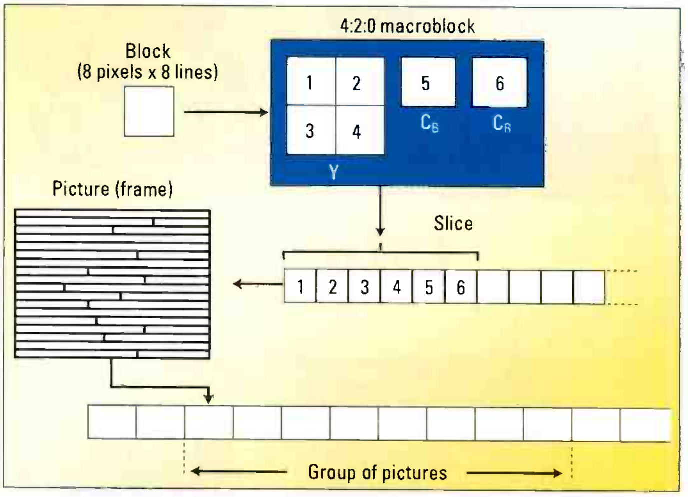


Figure 2. MPEG-2 4:2:0 video data stream architecture

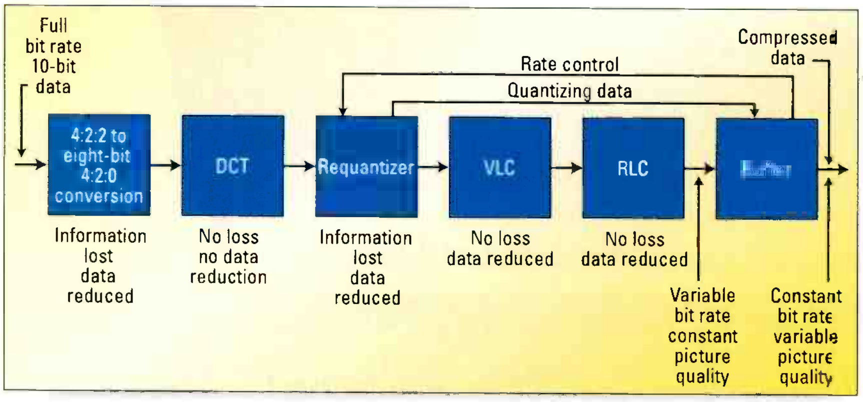


Figure 3. Conceptual block diagram of an intraframe (spatial) coder

Video stream data hierarchies

The MPEG-2 data structure is made up of six hierarchical layers:

• *Block*: Luminance and chrominance data are separated in 8x8 blocks of Y, C_B and C_R values.

• *Macroblock*: A macroblock consists of four blocks of 8x8 values in a window of 16x16 pixels of the original picture and their associated C_B and C_R values. The number of chroma blocks in the macroblock depends on the sampling structure (4:4:4, 4:2:2 or 4:2:0).

• *Slice*: A slice is made up of several contiguous macroblocks.

• *Picture*: A picture consists of a group of slices and contains information needed by the decoder.

• *Group of pictures (GOP)*: A GOP is made up of a sequence of various combinations of pictures.

• *Video sequence*: A video sequence includes a sequence header, one or more GOPs and an end-of-sequence code. Figure 2 shows the makeup of a video sequence.

MPEG picture types

The MPEG compression scheme results in three types of compressed pictures:

• *The intraframe coded picture (I)*: An I picture does not depend on information from other pictures. Only the spatial redundancies are removed. I pictures provide only moderate amounts of compression. Figure 3 shows a conceptual block diagram of an I compression scheme.

• *The interframe coded picture (P)*: The interframe compression reduces both the spatial and the temporal redundancies to increase the efficiency of the data compression. Figure 4 shows a conceptual diagram of an I/P compression scheme. The output of the spatial coder feeds a spatial decoder, which consists of an inverse REQ (IREQ) and an inverse DCT (IDCT), which reconstruct the predicted (past or I) picture. A fixed store memorizes and delays the I picture and feeds the motion estimator. The motion estimator compares the I picture with the present picture to create forward motion vectors. The I picture is shifted by these vectors to generate a predicted P picture. The predicted P picture is subtracted from the real (present) picture

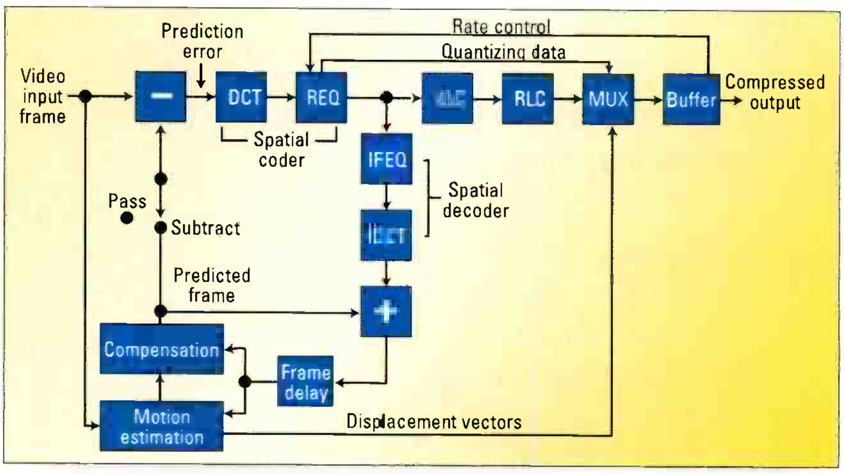


Figure 4. Conceptual block diagram of an interframe I/P encoder with motion compensation

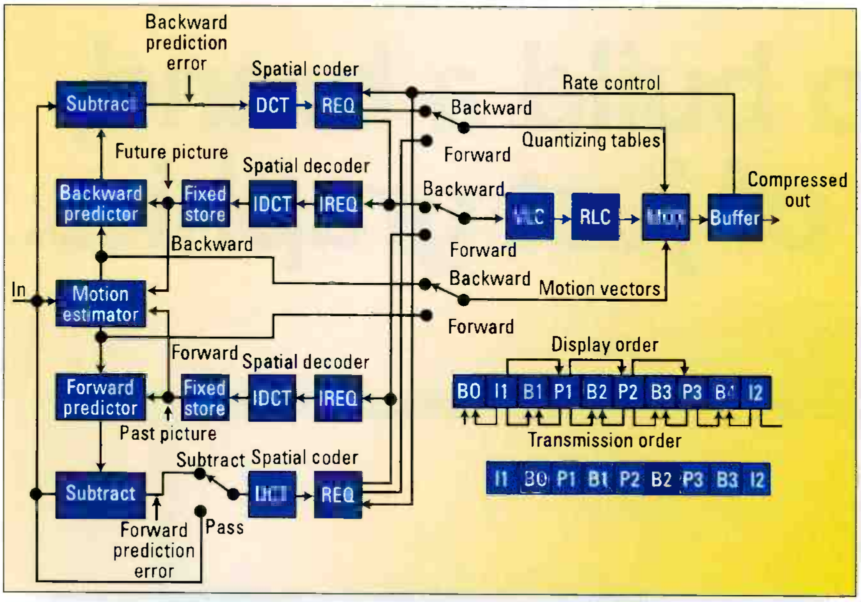


Figure 5. Conceptual block diagram of an IPB encoder

and produces a forward prediction error, which feeds the spatial coder (DCT and REQ).

In the motion compensation block, vectors are calculated that best predict the present picture. Because frames may be different in various manners, the prediction may not be perfect. If there were no motion and no other changes, the present could be perfectly predicted and the difference frame output would be zero, which would be easy to compress. When the two frames are different, the difference frame can still have much less information and will be easier to compress.

The output of the spatial coder feeds the VLC and the RLC. A multiplexer (MUX) combines the compressed data with the motion vectors and feeds the buffer. The buffer generated rate control ensures that the bit rate at the REQ output will not cause buffer underflow or overflow. The REQ feeds the buffer with quantizing table information for use by the decoder. To create an I picture, the video input feeds the DCT directly. After the I picture is created, the DCT is fed the predicted frame.

• *Bidirectional coded pictures (B)*: A new B picture from the input contains predictable information present in the I and P pictures, as well as unpredictable (discovered) information. Figure 5 shows a conceptual diagram of an IBP compression scheme. The motion compensator compares the B picture with the preceding I or P picture and the P picture that follows it to obtain bidirectional vectors. Forward and backward motion is used to generate several predicted B pictures. These are subtracted from the current picture. The resulting forward and backward data are switch selected depending on which of the two are nearer to reality. The picture differences are spatially coded in the usual manner and feed the VLC, RLC and the buffer.

• *The IPB sequence*: The I, P, B frame coding results in a GOP starting with an I picture, followed by a sequence of P and B pictures. The P pictures are formed using previous I or P pictures as a reference. The B pictures use both past and future pictures as a reference. The MPEG algorithm allows the encoder to choose the frequency and location of I pictures.

In applications where random access is important, I pictures are used twice every second. The encoder also chooses the number of B pictures between any pair of I or P pictures. A GOP is no more than 15 pictures long, starting with an I picture and finishing with a B picture. A typical arrangement of I, P and B pictures is shown in Figure 5 in the order in which they are displayed. The MPEG encoder reorders the pictures in the video stream to present the pictures to the decoder in the most efficient sequence.

Profiles and levels

MPEG-2 offers a wide choice of parameters, resulting in millions of possible combinations. The concept of "profiles" and "levels" serves to restrict the choice of parameters. The restrictions affect the choice of the picture size (horizontal pixels x active lines), the frame structure (I,P,B), the maximum data rate and the sampling structure. The choices offered allow for standard-definition (720x576 or 720x480) as well as HDTV formats (1280x720 or 1920x1080). Table 1 summarizes the constrained parameters. BE

	Profile					
Level	Simple I,P 4:2:0	Main I,P,B 4:2:0	4:2:2 I,P,B	SNR I,P,B 4:2:0	Spatial I,P,B 4:2:0	High I,B,P 4:2:0 or 4:2:2
High		1920x1152 60fps 80Mb/s				1920x1152 60fps 100Mb/s
High 1440		1440x1152 60fps 60Mb/s			1440x1152 60fps 60Mb/s	1440x1152 60fps 60Mb/s
Main	720x576 *30fps 15Mb/s	720x576 30fps 15Mb/s	720x608 30fps 15Mb/s	720x576 30fps 15Mb/s		720x576 30fps 20Mb/s
Low		352x288 30fps 4Mb/s		352x288 30fps 4Mb/s		

Table 1. Maximum constraint parameters for MPEG-2 levels and profiles (*frames per second)

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 Send questions and comments to: michael_robin@primediabusiness.com

DUAL MODE

not only analogue
not only digital

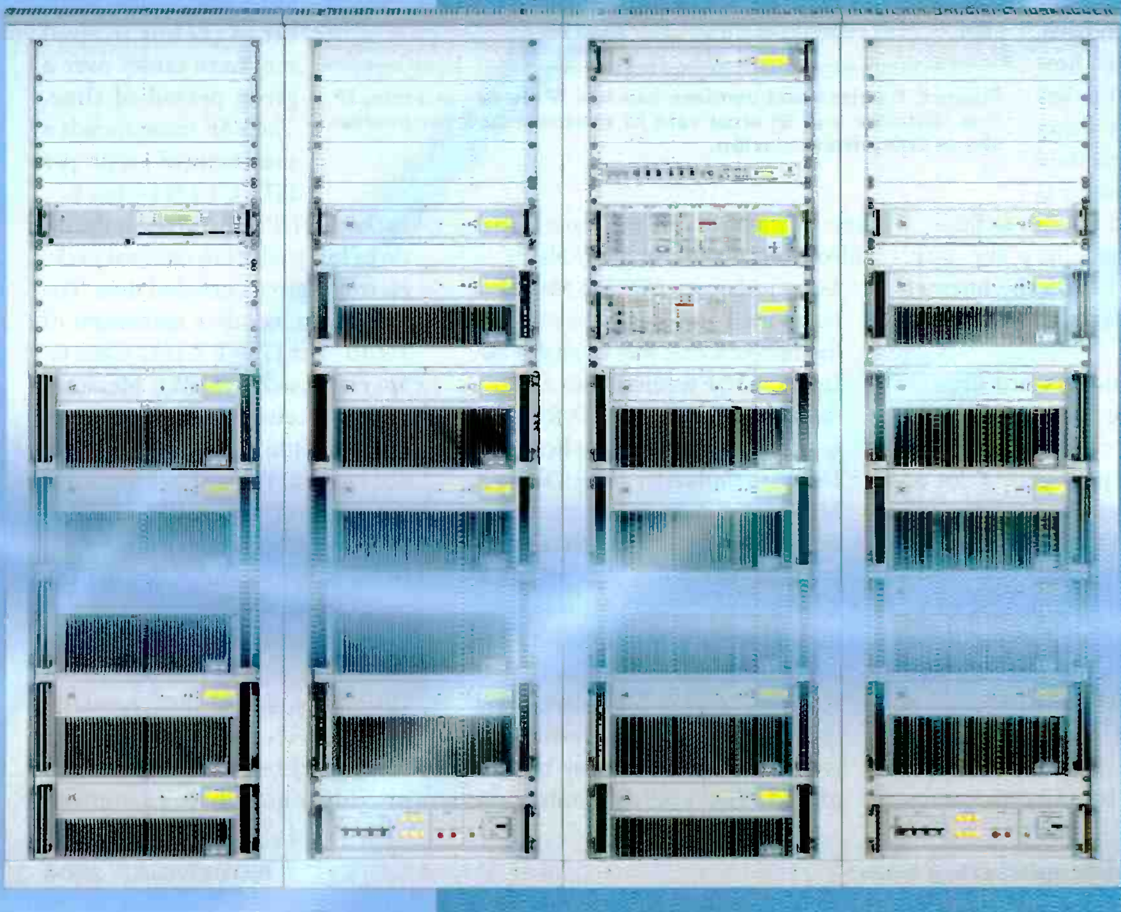
digital & analogue

Screen Service
ITALIA

SCREEN SERVICE ITALIA Srl
Via G. Di Vittorio, 17 – 25125 Brescia – Italy
Tel.+39 030 3582225 Fax +39 030 3582226
www.screen.it e-mail: info@screen.it

A single equipment allows transmitting digital (DVB-T or ATSC) or analogue signals digitally generated and of extreme high quality. The commutation between analogue and digital mode can be local or by any remote control system or by a command inserted into the Transport Stream.

DBT 100U (DVB-T)
DTT 100U (ATSC)



- Dual ASI input with statistical analysis and automatic switching
- PCR re-stamping
- Control of the crest factor
- Integrated SFN adaptor
- Management of the "null packets"
- Integrated test modes
- Integrated offset at steps of 1 Hz

Guaranteeing quality

BY BRAD GILMER

I have some bad news: The Internet is unreliable. It isn't just unreliable, it was designed to be that way. Internet Protocol (IP), the fundamental datagram transport protocol on the Internet, makes no guarantee that the information you send will ever get to its destination. Not only that, User Datagram Protocol (UDP), which carries quite a bit of Internet traffic (including many video applications), is also unreliable. Even Transmission Control Protocol (TCP) — which is supposed to take care of packets that are dropped, out of sequence or duplicated — is undependable. You might wonder how we have managed to get by all these years using this "best effort" method of delivery. The answer is that it's been good enough so far.

But, somewhere along the way, people began relying on the Internet to do things it was never intended to do reliably.

VoIP and professional video streaming have made the issue of quality of service (QoS) one of the top technical issues for service providers. A lot of good work has been done, and we are starting to see QoS solutions being deployed in the marketplace.

Several technical forums and standards bodies have been looking at the issue of QoS over wide-area networks (WANs). The ITU has developed a standard (*ITU-T Recommendation Y.1541*), that specifies a number of classes of service based on the needs of different applications. The Video Services Forum (VSF) has been working on establishing a set of QoS parameters focused on transporting real-time professional video across WANs. This work is based, in part, on the findings of the Pro-MPEG Forum's WAN group. Use the following parameters to establish QoS for professional video transmission over WANs.

