OCTOBER 2008

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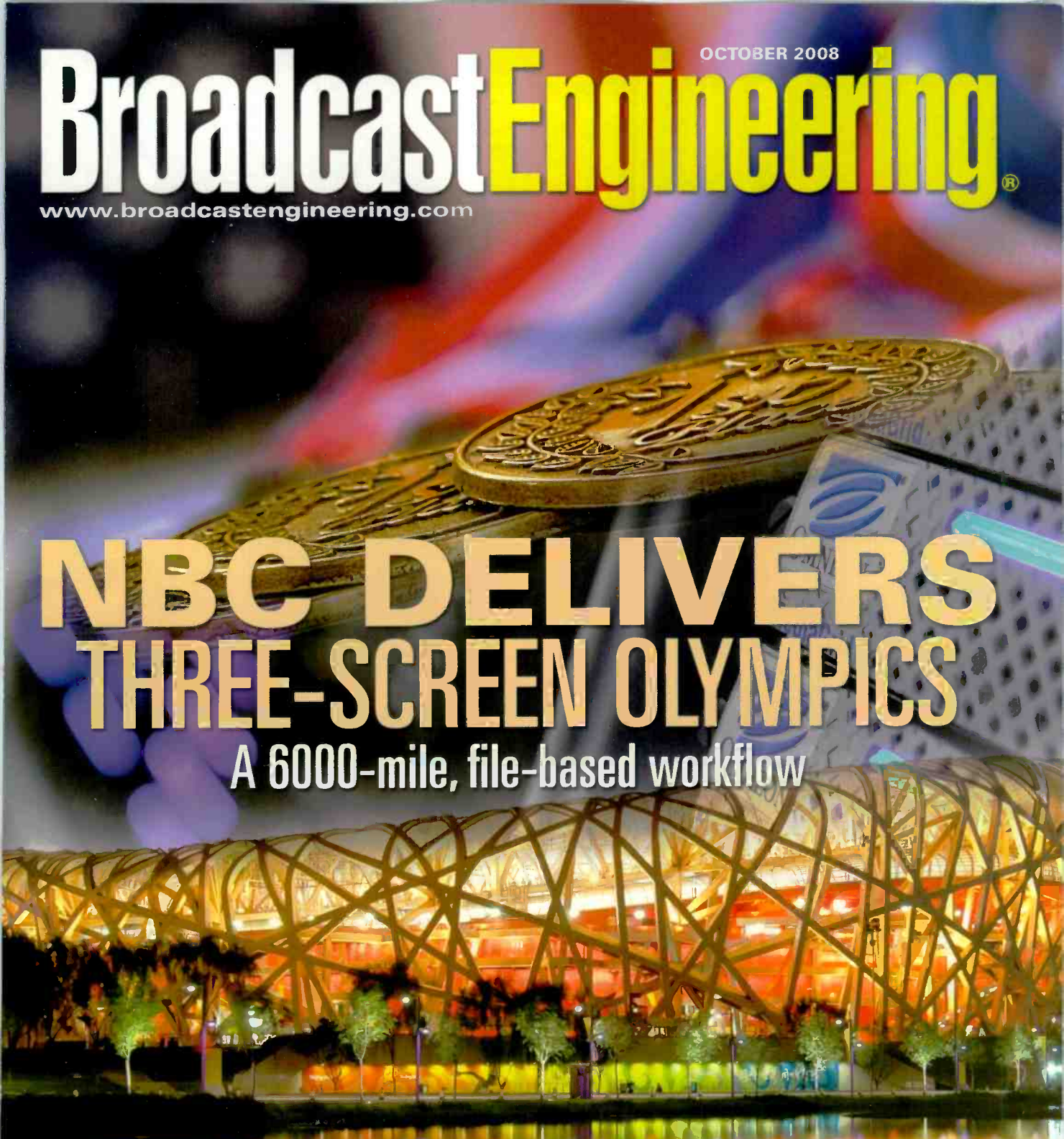
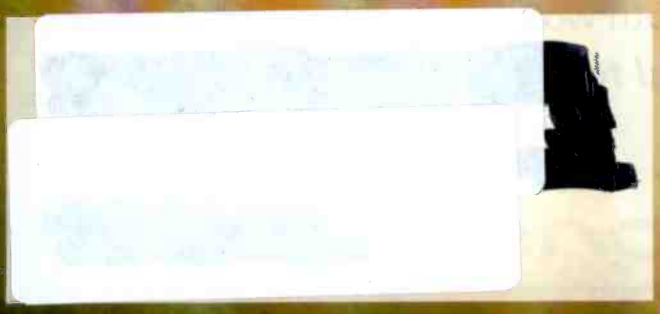


NBC DELIVERS THREE-SCREEN OLYMPICS

A 6000-mile, file-based workflow



ALSO INSIDE:

INSIDE AUTOMATION
Integrating formats and channels

COMPUTERS & NETWORKS
Keys to effective network administration

CAMERA IMAGERS
CCDs and CMOS technology

UNDERSTANDING MOBILE TV
What you need to know

A PENTON MEDIA PUBLICATION

WHEATSTONE D-9 Audio Control Surface at WPEC-TV, West Palm Beach, Florida

Hands ON or Hands OFF, Wheatstone TV Gets the Job Done

ALL Wheatstone D-Series digital audio control surfaces have traditional layouts, making them operator friendly—no long learning curve required. From our smaller D-7 through the D-9, D-10 and feature-rich D-12, right on up to our D-5.1 master audio control console, all Wheatstone networked audio control surfaces are *also* AUTOMATION READY, giving you the *best* of both worlds.

Choose Wheatstone digital for your television audio solutions!

D-5.1 Master Control

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The UTAH-400 Router Gives You The Power

When you get your hands on a UTAH-400, you've got all the routing power you'll ever need.

The Utah Scientific family of routers is so powerful, with so many frame choices, you can build the perfect-sized system for your application and budget.

Power at hand for as many signals as you want, in whatever formats you throw at it, up to and including 3-Gb data rates, and internal conversion on inputs and outputs as needed.

Yet the real power is in the reliability. With multiple redundancy options, round-the-clock support, and the best warranty in the business, you can't get a more solid system.

On the other hand, it's also flexible, expandable, and affordable. Contact us today and we'll spec a UTAH-400 that's just right for you.

Note: while the UTAH-400 offers more power to broadcasters, as an extra bonus, it actually consumes 25% less energy than similar systems, providing cooler, cleaner, and less-expensive operation.

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You told us we need to change.
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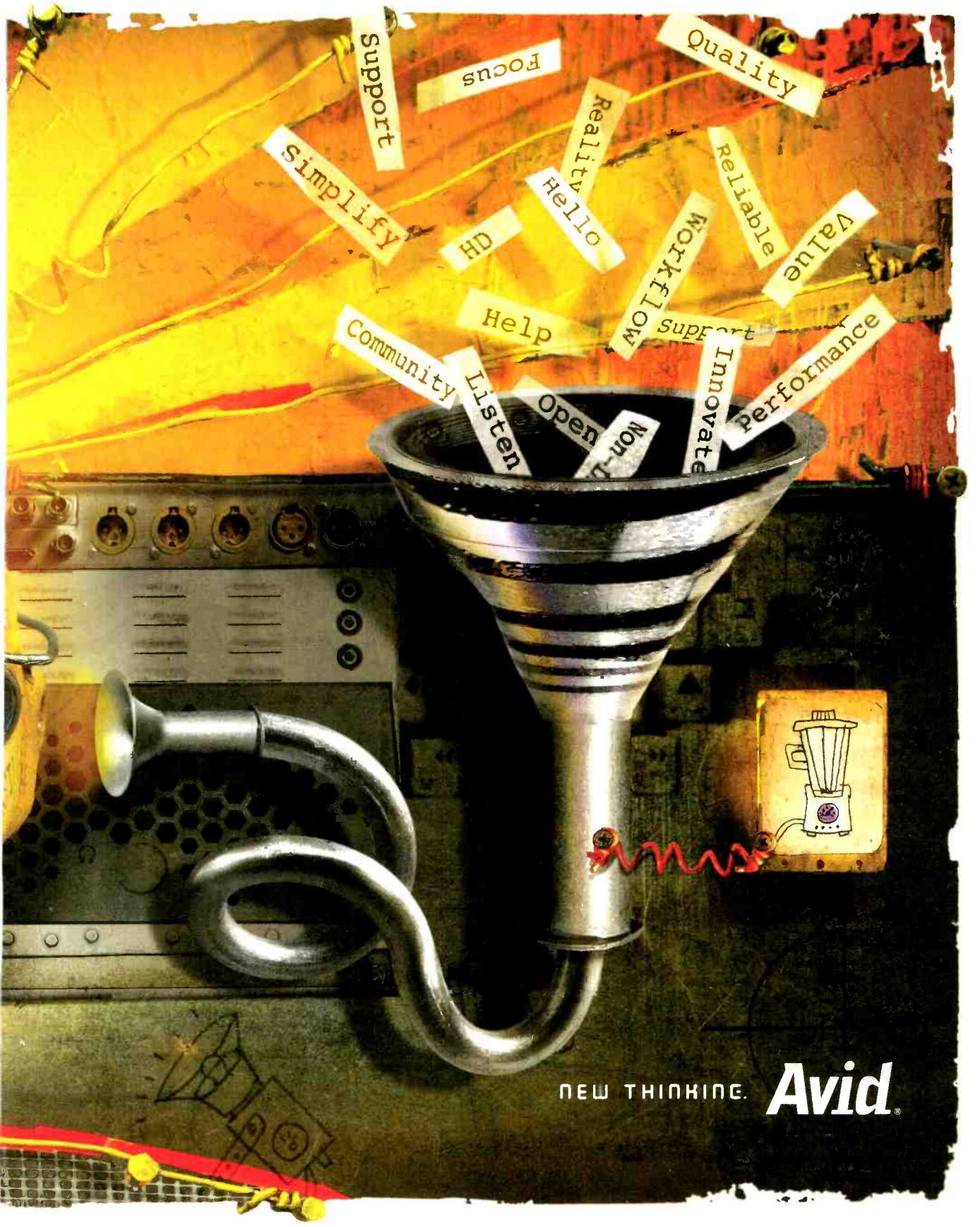

We're shaking things up – starting with better online support, a more engaging online community, and new software pricing. A new way of thinking. A new way of doing business. See for yourself at **Avid.com/NewThinkingBE**.

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Broadcast Engineering®

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PRODUCTION CLIPS

continued on page 8

OCTOBER FREEZEFRAME QUESTION

Supply the missing acronyms in this quote from Bruce Devlin, vice president of technology for Snell & Wilcox: "___ is a container which glues together video, audio, VBI, VANC and metadata. ___ is a metadata language that facilitates standardized communications between the program planning, automation and traffic areas of your facility."

The answer is on page 8.

even **twins** have their own **personalities.**

the beauty of P2 HD in two new handhelds

Like twins, Panasonic's new AG-HPX170 and AG-HVX200A full production quality P2 HD handheld camcorders are as alike as they are different. They both offer a 13X Leica Dicomar zoom lens; 1080i/p and 720p and 4:2:2 independent-frame recording; variable frame rates; a new, advanced 3-CCD progressive imager with spectacular quality; and the reliability and flexibility of a fast, file-based workflow.

Why might you prefer one over the other? The HVX200A features a DV tape drive in addition to two P2 card slots, allowing you to move easily from SD to HD and from tape to solid-state. If you have already transitioned to a solid-state file-based workflow, the two-slot HPX170 offers additional high-end features, including HD-SDI, metadata input, Dynamic Range Stretch and a 5-year limited warranty (upon product registration).

The HVX200A and HPX170. Distinctly different, yet uniquely alike. Learn more at **www.panasonic.com/p2hd**.

AG-HVX200A	AG-HPX170
• 11 variable frame rates	• 20 variable frame rates
• 4.2mm – 55mm	• 3.9mm – 51mm
• Lightweight – 5.5 lbs	• Lightweight – 4.2 lbs
• 3.5" flip-out LCD	• Waveform/Vectorscope
• 21 HD and SD formats	• 3 focus assist functions

P2HD when it counts

Panasonic ideas for life

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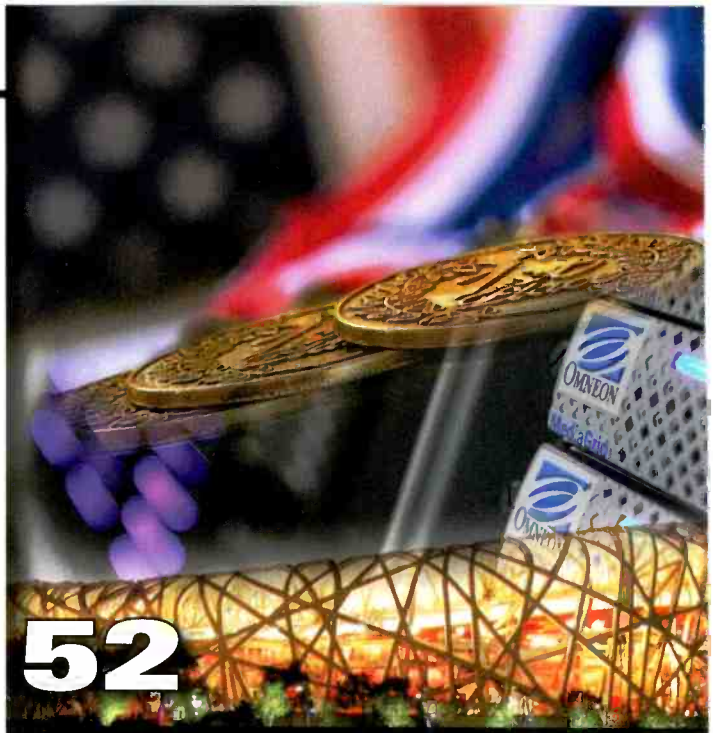
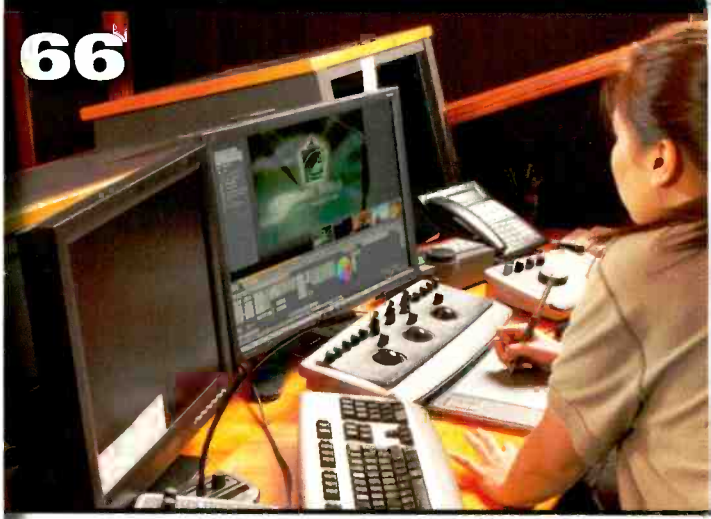


ON THE COVER:
During the Beijing Summer Olympics, NBC produced HD content and more than 2200 hours of streaming programs, accomplished primarily by a U.S.-based staff. Cover created by art director Robin Metheny. Photo courtesy Craig Norris, Alkira Technologies.



OCTOBER'S FREEZEFRAME ANSWER

MXF, BXF

For a tutorial discussion of BXF and MXF, see Brad Gilmer's March 2008 article, "Comparing BXF/MXF" (*http://tinyurl.com/4xxunx*).

NEW

HD wireless Free Space Optics transmission

Canobeam DT-150 HD wireless (infrared) transmission, used from a remote location, adds HD flexibility to your broadcast. Canobeam DT-150 HD transmits with ***No compression, No delay.***

- No license required; sets up fast and easy for permanent or temporary installations.
- Canon's exclusive Auto-Tracking function for rock-solid connections.
- Bi-Directional (point to point) HD and SD transmission from 20 meters - 1 km.
- Housing designed for outdoor or indoor installations.
- SFP (Small Form Pluggable) Single Mode Fiber Interface.
- Operating Temperature: -20C to +50C. Compact and lightweight: 8kg (17.6 lbs.)

SPORTS

NEWS

ENTERTAINMENT

DT-150 HD

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snellwilcox.com/sinclair

When you're responsible for the transition to HD news at one of the country's largest TV station groups, you need to ensure seamless integration of SD and HD material. That's why Sinclair's Mark Nadeau put Kahuna™ at the heart of his HD transition strategy.

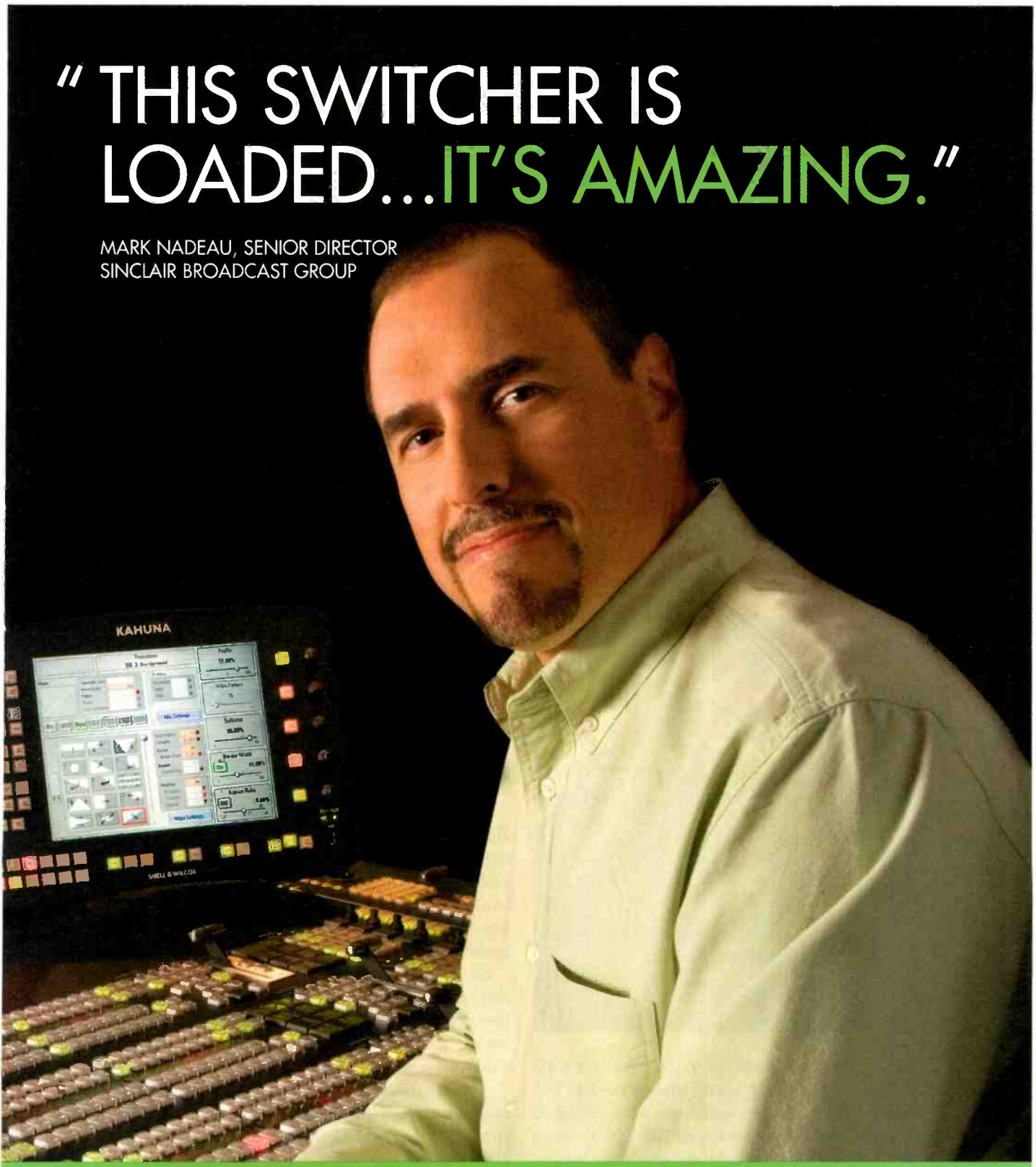
Kahuna combines unmatched switcher and DVE power with FormatFusion™, a revolutionary Snell & Wilcox technology that enables the seamless integration of SD material, such as graphics, camera feeds and archives into HD productions. All without the video delay and cost associated with external converters.

To find out why Sinclair chose Kahuna, visit snellwilcox.com/sinclair

KAHUNA

"THIS SWITCHER IS LOADED...IT'S AMAZING."

MARK NADEAU, SENIOR DIRECTOR
SINCLAIR BROADCAST GROUP



SINCLAIR BROADCAST GROUP STANDARDIZES ON KAHUNA FOR MOVE TO HD NEWS PRODUCTION

Putting Pictures to Work™ SNELL & WILCOX®

IBC was great, minus the travel

After enduring a 22-hour, door-to-door travel time getting home from IBC, I'm ready to endorse children-free airplanes. I was unfortunate enough to encounter several of the most ignorant, selfish parents with small children in all my years of flying.

In both legs of my return flight, there were multiple 3-year-old-something's who were allowed to totally disrupt the flights with their screeching, screaming behavior. I watched (and was forced to listen) as these acoustic terrorists held all of us passengers hostage, in one case for nine hours. No one, including the kids' parents, worked to temper the behavior of these obnoxious brats.

As any seasoned traveler will attest, traveling isn't what it used to be. Not that I ever knew "what it used to be," mind you. I didn't fly on a 747 until I was, well, almost as old as I am now. So, I don't have experience with the days of refined travel. But, I'm told that travel used to be luxurious and pleasurable. Today, travel is everything but that.

I recently watched a Discovery program about the Boeing 747 aircraft. The takeaway point for me was that the interior space of the plane — where they stuff us passengers — is longer than the Wright brothers' first powered flight.

Think about that. On Dec. 17, 1903, these guys flew the world's first powered, heavier-than-air machine only 120ft. That's less distance than you might walk from your seat to the galley in the back of a large aircraft.

Now, having established that the maximum distance available in one of these flying closets is 120ft (at least in a Boeing 747), I'm here to propose a new air travel standard be established. This new standard would help return airline travel to the days of yore, where men were men, women were women and most importantly, children did not fly.

I hereby propose that all children, their parents, guardians, grandparents or other caretakers, shepherds, herders, whatever, be required to sit in the rear most seats of any plane. In addition, there should be erected an acoustic barrier between those seats and the rest of humanity forced to share the same limited space in that aluminum tube called an airplane.

Now I don't want you to think that I'm pinning all of flying's discomforts on the existence of children. If I buy an airline ticket and the guy seated next to me weighs 400lbs, he's going to overlap into my space. If that happens, I have every right to demand a new, full-sized seat. I'm merely maintaining that the same guideline should apply when it comes to noise. When another person's obnoxiousness intrudes into my space, we have an issue.

And it's not just child noise that I'm against. There's talk about making it so people can use their cell phones during flights as well. One poll by the National Consumer League said that 79 percent of airline travelers are for keeping the ban on cell phone use on planes. Professionals simply don't want to put up with the noise. And I'd say that screaming, misbehaving, unruly kids create no less of a disturbance.

Now before you think of me as some inexperienced, childless person, let me set the record straight. I raised three children — two of them as a single parent. I well understand the challenge, but children can be taught to behave.

Perhaps we could ban kids who can't behave themselves (and the parents who refuse to make them behave) to the airplane's cargo hold. Heck, the kids will probably love it because they can play with the other animals kept there. BE

Brad Dick

EDITORIAL DIRECTOR

Tell me what you think at
http://community.broadcastengineering.com/forums/80.aspx

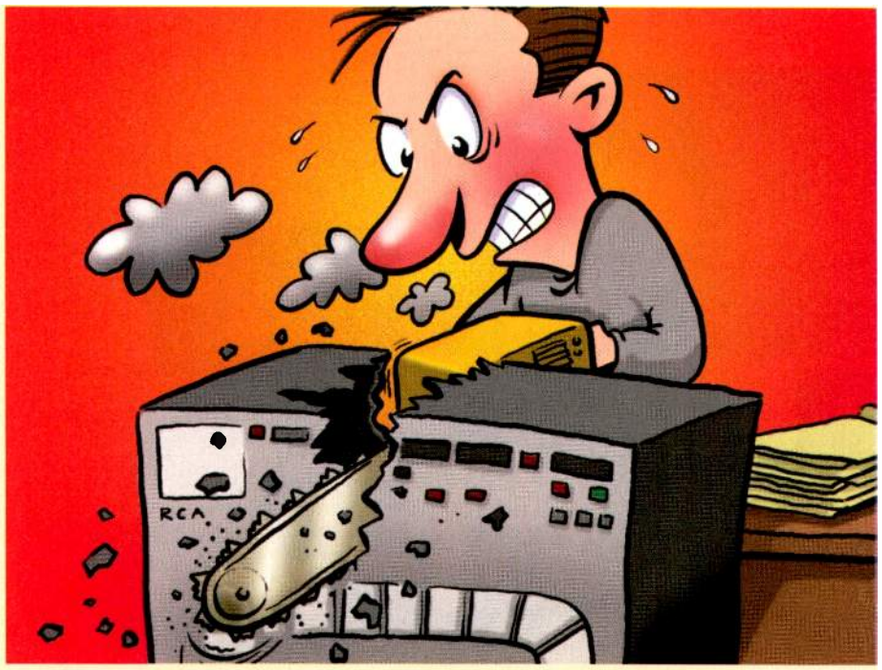
Rethink playout with rich graphics

With Xchannel, you can combine multi-channel, IT-based playout with the richest graphics. So there's no need to sacrifice the look of new channels as you move to more streamlined playout. Xchannel also integrates with your existing station automation, allowing extra channels to be added without replacing existing investment. The highest level of playout integration, without limitations. It's time to rethink what's possible.

Miranda

Rethink what's possible

www.miranda.com/xchannel



Recycling

Dear editor:

Your "Recycling" column in the September issue really hit home. I've been having some hardware issues, and I wanted to do just what that guy in the cartoon was doing.

Anyway, there are quite a few e-waste collectors that will pick up large hardware (computers, monitors, VCRs, hard drives, etc.) for free, if you have enough to make it worth their while. It doesn't take that much because, with clever scheduling, they make several stops in your area to fill their truck. Some places will even pay you for your trashed electronics.

I use eWaste Center in Commerce, CA (*www.ewastecenter.com*). I have three SGI monitors that I am giving them, only because the cable interface is obsolete. What I've found is that it's nice to get rid of the stuff, and it actually makes me feel better knowing the e-waste collectors will use a lot of the components as opposed to just chucking them all into a landfill.