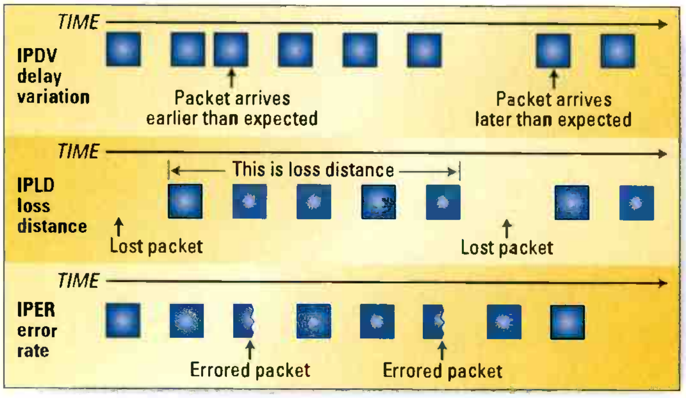


Figure1. Carriers and vendors can use IP delay variation, IP loss distance and IP error rate to measure QoS for professional video transmission.

- *Delay or latency (IPTD)*: Measures how long it takes packets to cross the network one way (transfer delay). The VSF recommends a maximum of 100ms of IPTD for professional video WAN applications.
- *Delay variation or jitter (IPDV)*: Measures difference in arrival time between packets. The VSF recommends a maximum of 50ms.
- *Loss distance (IPLD)*: Measures the minimum number of packets between lost packets. This is a critical recommendation for determining the characteristics of any error-correction schemes that may be employed. The VSF recommends a minimum of 50, based on Internet Engineering Task Force (IETF) 3357 and the Pro-MPEG Forum Code of Practice number 3.
- *Loss period (IPLP)*: Measures the number of consecutive packets lost in a row. This is another critical recommendation for determining the characteristics of any error-correction schemes that may be employed. The VSF recommends a maximum of five, based on IETF 3357 and the Pro-MPEG Forum Code of Practice number 3.
- *Packet corruption (IPER)*: Measures the error rate — the number of packets received that have errors over a given period of time. The VSF recommends a maximum of 1×10^{-4} per ITU-T Y.1541 Class 0.
- *Packet loss (IPLR)*: Measures the ratio of lost packets to received packets over a given period of time. The VSF recommends a maximum of 1×10^{-3} per ITU-T Y.1541 Class 0.
- *Spurious packet (SIPR)*: Measures packets received for which a corresponding transmitting packet was not created. The VSF recommends a maximum of 1×10^{-3} spurious packets per second.
- *Availability*: Measures uptime, expressed as network events per hour. There has been a lot of discussion regarding this parameter. Ultimately, availability translates into service-level agreements (contracts) between WAN service providers and their customers.

The VSF has said that useful service quality categories for professional video with delivered bit rates from 1- to 400Mb/s would be: <.003 network event per hour, <.01 network event per hour, <.1 network event per hour and <1 network event per hour.

A network event is defined as a single occurrence of packet(s) loss in the network.

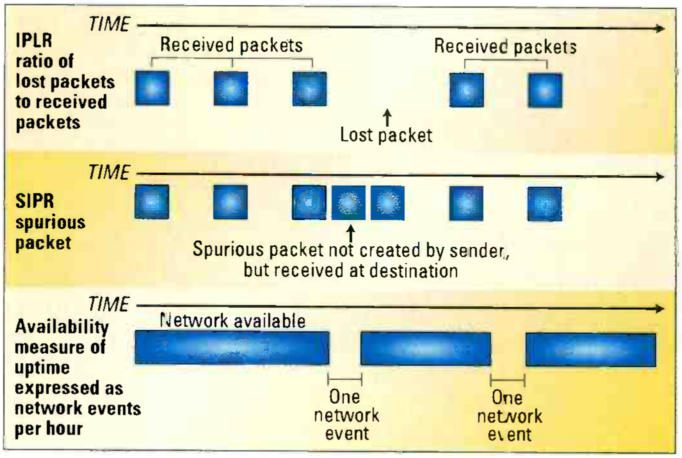


Figure 2. Concepts such as IP loss ratio, spurious packets and availability are also useful in determining the quality of service a network provides.

While work is ongoing, it is encouraging that the industry is reaching a consensus regarding the parameters and measurements that should be used to establish QoS for delivery of video over WANs.

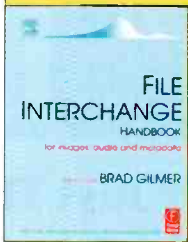
Given a set of parameters, network engineers need a technical framework within which they can implement a given QoS. While exact details of QoS frameworks vary, these frameworks share some common elements:

- *Signaling and admission control*: Controls the amount of traffic that is allowed to enter the network.
- *Shaping*: Provides a way to smooth out the bursty nature of traffic.
- *Policing*: Involves enforcing policies and dropping traffic from the network if it does not conform to rules established to guarantee the QoS on the network.
- *Routing*: Allows the network designer to establish routes that will guarantee a particular level of QoS and then mark packets so that they are sent across those routes.
- *Scheduling*: Used to ensure that high-priority traffic is passed through the network correctly while still allowing "mouse traffic" such as e-mail to get through.
- *Buffer management*: Provides techniques for metering traffic as it passes through routers on the Internet, keeping routes uncongested, and provides techniques for dropping low-priority traffic when buffers are in danger of being overloaded.
- *Traffic monitoring and feedback*: Provides network engineers with a way to monitor network activity.

While it is true that the core Internet may be unreliable, it's evident that several groups have done significant work to establish techniques, measurements and frameworks to establish the quality of service necessary to deliver real-time video over IP. **BE**

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

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



To order Brad Gilmer's book, "File Interchange Handbook for Images, Audio and Metadata," from Focal Press, visit www.focalpress.com or call 800-545-2522. The book is also available from most major booksellers.

DIGITAL HANDBOOK

Camera lens technology

BY LARRY THORPE AND GORDON TUBBS

Today's intense interest in digital imaging tends to overshadow an appreciation for the role and importance of lenses. There is, unfortunately, the perception that lenses merely prepare optical images before the digital camcorder records them onto digital media. In reality, however, lenses are where image creation first takes place. (See Figure 1.) Not only does the lens create the optical image for presentation to a camera, it also offers a powerful means of manipulating the image to enhance the art of storytelling.

The technically challenging role of the camera, meanwhile, is to transform the optical image faithfully into an electrical signal. Subsequent digital recording must likewise faithfully store the camera's digital reproduction.

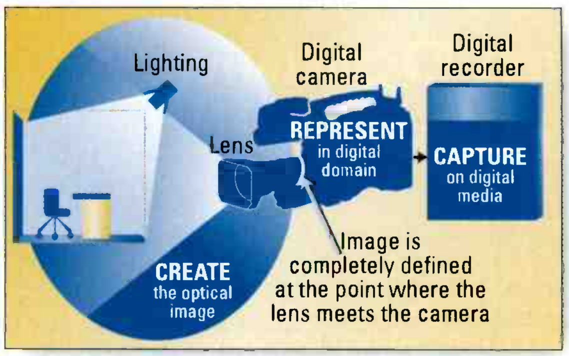


Figure 1. Lenses create the optical image for presentation to a video or film camera. Their primary role is to shape the attributes of the image that are reproduced from an object scene.

The fact that the lens is the primary arbiter of final image quality — both aesthetically and creatively — does not in any way diminish the role of today's digital cameras or other systems for image storage. Major new trends in this area, such as DTV, HDTV and digital cinema, are changing the video acquisition landscape radically. Because of these changes, an increasing number of professionals find themselves deciding which lens to purchase for new digital camera systems.

Choosing the right lens is difficult. First, there are many categories of lenses presently available in both the HDTV and SDTV domains. Secondly, high-end optical design is an extremely refined science with its own peculiar technical terminology and descriptors, which are sometimes difficult to sort out and understand. And competing lens suppliers sometimes offer conflicting messages, further complicating the process.

Lenses are a powerful means of manipulating images to enhance the art of storytelling.

So, to make an intelligent choice, it's necessary to first understand the basics of lenses and optical images. All images have a number of separately quantifiable attributes. It is the subjective aggregate of these attributes that produce the final aesthetic quality of the image. The lens' primary role is to shape most of these attributes. The lens also predetermines important picture quality attributes. These attributes can be further modified by the camera, the recording system and, finally, by the display system.

Optical image attributes

Let's briefly examine each of the image's attributes from the standpoint of a lens' creative and technical capabilities:

• *Angle of view:* This attribute determines the essential framing of the image. Basically, it determines how much of a scene a lens can image. Technically, it is the limit within which the lens can image the scene in accordance with the lens' focal length and its image format size and shape.

• *Zooming:* This is a strictly optical phenomenon that emerged relatively recently in the history of lens development. It introduced the ability to make dynamic, real-time adjustments of the angle of view without moving the lens relative to the scene. It represents an artificial, yet powerful, augmentation of the imaging process. It presents an image in a way that the human visual system cannot.

• *Depth of field:* This a fundamental optical constraint on a lens. The lens is focused on a particular subject in the scene, and the other objects in the image appear in focus within a limited distance in front and behind the subject on which the lens is focused. Depth of field varies with the lens' image diameter, its focal length and its aperture settings. Cinematographers creatively exploit depth of field by skillfully adjusting lighting and lens settings to present selected scene objects in sharp focus while simultaneously defocusing other portions of the scene. This helps portray a sense of depth to the two-dimensional optical image.

• *Perspective:* This is an essential attribute of any image representation (drawing or painting, film, or electronic image). It seeks to portray a 3-D representation in the same manner that the human visual system sees a live scene — with objects linearly diminishing in size as they recede from the position of the viewer.

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

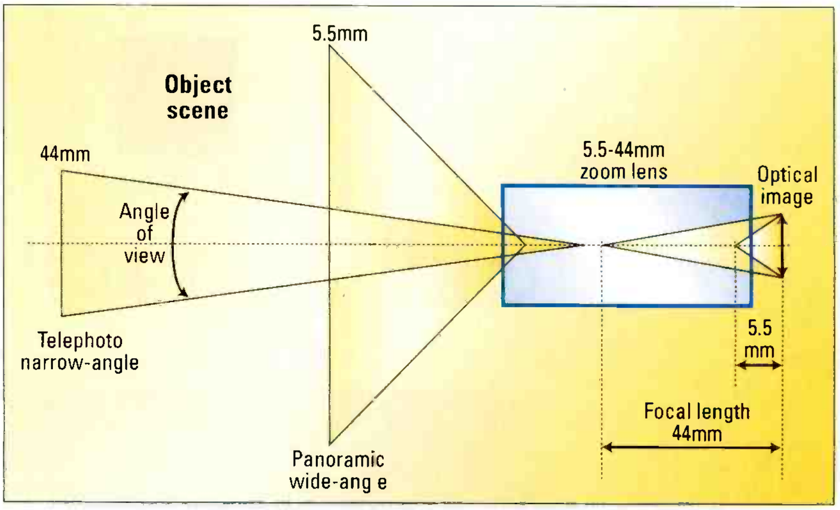


Figure 2. The angle of view is the limit within which the lens can image the scene in accordance with the lens' focal length, its image format size and its shape.

• *Aperture control:* The lens' iris allows the camera operator to manage a vast range of light levels. In that sense, the lens emulates the human eye's ability to control the amount of light to a level appropriate to the capabilities of the sensor (human retina, digital camera sensor or the chosen film stock).

• *Contrast or tonal reproduction:* This is a measure of the lens' ability to reproduce the full dynamic range of the light levels contained within the scene. It is a measure of the faithfulness with which the lens optics can distinguish the many brightness levels in the scene. A high-contrast lens is one that can distinguish the many levels of brightness within the high-brightness portions of the scene while simultaneously and clearly distinguishing the many lower levels of brightness in the shadowed areas of the scene.

• *Color reproduction:* This is an important attribute of the image that concerns the light transmission characteristics of the lens. The balance of colors of the light coming through a lens is expressed as a color temperature. In the case of the film camera, the lens design must take into account the colorimetric characteristics of the emulsions in the particular film being used. In the case of the digital video camera, the lens' spectral characteristic must be coupled to that of the light-splitting system in the camera and the colorimetric characteristics of the sensors employed.

• *Picture sharpness:* This is a measure of the response of the lens' optical system to the overall reproduction of contrast over a range of spatial frequencies. This is the most complex attribute of any image. Judging a lens' sharpness involves assessing the lens' resolving power and modulation transfer function (MTF) at a variety of points over the two-dimensional image. A reproduced image combines the sharpness of the lens, the capture media (film or video), and the reproducing medium (print, display or projection system). But it is the lens that primarily determines the final perceived picture sharpness.

A future look

This look at optical image attributes sets the stage for a series of articles set to appear in *Broadcast Engineering* in 2005 that are designed help the reader appreciate the role that lenses play in creating an image. This tutorial will continue in the January issue with an in-depth examination of television studio lenses. BE

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

Find more information at www.broadcastengineering.com

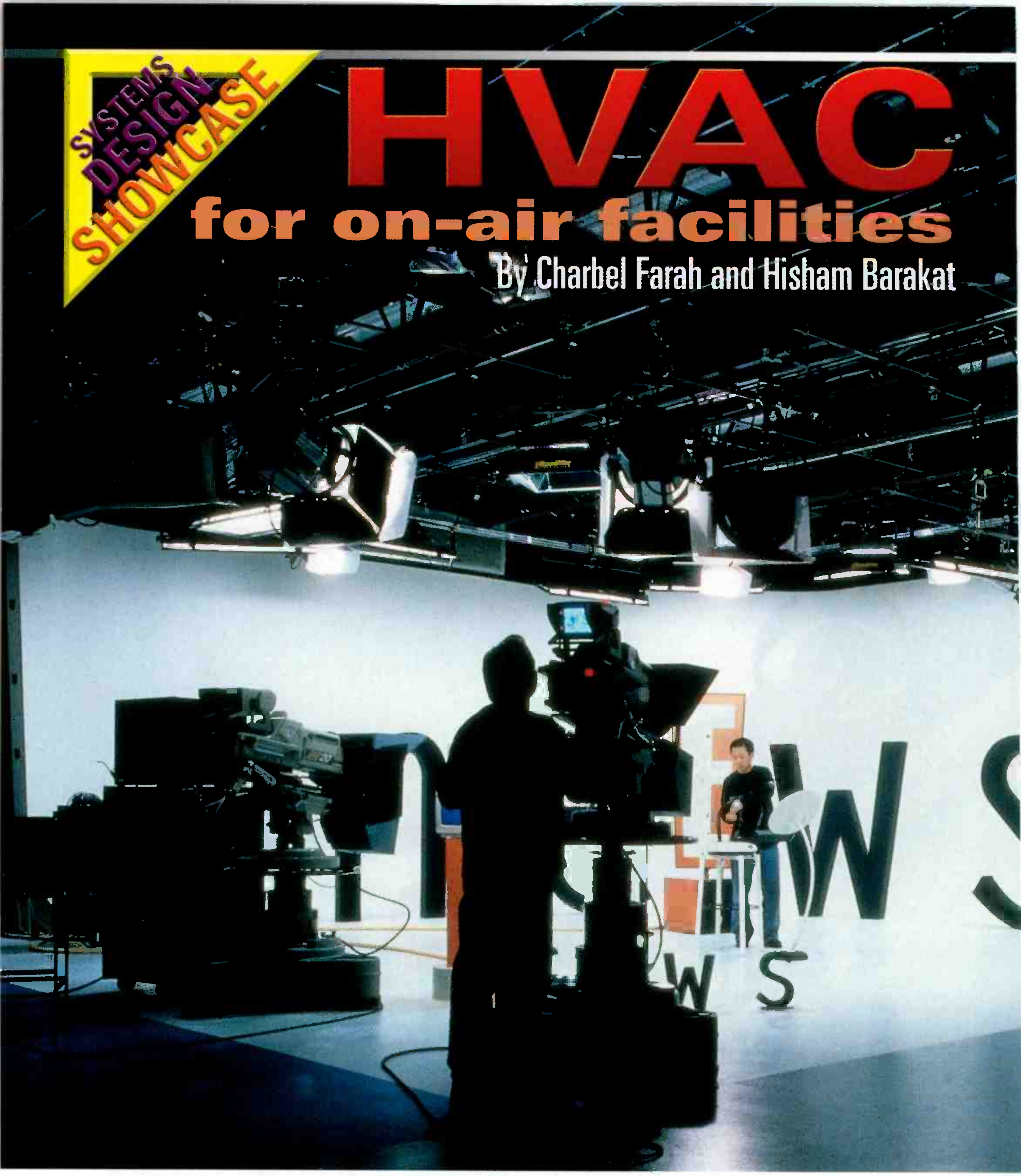
Lens Technology: SPECIAL REPORTS


EXTREME
Definition
MPEG-2 HD-SD ENCODER
Config1 Status Faults
TIERNAN
HE4000 PURECODER
HD/SD MPEG2 ENCODER

SYSTEMS DESIGN SHOWCASE

HVAC for on-air facilities

By Charbel Farah and Hisham Barakat



Designing mechanical and electrical systems for live-audience television studios presents unique challenges. Such systems must meet stringent technical criteria for spatial function, noise level, cooling, lighting flexibility, power quality, emergency power, system redundancy and isolation grounding. Moreover, they must provide comfort and safety for a large group of people.

Live-audience television broadcasting studios typically range in size from 2500- to 5000sq ft, and include a control room, audio room, video room, green rooms, machine rooms, and other support areas and amenities. The

E! Entertainment's E! News studio uses an overhead HVAC system with a tapered diffuser. Photos courtesy Syska Hennessey.

mechanical engineer must design a system that can provide 24-hour cooling for technical equipment, a comfortable environment for an audience ranging from 50 to 200 people, and be able to accommodate a significant lighting load, all while meeting an NC rating of 25 or lower.

This combination of operational challenges requires an HVAC system to deliver low-velocity air to the studio and distribute it using convection and diffusion principles. And, the designers must locate the mechanical and electrical rooms as far as practical from sound-sensitive areas to avoid transferring noise and vibration.

Minimizing noise and vibration

Choosing the right HVAC system is usually the first crucial step. A fan-coil system, which cools spaces by blowing air over coils that circulate chilled water, is not a good choice for an on-air live-audience studio. Although some manufacturers claim otherwise, this type of system must be placed as close to the space as possible, and is likely to transfer an unacceptable amount of noise and vibration. If an architect or HVAC designer recommends such a design, immediately begin asking tough questions.

Typically, packaged air-handling or air conditioning units are a good choice. These units should be self-contained and include fans, motors, chilled water coils or direct expansion (DX) coils with compressors and, in some cases, silencers. Such standard systems typically meet studio noise criteria. If not, they can be upgraded from a packaged unit to a custom or semi-custom manufactured unit.

Once a station has selected the design for the cooling unit, it's time to decide where to locate it. Usually, that requires a balance between having it close enough to the studio for effective design and having it far enough away for maximum noise isolation. Typically, the roof is the only place available to hold it. Most facilities mount cooling units either on the rooftop or in a dedicated mechanical room indoors. For indoor installation, the HVAC units must be mounted on isolators in an acoustically lined mechanical room located as far away from the studio as practical — at least 100- to 300ft. To help minimize the transfer of sound and vibration, use a fan with a variable-frequency drive. This allows the fan speed, and therefore the air velocity, to be varied. It is also best to control the fan with direct digital control (DDC) instead of using mechanical or pneumatic sensors and controls. DDC systems use electronic sensors and microprocessors to provide precise, dynamic control of the variable-frequency drive.

In this typical on-air studio, ceiling elements such as the lighting grid, studio lighting, ductwork, plaque diffusers and acoustic installation are suspended above the stage and elevated live-audience seating.

When sizing the studio HVAC load, consider factors such as lighting load, number of occupants and, in some cases, envelope load, which consists of roof, walls and glazing. Lighting load can be as much as 35- to 75W/sq ft, yet the mechanical system should be designed for an average operating condition of 25- to 50W/sq ft for practicality, diversity and economy. The size of an HVAC unit for a studio of approximately 4500sq ft and a live audience of about 125 people can range from 60 to 75 tons.

This occupancy level also increases the fresh-air requirement. Typically, such a room requires an air flow rate of 15- to 20cfm per person. Therefore, the size of the air-handling unit must increase proportionally. This is another good reason to locate the air handler on the rooftop, if possible. If a facility installs the air handler within the building, shafts to the rooftop must be large enough to deliver the required volume of fresh air as well as relief/exhaust air. In an existing building, new shafts are required to accommodate these requirements.

Air distribution vs. structural limitations

Air distribution presents structural challenges requiring ingenuity on the part of the mechanical engineer and close coordination with the architect, structural engineer and acoustical consultant.

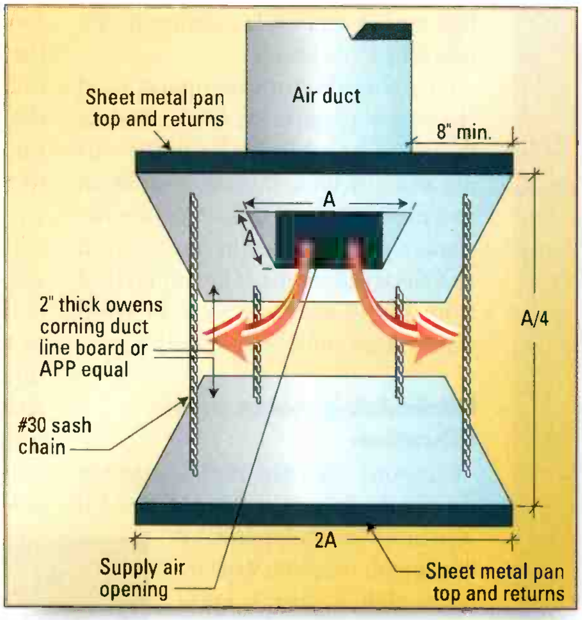


Figure 1. Diffusers reduce air velocity and noise. Shown here are the details of a plaque diffuser.

On-air, live-audience studios typically require a minimum floor-to-ceiling height of 18- to 22ft to accommodate the lighting grid. The lighting grid needs to be kept on the same plane throughout to avoid shadows, and all utilities must be kept above this plane. This height requirement increases in proportion to the studio's area. As a result, there is often little space left above the lighting grid for ductwork because of the structural support and seismic restraint systems the lighting grid requires.

To meet noise criteria, slow-speed airflow (typically 600ft/min) is required. This can be achieved with large ductwork. To achieve the acoustical requirement of NC 25, reduce the exit velocity at the diffuser of the air conditioning system even further, to 300ft/min or less. This increases the size of the ductwork significantly. Noise can also be reduced

by using silencers and acoustical lining in the ductwork. Be sure to locate the silencers outside the studio in order to reduce noise.

In some applications, engineers must further reduce air velocity at the diffuser, typically from 600ft/min to anywhere from 100- to 150ft/min. A custom-made plaque diffuser (see Figure 1 on page 42) is the most practical solution for live-audience applications because it achieves thermal comfort and acoustical requirements. It is also cost-effective. Another custom-made diffuser, a tapered linear diffuser (see Figure 2) is heavier and costs more than a plaque diffuser. A third custom-made diffuser, a fully perforated duct/diffuser, is recommended only for studios with a ceiling height more than 24ft. Whenever possible, locate the diffusers so they direct airflow toward the faces of audience members. This provides the most comfort because the audience will feel coolness but no breeze or drafts.

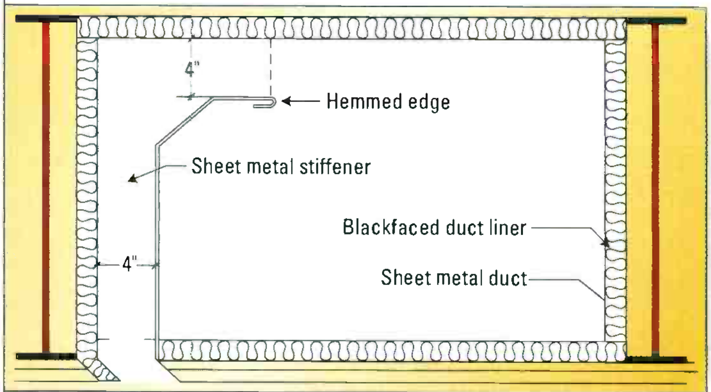
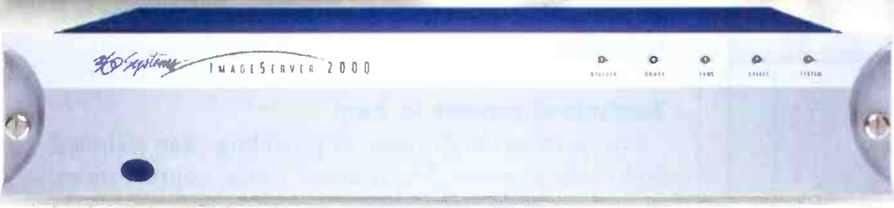


Figure 2. A tapered linear diffuser, shown here, is heavier and more costly than a plaque diffuser.

The overhead air distribution system described above is the most widely used system for studio applications. Another distribution method is to deliver air through a raised-floor plenum. With a low supply system, the return is located high for proper air circulation and effective cooling and comfort. In both overhead and under-floor methods, return air ducts have to be sized to deliver the air at a velocity not exceeding 300ft/min. Also, the placement of return air ducting is crucial. Don't locate return and supply airflow at the same height or location. With overhead distribution, locate the return at a low level. With under-floor distribution, locate the return at a high level.

Meeting variable loads

In a typical recording or broadcast studio, constant air volume control may be sufficient and effective. But, in an on-air, live-audience studio, the load generated by the audience can vary from day to day, show to show and even minute to minute during the course of the broadcast. For this type of studio, the ventilation system that can provide the best combination of comfort and energy conservation is a dedicated air-handling unit with variable air volume (VAV) control. The VAV control lets station staff adjust the



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

air volume during a show to maintain adequate cooling (typically about 68°F or lower). The most cost-effective implementation would be a single, DDC-controlled air handler serving the studio.

Heightened electrical requirements

Electrical systems in live-audience studios require special attention. The electrical engineer must design a power system that provides maximum flexibility for the user. Typically, a studio lighting designer or set designers define the lighting load. The electrical system must be able to handle loads as high as 35- to 75W/sq ft and the power system must be designed with enough flexibility to meet both permanent and temporary equipment loads.

Life safety is a key issue in a live-audience studio. Emergency lighting can employ fluorescent house lights or battery packs.

Technical power is key

Finally, we get to the issue of providing clean technical and backup power. The dimmer room, control room, equipment room and certain AC outlets in the studios need clean power. The typical solution involves installing isolation transformers with an isolated ground or uninterruptible power supply (UPS). The technical ground usually consists of a ground bus bar in each technical room and copper conductors all daisy-chained together and tied into the building's main service electrical ground.

If the total technical load requirement is greater than 200A, it is often cost-effective to have a 480V, three-phase, four-wire service delivered to the facility, where it is stepped down to 277V or 120V. A filter or continuous UPS system can be added to further reduce interference/harmonics in the technical equipment. Also, the technical power and AV cabling/signal requirements should be kept on separate distribution systems to prevent distortion. Because transformers, UPS and dimmers are noisy, it's a good idea to house this equipment in separate rooms located at least 100- to 150ft away from the studio. Or else, to reduce the length and associated cost of cable runs, the transformer and/or dimmer room can be lined with acoustical insulation and the transformer placed on vibration isolators.

Plan for reliability

Broadcasting with a live audience is like performing a high-wire act without a net. The medium creates unique opportunities. But, with no room for error, it also presents challenges for television directors and facility designers alike. Nonetheless, carefully planned and skillfully designed mechanical and electrical systems will support successful live broadcasting today and in the future. BE

Charbel Farah is associate partner, and Hisham Barakat is senior vice president, of Syska Hennessy Group, a consulting, engineering, technology and construction firm.

Towers + lead paint = trouble

BY DON MARKLEY

The Environmental Protection Agency (EPA) has the task of protecting the public from the hazards of lead-based paints. Another arm of the federal government, the Occupational Safety and Health Administration (OSHA), is tasked with making the workplace safer. The two agencies work together to protect workers, the public and the environment. But a new set of regulations is presenting some obstacles for broadcasters.

Nearly all TV stations have towers with multiple layers of old lead-based paint. Coatings of acceptable lead-free paint cover these old layers, but they are still a problem.

The EPA's national regulations do not regulate towers and similar commercial structures with regard to the paint itself. The EPA routes inquiries into this problem to a regional EPA authority rather than a national office. The regional regulations normally apply to residential lead problems such as wall paints, painted furniture, etc. For towers, the regional authority will refer you to your state environmental office.

But there are some basic EPA requirements that seem to exist nearly everywhere. First, you usually don't need to remove the existing paint if it is fully sealed within an acceptable paint. This certainly should be an incentive to keep towers well painted and in good condition. If the paint on the tower is flaking off, the concern is contamination of the ground in the surrounding area. At that point, the paint has to come off the tower. In addition, if work is going to be done on the tower that will disturb the paint in any way, you may have to strip the whole structure. That's when the fun begins.

First, you usually don't need to remove the existing lead paint if it is fully sealed within an acceptable paint.

Lead-paint removal

Stripping must be done in such a way that the chips and or paint dust don't escape. Usually, the surrounding area must be covered with a material that will keep the dust from getting through to the soil. Workers must wear protective clothing and breathing apparatus, and this equipment must be destroyed after the work is completed. OSHA clearly specifies the method of destruction. If the tower is to be sandblasted, a protective sheath must surround it to contain all the dust. You have probably seen this taking place on water towers. It looks like a giant bag that completely covers the structure.

There are some chipping tools that use a vacuum attachment to keep flakes from getting away. Those are usable in some states. That brings back the gist of the whole problem: Individual states have different requirements. Federal regulations govern the disposal of the removed paint chips and dust, including the protective clothing and equipment to be used. But rules on how to do tower work vary.

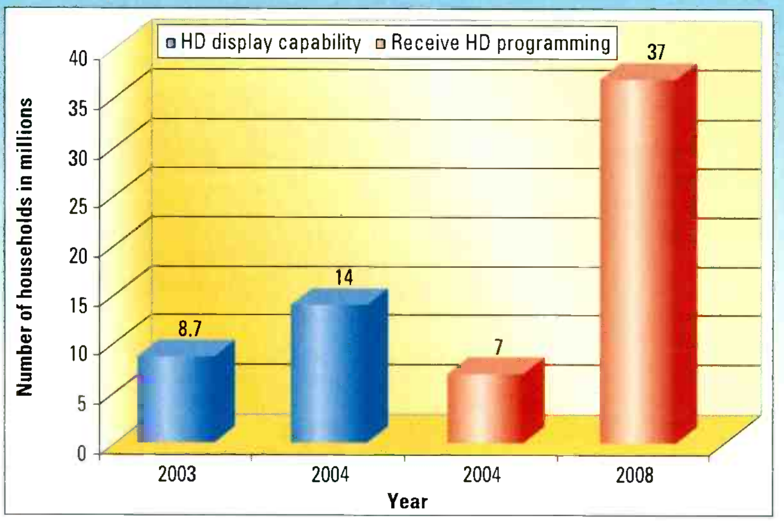
The one thing that doesn't vary is the extraordinary depth of trouble you will be in if you don't do this whole thing right. If you think that OSHA can get the front office upset, just watch what happens if you cause windblown lead paint flakes to fall over a wide area. Don't argue — just get your resume up to date and think about moving far, far away.

FRAME GRAB

A look at the consumer side of DTV

HDTV programming predicted to grow

Thirty-seven million households will receive HDTV by 2008



SOURCE: Strategy Analytics *www.strategyanalytics.com*

SOLUTIONS YOU CAN TRUST

Whether it's a transmitter, translator, antenna or complete RF system, you can count on DMT USA to provide solutions tailored to your needs. Our broad range of products, customer care philosophy and professional staff give clients the options to make educated decisions.