Richard Malzahn
Perpetual Motion Pictures

TiVo, are you listening?

Dear editor:

Television networks complain they're losing viewers to cable. Advertisers complain people aren't watching their spots. Yet both of them are promoting and/or using a technological "time bomb" designed to make both situations worse.

The "bomb?" Broadcast flags that stop DVR recordings. Although a court decision prohibits flag use in television programs (an appeal's on the way, no doubt), perhaps a small loophole exists that allows flag use in commercial messages. However, when one uses a programmed timer, the outcome is the same; when the DVR receives the flag signal, recording stops, and the desired program is lost.

On the morning of Oct. 1, I discovered an ad for a septic tank chemical was one of the "culprits" that's been disrupting my recordings of CBS' "The Late Late Show." Copyright protected? Is the firm worried it will be lampooned on YouTube? Correct me if I'm wrong, but I thought advertisers wanted viewers to watch their ads, and networks wanted people to watch their shows. Had I not been sitting in front of the machine and restarted it, I would again have lost between 25 percent and 90 percent of "The Late Late Show."

During the eight-minute break of Fox's Sept. 29 broadcast of "The Terminator," another such flagged ad aborted that show's recording. (As I wasn't watching through the DVR, I didn't see the error message. So, the commercial culprit remains at large.)

Folks, please rethink this position. If viewers cannot timeshift your programs, they won't watch them. Or, we'll use our trusty, flag-oblivious VCRs for several more years. (TiVo, are you listening?)

Janis Keating

TP and TS files

Dear editor:

I was reading your "Understanding muxing" article in the August issue, and your explanation of the difference between Program Stream (PS) and Transport Stream (TS) was good. I have a question: Is there any difference between TP and TS files? Many software programs seem to use them interchangeably.

Rick Schwamb
IT manager
Flanner's Home Entertainment

Aldo Cugnini responds:

Unfortunately, there is no real standard for file suffix naming. In general, there is no difference between TP and TS files. They also show up as M2TS and even MPG files. What really matters is the file header, which should be the same for all of these. To be exact, none of these is a stream either, which only exists as the file is being played out, or is being encoded and output in real time. BE

Test Your Knowledge!

See the Freezeframe question of the month on page 6.

"EXACTLY WHAT WE NEEDED"

A Multi-Format Switcher Good Enough To Be Called Ikegami.

"The Ikegami HSS-300 provided exactly what we needed for our productions at a reasonable price. We love the flexibility that it gives us. For HD concerts or small-studio shoots, it is the perfect combination of size and power."

Marvin Williams, Director of Engineering,
Manhattan Center Studios

The New HSS-300 Compact Switcher.

Manhattan Center Studios (MCS) purchased Ikegami's new HD/SD compact switcher to handle events that have multiple audio and video input sources. Their HSS-300 features 24 inputs and 12 outputs as well as two mix/effects (M/E) buses, with a two-channel DVE built into each M/E for basic programmable effects. A version with 16 inputs, 8 outputs, and 1 M/E is also available. Additional features include: color correction, hot swappable modules, redundant power, sync generator and AVDL facility, dual network capability, a 6.5-inch LCD touch screen for setup, and more. PGM/PST or A/B Bus type consoles and optional RAM recorder also available.

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East Coast: (201) 368-9171 West Coast: (310) 297-1900 Southeast: (954) 735-2203
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Pandora's box

Will mass personalization change the way we consume entertainment?

BY CRAIG BIRKMAIER

Over the past century, broadcasting — first radio then TV — transformed the media landscape, providing what many consider to be the most efficient means by which to deliver entertainment, information and commercials to the masses.

No other medium has demonstrated the ability to reach large audiences with the efficiency and effectiveness of broadcasting. But this has come at a very high price for society. Mass media has created a homogeneous pop culture where consumers are constantly barraged with messages that seek to classify us in terms of demographic groups rather than as individuals.

The overall noise level is so loud and annoying that individuals are opting out of the mass media to focus on what they enjoy, what they want and what they really need. In this there are two letters that the traditional media conglomerates have come to fear and are now reluctantly beginning to embrace: IP.

The Internet Protocol has created a new means by which communications is facilitated — from the one-on-one intimacy of e-mail to the mass appeal of services that can be accessed virtually anywhere on this planet. IP can support the few-to-many culture of broadcasting, the many-to-many culture of social networking and the ability to deliver an optimized experience for an individual.

There are two letters that the traditional media conglomerates have come to fear and are now reluctantly beginning to embrace: IP.

Broadcasting, on the other hand, is efficient, but impersonal. IP now threatens to open up Pandora's box with massive personalization of the entertainment experience.

All the evils of mankind

Remember when an encyclopedia took up several shelves in the family book case? Remember the joys of searching through those printed pages for information that was out-of-date by the time it was printed?

According to the online encyclopedia Wikipedia, "in Greek mythology, 'Pandora's box' is the large jar carried by Pandora that contained all the evils of mankind — greed, vanity, slander, lying, envy, pining — and hope."

It is not much of a stretch to think of the radio in your car or the TV in the family room as Pandora's box. Turn it on, and you will be confronted with all the evils of mankind — and a barrage of advertising messages, most of which must be intended for someone else … You are just a demographic, not an individual. Broadcasting is impersonal and sensational — the harbinger of mass culture.

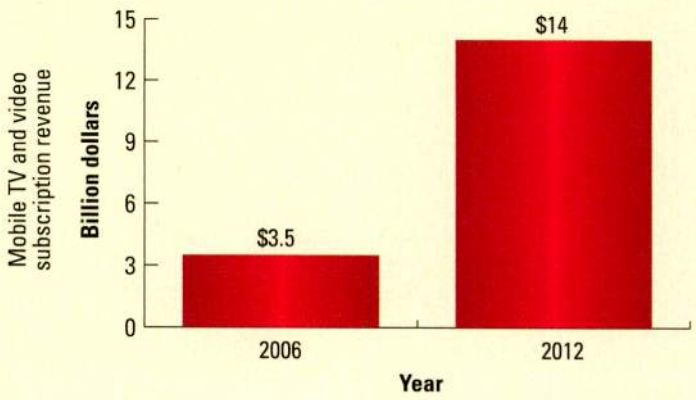
It certainly has and will continue to have a place among all of the media that are available to the masses. The important question to ask at this juncture is whether it will be complemented by highly personalized media or replaced by it.

One could also claim that the Internet has opened Pandora's box, providing individuals with access to all that is good and bad about mankind. We are exposed to spam, viruses, pop-up ads and just about every possible opinion on any issue. To enjoy the many benefits of this new medium, we must filter out the noise and decide what we will let in and what we will tell the world about ourselves. Sharing a little information can pay rich rewards in terms

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

Mobile TV and video subscription revenue increasing

By 2012, mobile video/TV subscription revenue to pass $14 million



Source: Multimedia Intelligence

www.multimediaintelligence.com

Loudness Measurement You Can Trust.

Now available in software!

DOLBY®

Dolby® Media Meter is powerful new software that accurately measures program loudness just as viewers subjectively experience it. Well suited to the needs of both broadcast and post-production facilities, it's an ideal tool for program-creation and quality-control applications, and perfect for optimizing broadcast, packaged media, VOD, and game media.

Dolby Media Meter can be easily integrated into Mac® and Windows® platforms for use at any point along the broadcast chain—providing a level of versatility previously unavailable. It's based upon technologies already proven in the award-winning DP600 Program Optimizer.

Use it as a stand-alone application or as a plug-in with audio workstations performing either real-time or file-based loudness measurement.

If you're looking for a software application for loudness measurement, Dolby Media Meter is the cost-effective choice at $795 (MSRP).

Dolby Media Meter Features

- Dialogue Intelligence™ technology
- ITU-R BS.1770-1 algorithm
- Loudness measurement and logging

MAC/WINDOWS

- Stand-alone application for file-based measurement
- Digidesign® RTAS plug-in for real-time measurement
- Digidesign AudioSuite plug-in for file-based measurement

MAC OS®

- Minnetonka AudioTools™ AWE plug-in for file-based measurement

Find more information on Dolby Media Meter at dolby.com/dmm.

of finding what we are looking for, but only if we trust the service with which we share that information.

The personalized IP experience is entirely dependent on our willingness to tell a computer what we like or want. It also relies on technology to use this information to filter the vast archives of Internet servers to find what we want, or to allow a service to push its content to us for consumption on-demand.

The notion of locally caching content is critical to the personalized IP experience, not to mention the ability of broadcasters to create relationships with individuals rather than demographics. Broadcasters can push content to local cache if they can convince consumers to subscribe or link to this content.

TiVo has become a generic term, not unlike Kleenex. The company has enjoyed limited success selling personal video recorders (PVRs) and its customized guides and personalized media services. But the concept of linking program guides to a digital video recorder has revolutionized the multichannel television programming world of cable and DBS.

Here, personalization is the responsibility of the individual to mark programs for recording. TiVo goes a step further by recommending programs based on what you already watch, and the company is beginning to offer personalization services for advertisers.

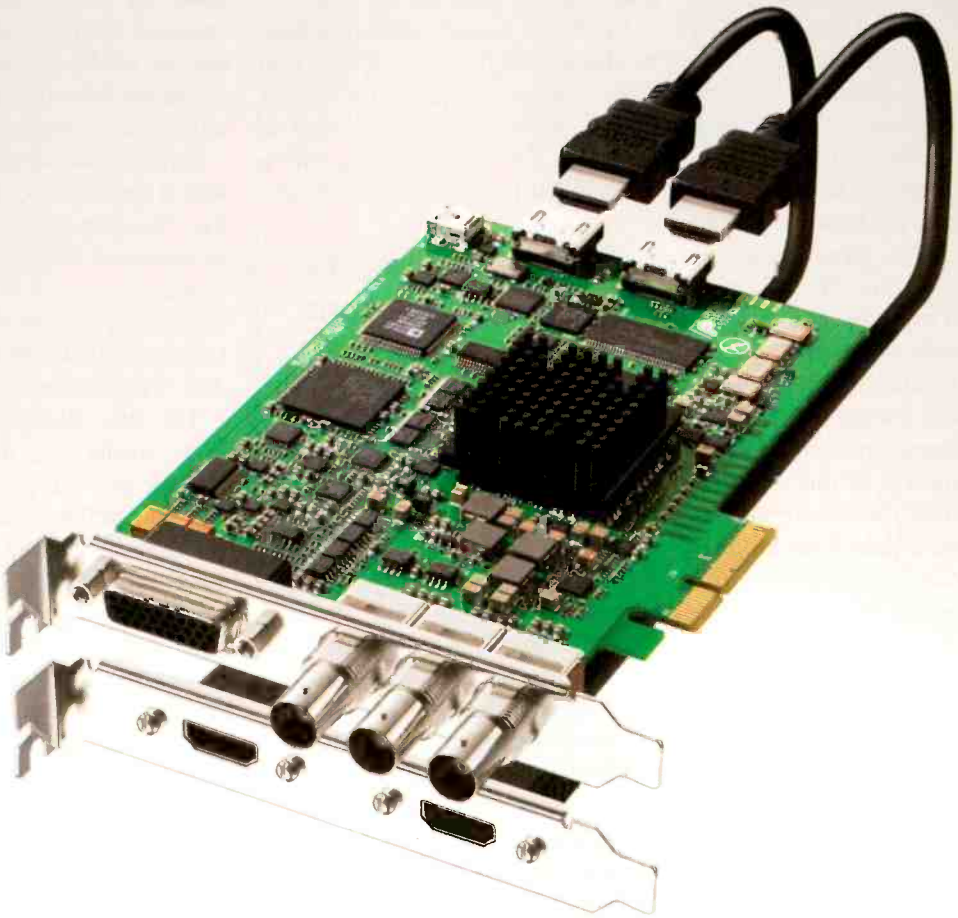
As the broadcast networks start moving their content to the Internet, they too are learning how to optimize that content for individuals. The net result is programs with fewer commercial interruptions and ads that are better targeted to the individual that is watching.

Advertisers have put up with the shotgun approach to TV advertising, but they will all tell you that the ideal future is one in which their ads are highly targeted to individuals, preferably those in the process of making a buying decision about the advertised product. It's a small wonder that Google has been able to create an advertising mecca on the Internet, with search-driven ads.

The Music Genome Project

Way back in 2000, a group of musicians and music-loving technologists came together with the idea of creating the most comprehensive analysis of music ever. They set out to capture the essence of music at the most fundamental level, assembling literally hundreds of musical attributes or "genes" into the Music Genome Project. Together these genes capture the unique and magical musical identity of a song — everything from melody, harmony and rhythm to instrumentation,

Blackmagicdesign



The new DeckLink HD Extreme has SDI, HDMI and analog connections for editing in SD, HD and 2K!

The new DeckLink HD Extreme is the world's most advanced capture card! With a huge range of video and audio connections, built in 3D LUTs and the new 3 Gb/s SDI. Advanced editing systems for Microsoft Windows™ and Apple Mac OS X™ are now even more affordable!

Connect to any Deck, Camera or Monitor

DeckLink HD Extreme is the only capture card that features SDI, HDMI, component analog, NTSC, PAL and S-Video for capture and playback in SD, HD or 2K. Also included is 2 channels of XLR AES/EBU audio and 2 channels of balanced XLR analog audio. Connect to HDCAM, Digital Betacam, Betacam SP, HDV cameras, big-screen TVs and more.

Advanced 3 Gb/s SDI Technology

With exciting new 3 Gb/s SDI connections, DeckLink HD Extreme allows twice the SDI data rate of normal HD-SDI, while also connecting to all your HD-SDI and SD-SDI equipment. Use 3 Gb/s SDI for 2K and edit your latest feature film using real time 2048 x 1556 2K resolution capture and playback!

Advanced Performance

Unlike FireWire, DeckLink HD Extreme has a 10 Gb/s PCI Express connection for powerful HD real time effects in compressed or uncompressed video file formats. This 10 Gb/s connection gives you more HD real time effects and you can take advantage of the 3 Gb/s SDI and built in 3D LUTs to edit your feature films!

Microsoft Windows or Apple Mac OS X

DeckLink HD Extreme is fully compatible with Apple Final Cut Pro™, Adobe Premiere Pro™, Adobe After Effects™, Adobe Photoshop™, Fusion™ and any DirectShow™ or QuickTime™ based software. DeckLink HD Extreme instantly switches between feature film resolution 2K, 1080HD, 720HD, NTSC and PAL for worldwide compatibility.

Decklink HD Extreme

$995

Learn more today at www.blackmagic-design.com

orchestration, arrangement, lyrics, and singing and vocal harmony.

With the Music Genome as its basis, a new Internet music service is demonstrating how dumb, impersonal computers can assist with mass personalization of media content. Pandora Internet Radio is available via an Internet browser and on a range of mobile devices such as Apple's iPhone. (See "Web links.") In a matter of minutes, an individual can create a radio station that streams music based on his or her preferences. Pick an artist or a song, and Pandora will make recommendations. Give a recommendation a thumb up, and it will find more music with genetic links. Likewise, a thumb down helps to identify what you don't like. Once you have a profile in place, you can turn on your "station" and stream music to your computer or phone.

Apple just added a similar feature to iTunes called Genius. (See "Web links.") Select a song, and the Genius sidebar shows other music that is similar. A few clicks and you have a new playlist based on music in your iTunes library. And Genius also recommends new purchases from the iTunes store that complement the music in your library.

When consumers search for content, the promotional advantage of the media conglomerates is lost.

It is not difficult to extrapolate how this kind of search technology is going to affect entertainment television. One particularly interesting aspect of this approach is that it may help hook-up independent producers with potential consumers of their content.

The broadcast world depends on massive promotion to make you aware of its programs. Radio ads hawk TV shows. The TV talk show circuit is used to promote TV shows, movies, music and books. And radio continues to be the promotional arm of a rapidly changing music industry.

When consumers take the time to search for content, and use services like Pandora Radio, much of the promotional advantage of the media conglomerates is lost. The individual determines what he or she wants, and computers match this up with metadata that describes the content.

The only caveat is the data itself. Who creates the data? How does content get listed in the database? Can content owners buy preferential placement as they do with the Google search engine today?

There are as many questions about this brave new world as there are proven solutions. What is clear is that Pandora's mass media box has been opened, and the media conglomerates no longer have as much power to control what we see. BE

Craig Birkmaier is a technology consultant at Pcube Labs.

? Send questions and comments to: craig.birkmaier@penton.com

Web links

- Wikipedia definition of Pandora's box
  http://en.wikipedia.org/wiki/Pandora%27s_box
- Pandora Internet Radio
  www.pandora.com
- What's new in iTunes 8
  www.apple.com/itunes/whatsnew

One name says it all.

real Real Broadcast Network (RBN), the leading global provider of live, multi-format, media services - featuring ViewCast® Niagara® systems.

With more than 300,000 Osprey® video capture cards deployed globally, ViewCast® sets the standard in the streaming media industry.

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The FCC's shut-off

Wireless microphones and other low-power 700MHz auxiliary facilities are no longer being licensed.

BY HARRY C. MARTIN

As part of its effort to clear all broadcast operations out of the 700MHz band on or before the Feb. 17, 2009, DTV transition, the FCC has imposed a freeze on any new authorizations for low-power auxiliary equipment operating on 698MHz to 806MHz. The FCC also has proposed to modify all outstanding licenses on these frequencies, so they will terminate as of Feb. 17, 2009. Currently, the most prevalent low-power equipment operating in the 700MHz band accommodates wireless microphones. Effective Aug. 21, these and other low-power 700MHz auxiliary facilities are no longer being licensed.

The FCC has said for years that full-service broadcasters would be removed from the 700MHz band as of the DTV transition date, but the agency has not been as clear, until now, about ending low-power auxiliary operations in the band.

The FCC has also proposed a blanket prohibition against the marketing of any devices that operate as low-power auxiliary stations in the 700MHz band.

In any event, the FCC has proposed to modify all outstanding low-power 700MHz licenses to specify that, to the extent that those licenses permit operation in the 700MHz band, they will expire as of Feb. 17, 2009. According to the commission, a wide range of alternate frequencies are available for use for such auxiliary services.

A blanket prohibition

The FCC has also proposed a blanket prohibition against the marketing of any devices that operate as low-power auxiliary stations in the 700MHz band. That would include the manufacture, import, sale, offer for sale or shipment of such devices. The prohibition would take effect as soon as the proposal is adopted. Because this proceeding appears to be on a fast track, it's possible that the prohibition could be in effect before the end of the year.

Besides the upcoming DTV transition deadline, a major impetus for the FCC's sudden concern about low-power 700MHz operation was pressure from the Public Interest Spectrum Coalition (PISC), which filed a complaint against several wireless microphone manufacturers, and a petition proposing, among other things, the creation of a "General Wireless Microphone Service" to use, on a secondary basis, vacant UHF channels below Channel 52. The FCC has requested comments on the PISC's proposals, but no action is expected on them in the near future.

Will it work?

The FCC's decision does not address precisely how it would enforce a blanket prohibition against everyone who currently owns and operates a 700MHz wireless mic. Many such mics are used by organizations like churches, theaters and corporate event venues, which are not likely to be keeping abreast of the technical details of their gear, much less the FCC's pronouncements. Thus, it is unlikely the FCC's abrupt ban on 700MHz auxiliary devices is going to be completely effective. BE

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

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

Dateline

- Dec. 1 is the deadline for TV stations and Class A TV stations in the following states and territories to place their 2008 EEO public file reports in their public files and post them on their Web sites: Alabama, Colorado, Connecticut, Georgia, Maine, Massachusetts, Minnesota, Montana, New Hampshire, North Dakota, South Dakota, Vermont and Rhode Island. LPTV stations originating programming in these locations, which are not required to have public files, must post these reports on their Web sites and keep them in their station records.
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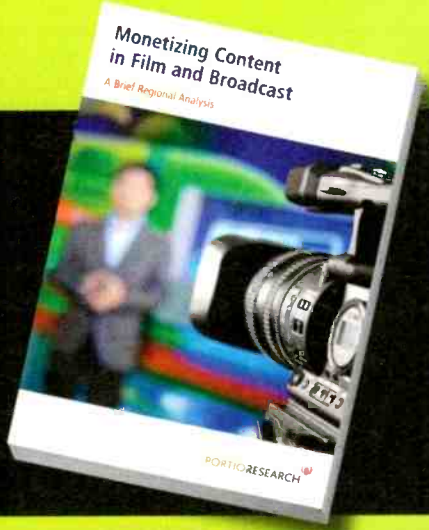

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Audio level control

Maintaining audio levels requires a fine-tuned ear.

BY ALDO GUGNINI

Electronically processed analog audio has been around since about 1876 when Alexander Graham Bell and Elisha Gray filed patents for "transmitting the human voice through a telegraphic circuit." But while the evolution of digital technology some 100 years later added incredible sophistication to audio systems, the underlying signal processing principles remain fundamentally the same. This is due in part to the fact that the entire process is ultimately coupled to the human hearing mechanism — and that evolves much more slowly.

Manual level control at the beginning

In the early days of radio and TV broadcasting, all audio level control was done by a skilled operator at the transmission point. Because of FCC rules regulating the modulation of analog RF carriers, stations had to be vigilant to assure operation within legal limits, i.e., no overmodulation.

Soon we developed electronic systems that could do this automatically, resulting in automatic gain controls and peak limiters. But while these circuits maintained legal operating conditions, broadcasters (and advertisers) soon realized that there was an advantage to producing a certain sound quality, resulting in technology to automatically modify the sound. Among the tricks employed was the use of gain compression to make the program sound louder without exceeding regulatory limits.

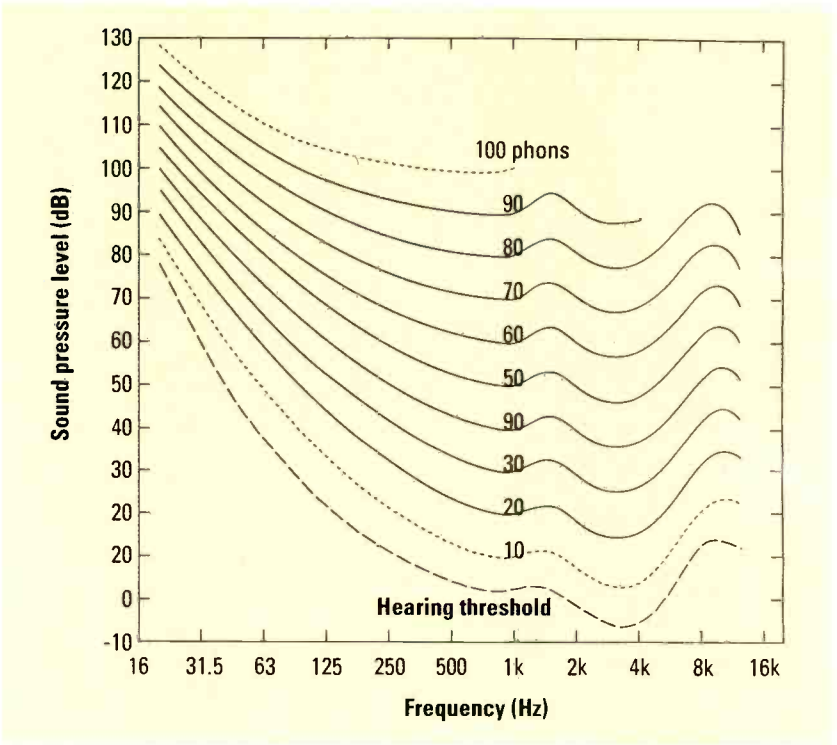

Figure 1. Equal-loudness contours

Volume compressors work by dynamically altering a gain element in the audio path. By raising the volume at low levels and lowering it at high levels, the dynamic range of the material is reduced, and the overall volume of the material can be increased.

Compressors can work in a myriad of ways, with the input-output relationship of the compressor having a linear or complex relationship. One of the challenges of automatic gain control is to avoid noticeable artifacts, especially when the processor must react to sudden changes in input dynamics.

Consider a situation where an aggressive amount of compression is taking place. If the input audio is riding at a low level, the compressor will work to increase the gain. Now, if a

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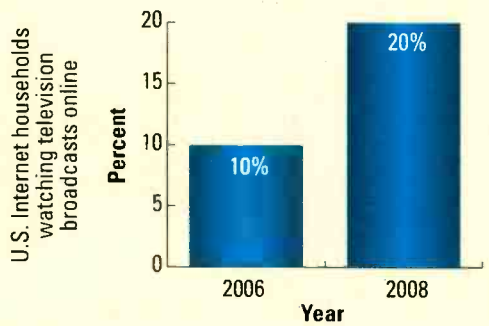

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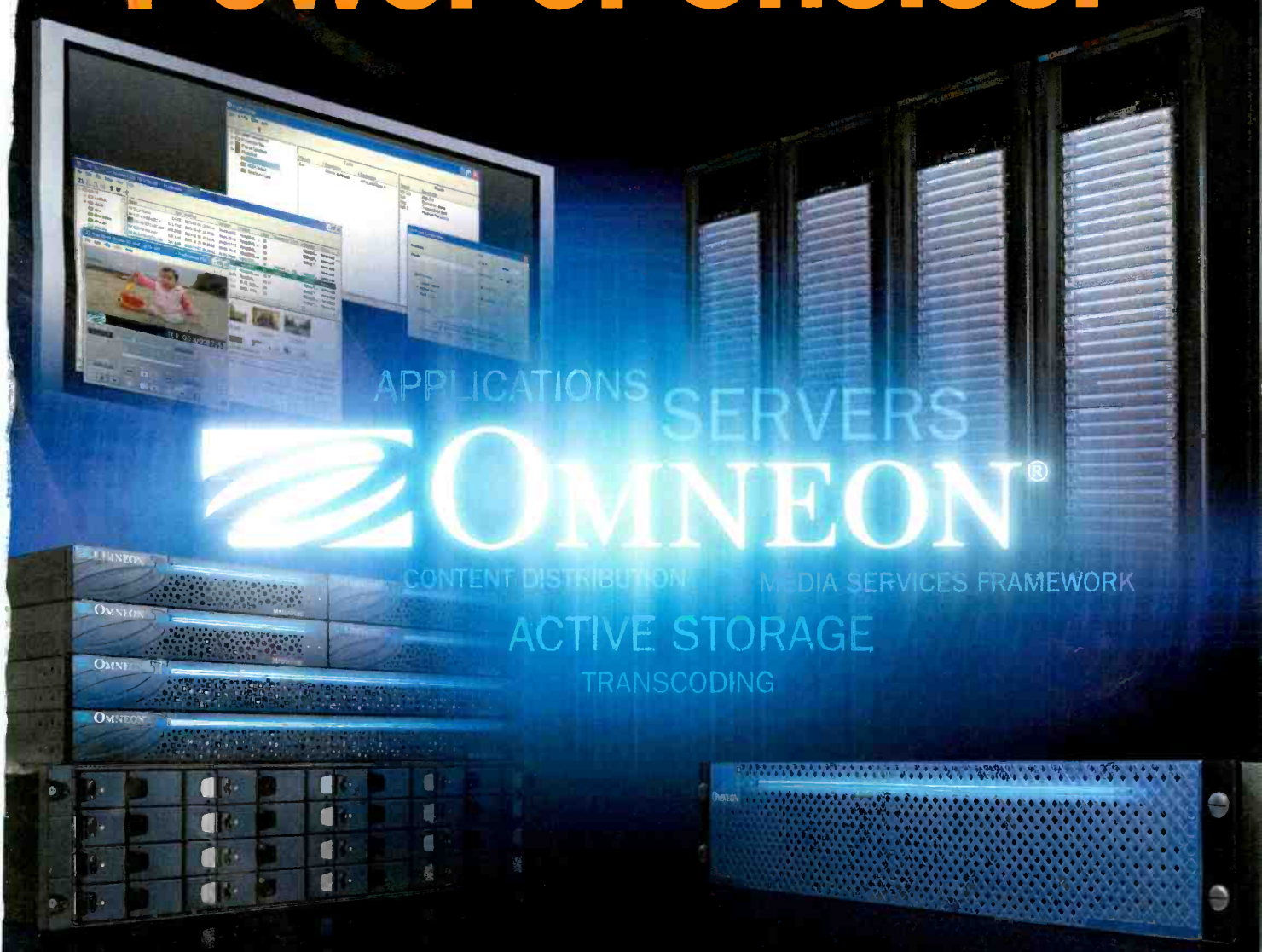

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high-level passage suddenly appears, the compressor must quickly lower the gain so that clipping or overmodulation does not occur. These gain transitions must occur with an associated time constant so that the gain change is not noticeable. Too slow a time constant can result in signal overload; too fast will result in pumping or breathing, as the gain change is heard.