BROADCAST
Analog and Digital TV Transmitters
Analog and Digital TV Translators
DAB Transmitters
FM Transmitters
STL Systems
Broadcast Antennas
Remote Monitoring Systems
Passive Components

SYSTEM INTEGRATION
Develop
Design
Install
Train
Support
Third Party and OEM Products
Turnkey Projects

AUTOMATION
Integrated Supervisory Systems
Multi standard Playout Systems

TELECOMMUNICATIONS
Microwave Links
Radio Base Systems

SPECIAL PROJECTS
Military RF Applications
Scientific Applications

DMT USA

1224 Forest Parkway, Unit 140
West Deptford, NJ 08066
+856.423.0010 tel, +856.432.7002 fax
sales@dmtonline.us, www.dmtonline.us

subsidiary of the DMT GROUP

To this same end, don't even think of using good old Charley from down the road to do this work without extensive supervision. It is imperative to use personnel trained in the proper use of protective devices and the disposal of unwanted material. Before you start any work on the tower that could possibly involve the paint, contact your state environmental protection office and review their regulations carefully. There are structural firms and tower painting firms that are familiar with the local requirements and have thorough training. Then, get your ducks properly in order. This should include a contract with the painters, including full hold-harmless agreements and naming the station as a co-insured. Before signing anything or allowing any work to begin, contact the station's insurance carrier and legal counsel. Remember, the corrective actions for soil contamination could involve the removal and destruction of soil over a large area. That involves costs too horrible to mention. We are talking about possible millions of dollars here while the front office yells at you — a lot.

Enough, you say. We need to replace that old tower anyway, so we'll just take it down and put up a nice new one that will be totally lead-free. Nope, it doesn't work that easily. You now have a few tons of contaminated steel. Assuming that you don't want to keep it on site sealed in a big baggie, you may have a great deal of difficulty getting a scrap yard to accept it. It will probably be necessary to go through the whole process of removing and destroying the paint before the tower even becomes acceptable junk.

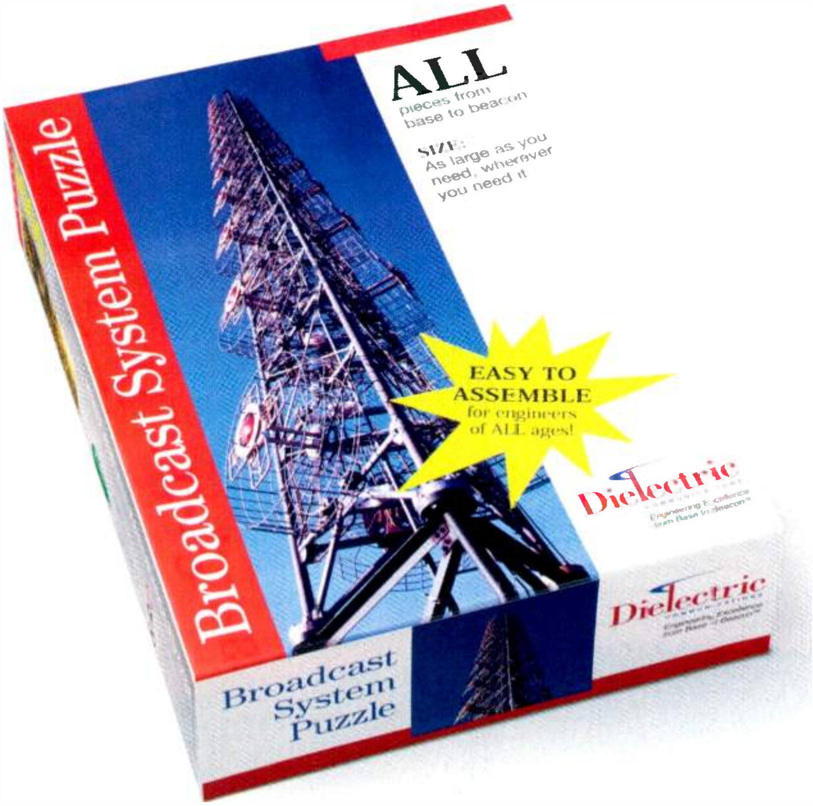
This isn't a simple situation. Done improperly, the costs of cleanup may well be greater than the value of the station. That thought alone should be enough to remind you to go through every hoop necessary before doing any work on the tower. It doesn't cost anything to go to the appropriate agencies and the station's insurance carrier to make sure that you are doing everything legally, and all bodily openings are suitably protected. The alternatives are truly awesome to consider.

And the whole lead-removal problem isn't going to go away. (If you have any doubts about that, just try to buy lead-based paint.) But it is a problem that station staff can easily deal with by using the appropriate contractors and working with the appropriate state agencies. Failure to do this will be a sure career ender. BE

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

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

Radio and TV broadcast systems made simple.



Dielectric has all the essential pieces to make your TV or radio project anything but puzzling. From design and site surveying, to excavation and construction, rigging and maintenance — we'll connect you with everything you need from the transmitter output, including:

Towers • Rigid or flexible transmission lines • Lighting • Antennas • Combiners • RF Systems

The warranty you want. The capability you need. The experience you demand.

Put Dielectric to work on your next project and watch everything seamlessly come together in picture perfect fashion.

Dielectric
COMMUNICATIONS
Engineering Excellence from Base to Beacon™

1-866-DIELECTRIC • www.dielectric.com

Master control systems

By John Luff

Over time, master control has changed, but its basic function remains the same. Broadcasters around the world use master control systems to build program streams and insert interstitials such as advertising and promotions for future programs. This is not to say that the changes in master control have been minor or superficial. On the contrary, the changes have been dramatic, driven by factors such as FCC-mandated ancillary services, the requirements of the marketplace, the details of the content and interstitials and a broadcaster's desire to differentiate his output from that of the competition.

Modern needs, modern problems

The FCC has mandated closed captioning, descriptive-video-service (DVS) audio, emergency alerts, ratings flags (V-chip) and, of course, DTV. Beginning early in 2005, broadcasters must add PSIP to their signals. Taken individually, these requirements are quite simple to accomplish. But they add cost onto the broadcaster's ledger that is unlikely to be offset easily by new revenue.

The broadcaster's quest for a unique look has led to a much more complex menu of switcher options. Among these enhancements are pushbacks, more and shorter interstitials, weather and other announcements over programming, complex voice-overs, rich

Modern master control rooms, like the one shown here in Turner Broadcasting's new HD facility in Atlanta, have different paradigms of monitoring and control.

graphics — sometimes over content (for hire), burned-in and moving logos, and network logo insertion at the station. To this, add HDTV content and several program streams multiplexed together, each of which might have all of the above elements.

To maintain the old functions and accomplish new ones, the tools of master control have had to evolve. In the early days of color TV, a master control switcher might have had 12 to 16 inputs, perhaps one or two key inputs, and a voice-over channel. It would likely have offered automatic transitions and a set of triggers for pre-rolling VTRs (or film chains). A preview output would have fed a separate monitor to allow the master control operator to look at network feeds on a larger monitor for quality control prior to air.

But such a limited master control could not adapt and expand to accommodate the changing demands of the FCC, station management and sales. Some of the new functions — such as V-chip, pushbacks, EAS, and even DVS and closed captioning — could be (and often are still) performed downstream. However, the explosion in the number of ancillary signals added to the output begs the issue of control, certainly of human control. Some functions, like closed captioning and V-chip, need only monitoring under normal circumstances. Other functions related to transitions in aural or visual program content (such as added lower-third graphics, pushbacks, voice-overs) add greatly to the number of things the operator needs to control and monitor. As a result, automation — first in the form of cart playback of interstitials, and later in servers — became a way to extend the amount of content an operator could handle reliably. The cart machine received a log from traffic and played entire interstitial pods as a unit, greatly easing the load on the operator and allowing more complex content.

We can credit (or blame) the rise of computers for enabling the next level of complexity in master control. If the growing demands on the master control operator had pushed him to his limit, might it not be possible for a smart machine to assume some of the burden? Manufacturers met this challenge by producing new master control hardware with rich feature sets that permit creative traffic, program and sales departments to squeeze more content and dollars out of a station's sole consumer product. Today's hardware offers rich graphics, layered signals and effective control of complex events.

To maintain the old functions and accomplish new ones, the tools of master control have had to evolve.

Operator interface

To make all these functions work, the operator needs an easy to use interface. (The links between traffic and automation facilitate much of the manual selection in the background.) The key component of this interface is software that can configure complex displays understandable to the human operator. The GUI must include three elements that enable the operator to understand complex events and manage them when they go wrong.

First, the GUI must have a setup task, which a facility might use only when it installs the master control or when it adds or removes peripherals. Many manufacturers now include in their peripherals embedded features that stations can activate later through software authorization keys. In addition, the setup functions offer a set of graphics and operation templates that allow the station to create and manage a unique look.

Second, the GUI must provide understandable data about the current operational state of the hardware and embedded software. This allows the operator to see that the next event has been sent to the hardware for execution (hopefully), and displays it on the preview system. Taken together with automation, this GUI element must clearly indicate critical information and facilitate manual operations that are part of normal practice. It also must permit multichannel monitoring for situations like multiplexed SD/HD in DTV. A hardware control panel is often part of this element. Increasingly, touch screens or mouse-driven computer displays are supplementing or supplanting the hardware panel we usually associate with master control. At the very least, it is becoming desirable to have a touch screen as a backup to the hardware interface. The best ones look exactly like the hardware panel so the operator understands them instantly.

Lastly, the modern GUI must provide fault reporting and resolution. For a multichannel operation, this may be the most important piece of software. It is not enough to have the monitor go dark and leave the operator wondering if it was the video/audio processor that failed. The system must alert the user to the highest degree possible. Consider the case of an operator working in a duopoly. He would have two NTSC channels (at least for the next few years), and two DTV channels, each of which might have up to four or five streams present. At any one moment, the operator is looking at four to 12 streams and their associated hardware chains. Concise and useful data will make the difference between lost events or lost hours.

Signal monitoring can now be done on plug-in modules in DA trays, as with Thomson Grass Valley's Maestro.

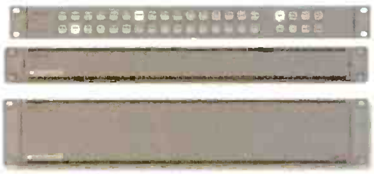
Modern hardware

Master control systems have evolved from stand-alone devices to hardware that can integrate and centralize functions like graphics creation, CG, still stores, logo inserters and DVEs. Yet the industry seems to be moving to view crosspoints and processors independently. (The opposite viewpoint is covered later in this article.) We might consider the switching requirement as an unnecessary overlap with routing, which is almost certain to exist in the facility. Thus, the processor (audio and video) might have Ethernet connections for moving graphics, receiving live data streams for processing as lower-third character generation, and other control ports, including automation. It might also have ports to feed requests to servers and other external devices. But the number of inputs may be reduced to half a dozen, some of which are key and fill inputs. By doing this, several manufacturers have been able to reduce the size of the processor to a card in a DA tray (though not a small one). Other manufacturers have made boards that mount in a routing switcher frame, using the same control system to facilitate

Ross Video Introduces 10 New Multi-Definition Synergy Switchers

OVERDRIVE PRODUCTION CONTROL SYSTEM

OverDrive is a powerful production control system that enables touch screen control over devices used in productions such as news, sports or live events. OverDrive integrates with the Synergy SD and MDX series of production switchers, leveraging powerful control interfaces over video servers, VTRs, DDRs, audio mixers, robotic cameras, routers, still stores and more.
www.rossvideo.com/overdrive/overdrive_overview.html



TALIA NK ROUTING

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

GEARLITE MD

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

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

Sony, PVM and BVM are trademarks of Sony Corporation

http://www.rossvideo.com/gearlite/gearlite.html

SYNERGY MD/MD-X MULTI-DEFINITION PRODUCTION SWITCHERS

The Synergy MD and MD-X series offers models ranging from the compact and powerful Synergy 100 MD single ME switcher to the extra large, hyper powerful Synergy 4 MD-X 4 ME switcher. Synergy MD and MD-X support all popular formats of HD and SD out of the box. Using the absolute latest technology, these switchers are full of standard features at a price point that puts a multi-definition switcher within reach of a typical mid-market customer.
www.rossvideo.com/synergy/switchers.html

broader control issues and crosspoint selection in a seamless fashion.

This tight integration, combined with separation of function, provides for interesting possibilities in fault management. It is not hard to envision a system that takes note of a failed master control processor and substitutes a backup in a 1-for-N (or N-for-M) redundancy strategy. The operator might be asked if he wants to move to a bypass path or simply replace a failed board with one from a pool of spares. By reducing the redundant switching functions and using an existing routing switcher or slot, the manufacturer saves on costly design, documentation and duplicative manufacturing of power supplies, frames and connectors. Cost comes down and reliability goes up, which is just the trade-off you need in a complex master control environment.

Control surfaces like Eyeheight's playout module have evolved to simpler metaphors.

Even when the processor is not card-based in an existing or multi-use frame, the economies achieved by not duplicating crosspoints are clear. This approach enhances and simplifies the master control switcher. Modern system designs seldom have sources uniquely fed to master control switchers. Most have at least a few routing switcher outputs dedicated to master control inputs. The strategy of building the processors without internal crosspoints seems to be an acknowledgement of this predominant design strategy and a way for manufacturers to guarantee the sale of a router.

Integrating graphics into the master control processor is also a powerful and fundamental change in architecture. Take promotions, for instance. The ability to generate the graphics for backgrounds or fill in text fields in a template derived from live or other sources can simplify the creation of a playlist for a complex channel. For instance, traffic might only call a template when inserting a weather crawl; an outside service provides data to fill in the text. The same method can apply to EAS. A keyboard is often available for simple text generation in the processor. You might even load a set of templates that would allow a reduced feature set for a backup to a production control room. But, clearly, these devices are not intended to replace complex character generators.

> **What if, instead of moving the crosspoints out, you moved master control functionality into the station's central routing switcher?**

Whither goest master control?

There's a second way to look at the dynamic of moving crosspoints out of the master control switcher. What if, instead of moving the crosspoints out, you moved master control functionality into the station's central routing switcher? The connector count goes down further, the integration with facilities management software might be enhanced, and the manufacturing cost should drop even further. It would also simplify system design, though at the expense of the ability to monitor paths inside the routing switcher that are no longer accessible.

In part, this is a generalized change in the way we look at routing switchers. Because all of the signals are present in the facility's hub router, you might ask: Why move them outside? At least two manufacturers have taken

slightly different but parallel strategies. One is developing specialized cards to put in a frame that also holds routing. The other is adding daughter cards to a router that offers features like keyers and voice-over capability.

This last approach plays well in the multichannel DTV environment. Many stations, particularly those in public broadcasting, see a need for simplified master control streams with fewer options at lower cost. Putting this functionality into the router allows it to route key and fill signals from any source seamlessly to any processing card for output as a simplified master control stream. This might also work well where a broadcaster uses his DTV bandwidth to provide functionality as a cable headend might, while also providing local branding at low cost. There is always a downside and, in this case, you might have to add a character generator and manage the content to allow a single generator to function on a time-shared basis with many outputs.

Lastly, you might consider having no master control switcher, but rather a processor that operates entirely in the compressed domain. Systems like this

Some master controls, like Leitch's DTP, operate entirely in the compressed domain.

have been available for several years. They allow you to link together and brand the MPEG server output (and, perhaps, a network signal delivered as MPEG). In addition, this type of processor allows you to add many normal master control functions without going back to baseband for processing and switching. The first wide-scale deployment of such a system in the United States is the FOX Network HDTV distribution. That system uses a number of devices that can combine local and network signals into a single output (which, after all, is the fundamental function of master control).

Looking forward

Several things are clear. The pressure of cost and flexibility requires new tools and operational techniques. Everyone who plans or manages a facility needs to understand the dynamics at play and the range of options available. Life will never be the same again. And there is much to learn. BE

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


"WOW"
PRO850
WIRELESS INTERCOM SYSTEM
That's the typical reaction we get when broadcast and theatre professionals see and hear the next generation from HME.
The amazing all-new HME Pro 850 Wireless Intercom System.
Call today for a demonstration and let us "WOW" you, too!
Intercom Specialties
888.810.1001
Systems Wireless
800.542.3332
HME
www.hmepro850.com
Introducing the DX-200
Spread Spectrum Wireless Intercom is finally here!
Call for Details
HME
PRO850
WIRELESS INTERCOM
POWER
BELTPAC CONFIG
RECEIVER STATUS
WIRED STATUS
CANCEL
ENTER
SELECT
TALK
LOCAL HEADSET

THE EVOLVING MASTER CONTROL

By Steve Sulte and Eric Goodmurphy

TVOntario in Toronto uses Leitch's Opus master control switcher to operate two broadcast networks. The single user interface controls multiple station outputs, which is key to signal consistency.

Blame it on branding, the use of those ubiquitous logos that appear in the corner of the TV screen. At first, these logos just winked on and off after each break. A year later, they stayed throughout the entire program. Now, they've become a mainstay, including everything from station IDs to promos for future programming and election results. This branding improves our viewing experience by helping us navigate through today's sea of entertainment alternatives.

Branding is the logical outgrowth of a broadcast channel's quest for a unique identity and increased viewership. As broadcasters continue to look for creative ways to generate more revenue by repurposing content, it's ironic that something so small has become such an important (and effective) tool. Cable networks can produce new channels almost overnight, all tightly packaged and branded for our enjoyment. The model works well.

But branding places new demands on master control. Simulcasting analog and DTV channels (with commercial inserts) is complex enough, even without considering brand content or data services.

This article explores the emerging,

Pack up . . . and GO!

MRC now provides the most diverse product line for lightweight portable systems, whether satellite links, portable systems for outside broadcast, or wireless camera systems.

For satellite, Mantis 100 is the lightest 1 Meter multi-band antenna available – weighing only 38 lbs. including antenna and transit case. The carbon fiber transit case stores the antenna and is easily pulled on integrated wheels. The EXOS is a modular, weatherproof, multi-function satellite terminal giving you the ultimate flexibility to choose between traditional MPEG-2 and/or IP based satellite transmission schemes.

For portable, airborne, or mobile applications, STRATA provides a broad range of options for analog FM or digital MPEG & COFDM applications. STRATA is now available in additional frequencies for both transmitter and receiver.

REPORTER by MRC now can be equipped with popular mounting adapters from IDX and Anton Bauer, letting you quickly swap out batteries to keep your field camera operating. Need to carry extra batteries for a prolonged shoot? An auxiliary adapter attaches to the REPORTER in place of the battery, letting you power the camera from a battery belt or vest.

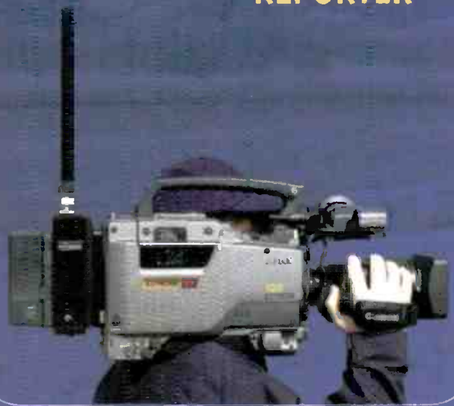
In addition, MRC offers the widest variety of MPEG/COFDM receivers, from the field proven CodeRunner 4, to the QuikVue Hand Held Receiver, the STRATA Portable Receiver, or the new RXL Receiver.

It's easy to see why MRC's innovation and design provides the best solutions for your portable systems.

Mantis 100 & EXOS

STRATA

REPORTER



www.mrcbroadcast.com

ADVENT COMMUNICATIONS

MICROWAVE RADIO COMMUNICATIONS

Microwave Radio Communications and Advent Communications are part of the Vislink Group.

Microwave Radio Communications – 101 Billerica Ave. Bldg 6 – North Billerica, MA USA 01862-1256 +1-978-671-5700 scalable master control environment and its ability to accommodate current and future workflows in multiple formats economically. In addition to offering a rich set of features, these new switchers must also be poised for the next round of technical challenges.

Traditional and contemporary models

Things were simple when we transmitted single analog channels. As the cornerstone of a station's infrastructure, the master control switcher was (and in many cases, still is) a dedicated box with dedicated inputs and a minimum number of capabilities. If a broadcaster required another output channel, he had to buy another switcher — simple, but expensive.

Yet, as multichannel transmissions have blossomed, the stress on master control has increased. New capabilities such as automation, character generation and squeeze effects were added around the switcher, but were not typically integrated. The trend toward more informative on-air images has added additional pressure, as master control systems must now handle increasingly diverse, localized branding and data services.

Many broadcast facilities have cutting-edge support for DTV, but their master controls are still years behind. If your switcher is a 15-year-old beast, today's multichannel commercial insertion and branding requirements have likely overstressed it. And facilities that haven't upgraded within the last three years are probably adding functionality as peripheral equipment.

Once a station decides to update its master control, the engineering staff is often surprised to learn that a new generation of master control devices not only provides the necessary staples, but also enables new channels and capabilities to be added economically. In basic terms, master control has gone modular.

The new mini masters

Because of broadcasters' continuing need to realize more value through upgraded channels and services (all within budget), facilities are starting to deploy a new generation of low-cost, modular master control solutions. These "mini" masters are more flexible than their monolithic predecessors. New channels and capabilities such as branding and surround sound can be added with ease. A facility can start with a single SD channel with a minimum feature set and upgrade to HD and more advanced features without purchasing new frames or panels.

Scalability, which is becoming commonplace for server and router manufacturers, is being applied to master control. An entry-level mini master might include a spartan yet highly capable feature set comprised of basic transitions and a single SD output. This unit can then upgrade to features such as clean commercial insertion (with effects), Dolby 5.1 mixing, and DVR capabilities for localization and time delay — for both SD and HD.

These upgrade modules for logo insertion, character generation, emergency alert, upconversion, voice-over mixing and squeeze effects are not specific to master control, but are, in fact, the same modules used throughout the facility — allowing the facility to leverage them across many applications. Processes that were typically performed upstream have now become native capabilities with one controlling interface.

From the customer's point of view, upconverting an SD signal is the first logical step in unveiling a new HD channel. Using the mini-master concept, the facility can budget for a fully branded SD channel today and reuse the base switching and branding functionality when the time comes to broadcast natively in HD with surround sound. This would not be possible if new frames, power supplies and interconnects were required. Within this model, incremental growth is easy and cost-effective.

Next-generation automation systems are already multichannel-aware. In addition to controlling legacy devices, the automation system's timeline controls multiple server channels and master control switcher crosspoints, as well as transitions and branding. If some or all of these capabilities are integral to the master control switcher, complexity is greatly reduced.

The master control operator's task is also easier with today's advancements and, in most cases, the job entails more monitoring than control. Where control is required, new advancements in panel architecture are reducing complexity and providing operators with more flexibility to tailor interfaces to specific applications. Some manufacturers offer a range of panels, from traditional hardware panels to software-based GUI panels that can be customized for specific workflows.

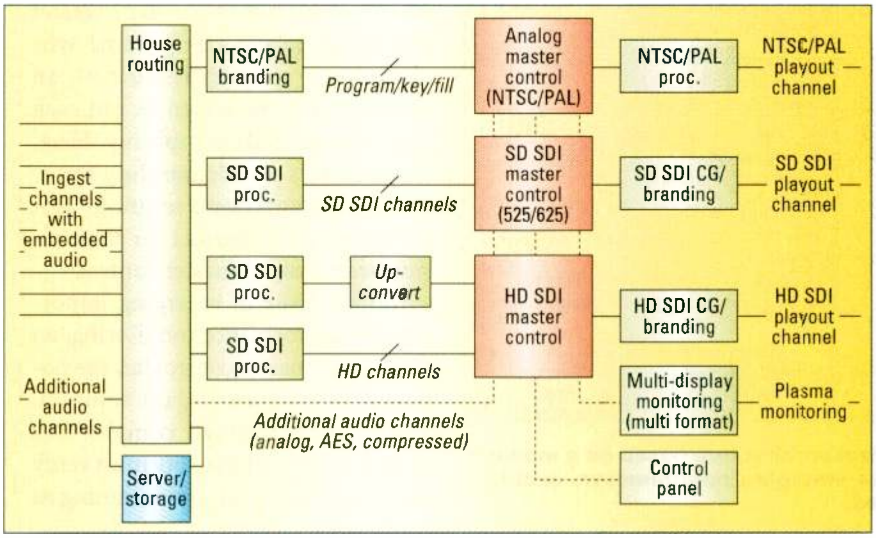


Figure 1. In traditional master control architecture, equipment is more dedicated and overall functionality is less scalable and modular than contemporary designs.

Challenges on the horizon

Because of this increased scalability and modularity, broadcast facilities are now solving problems within master control that have historically been difficult to solve anywhere else in the transmission chain. But new challenges are looming, based in part on the rapid evolution of audio, video and metadata.

Today's master control is almost entirely AES-capable, but the concern will be the proper handling of HD and Dolby 5.1 within this environment. Multichannel 5.1 audio for transmission is becoming a *de facto* requirement with broadcasters who are now designing infrastructures based almost entirely on DTV with surround sound capability.

With high-definition, surround-capable home theater systems being offered at incredible price/performance points, consumers are forcing broadcasters to get much better at what they do — particularly with regard to audio and video quality.

For example, a voice-over in Dolby E is not just a simple cross-fade — additional considerations must be addressed such as metadata and synchronization. It is becoming apparent that the logical place to solve many of these issues will be at the egress of a channel,

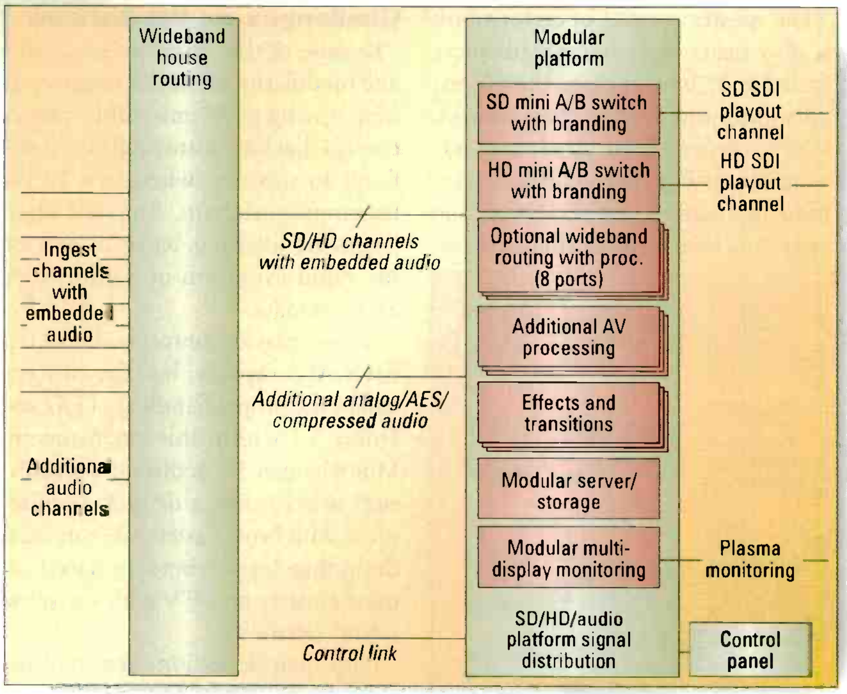


Figure 2. A contemporary master control architecture based on a modular platform is flexible and scales well to emerging requirements, enabling users to repurpose modules as required.

the master control environment.

Another ongoing challenge is maintaining synchronization between video and audio signals throughout the facility. Transcoding Dolby E at various points creates frame delays. Enabling and bypassing video processes upstream (e.g., aspect ratio converters, downconverters, etc.) creates additional delays. Using frame synchronizers at specific points can resynchronize these signals, but each path change adds complexity. Here, broadcasters are demanding automated, content-aware solutions that use metadata to correct for these issues seamlessly at master control.

Another issue of emerging importance is conformance monitoring, an area where master control has the potential to offer an elegant solution. Within an increasingly complex mix of daily content, the facility must verify that it is playing all programming as

planned and on schedule.

Watermarking and metadata technologies can offer potential solutions, and with the modular integration capabilities of today's master control, manufacturers can offer these features as future scalable enhancements.

Master checklist

There are several important factors to consider when selecting a new master control switcher:

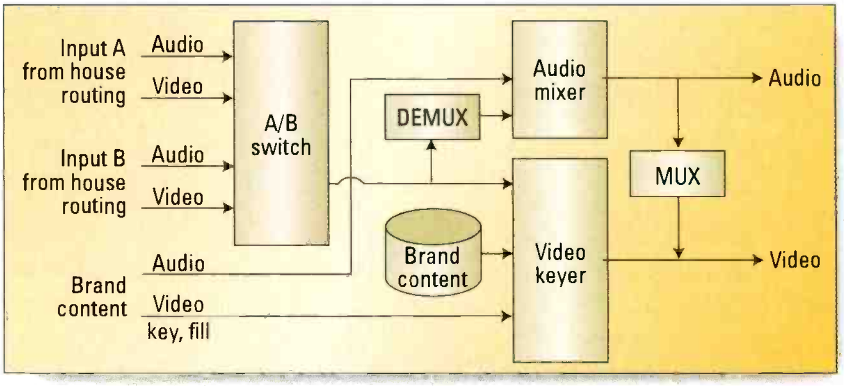


Figure 3. This is a detailed functional view of a channel branding and switching module. This module provides the cornerstone of mini master capability, including A/V branding, CG and switching.

- In addition to the basic requirements for modularity and upgradeability, consider a solution with an internal, self-contained routing matrix for seamless A/B mixing. The matrix lowers the reliance on the house router, and the modular framework allows for additional input blades. Conversely, if cost is an issue, marrying a simple A/B master control to the house router is effective.
- Select a solution that offers a choice of panels. The ability to configure a panel for a particular event or application has many advantages.
- Consider a company whose switching fabric is deterministic, with the ability to guarantee a transition in a precise amount of time — regardless of network traffic. When automation instructs the system to perform a task, ensure that the latency is within acceptable limits or fixed within a deterministic number of frames. Your LAN's IP traffic should not be a gating item.
- Look closely at the company's modular direction, and its ability to leverage its core technology across applications. An excellent example is time delay, which is an important requirement when planning for multiple-time-zone broadcasts. Exploiting the modular concept shouldn't require an entire server, but rather a single plug-in storage or time-delay module.

Master control a la carte

Master control switchers are now available in a variety of economical, scalable configurations, all targeted at making it easier for broadcasters to repurpose content, create new channels, brand their output and generate more revenue with existing assets. This *a la carte* solution eases the visual and financial requirements for getting a new channel to air. The continuing modular trend also makes sense given today's economies of scale. On a budget slated for improvements only, a large master control switcher would be out of the question. However, additional channels or plug-in capabilities for an existing mini master would likely be right in line.

The big-city station has different needs than the country station. The new wave of mini masters provides the flexibility to create a unique on-air look on a limited budget, with the potential to upgrade as required. BE

Steve Sulte leads Leitch's chief technology officers' group. Eric Goodmurphy is a product manager for master control switchers and development at Leitch Technology.

Adopting an IT-based broadcast infrastructure

BY BRUCE DEVLIN

The move to digital operations has freed broadcasters from many of the limitations of working in an analog environment. But, as broadcasters put their new digital infrastructures in place, it is becoming increasingly obvious that they need to integrate an IT-based workflow.

IT-based broadcast infrastructure reduces redundancy and allows greater sharing of media across a facility. This, in turn, streamlines production workflow. A common network also offers greater creative latitude in the use and reuse of graphics, program content and other material.

As broadcasters shed the constraints of the traditional broadcast business, they must consider a series of issues and opportunities inherent in the adoption of an IT-based broadcast infrastructure.

These include selecting an appropriate platform and operating system and deciding on the file types they will support. These decisions affect interoperability within the facility. Regardless of the type of infrastructure being instituted, concerns such as storage and security present themselves. And, of course, the broadcaster must consider the facility's network and how it will enable this new digital, file-based workflow.

Above: As part of its IT infrastructure, Hollywood's PacificTitle & Art Studio uses an SGI InfiniteStorage CXFS shared filesystem SAN.

Video-centric and IT-centric workflows

Figure 1 on page 68 shows a representation of a traditional workflow. The key points of this model are the multiple copies of the material that exist in the system and the number of people required simply to move the content around. With a traditional asset management system, multiple copies exist on tape and local video servers, and are distributed by SDI routers and/or "sneakernet." The final output originates from a copy of the program on a localized playout server, which delivers live SDI content to an encoder for air.