Loudness is not an exact science

The human hearing response is anything but flat, even for the perfect listener, having a roughly bell-shaped response that peaks around 3300Hz. In addition, the shape of the hearing response changes with the overall intensity of the sound.

This gives rise to the notion of equal-loudness contours, which describe the sound pressures necessary at different frequencies to give an equal perceived sound level. Equal-loudness contours have been described by various researchers. (See Figure 1 on page 26.)

Because the loudness contours describe perceived sound levels, they have been developed empirically, by gathering statistics from large numbers of experimental listeners. The curves relate to each other by means of units called phons, which define the sound pressure level at 1kHz. The well-known A-weighting curve used to measure noise levels is an approximation of the inverse of the equal-loudness contour at the 40-phon level.

The perception of loudness is also a function of other factors. Loudness increases as the sound power is spread over critical bands, generally at a threshold of about one-third octave. Also, loudness is a function of the duration of the sound, with the human auditory system integrating the received power over a window of about 200ms to 1000ms.

In the 1960s, the FCC conducted a study of audience complaints regarding loud commercials on broadcast television. As a result, CBS Laboratories developed a series of loudness meters based on many of the loudness factors described above. (See Figure 2.)

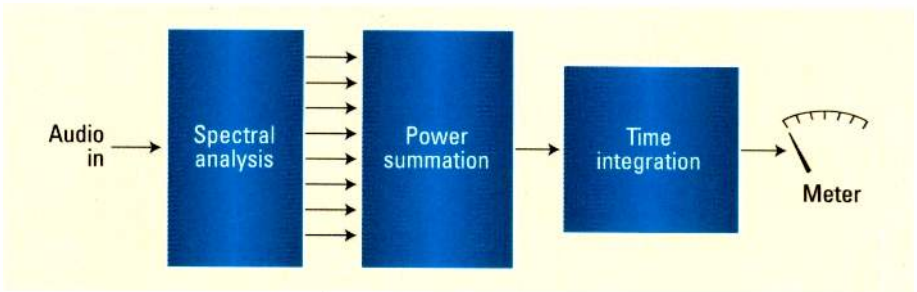

Figure 2. Loudness meter

By placing a loudness measuring circuit within the servo loop of an automatic gain controller, as in Figure 3, an automatic loudness controller was also developed. This kind of AGC-based analog loudness controller is not practical, however, because it will continuously force the program loudness to a constant level, resulting in an objectionable compression of the original program dynamics.

The human hearing response is anything but flat, having a roughly bell-shaped response that peaks around 3300Hz.

A better solution is available today with digital transmission: dialog normalization, or dialnorm. Dialnorm works by setting the ATSC receiver dialog level to match a predetermined loudness level for each source program. By measuring the long-term average program dialog level and then transmitting this as the dialnorm parameter in the bit stream, loudness consistency can be maintained from program to program and even across different broadcasters.

In the ATSC AC-3 bit stream, dialnorm is a 5-bit word, transmitted every 32ms, that sets a reference level in 1dB increments from 0dB to -30dB.

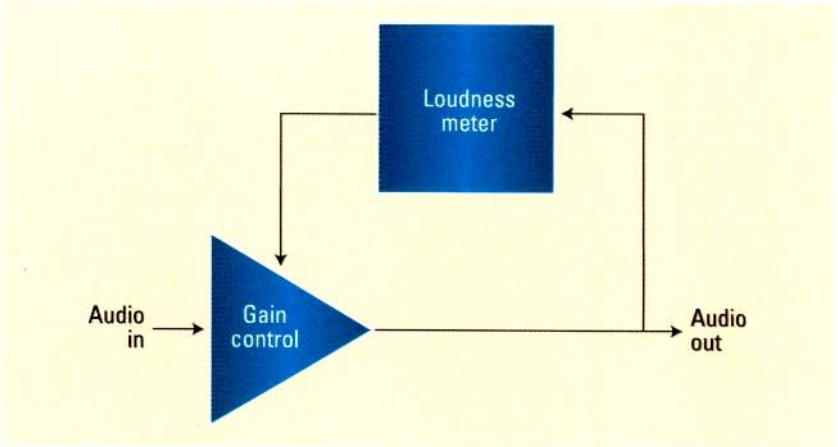

Figure 3. Loudness controller

At the receiver, dialnorm is then used to adjust the output level of the audio decoder. (See Figure 4 on page 30.) By equalizing to a common -31dBFS (full scale) level, the perceived loudness can be made uniform across programs and broadcasters. ATSC specifies the loudness measurement parameter as Leq(A), which stands for A-weighted equivalent loudness. It takes into

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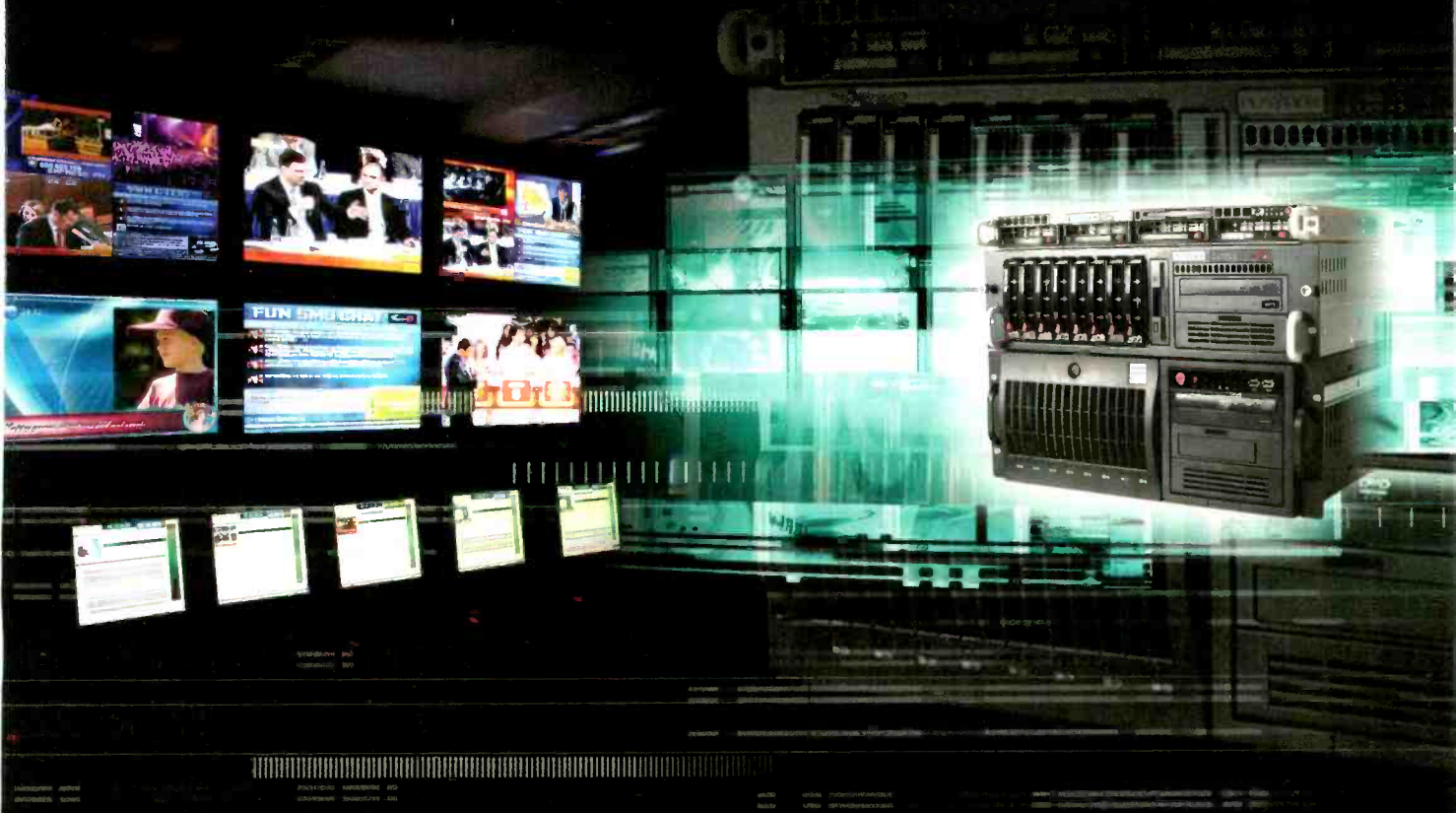

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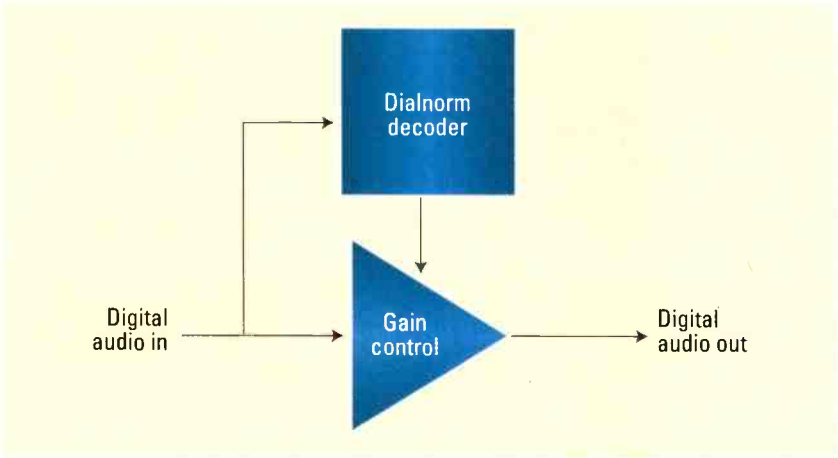


Figure 4. Dialnorm at the DTV receiver adjusts loudness on a program-to-program basis.

account frequency dependence and loudness integration, both of which are needed to measure speech material.

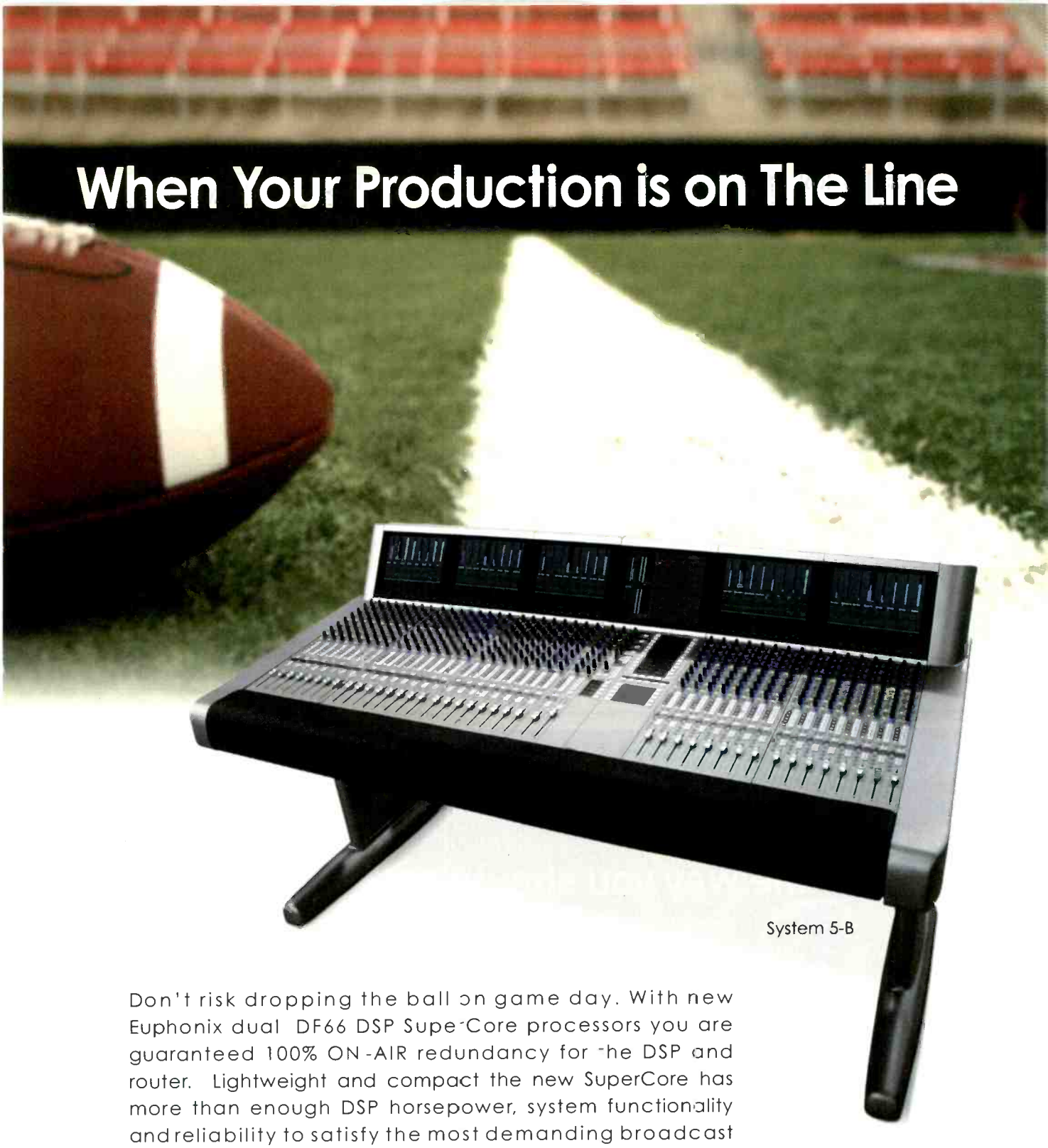
The CBS algorithm mentioned earlier also takes into account loudness addition from separate critical bands, which helps facilitate the measurement of wideband nonspeech material. The ITU-R standard, BS.1770, titled "Algorithms to measure audio programme loudness and true-peak audio level," specifies a more recent loudness measurement, Leq(RLB), using revised low frequency B-weighting.

Although Leq(RLB) is simpler to realize than the other methods, it performs better in subjective testing. It is now being proposed to replace Leq(A) as the recommended loudness metric in the ATSC standard.

One of the challenges of using dialnorm correctly is for different broadcasters to use equivalent practices in setting up their systems. Broadcasters can use different settings for dialnorm, as long as each one is consistent in their setups; any dialnorm setting can be used, as long as it is correctly generated. For example, a -23dBFS setting will be attenuated in the receiver by 8dB, -27dBFS by 4dB, and so forth.

One way to provide consistency is to produce all internal content to a common standard and then transmit a fixed dialnorm level. For example, at NBC Universal (NBCU), network stereo and 5.1 deliveries are required to be mixed at -23dBFS by the provider.

When Your Production is on The Line



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Most commercials deliver at a -22dBFS average, making a nice transition with programs when they meet the spec, according to Jim Starzynski, principal engineer and audio architect for NBCU. The network's dialnorm parameter is set to -23dBFS to match the programs and commercials and comply with the ATSC standard by targeting to -23dBFS without the need for agile metadata, but yielding exactly the same results. All contribution material is therefore produced to the -23dBFS level, and the network metadata is sent to the stations at this same fixed level. Of course, adjusting dialnorm for each program is equally appropriate, provided it's done correctly.

Internet chatter is rife with anecdotes about hot or weak audio across different broadcasters, despite the use of dialog normalization. This is not a direct consequence of different broadcasters using different values of dialnorm, because the system allows this.

Unfortunately, some broadcasters are still playing a loudness war by intentionally setting dialnorm to -31dBFS and then producing audio at a higher level.

Unfortunately, some broadcasters are still playing a loudness war by intentionally setting dialnorm to -31dBFS and then producing audio at a higher level. This of course distorts the intent of dialog normalization by reproducing a higher loudness level. A similar problem exists when broadcasters leave their Dolby encoders set to the factory -27dBFS level and then produce audio without regard to the actual loudness levels.

Establishing common procedures

The ATSC S6-3 "Ad Hoc Group on Loudness Issues" has been looking at this problem for more than a year. The group is in the process of establishing a recommended practices document, which will include guidance on contemporary measuring, monitoring, metadata and dynamics control techniques, as they relate to the loudness portion of DTV. Expect this work to be available in 2009. BE

Aldo Cugnini is a consultant in the digital television industry.

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Network administration

Avoid these four common administrator mistakes.

BY BRAD GILMER

Many engineers wake up one day to find themselves in the role of network administrator. This is not something they planned; it just happened over time. It starts innocently at first. A project comes up to build a network that links graphics stations together.

Or perhaps you become involved in connecting the new news system to the Internet.

However it starts, you soon find yourself creating user accounts on a server for someone, or being consulted on expansion of a computer network. I call this the accidental system administrator.

If this sounds familiar, rest assured that you have plenty of company. In fact, I too am an accidental system administrator, although now it is more something I choose to do.

Because many of us are administrators by circumstance rather than formal training, I would like to share some common mistakes people make in network administration with the hope that this will spare you some grief.

Avoiding training

An accidental system administrator may be reluctant to take formal training. You might feel that you can learn what you need to know on your own. You may resist training because this is not what you thought you would be doing for a living.

I am an accidental system administrator. Many of us are administrators by circumstance rather than formal training.

I encourage you to get trained. There are many courses taught in all aspects of network administration. Some are available at universities and community colleges, and others are online. There are courses in books as well. Get training that is specific to what you want to know. If you use Windows servers, take a Windows server training course. If you use Cisco routers, then take a Cisco training course. (By the way, Cisco has several outstanding books on computer networking.)

Speaking of books, go to the bookstore. Take time to look through the table of contents of books for subjects that interest you. Open the book, and skim through several pages to see if the author writes in a way that you can understand. While there are thousands of networking books out there, each one was written in a particular style. You will find that two authors can relate the same material, but one will reach you in a way that makes learning much easier.

My personal experience has been that courses and books are great for meeting a long-term training need. The Internet search engines can be useful for problem-solving, but I have a problem absorbing complex, lengthy technical explanations using a computer.

However, you would be amazed at how useful Internet search engines can be when you are getting "exception 3210 – segment fault occurred at 0x33206" messages. Just put the text of the message into a search engine, and find the solution to the problem in a few minutes.

```
2008-07-17 11:36:15 49.221.3.221 42487 192.167.3.20 - - - - - Timer_MinBytesPerSecond -
2008-07-17 11:36:15 49.221.3.221 42559 192.167.3.20 - - - - - Timer_MinBytesPerSecond -
2008-07-17 11:36:15 49.221.3.221 42593 192.167.3.20 - - - - - Timer_MinBytesPerSecond -
2008-07-17 11:36:15 49.221.3.221 43686 192.167.3.20 - - - - - Timer_MinBytesPerSecond -
2008-07-17 11:35:59 49.221.3.221 43686 192.167.3.20 80 HTTP/1.1 GET cms1/style/simpleblack/fuss.php?pdir=http://
mastercarwash.com/L.txt?&/ 400 - URL -
2008-07-17 11:36:15 49.221.3.221 42487 192.167.3.20 - - - - - Timer_MinBytesPerSecond -
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2008-07-17 11:36:20 49.221.3.221 43159 192.167.3.20 - - - - - Timer_MinBytesPerSecond -
2008-07-17 11:36:20 49.221.3.221 43225 192.167.3.20 - - - - - Timer_MinBytesPerSecond -
```

Figure 1. Examining log files is easier than you think. Here, someone has asked one of my Web servers to provide a page for mastercarwash.com. Just for the record, I do not host that Web site on any of my servers. It is easy to see unusual server activity like this if you regularly check your logs.

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Not checking server logs

This is a common mistake. Some of you may not know that almost every server in your system generates logs. You may avoid looking at the logs because they never seem to contain anything interesting. Here are important things to know about server logs:

- Usually you can set the level of detail in the log. Setting this level higher means you will not have to wade through pages of normal messages to see the important stuff.
- Most systems e-mail their logs nightly. If you set servers up to mail you their logs on a regular basis, you will quickly get used to what a normal log looks like. As a result, you can quickly identify something that is not right. Figure 1 on page 34 shows a log from one of my Web servers. See if you can spot the unusual log entry.
- Most systems can be configured to generate different logs for different types of errors. For example, set it up to only look at error logs. Then if you spot something suspicious, it's possible to dig into system message logs to get more information on the problem.
- Checking server logs regularly helps administrators avoid problems before they occur. For example, low disk space messages are a sure-fire warning that if you do not do something soon, the system will crash. Also, odd server log entries may help uncover a hacker attempting to get into your system before he or she actually succeeds.

Not keeping your software current

Let's face it: Many of us have learned over the years that you can cause lots of problems by going in and tinkering with a perfectly functioning system. (If it ain't broke, don't fix it.) Furthermore, most of us accidental system administrators still have full-time jobs around the facility fixing traditional broadcast equipment. So going out and looking for trouble is not something we are likely to do.

That said, there are times when it is appropriate to work on a system even when it is working well. This is called preventative maintenance, and the concept applies to computer systems just as it does to VTRs. Yes, sometimes upgrades can be painful. Yes, sometimes upgrades require coming in late at night. But understanding that upgrades are a normal part of system administration will help you approach the task with the correct attitude. Reviewing release notes can help network administrators decide whether installing an upgrade is worth the effort.

At some point, failing to pay attention to growth will come back to bite you.

Don't get me wrong. I know that sometimes upgrades can go wrong, with disastrous results. And sometimes upgrades require a tremendous amount of effort for what seems to be negligible gain. Evaluate upgrades and weigh the benefits versus the costs. But know that if you are in the business of maintaining computer systems, upgrades are an inevitable part of the job. Not upgrading exposes the network to security issues, system crashes and to eventual obsolescence.

Not paying attention to growth

If you became an accidental system administrator via the path I described above, then you probably have seen systems you installed grow over time. This is a good thing and means that the systems are being used by the organization. But many times, this growth takes place organically and without any planning. This will work for a while, but at some point, failing to pay attention to growth will come back to bite you.

For example, you may have installed a high-speed network that moves graphics and video from one place to another in the facility. Over time, others have asked for, and have been granted, access to the network. When the system was first designed, you carefully specified the switches, made sure that the correct wire was used and checked that each switch port had properly auto-negotiated the connection, or set the connections manually.

But as time passes and the network grows, others plug an old switch into the network. Someone grabs an old Cat 3 cable out of a box to replace a bad Cat 6 cable. Documentation is not updated, and before long, users are pounding a path to your door to complain that they need faster computers or a server upgrade because the network is performing poorly.

Some organic growth is inevitable, and it is probably bad for the organization to strictly regiment every aspect of the network (depending on how critical the network is to the station operation). That said, set aside some time perhaps once per year to think about the growth of your networks, and the changes in loads and usage. Is it time to segment the network so that all that graphics lab or newsroom traffic stays within that department? Is it time to upgrade your backbone switches? Periodically taking time to specifically address system growth will save you time and pain in the long run.

You're now a system administrator

While you might have gotten into the system administration business by accident, think about making this a focus of your work. Devoting time to training, avoiding common mistakes and learning on the job will put you in a great position for the future. In fact, many computer people are convinced that video is the future for their industry. See, you were in the right place all along! **BE**

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

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Knowing your camera's imager can improve your shots.

BY STEVE MULLEN

After two decades use, we are all familiar with basic CCD technology. During this period, the most recent development has been CCD sensors that support HD. CMOS sensors, like CCDs, are made from silicon. However, as the name implies, a complementary metal oxide semiconductor manufacturing process is used. Today CMOS is the most common method of making processors and memories. More on that later. First, we'll look at SD CCDs.

Interlaced scanning

Obtaining interlace video from a CCD employs a process called line-pair summation, which increases sensitivity by one-stop. The process may be implemented by a circuit external to a CCD or within a dual-line CCD. In the former case, all rows are read out each field time. In the latter case, alternating fields of odd or even rows are read out each field-time.

In either case, a two-line window slides down through the rows in increments of two lines. The window starts with the top row for odd fields and the second row for even fields. Each pair of rows within the window is added, thereby increasing sensitivity by +6dB. (See Figure 1.)

Today CMOS is the most common method of making processors and memories.

The window acts as a filter that reduces vertical resolution by about 25 percent, thereby minimizing interline flicker and interline twitter. The filter creates an interlace coefficient of about 0.75, which means a 480-row CCD can output only about 360 lines of effective vertical resolution.

Progressive scanning

When progressively scanned video is required, a CCD is read out at the frame rate. However, some dual-line CCDs can output all rows if they are clocked at half-speed (for example, 30Hz rather than 60Hz). These CCDs nicely support cameras that record 60i and 30p video.

Progressive scanning does not employ line-pair summation; therefore, progressive video has a 1.00 interlace coefficient. Without line-pair summation, sensitivity is not increased.