Figure 2 on page 69 shows the equivalent facility in a tapeless environment. Here, the emphasis is on shared content and multiple accesses to a central, managed resource. Multiple users can access content without making copies, preserving video and audio quality. This type of system

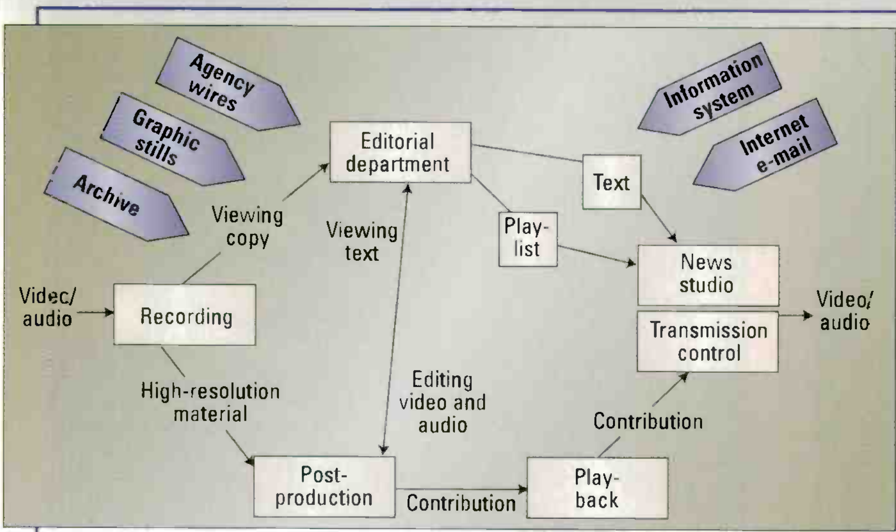


Figure 1. With a traditional workflow, the system contains multiple copies of the material and a number of people are required to transport the content within the facility.

also allows for increased automation because file transfers for airing can come from the central server according to the playout schedule. Actual broadcasts may involve involve live compression or pre-prepared offline compression, depending on whether the ultimate target is broadcast, VOD, phones, the Internet, etc.

Platforms, OSs and file formats

Interoperability is key to building an efficient IT-based infrastructure. So, it's important to select the right server platforms and operating systems for editing and graphics.

Some facilities will choose a single OS such as Windows, Unix, Macintosh, Linux, Irix or BSD. This consistency provides a seamless flow of data and media, though it can limit the choice and use of equipment. Other facilities may rely on several different operating systems working on a common network. Here, the vendors dictate the OS in exchange for the functionality, pricing or feature sets the broadcaster wants. In this case, interfaces are necessary to bridge the gap and facilitate interoperability over the network, regardless of the devices connected to it and the file systems used. (Such file systems include FAT, NTFS, HPFS, SMB, UPFS and ISO9660.)

One platform might support one set of rules for file naming, ownership, access and modification, while a second platform may rely on an entirely different set of rules for the same functionality. The time the facility spends managing communications, privileges and rights between these different platforms could instead be used to improve the quality and quantity of material the facility produces and distributes. This difference in functionality may arise from the vendor's choice of OS or file system, but the customer bears the administration cost.

A networked facility achieves the greatest benefit if the design engineer or systems integrator can build the broadcast infrastructure on the file format or standard that offers the greatest flexibility. Often, this will determine the choice of a server or primary storage device.

New file standards

New file standards such as MXF and AAF are changing the way facilities can use file types internally or across a network. These new standards include both the essence of the original file as well as metadata about the file format, such as sampling rate, image dimensions and similar parameters. With this information, a smart device can determine if and how it can use each file.

The MXF wrapping mechanism interweaves individual video frames and associated audio. The file's header and footer contain a description of what is in the file (the types of essence, the size of the pictures, the sample rate of the audio, etc.) for quick reference.

Vendors are still improving the MXF and AAF standards through testing, reporting and collaboration. Testing tools, available for Internet download, allow broadcasters to implement a common and consistent level of interoperability among their broadcast systems. One example is the tool provided by the MXF Test Centre of the IRT, the Germany-based Broadcast Technology Institute, which has made its MXF test tool available for download at *www.irt.de/*.

Vendors including Snell & Wilcox are also providing free, online access to their code base to speed improvements to the MXF standard (*www.snellwilcox.com/mxf/*). As broadcasters increase interoperability through these standards, they streamline their operations and achieve more cost-effective production and playout.

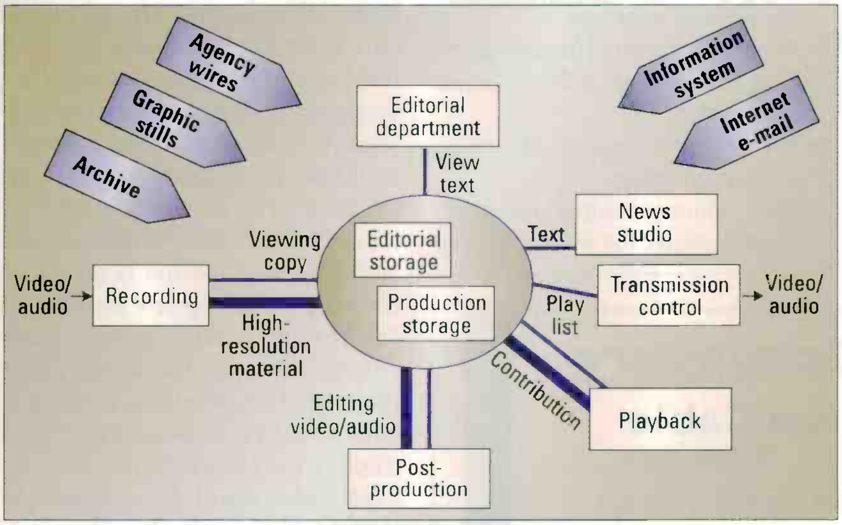


Figure 2. In a tapeless environment, the emphasis is on sharing content and multiple points of access to central, managed resources.

Data networks and storage systems

Storage costs have dropped, but the overall cost of implementing and administering these solutions has increased. The total cost of ownership, however, depends on leveraging operational benefits.

The local area network (LAN) is the simplest storage solution for IT-based asset management. You can connect a direct, attached storage system to a LAN to provide fast transfer speeds, immediate access and in-house control over the entire network. For a facility where media transfer and sharing is a strictly internal affair, a LAN provides sufficient access.

Broadcasters who need to share media across facilities would fare better by using metropolitan area networks (MANs) or wide area networks (WANs). Such networks have greater reach than a LAN but have less reliable data transfer speeds and are more dependent on outside sources for maintenance. In applications such as live broadcasting, these drawbacks can jeopardize the quality not only of video transfer, but also of the on-air product.

NAS	SAN
Connected through fast IP networks (Ethernet)	Connected through SCSI interfaces over Fibre Channel
The NAS head manages the file system (which knows about filenames).	A separate computer, often called the metadata controller (MDC), manages the file system.
Identify files by filename	Identifies only disk blocks. The MDC manages the file system (which knows about filenames).
Uses byte offsets to move within a file	Transfers raw SCSI disk blocks
Any computer with a network connection and permissions can open a file on an NAS.	Special software is required to manage the file system.
File metadata (permissions, dates, etc.) handled through the same Ethernet connection as the file data	File metadata often handled through Ethernet connections. Actual file data handled through the Fibre Channel connection.

Table 1. NAS and SAN networked storage solutions each have their own unique advantages and disadvantages.

Newer and smarter storage options include network attached storage (NAS) and storage area networks (SANs). Table 1 compares these two storage architectures.

It's impossible to say which system is better, faster or cheaper because the ultimate choice will depend on a number of factors, including:

- Number of simultaneous accesses needed to the storage
- Bandwidth required for each access
- Type of file (large video vs. small audio files)
- Nature of the access — streaming or random access
- Total volume of storage required
- Requirements for online backup and purging

It is possible to build a system that uses the best of both technologies to hit certain price and performance criteria. For example, one broadcaster from the Athens Olympics used a SAN system with a few hundred hours of content for live ingest with online editing of the live content. Behind this was a large (1000-hour) NAS system that had less strenuous real-time requirements, but was optimized for large volumes of near-line storage at reasonable cost.

Security measure

Security is a loaded term today. A security threat may be as simple as human error resulting in the loss of data, or it may be as great and overwhelming as a flood, earthquake or other natural disaster. It could also take the form of a malicious threat from an employee, computer virus or external attack.

A careful evaluation of the broadcast facility's vulnerabilities is critical in choosing an appropriate security solution. Centralized IT storage, while efficient, also requires a number of protection technologies and education of its users to achieve successful, continuous operation. In the end, the main goal of ensuring system security is to establish a reliable and cost-effective solution for upholding an acceptable broadcast standard.

IT now and to come

IT-based digital broadcast infrastructures open many doors for broadcasters. And with these opportunities comes the challenge of choosing among an ever-increasing selection of products and solutions. Deploying new transmission, storage and management tools in a file-based environment enables the broadcaster to lower the costs of using an inter-vendor solution. Open-source, IT-based standards such as MXF and AAF are helping broadcasters to optimize operations to suit their changing needs. BE

Bruce Devlin is vice president of technology at Snell & Wilcox.

SONY

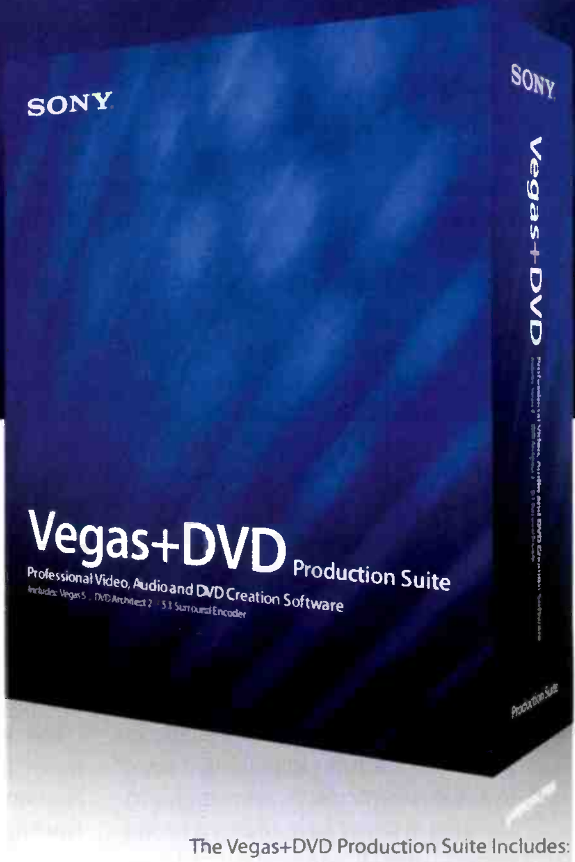
Uncompromising Innovation.

Vegas® software for video and audio production is now considered the standard to which other non-linear editing products are held. The Vegas+DVD Production Suite – which includes Sony® Vegas 5 and DVD Architect™ 2 software – provides an unmatched, innovative set of professional production tools.

Sony's Vegas 5 software redefines workflow by providing an all-in-one real-time solution for editing, multi-track recording, compositing, titling, scoring and encoding. Its customizable interface allows users to accomplish a wider range of complex production requirements. Whether you're off-lining 24p HDCAM proxy files or finishing your project in DV, Vegas software delivers the ultimate in flexibility.

Sony's DVD Architect 2 software delivers a complete, professional set of DVD production tools that lets you develop dynamic menu-based DVDs with subtitles, alternate audio tracks, end actions and more.

Created through imagination driven by uncompromising innovation. No other media production suite is like it.



The Vegas+DVD Production Suite raises the bar with these new features:

New in Vegas 5:
- 3D motion and compositing
- Keyframable bezier masking
- Control surface support
- Envelope automation recording
- Auto-input record monitoring
- Film-style 5.1 surround panning
- Real-time A/V event reverse
- Media subclip creation
- Customizable keyboard mapping
- Networked rendering
- And much more

New in DVD Architect 2:
- End actions
- Multiple audio tracks
- Subtitle support
- 24p DVD encoding
- Elementary stream import
- Project overview window
- Real-time external monitor previews
- And much more

The Vegas+DVD Production Suite Includes:
- Vegas 5 software
- DVD Architect 2 software
- Dolby® Digital AC-3 encoder

Uncompromising innovation for your unconventional creations.

Also introducing the Sony Pictures Sound Effects™ Series, a comprehensive, dynamic, five-volume collection of sound effects from the Sony Pictures studio archives.

Automating
master control

BY RICHARD BRICE

Many factors are coming together to reshape the modern master control room. Today, master control must enable broadcasters to respond to the demands of consumers looking for a broader selection of channels that provide more information and greater interactivity. Viewers also are demanding a higher quality viewing experience with HD and multichannel audio.

To offer more channels, each targeted to a smaller viewing audience, broadcasters must reduce their per-channel playout cost. This requires more affordable and more efficient equipment.

Integrated master control

Facilities used to use a separate switcher, character generator, logo generator and clip server for each channel. Modern master control systems can integrate all of these functions under the control of a single interface. In addition to making it easier to automate interfaces, more highly integrated systems have reduced broadcasters' overall equipment costs significantly. Today, master control functions can be readily combined, as long as master control discipline, workflows and values are respected.

To be successful, modern master control products need to be designed from the ground up for multichannel playout managed by a single operator.

In a multichannel environment, the goal is to make the difficult job of being visually aware of each channel as easy as it can be. Miranda's Master Control Glass Cockpit is one example of this development. The system features soft control surfaces for monitoring, setup and adjustments, along with dedicated transmission panels.

With a high level of multi-vendor system integration, a single operator can control more channels more effectively, and stations can add extra channels with minimal impact to their infrastructure. More recently, manufacturers have taken integration further by integrating local master control operations with remote sites. This allows a single operator to control multiple channels spread across multiple locations. The PBS ACE project uses this type of distributed control. A consortium including Accenture, AF Associates, BroadView Software, Intel, Masstech, Microsoft, Miranda Technologies, Omneon Video Networks, OmniBus Systems, and SES AMERICOM developed a master control infrastructure for PBS. The solution uses IT strategies to automate repetitive processes and reduce the need for costly manual operations at member stations.

The solution uses Miranda equipment for local branding, local and systemwide signal monitoring, signal routing, and interfacing. It provides multilevel, automated system monitoring and remote problem identification. It allows PBS to remotely monitor, over a standard Internet connection, exceptions occuring on stations in diverse geographical locations.

A more engaging viewing experience

To meet the demand for a more engaging viewing experience, broadcasters are continually enhancing their channel branding and graphics capabilities in the master control room.

Typically, stations can use a dedicated graphics automation system, separate from the main playout automation system, to simplify the control and management of the more complex on-air graphics today's viewer expects.

Integrated master control systems like Miranda's Master Control Glass Cockpit provide support for multichannel operations.

Control is critical in a multichannel master control environment because operators have neither the skills nor the time to complete tasks manually. One person might manage 10 channels in a facility, so control must be both simple and contextual.

Advances in this area include Miranda's new Imagestore Intuition branding graphics generator, which allows complex multilayer graphics and animations to be controlled effectively by station automation, or via intuitive hard or soft manual control panels. This control is at the heart of effective channel branding.

Changing trends in viewer tastes, economics, automation, and presentation have led to the development of master control systems that offer today's stations more flexibility. **BE**

Richard Brice is managing director, Europe, at Miranda Technologies.

PrimeVision rethinks remote audio

BY PAUL LYDON

The audio area in a television remote broadcast truck has generally taken second place to the video control and graphics areas. It is usually the smallest section in a vehicle and houses an average-sized mixing console that, until recently, was most likely analog. Now, digital audio consoles are more common. These usually offer automation and recall functions that allow engineers to reset for different scenes more quickly.

The onboard mixing console has become acceptable for use with speech on broadcasts of sport and ceremonial events. However, it is still the convention to work with a special mobile recording studio for live or as-live music and entertainment programs. Improvements in the functionality, reliability and quality of digital audio consoles have led some remote truck operators to consider using a single console installed in a dedicated area for all applications.

This reappraisal of audio is partly explained by remote truck companies' migration to HD. Multichannel 5.1 sound is regarded as the best accompaniment to HD, and operators are installing suitably equipped audio consoles. Danish company PrimeVision entered the HD market in June with the HD30 truck. This 689sq ft vehicle accommodates up to 30 cameras, 154 HD monitors, an 80-input video mixer and a Studer Vista 8 digital audio mixer.

PrimeVision engineers built a control room in the truck that would handle all audio, eliminating the need for a mobile studio for music projects. Building a complete package not only helps cut costs but also raises the quality of the facility. Unusually, a truck's audio section has expandable sides, which is the norm for the video areas in modern remote broadcast trucks. This makes it big enough for a mixing engineer and a score reader, plus a tape operator and any additional multitrack equipment.

Building a complete package not only helps cut costs but also raises the quality of the facility.

Selecting an audio console

The broadcaster selected the Studer Vista 8 in part because of its flexibility for use with both music and sports events. It works well for recording to multitrack or for live events. Also, high-quality sound makes it suitable for all kinds of music. For multitrack recording, the desk can be used merely as a means of monitoring the incoming signals. For live broadcasts, it has the headroom to deal with sometimes overpowering orchestral instruments.

The console ranges in width from 56.14- to 118.35in, depending on the total number of faders. The broadcaster configured the truck's system with more than 250 inputs and 150 outputs. It features three bays containing a total of 30 channel strips, with the Vistonics user interface. Twelve faders control up to 52 outputs/inputs or any combination.

The control panel also features a Vistonics interface, but with 10 faders and surround sound monitoring. Additional faders are available on a 10-fader sidecar section that can be detached from the main desk and located in the video section, so the audio engineer can work alongside the director and control the main console remotely.

PrimeVision uses the Studer Vista 8 console to record live audio in its HD30 remote truck.

Console in action

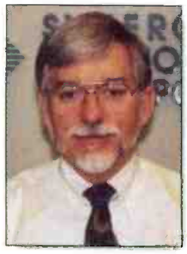
HD30 recorded performances of the ballet La Sylphide, held in July at the Paris National Opera, for NHK television and later DVD release. The music was recorded through 26 microphones in the auditorium onto a TASCAM DA-98. A live stereo mix was recorded on the audio tracks of a Sony M-2000HD VTR, with a backup on tracks three and four of the DA-98. The necessary components for a 5.1 mix were recorded on the remaining six tracks.

Among the permanent gear in the audio area is a TC Electronic System 6000 for reverb and processing. Classical music is the truck's primary focus, so there is no need for racks of equalizers and processors. Audio monitoring is accomplished on Genelec 1031 loudspeakers, supported by two Studer self-powered loudspeakers.

The use of the Vista 8 audio console in its audio section has enabled PrimeVision's HD30 to use one console for audio production of both sports and live music events. BE

Paul Lydon is a consultant based in the UK.

Test and measurement



BY JOHN LUFF

Testing analog audio and video signals was predictable and understandable — once you learned what a waveform monitor and VU meter looked like. The test equipment showed representations of amplitude over time. Variants of analog signals and test equipment evolved over decades, but there was no radically new technology from the early 1950s to the 1980s.

Then along came digits, computers, compressed video, surround sound, complex RF signals like COFDM, and phase-shift keying (8-VSB, QPSK, 8PSK, 64QAM, etc.). The comfortable and familiar technology no longer sufficed at even the minimum level. A rich set of new tools for the new technologies has developed in the last 10 years. Vector modulation monitors, rasterizers, remote monitoring probes, surround sound scopes, MPEG syntax monitors and a host of other tools now allow us to look at complex, sometimes esoteric, signals. Some test instruments display only textual information, a far cry from the intensely graphic interface of the waveform monitor.

Video was easy when the scope represented the same thing that was on the wire. There was no need to decode for display. A simple special-purpose oscilloscope was created that locked to the repetition of the line or vertical frequency of the picture.

Once created, the sensible display allowed operators to see any defect in the signal and the displayed picture. With digital video, SMPTE 259 resembles wideband noise on an oscilloscope, and that is no mistake. It is actually one of the pieces that makes it work. Find the clock, decode the digits, deserialize the signal, convert the signal from digital to analog, and then display. Verify the correct format, find the embedded data and audio signals, and display them. That is a lot more stuff to do than we did only a decade ago. And audio (PCM AES, or AC-3/Dolby E compressed) or compressed video (ASI) could be on the same coax. ASI looks similar to SMPTE 259. Just because it looks like noise doesn't mean it is SMPTE 259M. Audio is similar, though AES digital audio is not turned into a noiselike signal for transmission.

For the most part, scopes today have moved away from the cathode-ray display. Even if the form factor is similar, most waveform monitors use digital sampling and a raster display. With some rasterizers, it is possible to put the output on computer displays ranging in size from a few inches to several feet across. This is one example of the merging of conventional technology and computer technology. If the display can be a VGA screen (XGA, etc.), the test instrument can also use computer analysis techniques.

Today, engineers use many different measurement displays. An eye pattern is a specially triggered and displayed version of the time vs. amplitude display. The impression is that the eye is a repeating pattern, like sync in analog video. But, in reality, it is visible only by overlaying all of the transitions from which digits are decoded.

Another radically different class of displays uses text to view the syntax of digital signals. SDI, AES and compressed video lend themselves to this technique. It is possible to have an MPEG signal that is perfectly decodeable in all respects except that the syntax breaks a rule or two and leaves the signal useless in some or all decoders. MPEG signals use a complex series of symbols that are legal only if assembled in a specific syntax. But that type of test instrument can

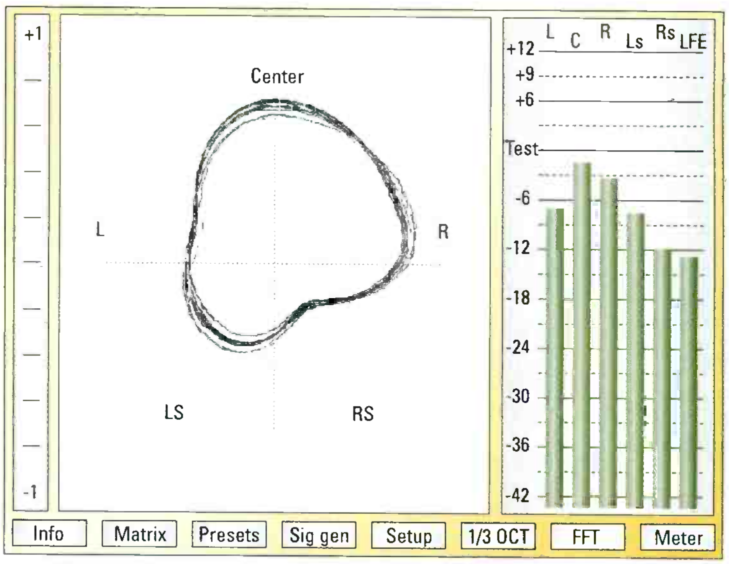


Figure 1. New scopes display the spatial distribution of the surround sound signal, along with the levels in each channel. These scopes can be programmed for different metering ballistics to match in-house and international standards. Surround sound MSD600C from DK-Technologies shown above.

An operator uses Tektronix's WFM700 multistandard waveform monitor. The monitor features an HD/SD eye pattern display, one of the many different measurement displays engineers use to monitor digital signals.

display complex and rich information in away that is easy to understand. It displays statistics about the signal and its content with format information that allows the user to troubleshoot difficult and obtuse problems in a complex domain. The ability to set alarms for out-of-limit or missing items allows the complexity to be invisible when all is well.

What about audio? How hard can it be with just two wires? Well, what about compressed 5.1 audio? How about Dolby E? How do you test AES? Specialized instruments analyze the content, the bit stream and the acoustic content (surround sound image). (See Figure 1.) A VU meter is interesting, but what about apparent loudness, content of the metadata or formatting of the data?

In addition to instruments that test the signal itself, we must also address the complex RF transmission technologies that deliver the signal to the end user. The ATSC's 8-VSB signal, as well as similar transmission technologies used for cable (QAM) and DVB-T (COFDM), require a new variety of test instruments that display RF in a way that allows the user to determine if the modulation meets the standard. Without these tools, it would be impossible to tell if the transmitter and its modulator are functioning properly.

These sophisticated tools are but a subset of the full suite of tools available. Waveform monitors can combine measurement capability for SD and HD signals, embedded audio, and even embedded compressed AC-3 or Dolby E. Modern facilities must have IT test instruments such as Ethernet testers and digital circuit test sets for T1 and DS3 lines. One key to successful measurement in an environment this complex is training on the right tools, and on analyzing the signals. BE

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

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

VIDEO ASSET MANAGEMENT SYSTEM

DEMO ROOM

Proximity Artbox: Integrates format conversion, storage, workflow management, and search and retrieval of artwork (video, graphics, script or audio) into one interface for post production; interfaces with current and legacy equipment from multiple hardware and software manufacturers including: Adobe, Avid, Chyron, Discreet, Leitch, Omneon, Pinnacle, Quantel, Sundance and Thomson Grass Valley.

646-452-5820; *www.proximitygroup.com*

GRAPHICS MANAGER

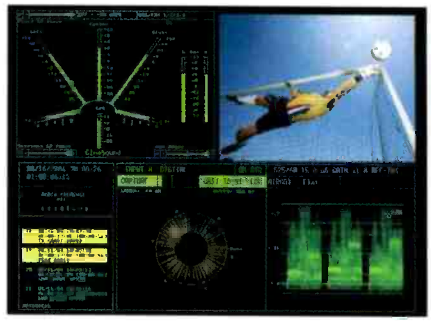
Inscriber Direct Control: Manages an Inscriber Inca AutoCG SD and an Inca AutoCG HD to simultaneously deliver SD and HD graphics; view and edit common graphic elements from one control application; ensures that SD or HD graphics fit their intended form factor and are rendered at the correct resolution; once modifications are made, output is simultaneous and on command.

519-570-9111; *www.inscriber.com*

HD MASTER CONTROL SOLUTION

Pro-Bel Masterpiece: Features a new HD mixer that can either be purchased new, or as an upgrade for the TX520; mixer can be used to upgrade existing SD video mixers; benefits from two keyers, with the ability to place a DVE into the signal chain before or after either keyer.

631-549-5159; *www.pro-bel.com*



SERIAL DIGITAL ON-SCREEN MONITOR

Videotek VTM-310G: Generates real-time signal quality alarms, based on user-adjustable limits, with time stamps into a log for evaluation and reporting of signal quality; provides two serial digital 525/625 (601) passive looping inputs; features Videotek's digital gamut and unique relative timing displays; select from a variety of audio options.

800-800-5719; *www.videotek.com*

DEVICE CONTROL TOOLSET

Harris Air Client 2.1: Enhances the play-to-air capabilities of the ADC-25 and ADC-100 automation systems; graphical user interface views all equipment and schedules controlled by the device server; allows users to import, edit and create transmission lists within seconds; features a configurable toolbar and drag and drop functions.

800-442-7747; *www.broadcast.harris.com*

MEDIA SERVER

Omneon Spectrum HD: Provides integrated playback of HD video content; when configured with other components in the Omneon Spectrum family, enables users to ingest, store, and play back SD and HD content simultaneously from a single system, using a common pool of shared storage; incorporates two new real-time media interface adapters.

408-585-5000; www.omneon.com

GRAPHICS SYSTEM

VDS Twister V6: Runs as a stand-alone application, or as a plug-in; users can access VDS' content creation tools and remote file transfer utilities from within a single user environment; suite includes paint tools and brushes, multiple layering capabilities, and image processing and masking tools.

631-249-4399; *www.videodesignsoftware.com*

MULTIPLEXER

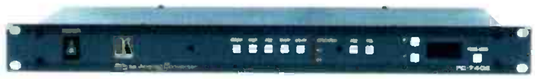
Opticomm Multiverse: Uses multiple division multiplexing (MDM) to transmit one to 144 channels over one fiber; can accommodate any combination of Opticomm's video, audio and data signal transmitters; transmits digital signals up to 25mi without repeaters; offers image stability unaffected by attenuation and noise; accepts an extensive range of video signals, from composite analog to RGB/VGA high-res to broadcast-quality SDI and HDTV.

858-450-0143; *www.opticomm.com*

GRAPHICS SYSTEM

Chyron DynaCrawl: 2RU system is designed to enable users to add up to two fully animated news crawls, tickers and time/temperature; transition effects include roll, fade, flip, spin, and roll and crawl; automatically gathers selected data from a wide variety of news, weather, sports and financial services and instantly updates the information on-screen.

631-845-2000; *www.chyron.com*



D/A CONVERTER

Kramer FC-7402: Multi-standard, adjustment-free, full 10-bit digital-to-analog converter; accepts an SDI (4:2:2 serial digital video) input, provides a re-clocked and equalized SDI output, and converts the original signal to analog outputs in four common signal formats; encodes 525-line signals to NTSC 3.58 or NTSC 4.43, and 625-line signals to PAL-B, -D, -G, -H, -I or Combination PAL-N.
888-275-6311; *www.kramerelectronics.com*

VIDEO EDITING SOFTWARE

Pinnacle Systems Liquid Edition PROversion 6: Adds a professional analog and digital I/O breakout box with plug-and-play USB 2 ease-of-use; offers software-based real-time multiformat editing, compositing and effects, advanced audio tools, and DVD authoring, all from the same interface; enables editing of multiple HD streams with real-time effects on a standard PC.
650-526-1600; *www.pinnaclesys.com/LiquidEdition*

MULTIFORMAT DVI CONVERTER

Doremi Labs HDVI-20: Converts SDI video and DVI-D to DVI; supports all SDI video formats; provides picture-in-picture display, on-screen menus, and an infrared remote to switch between its four input formats.
818-562-1101; *www.doremilabs.com*

INGEST SYSTEM

OmniBus'Intake: Deploy either as part of an end-to-end OmniBus newsroom or transmission solution or as a stand-alone product; includes manual control of tape machines and servers for ad hoc content acquisition, and an automated facility to schedule regular recurring bookings; schedule-driven tool works in conjunction with a transmission system to provide a prioritized list of content to be ingested.
+44 8705 004300; *www.omnibus.tv*

MULTIVIEWER

Zandar FusionPro: Includes a range of signal input and processing cards; supports HDTV — 1080i and 720p at 60/59.94Hz and 50Hz — at all output resolutions; features input auto detection and syncs automatically to the input signal source; HD cards support SDI; SD cards support PAL, PAL-M, NTSC or SDI 525/626; computer cards sync several resolutions.

+353 1 2808 945; ***www.zandar.com***

VIDEO AND AUDIO TEST GENERATOR

Extron Electronics VTG 400: Offers 34 video test patterns with adjustable levels; includes seven audio test reference signals with selectable frequencies and output levels; 97 factory scan rates are available for high-resolution computer-video, HDTV, 16:9, plasma, RGB and SD component video, S-Video, and composite video; SDI/HD SDI output is available.

800-633-9876; ***www.extron.com***

VIDEO SERVER

Gee Broadcast Geevs XT: Features five levels; a single-channel server that provides clip capture, management and playout; a digital or analog, multichannel server that operates in MJPEG, DV or MPEG-2 formats on the Geevs V4 platform; a DV dual-channel server with MXF compatibility; an optimized production server for use with Lightworks Touch nonlinear editor; and an uncompressed server available with 10-bit or 8-bit picture quality.

+44 1256 810123; ***www.geevs.co.uk***

BROADCAST TEST PLATFORM

Acterna DTS-330 digital: Determine the correctness of MPEG stream contents by viewing and listening to any unencrypted programs in real time; video decode/display function displays thumbnails; easily displays unencrypted MPEG-2 or MPEG-4 audio and video streams.

866-228 3762; ***www.actema.com***

DIGITAL VIDEO RECORDER

Fast Forward Video Mini DVR Pro: Features MJPEG compression and 720x486 pixel image resolution; can record up to two hours at 20:1 compression with readily available Compact Flash cards; is equipped for directly downloading files via an on-board USB 2.0 port; features video capture and playback at 60fps.