HD CCDs

An SD, dual-line CCD with a resolution of 720 x 480 outputs 173kb per readout. At 60i, the bandwidth required is 10Mb/s. An HD camera uses CCDs that output at a significantly higher data rate. For example, at 60i,

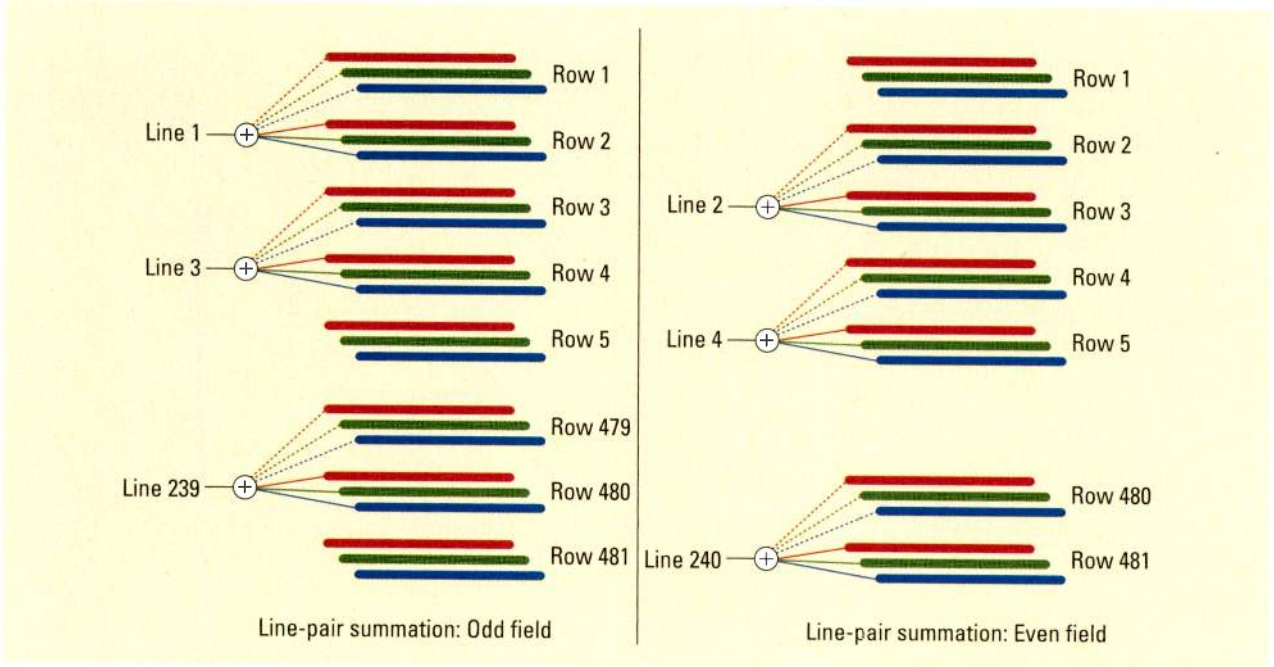

Figure 1. Line-pair summation, as shown in this diagram, reduces 30Hz interline flicker and interline twitter. Flicker is caused when a horizontal line is only one pixel thick. Therefore, with interlace video, the line appears in every other field. Interline twitter occurs when, for example, a camera pans vertically across one or more sharp horizontal lines.

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a 1440 x 1080 CCD requires a bandwidth of 47Mb/s.

CCDs running at very high clock rates consume a great deal of power. Small CCDs — typically those under 2/3in — cannot easily dissipate heat produced by high-power consumption. When, for example, a camera captures full HD at 60i and 30p, plus 720p60 and 720p30, one option is to use 1920 x 1080 chips running at 60Hz. Unfortunately, each chip requires a whopping 125Mb/s bandwidth. One solution: CMOS sensors that consume far less power and thus generate far less heat.

CMOS sensors

Most CMOS imagers use active pixel sensor (APS) technology, which requires at least three transistors per pixel. Each pixel incorporates a photodiode to collect light, a reset transistor, a row select (column bus) transistor and an amplifier transistor. (See Figure 2.)

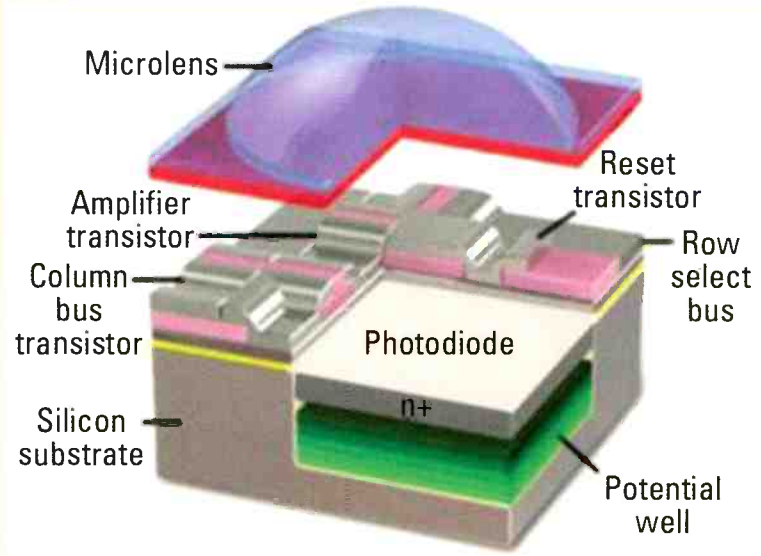

Figure 2. In the CMOS pixel structure, each pixel incorporates a photodiode (potential well) to collect light, a reset transistor, a row select (column bus) transistor and an amplifier transistor. The photodiode is covered by a microlens to help gather light, increasing sensitivity. The photodiode is typically 25 percent to 30 percent of a pixel's area. This is called the sensor's fill factor.

An image capture begins when a trigger is sent to all reset transistors within an addressed row to prepare the row's photodiodes to capture light. Upon the reset trigger, the transistor

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closes and pulls up the photodiode to V_{DD}, thereby clearing any photodiode charge. All photodiodes in a row are reset at the same instant. The reset begins an integration period. During this period, the amount of light falling on a photodiode determines how much charge accumulates in its potential well.

The integration period ends when a signal is sent to all row select transistors in an addressed row. Row select transistors pass the accumulated photodiode charges onto column busses. Each amplifier transistor acts as "source follower" that allows a photodiode charge to be sampled as a voltage.

All photodiodes in a row are simultaneously connected to all column busses. Each column bus terminates in a bus transistor that charges a sample-and-hold capacitor. The capacitor stores the voltage while a column waits for its turn to be output. When it is time to output a column, transfer transistor passes the stored voltage to an operational (OP) amplifier.

It is not possible to instantaneously output each row after sending it down the column busses. The time required to read out all pixels in a row is called row readout time (RRT). Rows, of course, are read out from a chip in a top-to-bottom sequence.

Adding additional ports to a CMOS sensor reduces RRT by simultaneously outputting multiple samples from a row.

Exposure control

When a camera operator sets a shutter speed, he or she is setting the integration period. For example, with a shutter speed of one-sixtieth second, the integration time is 16ms.

A CMOS chip's top-to-bottom exposure process operates much as a vertical focal plane shutter does in a modern film camera. (See Figure 3.) A curtain (red) is released to start its downward travel at the beginning of the exposure time.

When the first curtain has completed its travel, the film frame is fully exposed. When the exposure time ends, a second curtain (blue) is released to

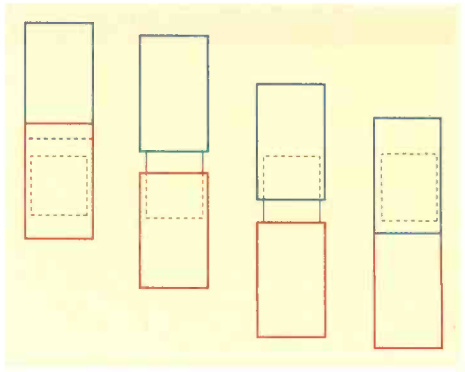

Figure 3. Shown here is vertical rolling shutter. Shutter mechanisms can be implemented in many ways. Modern 35mm cameras use curtain shutters that operate vertically because the travel distance is shorter (24mm). A horizontal shutter would need to travel 36mm. The shorter the travel, the higher the maximum shutter speed.

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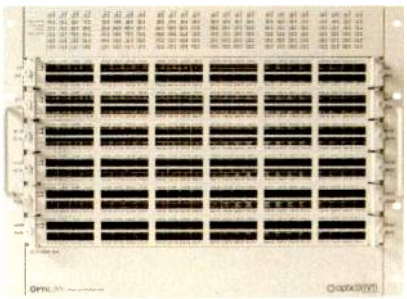

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begin its downward travel to close-off the film.

When a film camera is set to a short exposure time, the first curtain will not have traveled far before the second curtain starts chasing it down the frame. The narrow traveling slit formed by the gap between the two curtains exposes the film.

When a scene contains little motion, the difference in time between exposing the top and bottom of a frame creates no harm. However, when the scene contains motion, the time difference between the top and bottom exposure is captured on film as a rolling shutter artifact.

Because a CMOS sensor's rows are processed — reset and output — with an offset equal to RRT, a CMOS sensor also exposes each frame in a top-to-bottom pattern. The row exposure offset creates a rolling shutter skew that matches the direction of the object's movement. (See Figure 4.)

Figure 4. Rolling shutter artifact. This photograph by Henri Lartigue shows a race car skewed in one direction while spectators and telephone poles are skewed in the opposite direction. Lartigue was panning in the direction the car was traveling.

The row exposure offset also is responsible for wobble (a stretchy look when a camcorder is subjected to sudden motion), partial frame exposure (from flash cameras) and fluorescent flicker (bands of shifting scrolling color or flickering dark lines).

Noise reduction

The inherent design of CMOS chips is responsible for many types of picture noise. Dark current noise is one type of fixed pattern noise (FPN). Each photodiode has its own unique level of charge even when there is no light falling on it. Therefore, a matrix of photodiodes has

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a matrix of noise values. FPN is also introduced by tiny differences among amplifier transistors. These amplifier differences introduce errors as photodiode charges are converted to voltages.

FPN noise can be attenuated by a noise reduction technique called correlated double sampling (CDS). CDS requires two readouts of each photodiode. The first readout is performed immediately after a row is reset and is a measure of a pixel's noise. The second readout occurs after the integration period and is a measure of a pixel's noise plus signal.

At the bottom of each column, one sample-and-hold stores the noise voltage. After the integration period, a second sample-and-hold for a column stores the signal-plus-noise voltage.

To output each column, every column is addressed one-by-one. The two stored signals are fed to an OP amplifier. Each OP amplifier subtracts the noise voltage from the signal-plus-noise voltage, thereby yielding a signal voltage.

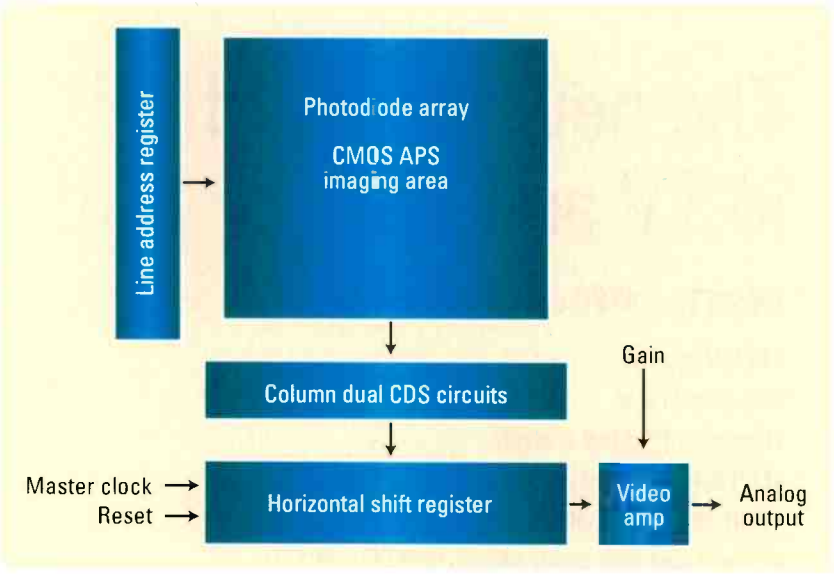

Figure 5. Shown here is an analog output CMOS sensor. Traditionally, CMOS sensors output image data through one or more analog ports. The more ports, the faster a complete image can be read out.

Image readout

A CMOS device has the unique capability to employ both row and column addressing to create a window within the photodiode matrix. A small window can be used to capture slow-motion video. For example, a 960 x 360 pixel window within a 1920 x 1080 sensor requires less than 17 percent of the entire sensor be read

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out, allowing the readout to occur up to 6X faster.

For a CMOS camera to support interlace video, its chips are clocked at the field rate. Then:

- An external circuit performs line-pair summation that converts each frame to a field. Through this process, sensitivity is increased +6dB, and the interlace coefficient drops to 0.75, thereby minimizing flicker and twitter.
- Cameras that employ vertical pixel-shift or vertical interpolation can simply discard alternate fields and record the field not discarded. Line-pair summation is not required because the image is inherently slightly soft. Sensitivity is the same for both interlace and progressive operation.

All column signal voltages are loaded into an analog shift register where pixel information is shifted to output port(s). In this design, analog-to-digital (A/D) conversion is external to the CMOS chip. (See Figure 5 on page 46.) To decrease image noise, internal A/D conversion can be employed. In this design, a CMOS chip's output path is digital rather than analog. (See Figure 6.)

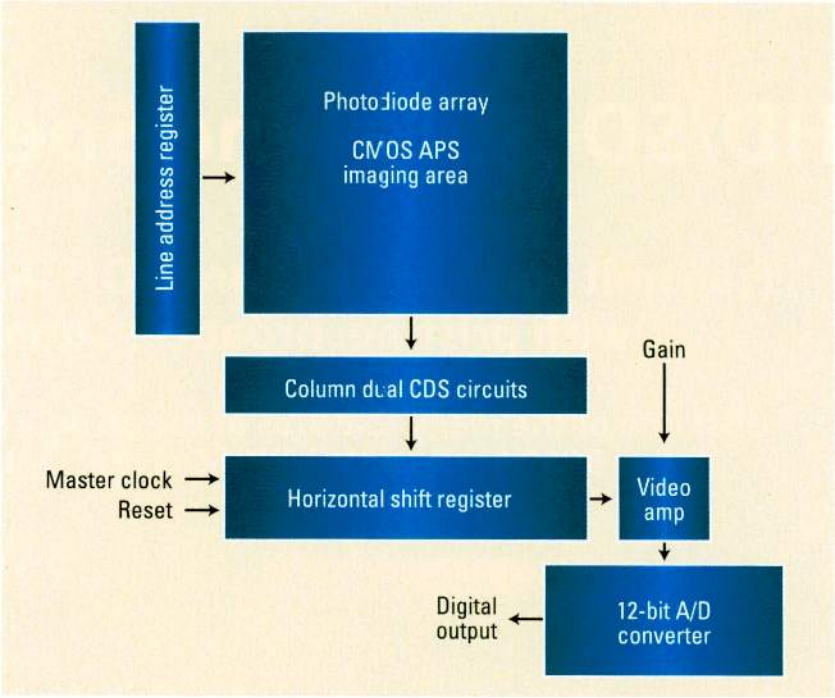

Figure 6. The advantage of digital output CMOS sensors with A/D converters is that analog signals need not travel from one chip to another with the A/D converters. This eliminates the possibility of noise being added to the tiny analog signals.

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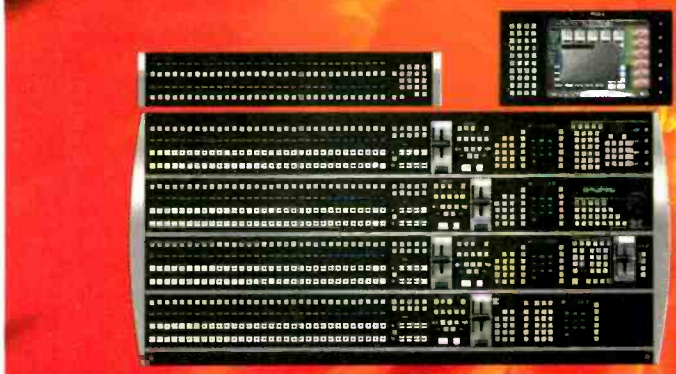

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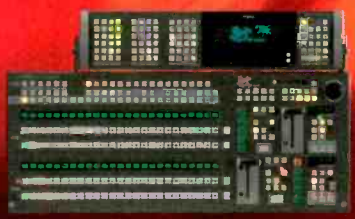

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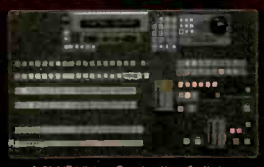

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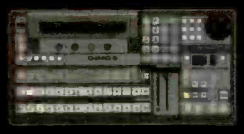

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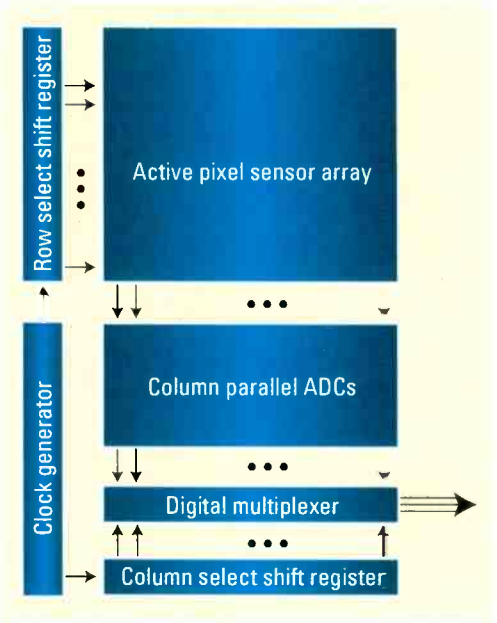


Figure 7. Sony's 35mm and APS 12-megapixel Exmor sensors employ a 12-bit A/D for each column. Because these CMOS chips have 12 digital output channels, they provide an output port for each megapixel.

Sony Exmor technology employs a massive amount of circuitry between each column bus OP amplifier and the chip's output port(s). (See Figure 7.) Each column has its own A/D converter. From this point forward, the data path is digital — not analog — thereby reducing image noise.

Key CCD/CMOS differences

The obvious difference between these technologies is that CMOS sensors inherently have no vertical smear. Therefore, when using CMOS-based cameras you can shoot just as you would were you shooting film. However, the latest CCD chips significantly decrease the appearance of vertical smear. (See Figure 8.)

Clearly, rolling-shutter artifact is the Achilles' heel of CMOS technology. This artifact can be eliminated by implementing a global shutter. However, this requires an additional transistor within each pixel that decreases a chip's fill factor — thereby reducing its sensitivity or forcing a reduction in the

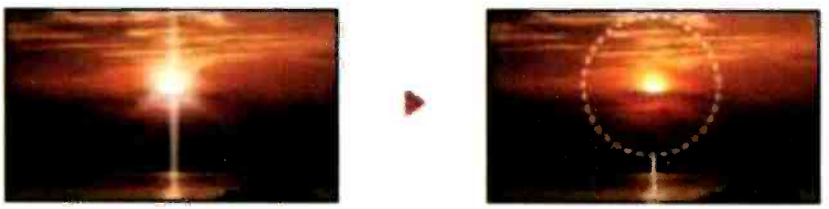


Figure 8. Vertical smear, as shown on the left, is one of the most annoying image artifacts CCD sensors. It is an immediate indication one isn't shooting film. As shown on the right, CMOS sensors inherently have no vertical smear.

Figure 9. Frame accumulation defines total photodiode integration time as a multiple of the current interframe interval. This image was shot using 16-frame accumulation.

Figure 10. This image was shot with a Sony HVR-V1 using its +36dB hyper gain option. Note the increased noise.

number of pixels.

CMOS sensors typically offer a maximum exposure time of one-fiftieth or one-sixtieth second. To obtain greater sensitivity, as is done with CCDs, video gain can be increased. When even greater sensitivity is required, some CMOS cameras offer the option to specify a number of accumulated frames. Frame accumulation defines total photodiode integration time as a multiple of the current interframe interval.

Accumulated modes do not suffer from increased image noise, but can have significant blur on moving objects.

CMOS accumulated modes do not suffer from increased image noise, but can have significant blur on moving objects. The image in Figure 9 was shot using 16-frame accumulation.

CCDs typically obtain super high sensitivity by engaging hyper gain. The result is a significant increase in image noise. Motion, however, remains clear. (See Figure 10.)

These high sensitivity modes are quite different and support different shooting goals.

Forecast

Both CCD and CMOS sensors will be used for years to come. Moreover, both technologies will employ multiple implementation strategies to meet performance goals and price points. BE

Steve Mullen is owner of Digital Video Consulting, which provides consulting services and publishes a series of books on digital video technology.

SYSTEM DESIGN
SHOWCASE

The NBC Olympic broadcast operating center was the central hub connecting Beijing to New York, creating a 6000mi remote via more than 100 program feeds. Photos courtesy Craig Norris, Alkira Technologies.

NBC delivers three-screen OLYMPICS

Here's how the network produced everything from HD to Web and mobile programming using IT and IP technologies.

BY BRAD DICK

Do it smaller, cheaper, lighter, faster, and by the way, in HD. That was David Mazza's assignment for this year's Summer Olympics in Beijing. As senior vice president, engineering-Olympics, for the NBC network, he and his staff were given a challenge for this year's games.

Do more — but quicker

Costs are a concern for every broadcaster, and originating the Olympics is no different. The invisible tribute to Mazza's team was the network's ability to produce more content, in HD plus 2200 hours of streaming programs, all accomplished by a production staff primarily remaining in the United States. This feat is largely due to the team's skill in pushing technology to new capabilities.

Key to his success was NBC's work-at-home initiative. The objective was to continue producing high-quality programming for increasing numbers of channels, but without the accompanying increased costs. Meeting this goal involved achieving several objectives: producing more HD and streaming content, expanding the work-at-home initiative, and doing so with a file-based workflow.

Step one required reconfiguring NBC's highly successful containerized core broadcast center. Beginning in 1999, the key components of the network's BOC were mounted in what the network calls RIBs, or racks in a box. Each RIB consists of two rows of 10 racks, mounted back-to-back with a work space between them. This allows engineers to mount and wire the equipment in the racks while still in the United States. After the wiring is completed, each RIB is moved into a shipping container and transported to the Olympic broadcast site. Once on-site, the RIBs are interconnected with other venues and equipment via ceiling cabling. The result greatly shortens build-out time.

Although some of the 2006 Winter Olympic Games were broadcast in HD, this year's goal was to provide U.S. audiences with a full complement of HD images in addition to several thousands of hours of streaming content. For the Torino broadcasts, the network built an overlay of HD on top of an existing SD infrastructure. Given the amount of HD content needed, Mazza needed to retool the BOC's central infrastructure.

Do it smaller, cheaper, lighter, faster, and by the way, in HD. That was David Mazza's assignment for this year's Summer Olympics in Beijing.

Despite the requirement for HD, Mazza actually reduced the number of RIBs needed.

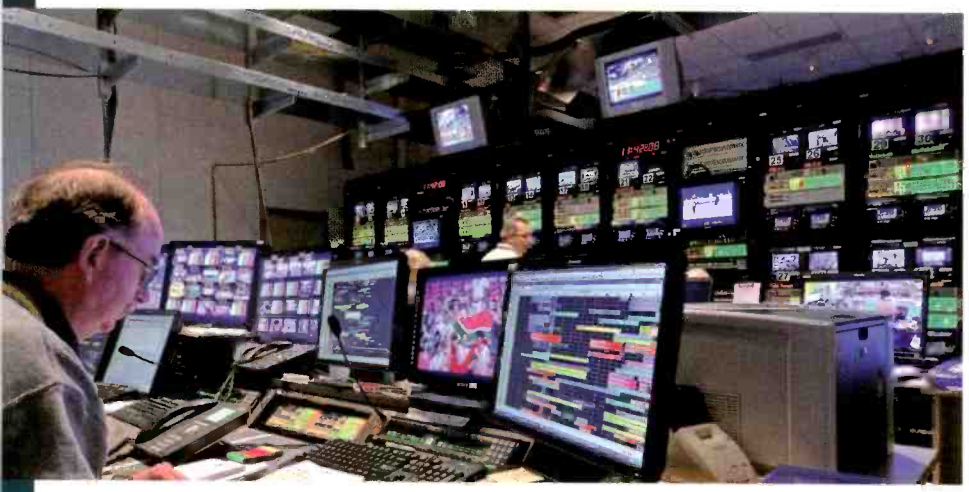
"We shaved off five RIBs. We had 13 RIBs in Torino, and now we only have eight," he said. "Considering that we went from SD to HD, it is amazing that we were able to shave off that many RIBs."

Part of this success stems from newer routing technology.

"The original SD router that we built in 1999 took up 10 racks, a

whole half of a RIB," he said. "That router was about 320 x 320 and only switched SD. Now we have an 800 x 800 HD router all contained in one rack. The new router reduced the required rack space while simultaneously almost tripling the number of crosspoints, all at six times the data rate." Another important change was to move the RIBs closer to each other because NBC was pushing the limit of HD over cable.

"We needed to get the RIBs close enough so that we could make the connections on copper," Mazza said. "Our goal was to reduce the setup time by 25 percent, which meant finishing in six weeks. We made it."



Even with live sports, automation played an important role in keeping each person and the broadcast center on task. This control desk provided a supervisory view of upcoming and current events.

Home sweet home

Another transformation in the network's Olympics workflow was to further build on its substantial and successful work-at-home effort. Beginning with the Winter Olympics in Torino, NBC experimented with doing actual content assembly in the United States. The process involved sending material back to New York so U.S.-based editors and staff could assemble final content. Not having to transport, house and support hundreds of production people at a remote location could result in significant cost savings. Mazza's support of this concept really shined in Beijing.

The work-at-home production was spread across eight U.S.-based control rooms. Five were at NBC headquarters at 30 Rock, one in New Jersey, one in Florida for Telemundo, and one at SoHo in lower Manhattan for the foreign language feeds. The work was divided into three types of programming: the off-tube factory, where voice-overs took place; the streaming factory, where new media streaming content originated; and the highlights factory, where SD and HD clip-based material was assembled.

While the Torino games required only 14 program feeds back to the United States, more than 100 separate program feeds were in place this year. Forty of these feeds were Web streams. The remaining feeds were a combination of HD and SD signals. NBC streamed more than 2200 hours of content for the Summer Olympics.

A 6000 mile remote

Because of the long distance between Beijing and the United States, any remote production solution

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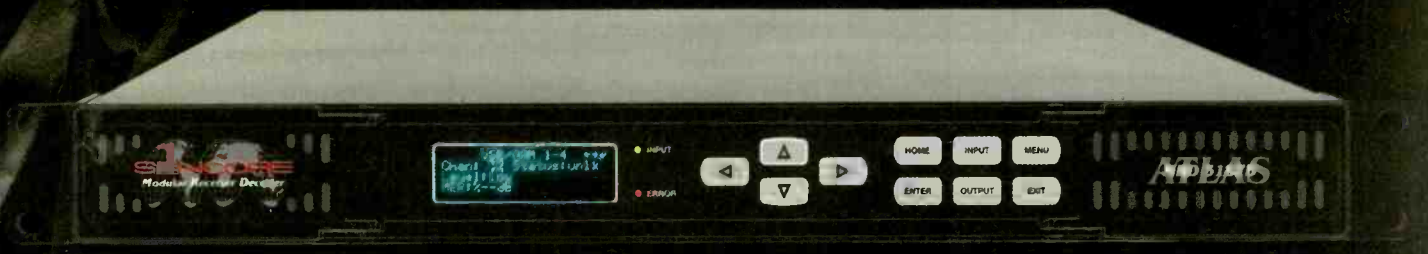

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had to meet three criteria. First, the content had to be resolution-independent. That's because the network needed to deliver content at rates ranging from 50Kb/s for streaming feeds to 50Mb/s for HD. Second, the solution also had to be location-independent. While the content originated in Beijing, production needed to occur in New York. Finally, the solution had to support a file-based workflow.

So what is the major challenge in producing content 6000mi remote?

"The first is physics," Mazza says. "It requires about 240ms to loop the signal via fiber between Beijing and New York. This places unique requirements on any file-based content

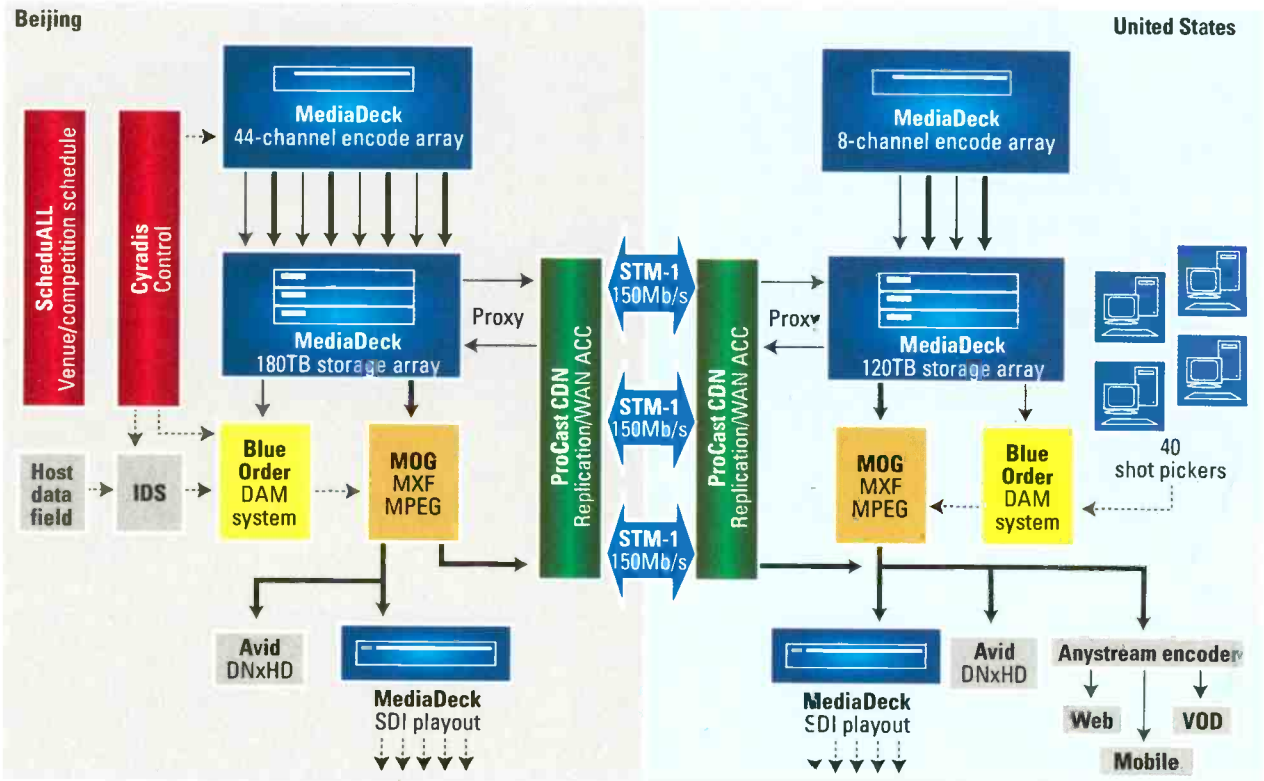


Figure 1. A key component in NBC's production of more than 2200 hours of streaming content, in addition to the work-at-home project, was Omneon's MediaDeck, MediaGrid and ProCast CDN. Combined, they allowed the network to create both Web and HD content with a U.S.-based staff.

passing through routers."

A key component in the work-at-home solution was provided by several Omneon products. (See Figure 1.) Twenty-two Omneon MediaDeck servers supporting 44 channels of ingest were based in Beijing, handling both IMX and XDCAM HD files. These servers also automatically generated matching low-resolution proxies for transmission to the United States. Both high-resolution and proxy files were then stored on a Beijing-based MediaGrid server. Eight channels of MediaDeck servers and another MediaGrid server were located in New York.

Once the content and proxies were generated, the proxies and some HD content needed to be sent back to New York. For this task, NBC used an Omneon ProCast CDN file transport engine. The ProCast CDN is designed to quickly move large files over long distances and yet remain unaffected by path length.

"TCP/IP sends a small blast of data, and then very quickly after transmission, it listens and says, 'Did you get that?' And if it doesn't get a response, it assumes that you didn't get it, so it sends it again," Mazza explains. "However, with 240ms of delay, this could just result in chatter. ProCast overcomes this issue through the use of several transfer protocols."

ProCast CDN's protocols permit file transfer speeds that can be orders of magnitude greater than FTP, especially over long distances like that from Beijing to New York. Two of the network's OC3 (150Mb/s) links back to New York were controlled by the ProCast CDN to speed file transfer.

Once the proxy files appeared in New York, shot pickers used a Blue Order MediaArchive DAM to browse, view and edit the content. The shot pickers were primarily responsible for shot selection for Web-based content. They would pick the shots, insert graphics and then drop it into a work folder that directed the file where to go. They could also send the content to specific locations. Some content might be targeted for an Avid editor based in New York, or even an editor based in China. The shots could also be fed directly to the Web system or to a MediaDeck for playout.

A different workflow was needed for HD content. Using proxies, a U.S.-based editor would develop an EDL and send it back to Beijing, where it was received by a MOG Solutions server. The server then retrieved the matching high-resolution images from the MediaGrid and conformed them into a single file, which was returned to New York. Those files could be further processed at 30 Rock or sent directly to

the Anystream system for Web, VOD or mobile playout.

NBC rewinds

For the summer games, NBC developed a sports feed called "rewind." Rewinds are actually live streams coupled with recorded metadata. The combination of streaming and content-specific metadata allowed the Web viewer to navigate through the content based on the metadata. For instance, a viewer could interactively select any video clip based on the statistics. If the viewer wanted to see a goal by a player that took place 11 minutes into the game, all he had to do was click on the appropriate metadata. The stream jumps to that point and plays out. NBC calls it user-driven highlights. The network produced approximately 3300 highlight clips a day to feed multiple new media platforms.

This production platform was essentially an automated distribution system, capable of flipping the file to whatever format the recipient needed. A three-minute clip of "goals of the day" could be sent to the Anystream encoder, which might make 50 copies of content in multiple file formats, all based on the destinations' needs.

"This was a huge part of what I like to call a very long-distance, file-based workload," Mazza said.

NBC's highly successful Olympic coverage was supported by Omneon's MediaGrid servers in both Beijing and New York. The servers were connected to an Omneon ProCast CDN transport system, which allowed the network to create a U.S.- based, fully interactive, edit-by-proxy content creation system — a 6000mi file-based workflow.

Something old, something new

Mazza is a bit of a belt-and-suspenders kind of guy. In Torino, he said that the Olympics isn't a place to experiment with new technology because there is no room for mistakes.

"It's true. We say that," Mazza said. "We couldn't run with that same level of risk for all those new things on the broadcast side because there's just too much risk."

However, when it came to trying new things, Mazza says, "We ran a whole bunch of new things that had the risk

meter essentially pegged. We couldn't have done that without both new technology and trying some new ideas."

He adds, "The key is balance. You ask how many people are going to see the stream, how visible it is. If somebody tunes in to the Web at eight in the morning and they were thinking there was going be a certain clip and there was a slightly different clip, or we were trying to make 100 clips and we only made 90, most people won't know the difference. So we keep that in mind in determining how risky we're willing to be. But, we certainly pushed the envelope big time with the digital media arena."

The continuing challenge

When asked why he keeps taking on this Olympic assignment, Mazza laughs, saying, "I find each game is a totally new challenge. I couldn't have told you two years ago that we were going to be launching all these new media projects. Sure, I knew something was coming, but we didn't know it would be this big. Our production staff and executives say, 'Hey, we need to get to this point.' They don't tell us how to get there; they just say, 'Here's the starting point, here's the budget — you need to get to this point.' It's up to us to figure it out."

David Mazza, senior vice president, engineering-Olympics, NBC, began his Olympic career at the 1996 Summer Olympic Games in Atlanta, GA. Since then, he's headed up each NBC Olympic broadcast from locations around the world. At the Beijing Olympics, he met with *Broadcast Engineering* editorial director Brad Dick (shown on the right).

He adds, "With the Olympic broadcasts, there are always going to be new challenges. And as much as we try to manage the risk and say we don't want to try new things because a show is too high-profile, or there's too much to lose, we always end up doing it. For me and the team, it's kind of a love-hate relationship. We're preaching conservative working products, nothing new, nothing earth-shattering. Yet we really are doing earth-shattering things each time. That's kind of exciting, and it can even be scary at times."

Mazzo laughs, saying, "But it's a good challenge." BE

Mobile DTV

Find out how to integrate ATSC-M/H technology into your station.

BY JAY C. ADRICK AND WAYNE E. BRETL

The U.S. television broadcast world will undergo major changes in the months ahead with the end of analog broadcasting and the beginning of mobile DTV service by some broadcasters. The industry has been abuzz for the past year, with demonstrations of mobile technology from several companies. The ATSC Technical Standards Group (TSG) has been busy, along with the Open Mobile Video Coalition (OMVC), with the selection of technology and documentation leading up to an ATSC Mobile/Handheld (M/H) standard.

Several years ago, broadcasters and equipment manufacturers began to realize that over-the-air broadcast television would soon see competition from new players who wanted to reach an ever-growing audience of on-the-go viewers. The competition was coming from companies that planned to use the 700MHz spectrum that was recently auctioned off by the FCC and from 3G wireless operators. Broadcasters realized that they needed to compete, but there was one problem: The ATSC DTV system was not designed to reach mobile devices.

Broadcasters and equipment manufacturers began to realize that over-the-air broadcast television would soon see competition from new players who wanted to reach an ever-growing audience of on-the-go viewers.

In the mid-1990s, when the ATSC DTV system was developed, the main focus was to achieve as much digital payload as possible within the 6MHz of allotted RF spectrum. This was necessary to allow for the then-nascent MPEG-2 HDTV encoding. As technology advanced, the bit rate necessary for HD encoding decreased, allowing broadcasters to dedicate bits for additional services, such as multichannel or mobile.

ATSC-M/H technology overview

The ATSC-M/H system is based on technology developed by Harris, LG and Zenith in their MPH system, blended with some parts of the A-VSB technology developed by Samsung. The system technology is made up of three layers of activity:

- *the physical layer,* which is all about getting the bits from the station to the handheld and mobile receiving devices;
- *the management layer,* which includes signaling and announcement information on services, conditional-access system (CAS) information, digital rights management and electronic service guide (ESG) information; and
- *the presentation layer,* which includes audio and video encoding, closed captioning and interactive applications.

The mobile services are based on IP transport rather than legacy MPEG. However, the transport of the M/H data from the integration point with the conventional ATSC signal to the transmitter exciter requires that the IP datagrams be encapsulated into the MPEG-2 transport. The IP-based transport methodology allows for an easy integration of both real-time and non-real-time services. It also offers support of multiple program streams in each M/H channel or "parade."

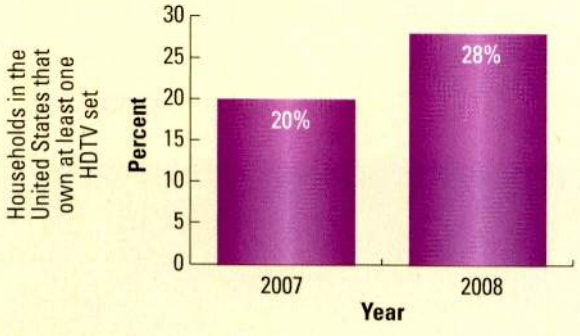
Each M/H channel can typically carry about 600Kb/s of payload. Depending on the level of robustness

FRAME GRAB

A look at the consumer side of DTV

Number of homes with an HDTV set up 8 percent

Twenty-eight percent of households own at least one HDTV set.



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selected by the system operator, each M/H channel will occupy about 2Mb/s of the main ATSC stream due to the additional channel processing required to make the mobile data withstand the rigors and impairments found in mobile reception.

Program content is encoded using H.264 v1.3 for video and HE-AAC for audio. Video resolution is scalable up to 416 x 240 supporting 16:9 aspect ratio presentations, and the audio is stereo with future capability for surround. All real-time streams are encapsulated using RTP/RTCP, while non-real-time content is encapsulated using File Delivery over Unidirectional Transport (FLUTE) protocol.

Rather than create all services from scratch, the ATSC TSG S4 working group has selected elements of services, such as the ESG from existing mobile standards like the Open Mobile Alliance Mobile Broadcast Services Enable Suite (OMA BCAST). More details on the various services will be revealed by the ATSC in the near future.

The magic is in the physical layer

The M/H data needs to be specially coded to serve the M/H receiver for reception under rapidly varying signal conditions, and at the same time appear the same as ordinary 8-VSB data to legacy receivers so that they are not disturbed. This is accomplished by precoding the M/H data and then passing it through the legacy ATSC process in the form of normal-appearing data packets.

The precoding is done at two levels, first as data bytes and then as channel symbols. M/H data bytes are cross-interleaved and coded with both Reed-Solomon and cyclic redundancy check (CRC) codes. The data and its code bytes are packaged into normal ATSC data packets, which then are processed in the usual legacy process,

Rather than create all services from scratch, the ATSC TSG S4 working group has selected elements of services, such as the ESG from existing mobile standards.

including interleaving. This changes the solid block (or "group") of M/H data to a sawtooth-shape region for transmission. In the second level of coding, normal ATSC trellis coding is augmented with a serial concatenated convolutional code (SCCC) for the M/H data. (See Figure 1.)

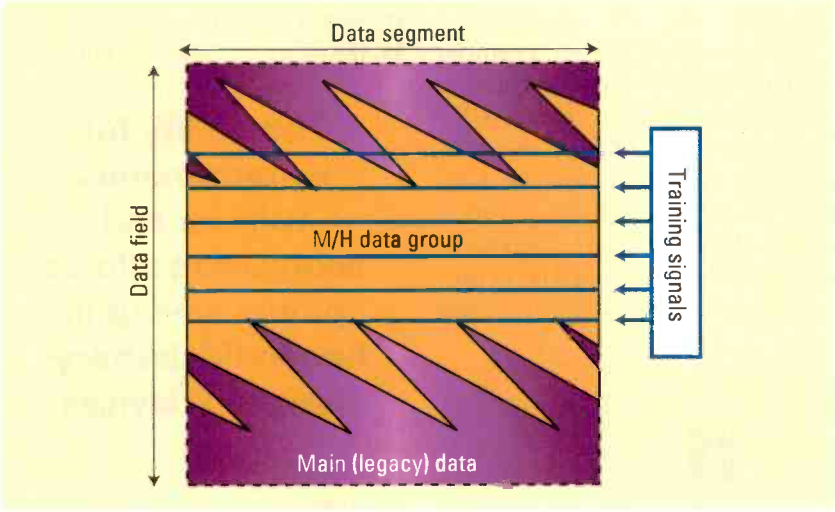

Figure 1. During precoding, M/H data and its code bytes are packaged into ATSC data packets. These packets are then processed in the usual legacy process, which changes the solid block of M/H data to a sawtooth-shape region for transmission.

The group of M/H packets also contains known data sequences at regular intervals. These training sequences allow the M/H receiver to make accurate and frequent estimates of the channel multipath conditions. In fact, the M/H receiver can successfully receive a single, isolated group

Normal ATSC trellis coding is augmented with a serial concatenated convolutional code (SCCC) for the M/H data.

because of its instantaneous measurement of the channel.

The ability for instantaneous turn-on and acquisition allows power saving in handheld, battery-powered devices. Various programs can be carried in separate parades of groups, and the receiver RF front end only needs to draw power during relevant times. (See Figure 2.)

ATSC-M/H system architecture

Integrating ATSC-M/H systems into an existing ATSC broadcast chain is relatively easy, as was demonstrated during the OMVC Initial Demonstration of Viability (IDOV) testing that took place earlier this year.

At the studio end of the system, an M/H multiplexer is integrated into the ATSC stream after the existing ATSC multiplexer. Depending on the manufacturer, the multiplexer could include an integrated IP encapsulation system and also integrate operational and maintenance data packets to control the various M/H modes created in the M/H exciter. The multiplexer may also perform some packet timing functions to prevent buffer overload at the receiving end. The multiplexer output format is a conventional 19.4Mb/s stream based on either ASI or 310M format. No changes are required for the station's STL.

The ability for instantaneous turn-on and acquisition allows power saving in handheld, battery-powered devices.

Each real-time M/H program stream will require an IP-based mobile program encoder that will send the mobile signals to the encapsulator and multiplexer. Non-real-time (NRT) content requires an authoring station and server for storage and a management system to schedule and release the NRT content. Because the connectivity between these content sources and the encapsulator/multiplexer is IP-based, a reliable IP link can allow

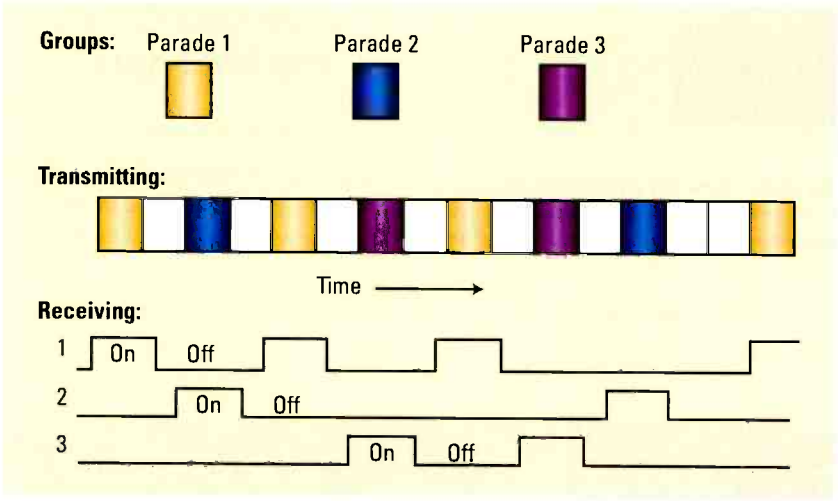

Figure 2. The receiver RF front end only needs to draw power during relevant times.

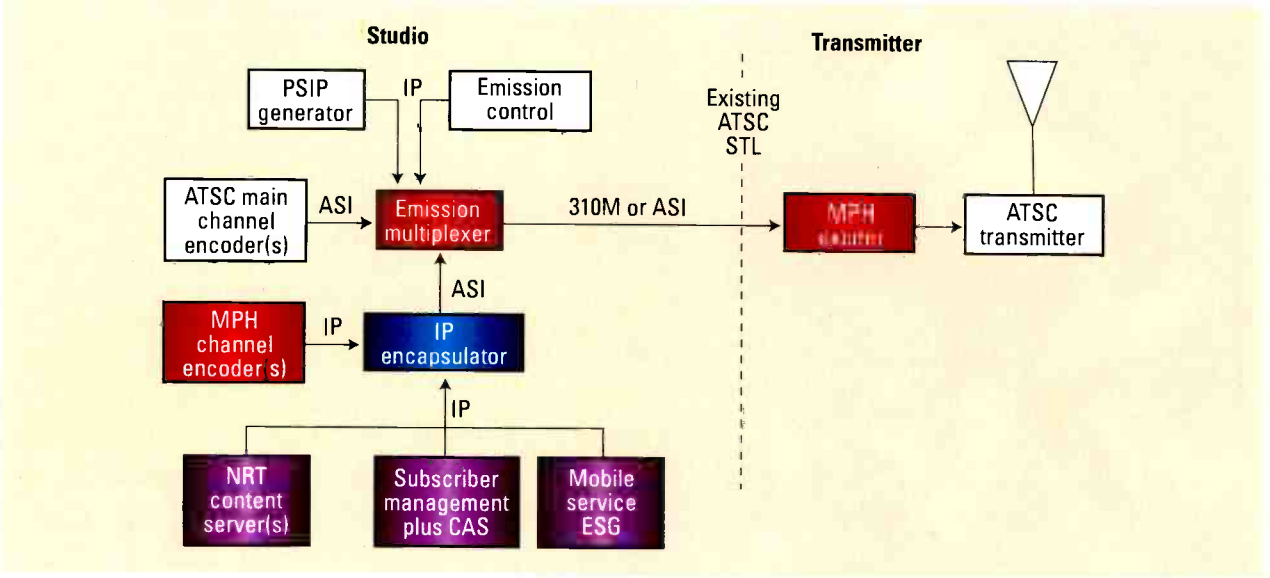

Figure 3. The electronic service guide (ESG) system, conditional-access system (CAS) and other advanced applications systems connect to the M/H encapsulator/multiplexer using IP as the transport.

the content sources to be separated from the transmission system. The ESG system, CAS and other advanced applications systems all connect to the M/H encapsulator/multiplexer using IP as the transport. (See Figure 3.)

At the transmitter, the ATSC exciter needs to be replaced with one that can support M/H. In recent months, manufacturers have introduced new software-based exciters that can be upgraded to ATSC-M/H service. Older exciters are not upgradable because of the amount of processing power required to create the M/H signal.

There are several major RF considerations that a station must review when entering the mobile business. ATSC-M/H is an RF-delivered wireless business with no delivery help from cable or satellite. If the transmission system fails, the signal is off-air, making redundancy crucial. Redundancy should cover the entire chain from encoders through to the transmitter.

While UHF works best for mobile DTV, high-band VHF has also been tested and works quite well.

While UHF works best for mobile DTV, high-band VHF has also been tested and works quite well. There are receiving antenna shortcomings at VHF that introduce some reception limitations.

Transmit antenna polarization may also be a factor because most portable and mobile receiving devices have vertical, polarized receiving antennas. At least one broadcast antenna manufacturer reports that there has been a recent increase in interest by broadcasters looking to add vertical polarization to their signal.

Finally, broadcasters should consider maximizing their power and providing as much signal coverage as possible under the FCC rules. During the recent FCC window of opportunity to maximize, more than 600 stations applied for maximization.

With the ATSC hoping to complete the standards process by early 2009, new broadcast equipment coming this fall and consumer devices planned for later in 2009, this coming year will be busy for broadcasters looking to enter the mobile DTV business. **BE**

Jay C. Adrick is vice president of broadcast technology for Harris, and Wayne E. Bretl is senior principal engineer for Zenith.

Effective storage

You can never have enough storage — or proper management.

BY DENNIS HO

Data storage and its management directly affect workflow efficiency and the bottom line. Demands for storage continue to increase, even as the technological complexities create more headaches. A storage strategy is critical because, of course, without efficiently organizing, storing and monitoring data, we don't have a finished product.

With regard to media files within a production environment, the old adage, "You can never have enough storage," is true enough. However, with technical advancements in storage hardware, along with an array of options, there is no single approach to storage needs.

For example, at Digital Jungle we are constantly integrating multiple platforms within our facility. Moreover, many of our digital intermediate (DI) projects are in a true 4K workflow with deliverables in 2K digital cinema, HD, IMAX and 35mm film. Any single 4K long-form project or feature with all of these deliverable requirements generally requires massive storage (100TB or more).

Making it work

A traditional and popular method to link all of the workstations together would involve an online centralized

A storage strategy is critical because, of course, without efficiently organizing, storing and monitoring data, we don't have a finished product.

At Digital Jungle, most DI projects are in a 4K workflow and delivered in 2K digital cinema, HD, IMAX and 35mm film. With each project easily reaching the 100TB range, the facility works hard to budget and use its storage space effectively.

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COMING IN OCT.

Is your RF ready for February 2009?

Presented by Jeremy Ruck

October 14, 2008 – 2:00 pm EST

Antenna's ready and transmitter's ready, but are you ready for the February 2009 analog cutoff? Don't miss this point-by-point check off of the required DTV RF system performance. Consulting engineer for Don Markley Associates, Jeremy Ruck, will help ensure that all of your station's RF DTV systems are ready for the big day.

COMING IN NOV.

Video compression & artifacts

Presented by Aldo Cugnini

Nov. 11, 2008 – 2:00 pm EST

As viewers replace their analogTV sets, they will increasingly be aware of any compression or conversion artifacts that stations broadcast. This engineer-level class will help you better understand how compression works and the effects it can have on image quality. You'll learn how preprocessing and signal conditioning can reduce compression artifacts and improve your signal quality.

SAN storage system. SANs are complex and can quickly become unruly without precise calculation. Many companies call for an offline-shared environment with one or two stations being able to give off the final product. This requires guaranteed data at all times and a large infrastructure.

A typical SAN solution requires additional headroom storage beyond actual storage use. When calculating your data requirements for the SAN, take the number of stations and multiply that by the number of video streams each station is going to play back simultaneously for the offline systems. Then add your online stations to the data requirements. (Each one of your online stations is only going to play back one stream of video at a time, so calculate at the highest possible rate to insure reliability.)

Smart and dumb storage

There is also a different line of attack. To efficiently deal with storage, you can split your storage inventory as either smart or dumb. Some drives are made to act as smart online storage. They know which files and sequences are identical, eliminating wasteful duplication. No matter how many timelines or versions are created, these storage systems are smart enough to store only what is absolutely necessary.