800-755-8463; *www.ffv.com*

STUDIO PEDESTAL

Vinten Quattro S: Offers a four-stage telescopic column that eliminates the need for raised staging; eye-line shots can be achieved on or off a raised platform; triangular column design offers torsional stiffness, minimizing all unwanted rotational movement; low-pressure pneumatic system, combined with the high precision bearing configuration, provides smooth, counterbalanced elevation movement, allowing quiet and seamless on-air motion.

+44 1284 752121; *www.vintenquattro.com*

SIGNAL CONVERTER

Canopus HDSC1: Converts HD-SDI signals to HD component output or SD-SDI signals to SD component output; supports YUV and RGB format signals; provides instant output of HD content to HD component displays; incorporates a sync generator for HD (tri-level sync) and SD (black burst).

408-954-4500; *www.canopus.com*

INTEGRATOR

Leitch CCS-TRAX: Integrates the operation of routers and processing products into a single control interface; is a key component of the Integrated Content Environment product platform; features a complete system of hardware control panels and software applications that control and monitor CCS-enabled and SNMP-enabled devices on a network from anywhere in the world.

859-371-5533; *www.leitch.com*

DVCPRO CAMCORDER

Panasonic AJ-SDC615: High-sensitivity 520,000 pixel, 2/3in 3-CCD camcorder with a built-in IEEE 1394 interface is switchable between 16:9 and 4:3 aspect ratios; provides 750 lines of resolution, a high 63dB signal-to-noise ratio, a high sensitivity of F13 at 2000 lux, and low-light shooting down to 0.1 lux (at +48dB) with minimal smear; also features 12-bit A/D DSP circuits; includes Shockless White Balance.

201-392-4127; *www.panasonic.com/broadcast*

HD/SD VARITIME SYNC GENERATOR

DK-Technologies PT5300: Supports all HDTV standards; is backward-compatible with DK's existing SDI and analog sync video generators; provides feature upgrade paths; design allows for configuration flexibility.

+ 45 44 85 02 55

www.dk-technologies.com

PORTABLE HARD DISC RECORDER

Sennheiser Rosendahl bonsaiDRIVE: Captures high-quality video and multitrack audio; simultaneously handles 4:2:2 PAL or NTSC video signals alongside 10 audio channels; video is handled in either composite, S-video or component formats; audio I/O is configured as an analog stereo pair and a 24-bit, 48kHz ADAT eight-channel digital stream.

860-434-9190

www.sennheiserusa.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
Sr. Assoc. Editor: Laura Dixon, ldixon@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.: Christina Heil, cheil@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 Wright's Reprints to purchase quality custom reprints or e-prints of articles appearing in this publication at 877-652-5295 (281-419-5725 outside the U.S. and Canada). Instant reprints and permissions may be purchased directly from our Web site; look for the iCopyright 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

New Products

DIGITAL AUDIO MIXING SYSTEM

Euphonix System 5-MC: Based on the Euphonix System 5 compatible control surface; features eight to 48 channel strips each with eight knobs, moving fader and TFT display; includes MC Intelligent Application Controller for master control functions; has two expandable frame options; features Studio Monitor Pro for surround sound monitor control; interfaces to ASIO and WDM compliant I/O hardware; uses the EuCon control surface protocol for integration with DAWs.

650-855-0400; *www.euphonix.com*

United States Postal Service
STATEMENT OF OWNERSHIP, MANAGEMENT, and CIRCULATION
Required by 39 USC 3685

1. Publication Title: Broadcast Engineering
2. Publication Number: 0007-1994
3. Filing Date: 09/22/04
4. Issue of Frequency: Monthly
5. Number of Issues Published Annually: 12
6. Annual Subscription Price: Free To Qualified
7. Complete Mailing Address of Known Office of Publication (Not Printer): PRIMEDIA Business Magazines & Media, 9800 Metcalf, Overland Park, KS 66212-2216 (Johnson County)
8. Complete Mailing Address of Headquarters or General Business Office of Publisher (Not Printer): PRIMEDIA Business Magazines & Media, 9800 Metcalf, Overland Park, KS 66212-2216 (Johnson County)
9. Full Names and Complete Mailing Addresses of Publisher, Editor, and Managing Editor - Publisher: Dennis Triola, 9800 Metcalf, Overland Park, KS 66212-2216 (Johnson County); Editor: Brad Dick, 9800 Metcalf, Overland Park, KS 66212-2216 (Johnson County); Managing Editor: Brad Dick, 9800 Metcalf, Overland Park, KS 66212-2216 (Johnson County)
10. Owner - Full name: PRIMEDIA Inc., 745 Fifth Avenue, New York, NY 10151 USA
11. Known Bondholders, Mortgagees, and Other Security Holders Owning or Holding 1 Percent or More of Total Amount of Bonds, Mortgages or Other Securities: None
13. Publication Title: Broadcast Engineering
14. Issue Date for Circultion Data Below: September 2004

15. Extent and Nature of Circulation	Average No. Copies Each Issue During Preceding 12 Months	No. Copies of Single Issue Published Nearest to Filing Date
a. Total Number of Copies (Net press run)	50,315	49,744
b. Paid and/or Requested Circulation		
(1) Paid/Requested Outside-County Mail Subscriptions Stated on Form 3541. (Include advertiser's proof and exchange copies)	29,694	29,792
(2) Paid In-County Subscriptions Stated on Form 3541 (Includes advertiser's proof and exchange copies)	0	0
(3) Sales Through Dealers and Carriers, Street Vendors, Counter Sales, and Other Non-USPS Paid Distribution	13,636	13,651
(4) Other Classes Mailed Through the USPS	0	0
c. Total Paid and/or Requested Circulation [Sum of 15b 1, 2, 3 & 4]	43,330	43,443
d. Free Distribution by Mail (Samples, Complimentary and other free)		
(1) Outside County as Stated on Form 3541	4,199	4,129
(2) In-County as Stated on Form 3541	0	0
(3) Other Classes Mailed Through the USPS	0	0
e. Free Distribution Outside the Mail (Carriers of other means)	1,004	900
f. Total Free Distribution (Sum of 15d and 15e)	5,203	5,029
g. Total Distribution (Sum of 15c and 15f)	48,533	48,472
h. Copies not Distributed	1,782	1,272
i. Total (Sum of 15g and 15h)	50,315	49,744
j. Percent Paid and/or Requested Circulation	89.28%	89.62%

16. Publication of Statement of Ownership - Will be printed in the November 2004 issue of this publication.
17. I certify that all information furnished on this form is true and complete. Signature and title of Editor, Publisher, Business Manager, or Owner - Sonja Rader, Audience Marketing Manager, 09/22/04

Professional Services

For Sale

For Sale

Save Video & Money!

Save your company thousands of dollars by archiving your valuable media on the most durable mediums available today. Archive with SMPTE time code, CC, VBI, RS-422 control and more. Store on optical DVD and hard drive and have global control from anywhere in the world.

For more information and an on-site demonstration **www.baystor.com**

BK-2500 Video Vault

BAYSTOR

Contact Us Today! (888)229-7867
baystor@kardengrouptech.com

NAB 2004 AWARD FOR INNOVATION IN MEDIA
www.baystor.com

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

ELECTROXS.COM
* BROADCAST * POST * PRODUCTION *
* TEST * BUY / SELL / TRADE *
* SCOPES * EQ. RACKS * VTRS *
* & MORE! *
CALL 800-542-0646

- Production Unit
- Matrox DigiSuite
- Beta SP
- Sony cameras
- Mics. Lights
- Teleprompter

Will finance (239)-434-2209.

SONY®

DSR390L
DVCAM Camcorder with Studio Capability

New Type 1/2 inch Power HAD CCD's
F13 at 2000 lx sensitivity
65 dB S/N ratio
0.4 lx min illumination (F1.4)
TrueEye process
DyanLatitude
Skintone Detail
Black Compress and Stretch

SONY Authorized Professional Reseller

BRAND NEW
PRE OWNED
BUY
SELL
TRADE

The leading broadcast video sales company on the west coast!

Studio Exchange

818.840.1351

emoil for quotes **Paul@studio-exchange.com**

816 N. Victory Blvd. Burbank, CA 91502 FAX 818.840.1354

Employment

EMPLOYERS/EMPLOYEES
Click On
KeystoneAmerica.com
NO. 1 TECHNICAL / ENGINEERING EMPLOYMENT SERVICE

ADMINISTRATIVE OFFICE OF THE COURTS

SR. AV VIDEO SYSTEMS TECHNICAL ANALYST
$6,419 - $7,802 per month

The California Administrative Office of the Courts in San Francisco has an opening for a Sr. AV Viedo Systems Technical Analyst that will lead the efforts of a pioneering team providing research, technical analysis, and statewide guidelines for developing court and courtroom presentation technologies. Responsibilities include analysis, design, planning, project management, and implementation of complex technical projects of a statewide scope. Requires: BA equiv. and 3 yrs of technical exp. including a minimum of one year of lead experience. For online information and application see our website at www.courtinfo.ca.gov/careers and refer to Job Req #2079. EOE.

Employment

Help Wanted

CHIEF ENGINEER NBC TUCSON, ARIZONA - KVOA 4, seeking a person with extensive television station experience. Responsiblities include : microwave, transmitter, information systems, maintenance and building. The hiring, training, evaluation and scheduling of staff...as well as operational and capital budget preparation. Responsible for providing technical customer service satisfaction for internal as well as external customers. People skills as well as technical skills are essential. Strong management experience a plus. Apply to: gnielsen@kvoa.com or Gary R. Nielsen President and General Manager, KVOA Communications, PO Box 5188 Tucson, AZ 85703. No Phone Calls Please. EOE, Drug test & MVR are required.

WDSI FOX61TV - seeks Assistant Chief Engineer: experience with UHF Transmitter preferred, ability to maintain studio equipment, analog and digital tape recorders and DVC Pro equipment required. Good communication skills a must. Send resume and cover letter to: WDSI FOX61 Attention Christene Ramsey, 1101 East Main Street, Chattanooga, TN 37408, email to wdsijobs@pgtv.com or fax to 423-265-3636. NO PHONE CALLS PLEASE. Deadline for resumes is October 31, 2004. WDSI FOX61 is an equal opportunity employer and a drug free workplace.

Help Wanted

CHIEF ENGINEER - WHTM TV abc27 is seeking a chief engineer. The successful candidate will have in-depth knowledge of digital and analog technologies as used in a broadcast environment, as well as a thorough knowledge of broadcast and microwave RF technology. This position requires experience in TV broadcast engineering management including studio and transmitter facility maintenance, capital projects implementation, production and on-air operations. The candidate must also have a complete working knowledge of all building systems and knowledge of compliance standards of all governmental and industry regulations. A degree in a technically related field or equivalent work experience is required. Send resume to: Human Resources, WHTM TV abc27 3235 Hoffman Street, Harrisburg, PA 17110 EOE.

Maintenance Engineer

CBS News, NY, has an excellent opportunity for an experienced Maintenance Engineer.

Candidate must have a minimum of 5 years experience repairing and maintaining ENG and news editing equipment. Experience troubleshooting and resolving non-linear editing system, video server and related network problems required. Must have computer skills and operations experience on news remotes. Some travel required. BSEE preferred.

Send resume to **CBS, Attn: Maintenance Engineer, 524 W. 57 Street, New York, NY 10019.** EOE

CBS

Help Wanted

CHIEF ENGINEER - Paxson Communications is seeking a hands-on individual to manage the technical staff along with the design, installation, repair and operation of all technical systems and equipment at a TV station. Requires a minimum of three years managing a television engineering department, FCC license, SBE certification and valid driver's license. Submit resume with salary history to: WEPX, Ref: Chief Engineer – Greenville, NC, 1114 N. O'Henry Blvd, Greensboro, NC 27405. Fax: 336-272-9298. E-mail: employment@pax.net. EOE

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:

- **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

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

Ad Index

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

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
Wright's Reprints
(877) 652-5295;
International inquiries, (281) 419-5725
jbanda@wrightsreprints.com

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 November 2004, Vol. 46, No. 11 (ISSN 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: DP Global Mail, 4960-2 Walker Road, Windsor, ON N9A 6J3. 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.

All the news
that's fit to stream

BY PAUL MCGOLDRICK

Television news is a conundrum. The process to select the stories that are broadcast is a picky one. Not picky in the sense that the stories have to be just right, but picky because of the sheer quantity of what is available.

In a network operation, a local station's selection of news items stems from previous assignments that reporters were sent out to cover, along with those stories that came up unexpectedly. They cover local interests, concerns and amusements and don't hesitate to break away for an occasional freeway chase. The network coverages a tiny selection of the stories, with a focus on the content that the network itself has originated. International stories tend to be only those that involve Americans' lives, giving us a pretty narrow-minded view of the world around us.

At the alternate networks, CNN has developed a fabled reputation for coverage of, particularly, international events. Today, in a crisis, many people will turn to one of the cable networks for the earliest — if not the most in-depth — coverage.

The most interesting news phenomenon this year is the broadcasting of "fake" news. Comedy Central's *The Daily Show with Jon Stewart* is on the right channel — comedy. But, despite its comedic tone, it has become a major political force, attracting guests of all political backgrounds.

Apart from CNN, FOX and Comedy Central, the broadcasting of news has, in general, become a staid repeat between channels with highly similar formats. Many, however, are missing major opportunities to further inform us, creating untapped revenue streams. Organizations will do whatever they can to protect their main "property" which, in the case of the television news operation, has been the broadcasting of their product. But according to a study by Ball State University for the RTNDA, 91.7 percent of all TV stations in the United States have a Web site that also carries news. That's about 25 percent more than radio stations. Of the top 100 stations, only five did *not* have a Web site at the time of the survey.

No publication will survive without quality content, streaming or not.

Those Web sites generate more e-mail complaints than the stations get for any other area of their operations. Readers complain of typos, illiteracy and plain dumb errors. The news sections on the Web sites often also contain unremoved coding; strange mixtures of upper- and lower-case lettering; fragmented sentences; and quotes, often without quotation marks, from sound bites that are badly transcribed — or plain misquoted. Sources are identified incorrectly or not identified at all.

You'll find that many Web site operations are a one-person show. Whereas management will approve on-air scripts at warp speed, it doesn't want anything to do with the written scripts for the web. And, although the reporters who originated the broadcast story would be the best source to modify it for HTML reading, they're already off onto the next assignment.

No one would attempt to succeed in the print news business without people to check stories and determine priority and location according to house rules of importance and significance. The same should be true of an online version. Go look at Google's news service and you will see what happens when there is no human making decisions about what are top stories and how to classify the publications they mine.

The Web can be a source of revenue for a news operation, but stations need to recognize the link between using resources and success. No publication will survive without quality content, streaming or not. That's true of the medium we work in, and it's true of the online medium, too. BE

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

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

HD/SD PROFANITY PROTECTION SYSTEM

Monitoring Output

- Dual Mode HD or SD SDI Compatible
- Embedded & Discrete Audio Support
- User Allocatable 24 Sec. HD or SD Delay
- Solid State Delay Memory (No moving parts)
- Programmable Operator Reaction Time Handling
- Over 30 Profanity Protection Transitions
- Program to Safe Shot Transitions: Uninterrupted Clean Switch Video, Popless SoftSwitch™ Audio
- Safe Shot Frame Capture, Video Loop
- Relay Bypass Protection
- Contact Closure Inputs for Transition Triggering

HDSD9545DLY-PRO

Evertz HDSD9545DLY-PRO gives you everything you need to keep profanities from making it on AIR. The HDSD9545DLY-PRO enables the operator to insert the desired time delay via a front panel control and display panel. There are two video paths which are HD and SD compatible. The main program feed will usually be focused on the main detailed action. Both channels are delayed by the same amount. If an offensive event occurs, the operator has only to hit one remote button to cause the program video and audio output to be clean switched to the alternative back-up channel. When the offending material is no longer present, the output can be returned to the main detailed image, all without the audience noticing that an edit has occurred.

New York Sales
newyorksales@evertz.com

West Coast Sales
818-558-3910
LAsales@evertz.com

U.S.
Western Sales
uswestsales@evertz.com

Head Office
905-335-3700
sales@evertz.com

evertz®
www.evertz.com


[What's Your HD Strategy?]