There is also a different line of attack. To efficiently deal with storage, you can split your storage inventory as either smart or dumb.

Dumb storage, on the other hand, can be used for offline RAID fiber storage. It is relatively cost-effective and has a very fast 4Gig throughput. (We can transfer 10 to 12 DPX files per second at 4K resolution to or from our RAID system.)

It's called dumb storage because it simply stores precisely what it's given. This storage hardware acts as an archive. It stores not only the media, but the entire project as well. With a PC server and RAID storage, you can off-load projects to a client's FireWire drive or store media and data for future use.

Using a fiber switch to connect multiple RAID storage systems to smart storage allows broadcasters

to effectively share footage and data across all platforms. Adjusting the ratio between smart and dumb storage is a constant balancing act — based on current project needs and projecting storage needs that are in the queue.

While having all projects online all the time is ideal, it is not very cost-efficient. For now, a hybrid storage scenario works well within most workflows. And here, it's important to remember that it's not only the amount of storage that matters, but also the type and how it's managed that is crucial.

While having all projects online all the time is ideal, it is not very cost-efficient. For now, a hybrid storage scenario works well within most workflows.

Last but not least, we must always remember to properly budget disk space for all of our projects. First, what are you going to edit with? No matter what format you start on, you have to choose a codec that is going to fit well within the budget.

At the moment, 4K is the biggest hog of disk space, which is why most editors choose to convert it into a more manageable format like HD.

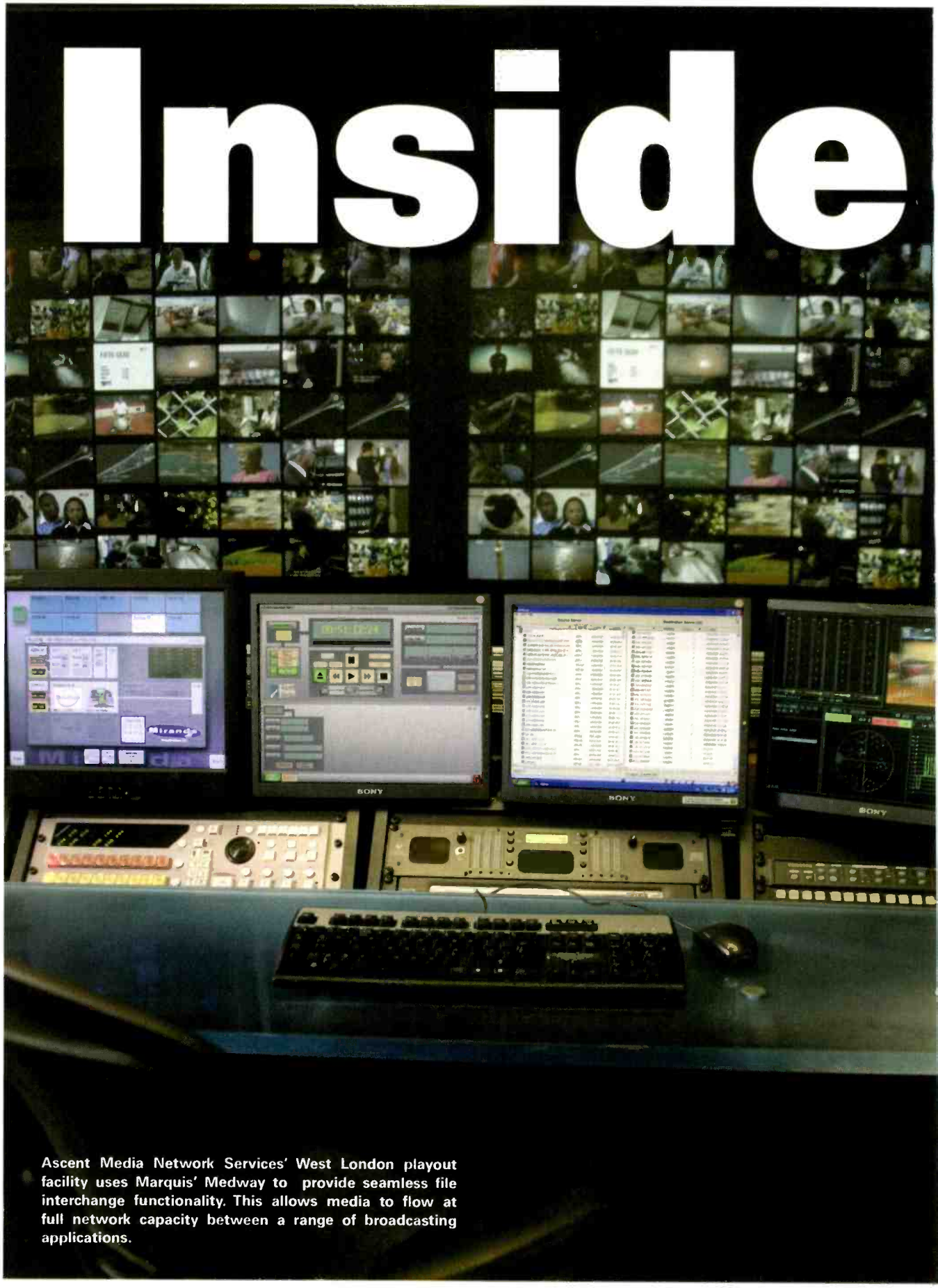
If you shoot SD DigiBeta, you might consider DV as your offline codec. Either way, you need to know the amount of media that has been shot in order to have enough disk space while editing.

Once you know your compression, find out how many megabytes per second it takes to sustain that particular compression. Take the megabytes per second, and then multiply by 3600. You now have the approximate baseline total of disk space you are going to consume for the project.

An easy way to get the baseline total is to use the AJA Data Rate Calculator Application Version 2. (Visit *http://tinyurl.com/45x3fm* to download the TAR file.) This will quickly show you how much data will be consumed per hour. Remember, this will not tell you the complete storage requirement, but it is a good quick reference tool that is easy to use. **BE**

Dennis Ho is president of Digital Jungle Post Production.

Inside



Ascent Media Network Services' West London playout facility uses Marquis' Medway to provide seamless file interchange functionality. This allows media to flow at full network capacity between a range of broadcasting applications.

automation

Your guide to achieving successful systems integration in a cross-platform, multipurpose digital broadcasting environment starts here.

BY GRANBY PATRICK

Despite recent advances, the successful integration of systems over a network to enable efficient workflows in a cross-platform, multipurpose broadcasting environment continues to be a challenge. If we look at what's actually involved in this process, we can understand why this challenge remains and identify ways to achieve an efficient solution.

To begin, there are 14 parameters ranging from frame size through compression that need to be matched in order to move a clip between two boxes. And yet, this still doesn't actually improve our workflow. All this achieves is what we used to do by taking a tape from one VTR to another! File-based workflows start to pay dividends when the clip carries its own description, i.e., the metadata, so that the system can automaticallly file it, process it, index it and deliver it.

Metadata

The number of metadata variants is as great as the number of manufacturers' products multiplied by the number of different applications that the users require. Even if we find a standard way of encoding the metadata, there would never be a standard for the different pieces of metadata that need to be carried, as these are tied to the specific workflow we are trying to achieve. There have been a number of attempts at creating metadata frameworks such as DMS-1, Dublin Core, SMEF and most recently BXF. However, when made sufficiently flexible, they become very complex, making them difficult to use. This is unfortunate because a workflow often only needs a very simple but specific set of metadata.

Identifying the essential metadata — and ensuring that this is carried through the system along with the clip material — is key to the success of integrated workflows.

Workflow

A workflow can signify many different things. In this article, it's the human activity required to make the system deliver the desired output, whether it be a program, a news bulletin, a promo or a whole channel. Obviously the objective is to ensure that the people using the system add as much value as they can at each stage without having to perform repetitive tasks that reduce overall efficiency. Repetitive tasks should be automated. Information, once entered, is part of the system. And housekeeping tasks should allow the user to make critical decisions easily and then carry out the rest of the work automatically. It becomes clear that an important aspect of achieving this efficiency is to ensure tight integration between the different parts of the system.

Identifying the essential metadata — and ensuring that this is carried through the system — is key to the success of integrated workflows.

Systems

Systems from single manufacturers may be efficient only for performing the precise tasks for which they have been designed. However, caution needs to be applied because, in the future, the manufacturer may develop its system to benefit the maximum number of customers, which may not suit your own development path.

An option is to build a system from a selection of manufacturers' file-based products — each chosen to suit your application. These products must be integrated to support efficient workflows. Different products

have different needs from their files.

An ingest or playout server will have a file structure that is designed to allow the server maximum levels of performance when recording or streaming the clips. This may mean that the video and the audio can be interleaved. It may also mean that an interframe compression is more efficient than an intraframe compression.

An archive system will be primarily concerned with the size of the files and the ease with which they can be managed. An editing system will be more tuned for rapid access to any part of the file, favoring intraframe compression, and allowing the playing of large numbers of separate audio files with the video. This tends to lead to a separate component (video and audio) file structure. Effects systems may store uncompressed video to reduce the effect that multiple generations of compression have on image quality.

All of these systems have different file structures for different reasons, but they all need to be integrated. An integration layer will ensure that material can be moved as seamlessly as possible. Ideally, this integration layer will access one product in its native file format, convert the file and deliver to the target product in its native format, all without any interim copies, and as a continuous data stream offering the highest performance.

Moving the file is not enough. The metadata must stay with the file so that the workflow remains efficient. In most cases, the metadata relating to a clip is not stored with the clip itself but in a separate data structure — whether that be a database or simple clip reference file. The integration layer needs to fetch the metadata, translate it and deliver it to the target systems, at the same time as it is delivering the media. (See Figure 1.)

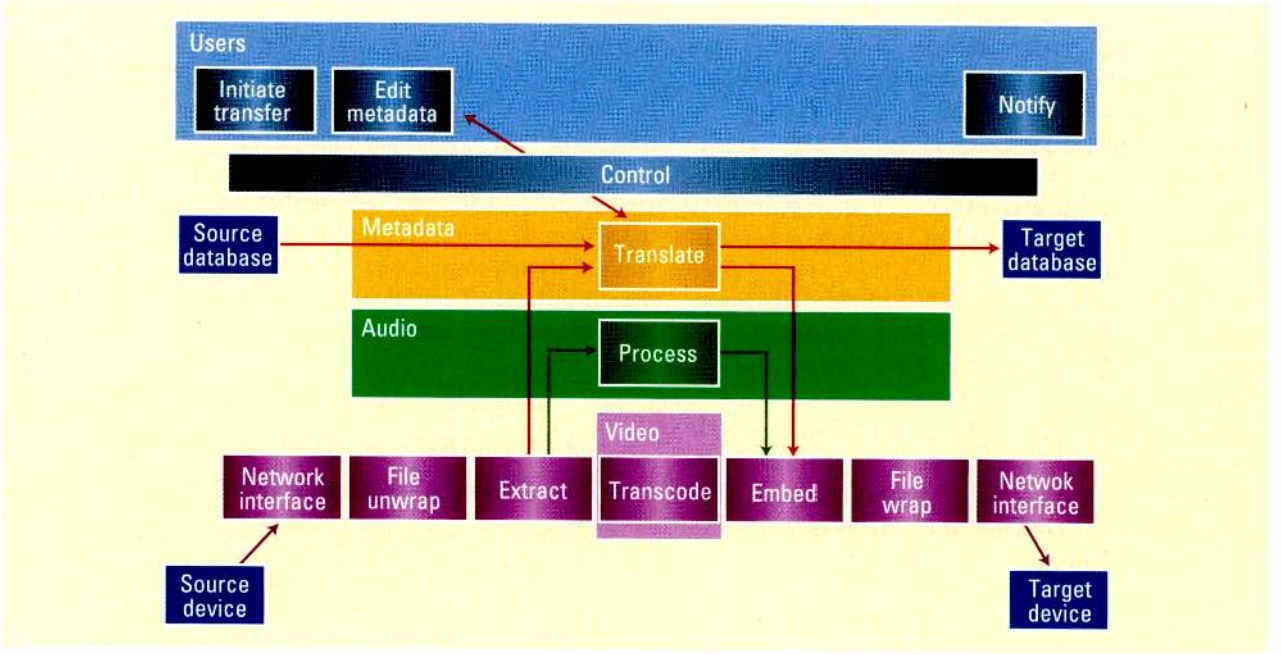


Figure 1. Conceptual diagram showing integration process for file-based workflows

Control

The ability to move media is not useful without a method to control those movements. Like with video routers, the control system may be built into the integration layer application. Alternatively, there may be a need to manage and monitor these movements from a higher level control system that has business and workflow logic built into it. Of course, if both methods exist, any transactions initiated via an external control system should be visible using the manual method as well. In this way, it can act as a backup strategy in the event of a failure.

In the context of media file integration, the control system may be a conventional automation system, but it is more likely to be an asset management system with some degree of workflow automation. As well as providing a mechanism for initiating the transfers, there must be a mechanism that allows the receiver to be aware of the incoming material and its transfer status.

For major installations and enterprise-level performance, the system should be able to gracefully handle as many exception cases as possible. Files may fail to transfer for many reasons, and it is important to notify the users (probably both source and destination users) that the transfer has failed.

Systems used for this kind of integration need to be flexible so they can be configured for a range of media formats and metadata structures. These systems must also be precise so that everything transferred is valid and not spurious or corrupted. This ensures that the resulting files at the destination are formed for the intended target device. These two requirements tend to conflict, making the detail of providing reliable integration difficult to achieve and maintain over a long period.

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products and software versions, changing the manner in which third-party systems communicate with them. The integration layer must have a flexible architecture that allows it to be adapted to this continuously changing landscape, while still offering consistent user interface and workflow behavior.

Movement

All of this is often carried out in an IT environment. Designing a secure network that supports the file movement and sharing needed requires skills that are in short demand. Most engineers skilled in general IT applications don't have experience dealing with the kinds of network and file traffic experienced in a broadcast facility. Most broadcast engineers don't have the experience in designing and configuring network systems to be efficient and secure. In many cases, over-engineering and accepting unnecessary limitations in the workflow and flexibility of the system are the compromises accepted in order to deliver a network that can be used in these kinds of environments.

Some broadcasters have already found the answer to their cross-platform, multi-application integration problems by using specialized integration software. Such solutions act as media highways for content to move freely between a range of applications irrespective of their hardware platforms or software architectures.

This approach not only overcomes any interconnectivity bottlenecks, but also optimizes workflow efficiency through advanced manipulation and management of metadata. Media is wrapped and streamed for movement through the production process, allowing the metadata to remain attached. Such software allows for tightly integrated workflows based uniquely on the user's objectives and resources.

Benefits

As well as optimized interoperability between best-of-breed products, including solid-state and disk-based camcorders, an array of other benefits can be achieved by using specialized integration software. A few of these benefits include improved media tracking and accessibility, financial and time savings through fewer manual processes, better use of existing assets, and improved reporting procedures. Improved reporting procedures can be accomplished by using the metadata to provide useful data to back-office systems for integration with administrative tasks such as billing and statistics reporting.

Most frustratingly, when it all comes together and works, the result looks so smooth and easy that it leaves everybody asking, "How come that was so difficult?!" BE

Granby Patrick is partner director of technology for Marquis Broadcast.

News TECHNOLOGY

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A letter from the publishers

The TV news business is in a state of transition. Not only are the technologies used to shoot, write, edit and playout stories in an accelerated stage of change, but the very notion of what it means to be a television news organization is evolving. While new distribution platforms — such as the Internet, cell phones and the much anticipated mobile DTV receivers — create an opportunity for newsrooms to extend their reach and their brand, they also demand a re-examination of how news personnel and technology should be employed.

At the same time, a decline in national advertising sales, competition from new media sources, continuing capital demands for DTV infrastructure build out and larger concerns about the nation's financial system are greatly affecting how station news departments manage their way through these changes. News technology aimed at improving workflow efficiencies is part of the answer. However, an even more important piece is using that technology to fulfill the ultimate mission of a TV newsroom, namely providing important, interesting local news content that viewers turn to regardless of the platform they choose to use.

To help engineers and managers address these challenges, *Broadcast Engineering* and *Broadcasting & Cable* magazines have joined forces to produce a series of supplements and private technical symposiums focused on practical solutions. This supplement and symposium are focused on newsroom technology. We've assembled key vendor and industry experts to offer both their thoughts and experience and to answer your questions.

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Vice President,
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Larry Dunn
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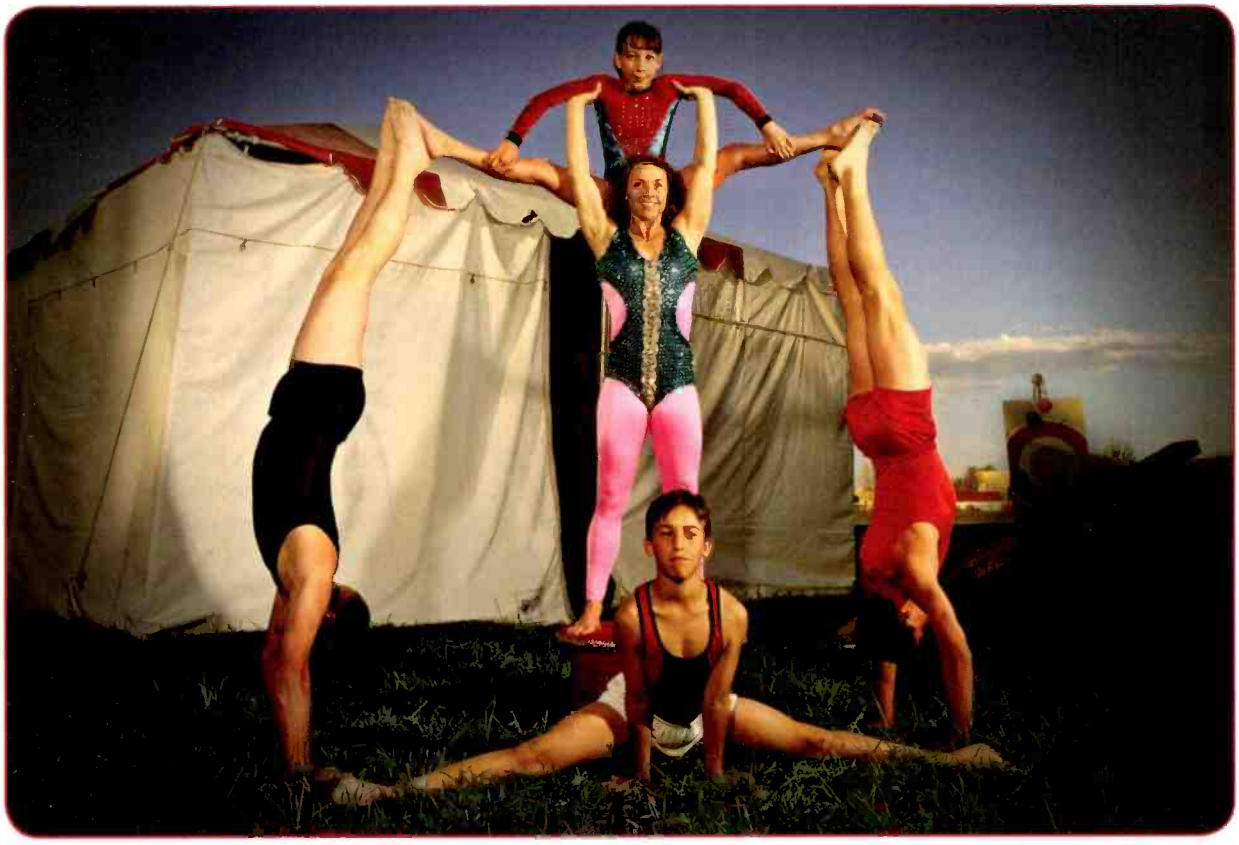

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A radical transformation

Succeeding in today's media environment means giving consumers more — something that will require a major shakeup in newsrooms and attitudes.

The broadcast business model doesn't work anymore and needs a top-to-bottom overhaul of technology, operational approaches and attitudes to succeed going forward, says Jerry Gumbert, president and CEO of Audience Research & Development. Gumbert, who delivered one of the keynotes during the News Technology Summit produced by *Broadcast Engineering* and *Broadcasting & Cable* magazines Sept. 24-25 in Dallas, contends broadcasters must ask themselves a fundamental question.

"We all have to step back and ask, 'Based on changing media consumption by consumers, based on the multiple platforms that they are consuming news and entertainment on, based on technology evolution and innovation, what's the best way to march forward to do things at the highest level of production, to be as productive as possible and to be as impactful as possible?'" he says.

Gumbert, who advises many of the largest media brands, including News Corp./FOX, Time Warner, Viacom/CBS, ABC/Disney and Media General, says broadcasters must shake off business as usual in today's media environment and focus on improvements to productivity.

"Clearly, we can't keep using at any level in the television station the core operational systems in place for the better part of 40 years," he says.

In particular, Gumbert identifies the newsroom for sweeping changes because for most local stations with a serious commitment to news, they are the central moneymaker.

"First and foremost, when you look at a television station, you have to look at the newsroom and the people who make the most money there, and those are the anchors," he says.

Stations must spend money and time equipping their journalists with the skills needed to become multimedia journalists, says Jerry Gumbert, president and CEO of Audience Research & Development.

While anchors should remain the face of the brand, much more will be required of them going forward.

"Anchors can't just be newscasters; they have to be the chief journalists of the television stations they serve," Gumbert says. "They have to be productive and impactful in that position."

Improving productivity isn't confined to anchors. What's needed are multimedia journalists who "have skill sets that journalists of the past and unfortunately many who are working journalists today don't possess," Gumbert says.

While multimedia journalists are journalists first, they also possess a broad variety of skills beyond interviewing, writing and presenting.

"These people shoot their own video. They shoot their own still photography in the print world. They are real comfortable with posting on the Web and HTML. They're graphic designers, and they are video editors," he says. "In today's world, that is not it a difficult thing to do based on the technology."

These changes are needed so stations can fulfill their primary goal: putting more people on the street gathering news and information.

"If we do what the print world is doing — putting fewer pages in the paper because ad volume won't support the business model — that just lessens the value proposition between customer and media company even more dramatically," he says. "If there has ever been a time when we should be giving customers more, not less, it is now because they have so many choices."

Gumbert acknowledges these prescriptions for what ails TV news may bruise some egos. But managing their way through ruffled feathers is only a first step for stations. For this medicine to work, stations must spend money and time equipping their journalists with the skills needed to become multimedia journalists and for their anchors to transition into chief journalists.

"If we don't step up and make that investment, then our ability to grow our revenue is not only going to be eclipsed, our revenue will begin to deteriorate at a rapid rate because we are not equipped to deliver what the consumer needs," Gumbert says. "We can either catch up to consumers and give them what they want, or we are going to lose out in this game." ■

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The challenge of TV news

No longer is it sufficient simply to put the best news product on-air. New distribution platforms like the Internet and mobile phones are demanding that TV newsrooms re-evaluate their mission.

BY PHIL KURZ

The evolution of tapeless editing tools is helping newsrooms transition into "local media outlets" serving multiple distribution platforms. (Photos courtesy KLTV in Tyler, TX.)

It's no secret that television newsrooms are facing a variety of budget, personnel and technological challenges these days. Permeating all of these, however, is the single most important test facing TV newsrooms: how to enhance their brand in a time when Americans by the millions, particularly younger Americans, are seeking out news and information elsewhere.

Survey results released by the Pew Research Center for the People & the Press in August revealed 37 percent of the general public regularly gets its news online, up 24 percentage points from a decade ago. More to the point, the Pew research identified 13 percent of news consumers it dubbed as "Net-Newsers," who are affluent, well-educated, relatively young and more regular readers of political blogs than viewers of network news. While not close to being the majority of news consumers, Net-Newsers do reflect the tendency of relatively younger people to seek out news from non-traditional sources.

Taken with the 23 percent that Pew identified as Integrators, those who select TV as their top news source but also turn to the Internet daily for news, the two segments represent a sizeable piece of the total news audience that is regularly turning to competitive new media for news and information.

For television stations, the shifting news consumption patterns of such a large portion of the audience raises the challenge of how best to allocate limited financial and journalistic resources in a way that attracts viewers and regular Internet visitors to their brand — not simply their on-air channel assignments or Web sites.

"There's no question that the traditional notion of television stations and TV news is in a profound state of transition," says Jeff Kiernan, news director of WBZ/WBSK in Boston.

Kiernan was among several panelists exploring the challenges facing TV news operations at the *Broadcast Engineering* and *Broadcasting & Cable* News Technology Summit in Dallas Sept. 24-25.

"I'm bullish on television," he says. "I'm bullish on television

because it is about being local and generating local content. How the public receives the content will continue to develop, and to a degree that's the unknown."

As Kiernan sees things, access to news from other platforms requires television station newsrooms to begin transitioning from simply being TV news sources into becoming "local media outlets" that serve up "interesting local stories and good local video and sound" regardless of the distribution platform.

Brian Bracco, vice president news at Hearst-Argyle Television, shares a similar philosophy and takes it a step further, suggesting stations making this transition adopt what he describes as "a 24/7 mentality."

"Rather than your traditional 5 p.m., 6 p.m., 10 p.m. or 11 p.m. newscast and morning newscast, I think the demands of the news cycle are such that we have to be on the Web, on mobile and on TV, and we have to be on all the time," says Bracco, also a News Technology Summit panelist.

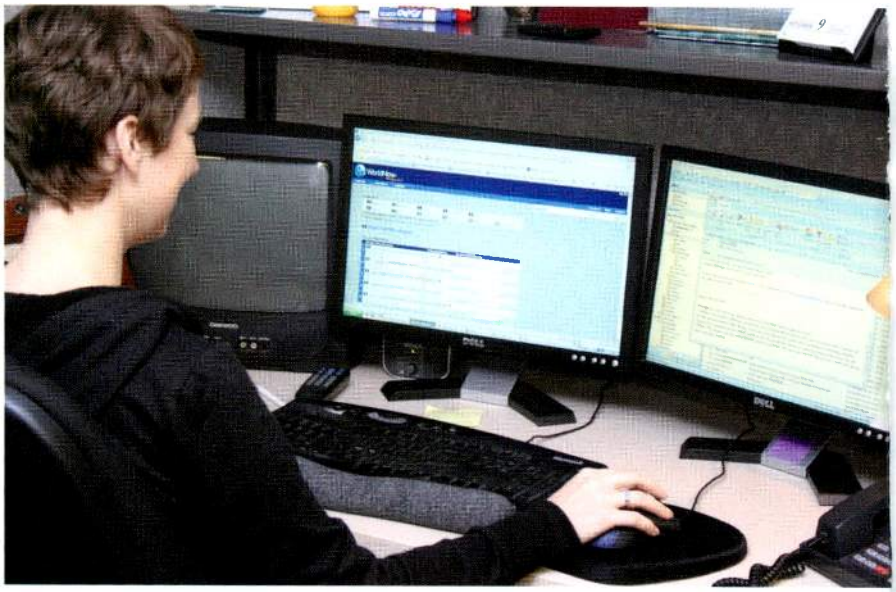
At KLTV in Tyler, TX, the Web presence of the station is so important to news director and News Technology Summit panelist Kenny Boles that he has taken to calling it "our other TV station."

"That's how we've described it, trying to educate everyone in the newsroom to make them understand just how important this platform is," he explains.

The importance of the Web and other emerging distribution platforms to the brand identity of a station in its local market cannot be understated when today's typical news consumption patterns are considered, Bracco says.

"Most people go to work, turn on their computers, and they have your brand sitting in their tray or they are listening to things going on, such as a political speech of a candidate visiting locally that we don't cover on-air but might stream live on the Web site," Bracco says. "They're seeing things online, so by 5 p.m. or 6 p.m., our news can't be stale. It can't be old. We cannot hold stories for our newscasts. We have to publish them online. We don't have to publish all the details of the stories, but we have to publish some of them because we know there is a huge audience between 10 a.m. and 2 p.m. on the Web.

"How else are we going to get the word out? On our own air when we have an exclusive story? Or, we can use our own air, the Web and a mobile device to say, 'Come watch. We have more on this exclusive.'"



While KLTV in Tyler, TX, has one Internet producer, Kathryn Khalil (shown), all news managers, producers and most news photographers at the station are responsible for Web maintenance.

Given the economy, expanding local TV news onto the Web and beyond on a 24/7 basis is a tall order.

Financing the future

While expanding the reach of the station's news operations onto the Web, mobile phones and other platforms that may be the shape of things to come, it's necessary to keep the importance of these new distribution alternatives in perspective, says Mike Devlin, president and general manager of WFAA in Dallas and News Technology Summit panelist.

"I'm glad we have the Web because it is showing some growth, but it is a very small percentage of the revenue we get from spot television. It is dwarfed by spot television," he says. "I know it is a relatively new medium, and it has some nice growth on small numbers, but there is no way you could support a large television newsroom based on revenue from the Web site. You are not supporting helicopters, satellite trucks and live trucks by your Web site."

Particularly in this economy, when some automakers are struggling to stay afloat and cutting back on their television advertising, expanding local TV news onto the Web and beyond on a 24/7 basis is a tall order.

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Many of Avid's open solutions are achieved through the use of industry standard open formats and protocols. Occasionally, however, close integration calls for solutions that interface directly with Avid software applications through the use of APIs (Application Programming Interfaces). Prospective implementers are invited to enter into a license agreement with Avid and participate in the appropriate development partner program. These agreements and programs help ensure sustainability of third party development efforts because licensed users are notified of updates, and may also be entitled to access technical support from Avid to assist in development.

Open Storage Solutions = Open Workflow

What is not always recognized is that Avid storage is not restricted to supporting Avid applications and workflows. Other applications you may use to support your workflow – 3D animation or modeling packages for example – can also access and store their data in the Avid environment, thus extending to them the same level of security and controlled access as that enjoyed by the Avid media itself. When storage is combined with an Avid workgroup solution, any non-Avid assets can be tracked, as well as Avid native ones, greatly enhancing the overall total system integration.

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Open Asset Management = Seamless Integration

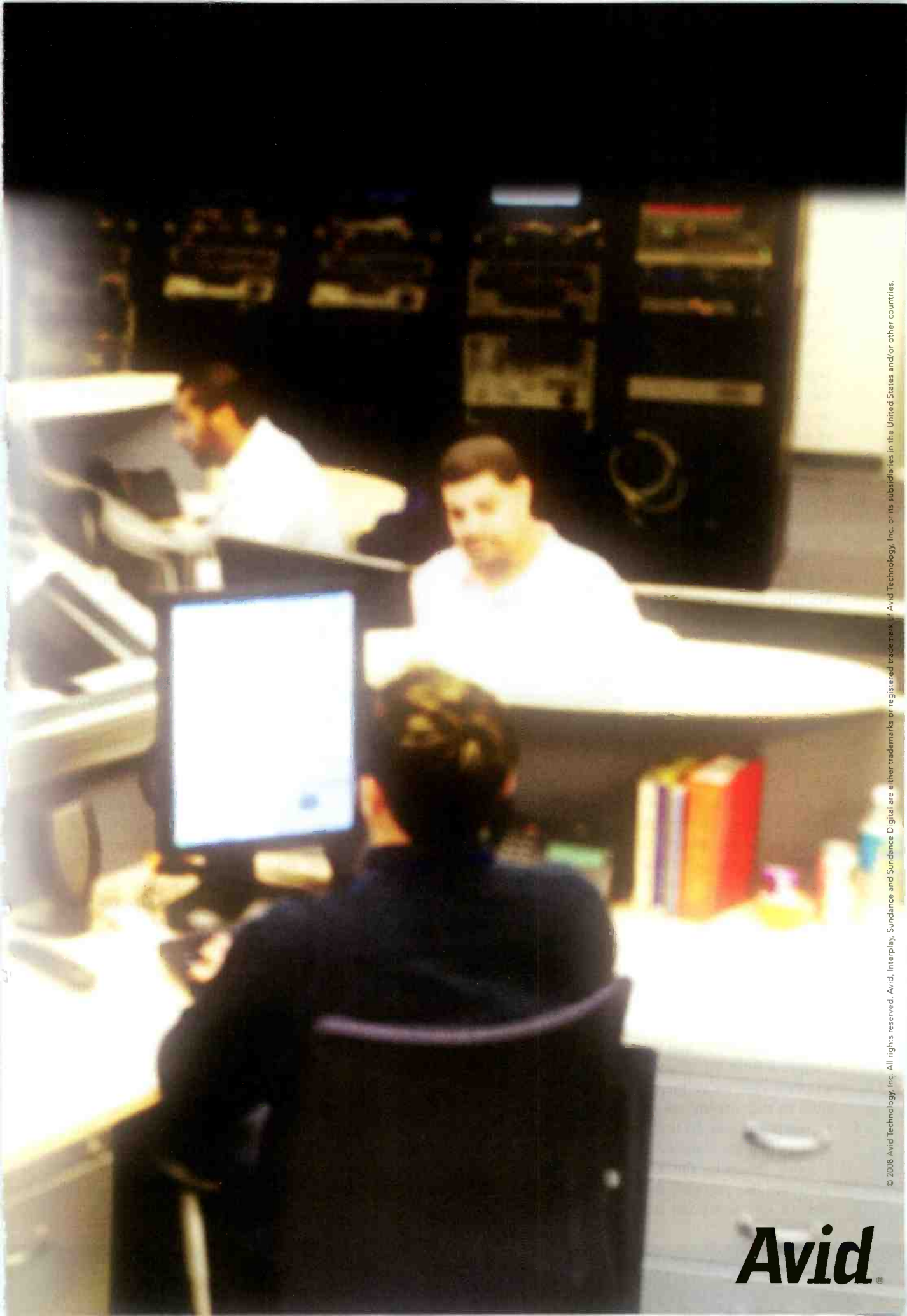
Avid Interplay® Web Services are based on industry standard open platform SOAP technologies and expose many of the functions that were previously only accessible through the Interplay Access application. Through the use of Web services, third parties can now integrate Interplay seamlessly into their customized automated workflows.

Open Archive Solutions = Protecting Your Content

Media assets probably represent the single biggest investment of enterprises involved with content creation. And users of these assets will almost certainly want to preserve them in as secure an environment as possible. Avid offers a number of archiving solutions, including support for third party archive management and robotic library systems.

Open Automation = Innovative Solutions

Avid also provides solutions for Transmission automation through its Sundance Digital range of products. By their very nature, automation systems must interface with a wide range of third party systems and applications. Sundance engineers are actively participating in the SMPTE committee that has developed a format for the exchange of – particularly traffic related – broadcast data. Once adopted by traffic and automation vendors, it promises to deliver very close integration between delivery systems, scheduling departments and automation control.



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think we have ever faced greater challenges than we do today," Boles says. "We've seen a significant downturn in national sales numbers, and that's had a dramatic impact on local stations — large and small markets alike."

Despite the downturn, stations don't have the luxury of ignoring the changing news consumption habits of their viewers.

"I think whether small or large market, a lot of us ask the question: How many will be left standing at the end of the day?" Kiernan says. "I think the ones that will be standing at the end of the day are the ones that are constantly making themselves relevant to consumers."

For KLTV, making the station relevant to viewers takes many forms during this general business downturn. On air, it has meant relying on audience research to identify areas where savings can be made without diminishing the news product. The station's morning news show is a case in point.

"Using research as a basis, we found when our viewers get up in the morning, they don't want repeats from the night before," Boles says. "They really want to know what's going on now that is important, significant and newsworthy. That lets us draw more on our national resources — ABC and CNN — for live shots from around the country and around the world. Even though we've had to cut our budget a little bit when it comes to personnel, we've increased it a little in the satellite area in order to reach out and draw on the resources that are available to us."

More generally, the weakening economy has required stations to rethink who gets hired and what's expected of existing personnel.

"I think we are expecting more from people, which is a culture shift for many of them," Devlin says. "If you were an anchor and your job was to anchor a five p.m. newscast, that was about it. We're now going to ask you to do some reporting and to cut an insert for the digital channel."

Small, lighter easy-to-use tapeless cameras are helping newsrooms increase their presence in the community and capture more news footage.

He adds, "From their perspective, it's: 'You're not paying me anymore.' From our perspective, it's: 'We are in a mature medium,' and particularly this year when we are not making any more than we made last year, we need some new streams of revenue."

The compensation question is only one aspect of the equation of asking staff to learn more and take on added responsibility, Bracco says. Many people simply resist change. An anchor who previously worked with Bracco when years ago newsroom computers first appeared is a classic example, he says.

"There was an anchor who put her electric typewriter under her desk because she said, 'I know this computer is going to break down sometime,'" Bracco recalls. "It just gathered dust for about a year. Then one day we took a power hit and lost all of the power to our station for a period of time. I looked down at the electric typewriter and said, 'That typewriter isn't going to do you any good. We still don't have electricity.' The next day she threw it in the garbage. There are always going to be people who resist change. It's our job to move them into the digital era."

Unlike long-time staff and journalists with established job expectations, new personnel being considered for positions in the newsroom must come prepared to be versatile and ready to take on a variety of responsibilities, Boles says.

"You can't just hire a producer now who doesn't know how to edit, who doesn't know how to grab a camera, and run out and shoot a story if needed," he explains. "We're having to hire smarter, and the people we hire need to bring more to the table than they did before. They need to bring a cross-training in different jobs and responsibilities throughout the newsroom. You can't have any one person who only knows how to do one thing anymore."

Technology to the rescue?

The transition from linear tape news production to file-based workflows could not have come at a better time for stations. As pressure mounts to write, produce and edit content for multiple

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platforms, the efficiencies produced by working with files helps news managers meet growing editorial demands by keeping new hires to a minimum.

"We've seen significant personnel savings resulting from our file-based workflow," Boles says. "Not only has it enabled us to do more and do it more quickly than before, but yes, there were a couple of tape editors whom we didn't need anymore simply because their primary job was simple tape playback on air. Those positions were phased out. It also has allowed us to take our tape editors and use them more for Internet maintenance because it simply doesn't take as long as it did before to do the work."

While maximizing efficiency is important, it shouldn't cloud the bigger picture, namely producing relevant, interesting content, Devlin says.

"I am just a content guy," he says. "I think the technology is great, and it helps us do what we do, but people don't watch technology. At the end of the day, if you have content that is interesting, you'll get an audience. Otherwise, it's moving tapioca pudding around efficiently. Tapioca is not very interesting to watch."

Content, not technology, must be in the driver's seat in order to thrive in these challenging times, he advises.

"We can digitize all we want," Devlin says. "We can slice it and dice it. We can go from 10 people to one person editing. But is what they are editing interesting? The audience is pretty indifferent to our process."

Content, not technology, must be in the driver's seat in order to thrive in these challenging times.

One way technology can assist in keeping content relevant and interesting is directly related to the Web, Boles says. Specifically, KLTV's Web site gives the news director a daily glimpse of what's important to viewers and helps him in his editorial planning and decision-making process.

"It certainly helps shape your editorial decisions," Boles says. "You are able to see a specific breakdown of how many page views you got for specific stories."

In effect, the Web is a feedback loop from viewers that has given the news director new insight into his audience.

"One of the things it has taught us is there are stories that transcend any regional appeal," Boles says. "We can have our local stories mixed in with the top state headlines, and if there's a dramatic story out of Houston, Dallas or San Antonio, on any given hour of the day, it can get more page views than our local content."

WBZ is taking this sort of viewer feedback to another level.

"One of our goals in our morning newscast is to literally start a dialog with viewers at the beginning part of the day," Kiernan says. "It starts with our reporting on interesting and important stories during the newscast, and having that dialog literally takes place during the newscast and after via new media in real-time via text messaging, blogging and Internet chats about those stories being aired."

Even though newsrooms increasingly are serving up content to the Web and mobile devices, on-air local television news remains their core product with the farthest-reaching impact on their communities.

Fade to black

Regardless of the challenges facing TV newsrooms, reporters, editors and producers shouldn't lose sight of the fact that today is an extraordinary time to be a journalis.

"I think this is probably the most exciting time in journalism," Bracco says. "I guess all times are exciting, but these are really exciting. There are so many opportunities for so many different types of journalists to be contributing to all of these different platforms. I think the journalists coming out now who embrace all of these new technologies are going to be the leaders down the road, and they will make the change easier." ■

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Remaining competitive

To continue being relevant to viewers, broadcasters must transform their newsroom workflows, free up resources, and focus on delivering more and better news.

Broadcasters don't have a choice if they wish to remain competitive in today's rapidly evolving media climate. They must implement more efficient workflows, free up resources, and focus their efforts on better serving their viewers and advertisers, says Dave Lougee, president of the Broadcasting Division of Gannett.

Lougee, who is delivering one of three keynote speeches at the News Technology Summit, organized by *Broadcast Engineering* and *Broadcasting & Cable* magazines Sept. 24-25 in Dallas, points out that the rise of broadband, the Internet and the evolving media consumption habits of the general public demand that broadcasters understand what their competitive advantages are and what they are not.

"In the past, so much of our business was built around our distribution, towers and transmitters. Having a license gave you an advantage in business that resulted from having a very valuable and unique way into the home," Lougee says. "As broadband gets ubiquitous, that opens up a whole new set of issues, relative to our distribution advantage. We continue to have an advantage, but we don't have the same hold on distribution that we once did."

To compete, TV stations must radically transform their workflows so they can allocate a higher percentage of resources to focus on serving their customers' needs.

"We need to have more resources dedicated to gathering and originating original local content or making direct local sales," he says.

Currently, too much labor and overhead cost are focused on back-end processes at the station that don't directly impact viewers and advertisers.

The Internet gives stations the chance to become hyper-local in their coverage, says Dave Lougee, president of the Broadcasting Division of Gannett.

"The technology is there for us to change that model relatively dramatically," he says, "but we have to face that as an industry."

On the news side of the station, that means a workflow that allows journalists to create stories seamlessly for the full range of today's distribution platforms. On the sales side, that means taking advantage of technology to streamline the sales process so more effort can be focused on getting in front of customers and less on paperwork back at the office, Lougee adds.

While technology offers a part of the solution, another critical piece is the willingness of personnel to adapt to changing demands on what they do stemming from these new workflows.

"I remember it wasn't that long ago that some of us worked in newsrooms that were both TV and radio newsrooms. Reporters at the time didn't think twice about filing a story for TV or radio. The same is true for whatever technologies become available in the future," Lougee says. "What we have in our newsrooms are journalists. We have to take advantage of that software and those desktop applications that make it possible for a much higher percentage of our folks to be putting out content."

Doing so will help journalists take advantage of the Internet to better fulfill a core broadcast mission, namely serving the local audience.

"What we define as local doesn't really line up with what the customer's definition of local is," Lougee explains. "As an industry, we define local as the reach of our transmitter and then how Nielsen puts a bow around what those transmitters reach."

Lougee points to the Washington, D.C., DMA as an example.

"Inside the Washington, D.C., DMA is the District of Columbia; Prince George's County, MD; Montgomery County, MD; Fairfax County, VA; Arlington County, VA; and a couple of others too," he says. "Those to some extent are different planets. That's a definition of local that only exists because of broadcast transmitters."

However, the Internet gives stations the chance to become hyper-local in their coverage. The key to making that happen, Lougee says, is using technology to transform workflows so that more resources are available to generate the relevant content that serves their communities. ■

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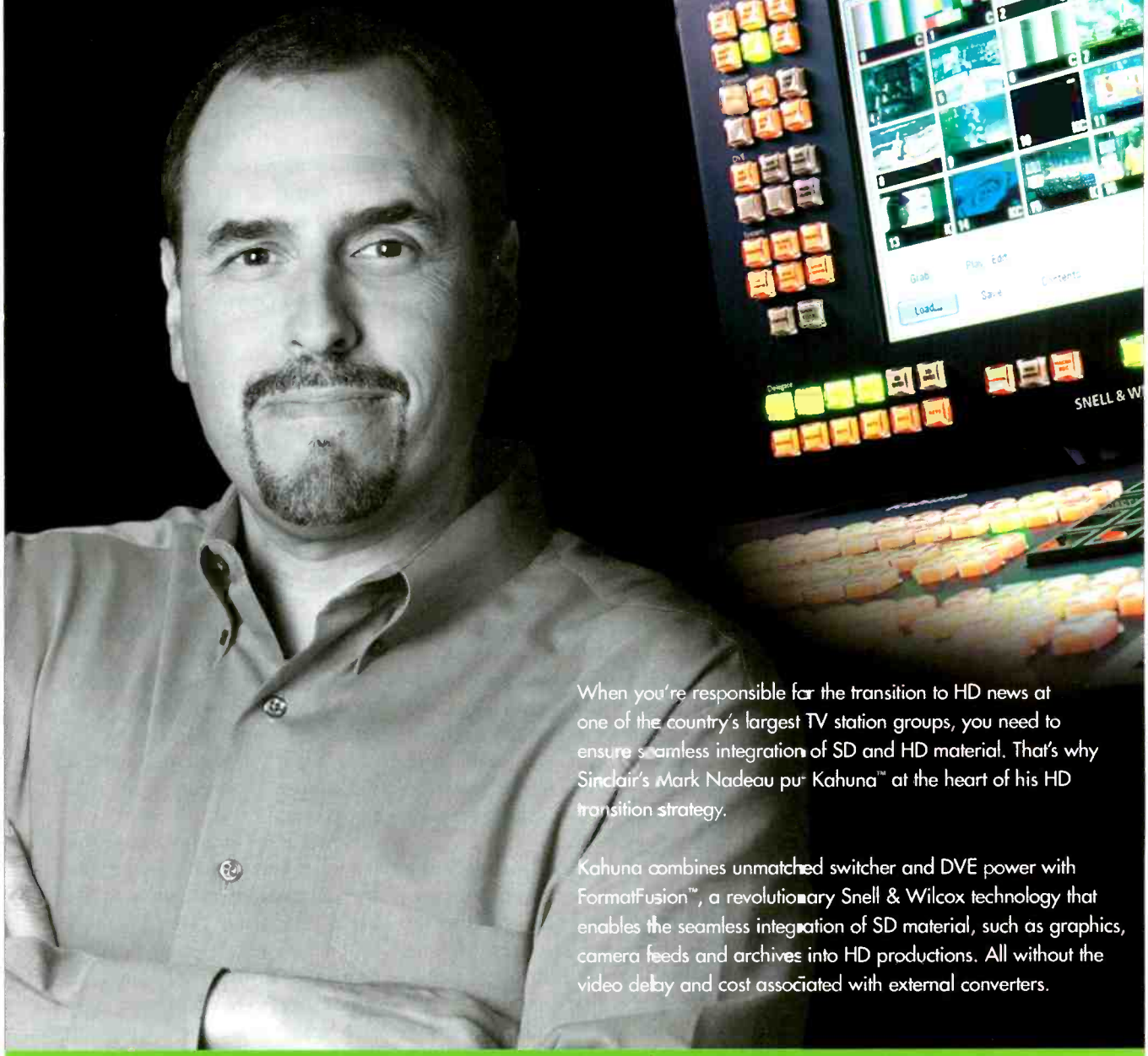
MARK NADEAU, SENIOR DIRECTOR
SINCLAIR BROADCAST GROUP



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Integrating technologies

The day of accepting technology-related glitches, especially those that could be prevented by open communications, has come and gone.

Andy Fisher, president of Cox Television, has a simple message for technology vendors: Open your systems, let them exchange data freely, and jettison any tendency to depend on proprietary technology that hinders the creation of harmonious, transparent workflows.

Fisher, who presented a keynote speech at the News Technology Summit produced by *Broadcast Engineering* and *Broadcasting & Cable* magazines Sept. 24-25 in Dallas, says the realities of today's television business preclude stations from accepting anything less.

"When you are betting entire enterprises on these multimillion dollar systems, it is just the height of frustration to have these glitches occur," he says. "The day is past when everything can be proprietary, because simply put, no machine is an island. There is something intrinsically paradoxical for equipment manufacturers to offer an item that has to sit in a workflow but then use proprietary linkages to do so. That's crazy."

While acknowledging that vendors have offered stations technologies that have improved workflows and created efficiencies in many forms, small and medium-sized stations too often are required to live with levels of integration among various pieces of technology that are unacceptable, he says.

"Good people are taking expensive pieces of equipment and still having problems getting them to talk with each other," Fisher explains. "It's one thing if you are doing this at home trying to get your wireless network to work. It's another thing if you just spent $3 million and are asking good people to try to put on a fine broadcast and have lots of machines that don't seem to talk the same language."

Even among the general public, patience is wearing thin with technology snafus, says Andy Fisher, president of Cox Television.

The day of accepting technology-related glitches, especially those that could be prevented by open communications, has come and gone. Even among the general public, patience is wearing thin with technology snafus.

"You don't have to look much farther than the Macintosh-Microsoft ad campaign to realize that frustration with technology that doesn't work is very much a part of public consciousness," he says.

In this respect, the television viewing public and television professionals share a common frustration when technology fails.

"The viewer just wants to push a button on the television and see a newscast," Fisher explains. "He does not want to push a button on the television and see a newscast where video doesn't work or where it's: 'Just a moment, we are rebooting.' That is the same level of frustration to the viewer that the operator feels when he writes a multimillion dollar check, and he gets machines that are talking different dialects."

That frustration also has contributed to unwillingness on the part of many TV professionals, including Fisher, to be technology pioneers who must grapple with the inevitable hiccups and headaches that accompany owning Serial No. 001 of any technology.

"The first adopters deserve our praise and our condolences," Fisher says. "While the magazines often feature those who are in magnificent, sparkling engineering centers or edifices, there is something to be said for being among those in the second wave after the first wave of technology adopters has fixed the bugs for you."

Yet, even after waiting to be part of the second wave, several years ago Fisher found his station at the time had a surprising amount of difficulties with machines not talking to one another.

However, he holds out hope that the worst may be behind the industry as it makes its transition to file-based workflows. The Broadcast Exchange Format (BXF), Material Exchange Format (MXF) and MOS offer reason to be optimistic.

"I see the current opportunity that is beginning to develop as one that is extremely positive," he says. "However, all of the vendors must recognize the critical importance of their various technologies truly integrating — not just in their advertisements, but also in the field." ■

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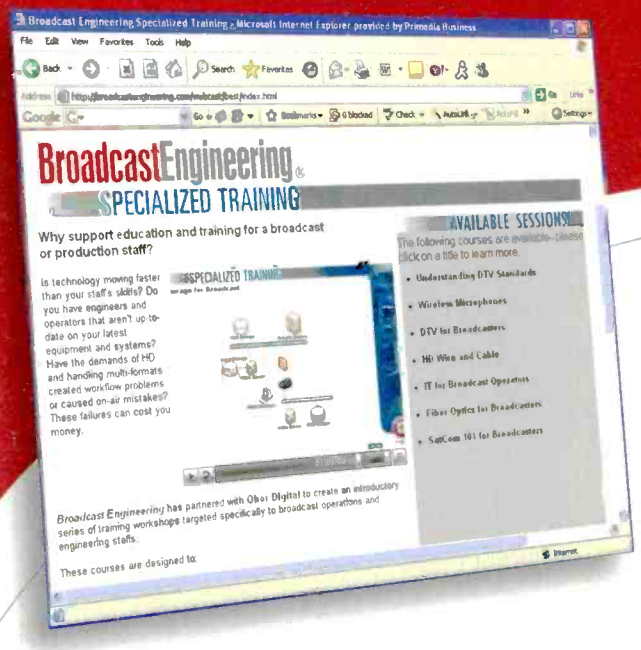

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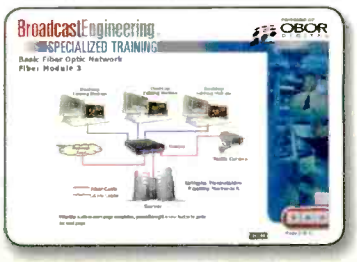

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In general, it is hard to beat semiflexible coaxial cable for the long cable run from the equipment room to the broadcast antenna.

Selecting transmission lines

BY MICK BENNETT

Rising from inside the transmission equipment room and reaching all the way to the antenna at the top of the tower is a vital link in the broadcast chain — the RF feeder or transmission line. There are various schools of thought as to what feeder solution is preferred out of three basic variants: semiflexible coaxial cable, rigid coaxial transmission line and rigid rectangular waveguide.

Each feeder option differs significantly in construction, electrical performance and maneuverability. And, no single solution is ideal in all cases. The challenge, therefore, is how to select the most appropriate feeder solution for a specific application.

Broadcast transmission sites display a wide range of electrical and physical requirements. Transmitter power levels can range from tens to hundreds of kilowatts. Depending on the length of the run and the frequency of operation, feeder insertion loss constraints can differ greatly, and other electrical parameters, such as VSWR, can assume different degrees of significance. Also, physical considerations, such as whether the feeder is located indoors or outside (or both), wind loadings and space restrictions, all come into play.

Finally, the installation periods associated with the three feeder options vary significantly and need to be factored into the selection process. Occasionally, one issue will be of such importance that it overrides other considerations.

The final selection, however, typically will be based on a combination of the various technical priorities and the associated cost impact. Let's look at different types of transmission lines and some key considerations.

Each feeder option differs significantly in construction, electrical performance and maneuverability.

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Coaxial cable

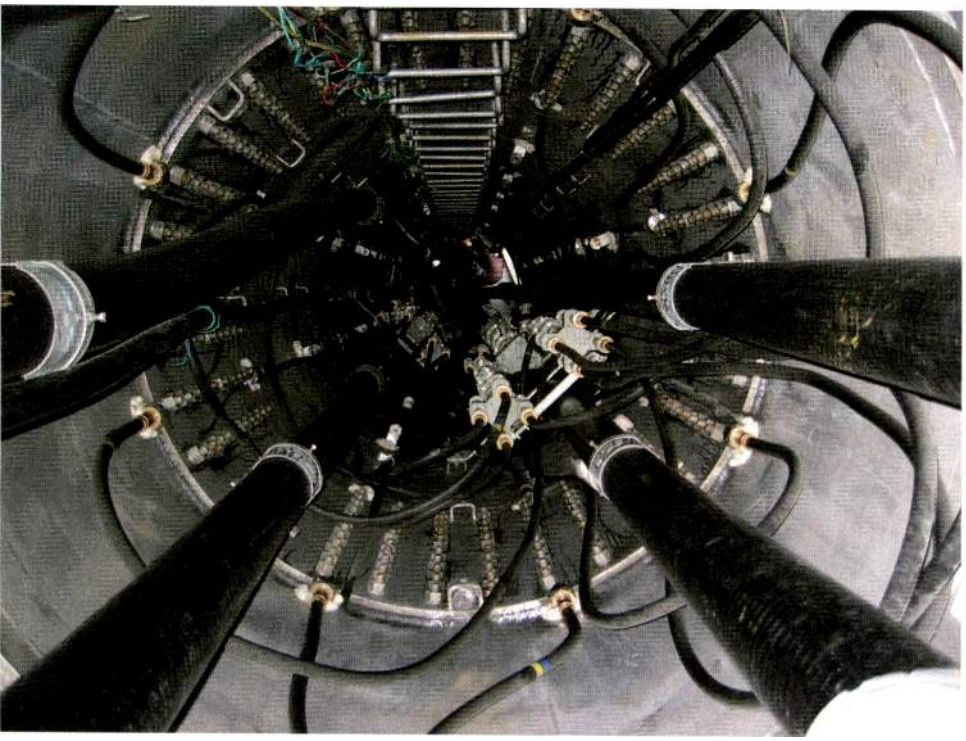
In general, it is hard to beat semiflexible coaxial cable for the long run from the equipment room to the antenna at the top of the tower. Although the historical convention in North America has often been to deploy rigid coaxial transmission line, coaxial cable has several advantages, particularly for outdoor applications.

The performance benefits attributed to using continuous coaxial cable include low loss and low VSWR. This is mainly due to the lack of points of connection, which would otherwise generate reflections. Sweeping bends in the feeder line are permissible and perhaps even preferred to straight lines. There are no 90-degree bends that can introduce reflections that may occur in rigid feeder systems.

Coaxial cables deployed for broadcasting applications often require relatively high-power ratings. To accommodate the heat that is produced, air dielectric coaxial cable construction may be preferred. At mid-UHF frequencies of 665MHz, 6-1/8in air dielectric cables are typically rated at 60kW. Higher-power versions, constructed with Teflon-based spacers between the inner and outer conductors, can accommodate powers of around 90kW. For lower-power applications, such as repeater sites or indoor routing of the signal between some equipment, foam-dielectric cables are a good solution.

For outdoor installations, an air dielectric construction requires the use of pressurization equipment to ensure the transmission line is effectively protected against water ingress. This can be handled with bottles of dry nitrogen or, if the line is quite long or leaky, a dehydrator.

The ease of on-site pressurization, and the general lack of significant ongoing maintenance, can add to the advantages of using semiflexible cable for the tower-top feeder run. With no mechanical joints along the length of the cable, the opportunity for air leaks is reduced. This decreases the need for regular maintenance of the pressurization system.



Semiflexible coaxial cable is easy to install.

A rigid view

The main alternative to semiflexible coaxial cable is rigid coaxial transmission line, or rigid line. Like conventional semiflexible air dielectric coaxial cables, rigid line has copper inner and outer conductors, separated by polyethylene spacers, with air as the main dielectric medium.

Unlike semiflexible cable, rigid line is installed in short straight lengths — typically up to 20ft — that are connected together at flanged joints with internal couplings to form the required transmission path. A 1000ft line would therefore have more than 50 mechanical joints. A large number of connections can make a rigid line installation prone to reflections and higher VSWR.

Despite this, many broadcasters still deploy rigid feed line to the antenna. Rigid coaxial transmission line has similar attenuation and power handling to feeder cable, but it is uniquely suited to deployment in tight spaces, where the minimum bend radius of cable is too great. Installation, however, is considerably more labor-intensive and time-consuming when compared with a flex cable. Each section of rigid line has to be hoisted for installation and then bolted to the tower using spring-loaded hangers, which accommodate expansion and contraction.

In contrast, semiflexible cable is installed in a single length using a process that is far simpler. A winch is attached to hoisting grips fitted to the end of the cable, which is then hauled up the tower, directly from the cable drum. The coax is then connected to the antenna and mounted on the tower with simple hangers or straps.

When comparing the installation times of the three feed line options, the rule-of-thumb is to allow two days for hauling and terminating coaxial cable. This compares favorably to a one-week allowance for rigid coaxial transmission line installations and two weeks for rigid rectangular waveguide.

High-power alternative

For higher-power applications of up to 200kW, rigid waveguide provides another RF feeder option. Comprising a rectangular aluminum waveguide cross-section, it is typically used as a single run to the tower top in place of a pair of parallel cables. Notwithstanding the lack of redundancy, the main advantage to waveguide, in addition to the power rating, is its remarkably low insertion loss. This is typically around 0.0007dB/ft, compared with values of 0.15dB/ft for 6-1/8in semiflexible cable, at the mid-UHF frequency of 665MHz.

The low insertion loss of rectangular waveguide, however, comes at a cost, both electrically and physically. Bandwidth and VSWR rigid-line performance are typically inferior to both coaxial cable and rigid line. Importantly for digital TV transmission systems, which are sensitive to nonlinear phase distortions, the group delay response of waveguide is also inferior. Additionally, installation and maintenance practices are far more complex, time-consuming and costly.

Even so, the most practical application of rectangular waveguide is for extremely long runs and/or very high powers, where minimizing insertion loss is of prime importance, and the reduced performance in other areas is regarded as secondary.

Rigid line indoors

Indoor applications, where pressurization is unnecessary, often rely on unflanged rigid line. This line is mainly used for RF connections between transmitters, filtering equipment, combiner chains and switch frames, and for the link to an external wall where the antenna feeder is connected. The transmission path often comprises short sections and multiple 90-degree bends. These applications are far more easily resolved with rigid line than semiflexible coaxial cable because of semiflexible cable's inability to handle small radii bending. This is especially the case where high powers (and accompanying large diameter cables) are concerned.

In indoor applications, where tight spaces mean tight bends, unflanged rigid line comes into its own.

The advantages are multiplied when space is at a premium. Using 90-degree and 135-degree elbows to achieve bends, unflanged rigid line is the most flexible option for tight indoor applications. Moreover, the unflanged rigid line is easily handled on-site. Once the various transmission path lengths have been determined, the rigid line is easily cut and joined, even in confined spaces.

Unflanged rigid line is the most flexible option for tight indoor applications. Moreover, it is easily handled on-site.

Joining the sections of rigid lines indoors is a simple process. Instead of a braised- or soldered-on flange, the join is achieved by means of a bullet-style inner connector and an external sleeve, held in position by hose clamps. If the system needs to be relocated as the transmission site grows and evolves, the connections are easily removed, adding an element of future-proofing to the installation.

Cable selection

Each of the above cable options has advantages in particular situations. The choice of which feeder solution to select is largely dependent on the transmitted power, space availability at the site, whether the deployment is indoors or out, and other project-specific requirements.

In general, however, a good rule-of-thumb is to consider using semiflexible coaxial cables for the run up the tower and rigid line indoors. Such a solution provides a good combination of features and benefits. It has the advantage of lower cable-to-tower mounting cost while still providing ease of installation in small transmitter room spaces. BE

Mick Bennett is global product manager, broadcast and defense systems, Radio Frequency Systems.

Panasonic's BT-LH1760

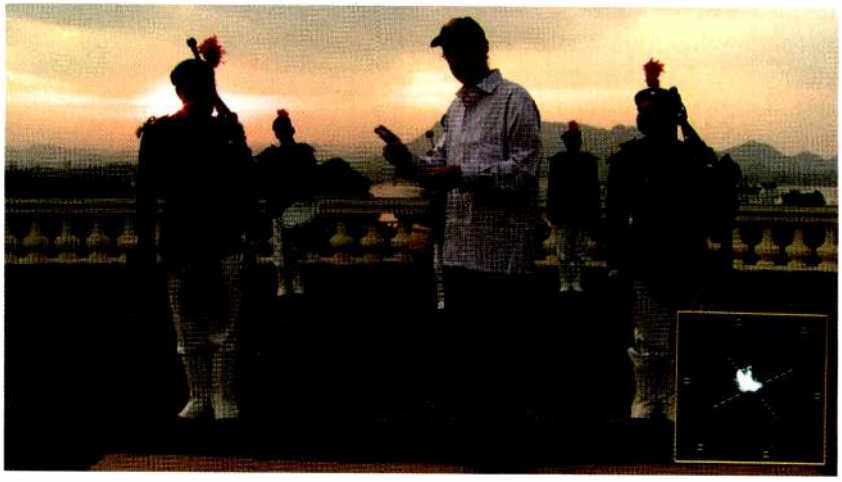
The LCD monitor offers CRT-level performance at a reasonable price.

BY BARRY BRAVERMAN

It's a noble thought to be sure — to see what we're actually doing. For shooters, one would think this should be a given in a business where seeing *is* everything. However, that apparently isn't the case these days. We will discuss to no end the relative merits of shooting 2K, 4K or even 6K resolution, but ask about something practical like the quality of a camera's viewfinder or monitor, and our eyes grow dim. Often it seems the *fantasy* of capturing great images is more appealing than *actually* capturing great images.

The Panasonic BT-LH1760 is the new workhorse for road warrior shooters with a keen sense of craft. On-screen audio meters have been added to the new model, along with a much improved viewing angle and blacks.

The truth is that when it comes to setting critical focus and back-focus, color accuracy, white balance and contrast, most of us are flying blind. Perhaps it is self-evident that accurate focusing of HD images requires an HD display, and the larger the better. After all, the shooter is at a major disadvantage peering at a 1.5in viewfinder or tiny swing-out LCD screen; audiences are likely seeing the same images on a large plasma display or otherwise projected at high magnification. It is truly troubling to think that our audiences have a clearer view of focus and color accuracy than we do.



The 1760 displays much better detail in a scene's brightest highlights. The built-in waveform/vectorscope provides additional feedback to avert clipping in these problem areas.

Seeing what we're doing

Panasonic's BT-LH1760 is one of the first reasonably priced LCD monitor to offer CRT-level performance. For years, many of us have used and appreciated the BT-LH1700; its ruggedness and good performance has earned a hallowed place in our daily toil and trusty travel kits.

The new 1760 exhibits noticeably better images overall than its lower-cost sibling, with much improved blacks especially apparent in challenging shadow areas. Achieving solid black has been the traditional bête-noire of LCD monitors, as the fluorescent backlight projected through a liquid film panel produced a murkiness that made accurate color and contrast assessment difficult, if not impossible, in the field.

The monitor reduces the blue cast in the shadows and murkiness by inserting a moment of black in the refresh cycle. This is a key advantage to doubling the panel's drive speed to 120Hz.

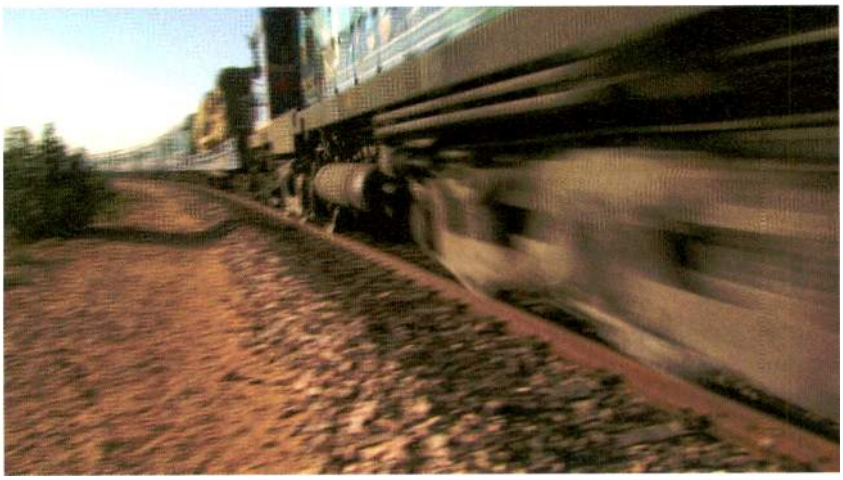
The improved blacks and pronounced reduction in motion blur are particularly evident when compared with traditional LCD displays using a frame creation strategy. For shooters, it is important to note that the picture hold in the 1760 is half

The truth is that when it comes to setting critical focus and back-focus, color accuracy, white balance and contrast, most of us are flying blind.

that of the 1700, so the rendering of fast action, especially in sports, is considerably smoother.

The monitor uses advanced In-Plane Switching (IPS) to improve the viewing angle and a 3-D LUT for each RGB color to improve color accuracy. This accuracy is enhanced by the monitor's 10-bit processing engine, which infuses additional detail into the LCD panel's 8-bit gamut. This detail can help represent scenes with very bright highlights, as may be the case when shooting interiors with hot exterior windows.

The 1760 inserts a moment of black in each cycle to ensure good shadow integrity and solid blacks.



The double-speed 120Hz display eliminates the after-image motion blur typical of most LCD displays. The improved smoothness is especially apparent in high-motion sports scenes and speeding trains.

So many new goodies

The improvements in the 1760 are considerable. The little used Y/C jacks have been eliminated, and in their place a headphone jack has (finally) been fitted. I would prefer a front-mounted headphone jack, but real estate is obviously tight in these units.

However, real estate is not too tight to preclude adding a DVI-D input for computer applications. This means a simple HDMI to DVI-D adapter cable makes this monitor accessible to the growing number of AVCHD cameras. Again, I would prefer a direct HDMI input, and I suspect this will be an added feature in the future.

Embedded audio is now standard in the monitor, simplifying output to powered speakers via a single BNC (HD-SDI) connection. Such a workflow enhancement may seem small at first glance but then seems suddenly more significant on a set where simplicity and fewer cables is often the key to successful coping.

Speaking of simplicity, the cooling fan has been eliminated, reducing potential noise and power consumption. Film_Rec gamma, pixel-to-pixel and split screen modes are easily accessed from the front panel's five function buttons, and eight channels of audio are now supported via an array of on-screen level meters.

Conclusion

Seeing what we're doing shouldn't be the stuff of intrigue. Like driving a car on a busy thoroughfare, we shoot-

Seeing what we're doing shouldn't be the stuff of intrigue.

ers need to see clearly and accurately where we're going. With the advent of HD and higher resolution cameras, it's never been more critical to see precise focus and color.

High-definition magnifies everything we do. Along with the greater desired picture detail comes also greater visibility of our images' shortcomings. With focus, color balance, exposure and chromatic aberration in our lenses, we need an increasingly sophisticated monitor like the BT-LH1760 to see it all — or at least see as much as our viewers are seeing. **BE**

Barry Braverman is a veteran cinematographer. His latest book, "Video Shooter," is available from Focal Press/Elsevier.

Camera imaging

New electronic sensors can provide benefits beyond just higher resolution.

BY JOHN LUFF

Capturing images has always started at the most elemental level — in fact, all the way to elemental particles. For nearly 200 years, chemical photography relied on the effect that photons have on chemical bonds. Moving pictures were no different. They were just a series of short exposures played in rapid sequence, but still captured the same way. The fact that the camera shutter is open only a brief time is a form of sampling, averaging the image over the length of the exposure.

Modern camera sensors

Although we might want to think of modern and highly sophisticated electronic cameras as fundamentally different, they still rely on the effect that photons have on a sampling medium. The big advantage of electronic sensors is that they don't require out-of-camera processing to access the latent image. Instead they extract the image, erase the sensor's memory of the previous integration period and get ready for another image, all in a pretty short period of time.

This quantum conversion is critical to practical imaging. For decades, chemists worked to make better emulsions for motion picture film, with great success. The best films are both sharp (which one might think of as sensor density) and sensitive (quantum efficiency). Of course, the chemistry is much more complex than we mere mortals can understand, as the shape and size of the grains of emulsion have a huge effect.

In electronic sensors, the chemistry is no less complicated, and the physical arrangement of the cells in an array sensor can greatly affect the way the visible light is converted. Just like film, it is integrated over an exposure period, though the light is never interrupted by a mechanical shutter. Unlike film, which produces essentially a continuous frequency spectrum and falls at higher spatial frequencies, electronic sensors have discrete sample positions in regular patterns. This gives rise to interference with the content being sampled. To prevent aliasing, low-pass filters are inserted ahead of the sensor.

Thomson Grass Valley uses a Xensium CMOS sensor chip in its Infinity camcorder.

Even more interesting, film is inherently resolution-independent. It works at SD and HD resolutions, set as much by optics as anything else. Electronic sensors are optimized for one resolution, though interesting approaches allow processing groups of cells into virtual pixels, even if they did not exist on the physical sensor. Thomson, for example, uses a sensor in some of its cameras that is 1920 x 4320. By grouping cells vertically in groups of four, it can get 1080 lines (4320 divided by four). By using groupings of six vertically, it can get 720 lines (4320 divided by six). Of course, horizontally it needs to combine cells from the 1920 to get the 1280 needed for 720p images (not a neat integer number at 2.666) while maintaining aspect ratio, but the concept is quite clear.

What happens to the low-pass filter in such a circumstance? Seemingly, it cannot be optimized. In reality, however, the number of original samples has not changed, and any filtering needed to correct the image data can be done as part of the management of the combined pixels in the signal processing and scaling. This moves the issue from the physical domain to the abstracted electronic domain.

Television camera sensors need to store photons — actually, they are electrons representing the photons that collided with the sensor. Those need to be transported back to signal electronics, which we often assume are digital in modern cameras. But fundamentally, television cameras are analog devices with digital signal processing on the tail end of the sensor.

This arises directly out of the analog nature of the light and the lenses used to capture the scene.

We choose to process digitally for all the right reasons, including the flexibility it offers and the ability to transmit the image over long distances without degradation. Doing so with HDTV signals in an analog format would limit high-quality links to a few dozen feet, and maintaining quality would be nearly impossible compared with digital plants. But inside the front end of cameras lurks an analog core.

Amazingly, modern cameras have become so ubiquitous that HD cameras for POV applications now cost less than $2000 with an integral lens. Chip sizes are even more of a shock in today's camera systems. Sensors vary from barely 1/6in to a full inch in size and even larger for some D-cinema cameras. Barely a quarter goes by without a new format's introduction.

Image quality is so good in high-end applications that the limiting factor is no longer the sensor or the electronics behind them, but rather the optics in front of them. Simply put, diffraction-limited optics cannot match the capabilities of some of the cameras they attach to today. As cameras continue to improve in performance and features, optics will become even more expensive as optical engineering is reaching the point of diminishing returns from development.

Transmission distances now can count in kilometers instead of the meters available seven decades ago, with no change in signal quality.

Interconnection

Also affecting modern camera systems is renewed interest in interconnection strategies. At the World's Fair in 1939, when David Sarnoff kicked off the first demonstration of live television in a public venue in North America, the interconnection was a few dozen wires with complex signals driving the scanning of the image tubes directly. By the 1970s, the number of conductors was up to 81 for a color camera and 101 for some cameras made in Europe, carrying extremely high voltages.

A huge improvement came with the introduction of triax cameras, allowing a simple connector and camera cables of thousands of feet without degradation. But HD cameras make triax a difficult proposition. With the introduction of the standardized SMPTE 311/304 fiber camera cable and connectors, much was gained.

Transmission distances now can count in kilometers instead of the meters available seven decades ago, with no change in signal quality. Even HD viewfinder return signals are practical because of the ability to send standardized digital HD signals over standardized media. One might ask if compression will ever become so good that we can transmit a camera's pictures in compressed format with lower bandwidth, while at the same time wondering how we will achieve interconnection of the 8K cameras now in early development for D-cinema and other purposes. BE

John Luff is a broadcast technology consultant.

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

Carl Zeiss +0.5 DigiDiopter — Band Pro

Magnification lens is designed to work in conjunction with DigiPrime and DigiZoom series as well as other professional 2/3in HD lenses; attaches to the front of the lens for increased close-focus range and magnification capability; employs an achromatic dual-lens assembly to minimize color fringing and spherical aberration; features antireflective coating to reduce light loss and flare while improving transmission for crisp images with saturated colors and accurate blacks.

+49 89 9454849 0; *www.bandpro.de*

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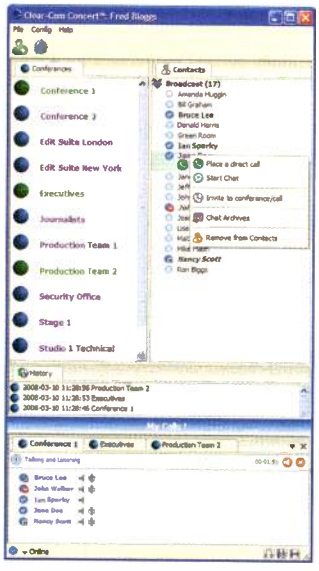

Communications system establishes a single communication environment for traditional and IP intercom users; links to the Eclipse Matrix Frame with an E-Que IP card over Ethernet; can provide backup communication to the Eclipse by connection to an E-Que IP card; introduces a new user interface that includes an Eclipse panel view, offering users the ability to participate in Matrix communications from any Windows PC with a network connection, including over the Internet.

510-33-6600
www.clearcom.com

LiGHTBoX — MultiDyne

Fiber-optic field transport system designed for field and harsh environment applications where battery-powered equipment is required; can be linked via tactical fiber cable to the company's DVM-2500, HD-1500, HD-3000 and HEMC-4000 transmitters; is fully customizable to offer virtually any signal compilation; offers support for HD, NTSC, audio, Ethernet and data.

516-671-7278; *www.multidyne.com*

eyeCon — Eyeheight

Web-based system controller allows PC-based control of any module in the company's FB-9E Ether-Box platform; features integral diagnostics that provide instant assurance that the module under interrogation is fully operational; allows device communication and control via intranet or Internet, giving the ability to check a compatible Eyeheight product anywhere in the world via TCP/IP link.

623-328-5800
www.eyeheight.com

LV5330 — Leader

Waveform monitor features a 6in integral XGA TFT screen that makes the unit appropriate for on-camera operation; measures 8.5in x 5in x 2.5in; weighs 2.9lbs; can be operated from mains via optional universal power supply or from a 12V battery (V-Lok or Anton Bauer); power consumption is 18W; display panel is framed on three sides by clearly labeled push-button function selectors, three rotary adjustment control and a forward-facing USB interface; dual auto-detecting HD/SD-SDI inputs and a switched output are incorporated.

800-645-5104; *www.leaderusa.com*

XStream — EditShare

Shared-storage, collaborative workflow solution for DI and broadcast workflows; each 16-drive chassis processes more than 1Gb/s; allows users to combine multiple XStream chassis to match the needs of any large-scale production workgroup or high-bandwidth content creation facility; provides an open environment for creative teams to share media regardless of application and platform; supports large numbers of SD and compressed HD video streams or multiple streams of uncompressed HD or 2K video.

617-782-0479
www.editshare.com

NEXIO AMP 2.0 — Harris

3Gb/s-ready broadcast server features increased processing power and great I/O density; supports four HD video I/O channels; capable of ingesting and playing out 1080p signals; media applications include NEXIO AMP Logo, an on-air branding system that allows each playout channel on NEXIO AMP to feature unique graphic elements and animated sequences; other applications include NEXIO AMP ChannelView, a multiviewer I/O monitoring application, and NEXIO AMP Track Editor, an audio track and captioning metadata manipulation tool.

800-231-9673
www.broadcast.harris.com

IntegrityCS Series — QuStream

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416-385-2323
www.qustream.com

RFX-PRX-II — RF Central

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717-249-4900
www.rfcentral.com

integraSuite — iStor Networks

Management interface eliminates the requirement to manage individual RAID groups and their LUN configurations; presents a pool of storage that is easily carved up into individual customized volumes, reducing administrative, support and other operational costs; supports multiple RAID levels across drives; facilitates flexible storage configurations by managing integraStor's storage virtualization engine, which can fully use all drive capacity in a pool of mixed drive configurations.

888-984-7867; *www.istor.com*

Unity 4600 — Wegener

Satellite media receiver now supports next-generation DVB-S2 satellite demodulation as a standard feature; with its advanced coding and Forward Error Correction (FEC) options, DVB-S2 modulation provides broadcasters with the ability to manage inclement weather, satellite service provider limitations and bandwidth consumption; includes built-in analog, digital A/V and ASI outputs.

770-814-4000
www.wegener.com

TG700 — Tektronix

Upgrades to the TG700 modular multiformat precision video signal generator include the addition of 1080p SDI signal generation on a single link; this capability was added through the new 3Gb/s HD3G7 module, which supports both Level A and Level B 1080p SMPTE formats; provides an upgrade path for those who wish to purchase a signal generator now but add 3Gb/s outputs at a later date.

800-833-9200; *www.tek.com*

TRU-CUT IR-750 — Schneider Optics

Camera filter removes the infrared spectrum from the light path before it reaches an HD camera's sensors, resulting in more vibrant colors and true black tones from both CCD and CMOS sensors; maintains a high modulation transfer function in the visible spectrum; its coating meets or exceeds military standards for durability.

800-228-1254
www.schneideroptics.com

MicroClyps — Chyron

HD/SD switchable graphics server offers instantaneous clip recall and playout for live production applications; can be configured as either HD or SD, each with synchronized audio, video and key outputs and a built-in keyer for compositing clips on program video; uses wavelet compression technology and selectable compression ratios to provide high-capacity storage and reliable playout of channel branding, promos, snipes and bumpers; more than five hours of HD and 15 hours of SD online compressed video/key content can be stored on the system.

631-845-2051
www.chyron.com

HVR-Z5E — Sony

HDV camcorder features a fixed G Lens system, native progressive recording capabilities and increased sensitivity for low-light conditions; uses Sony's new 1/3in ClearVid CMOS sensor system enhanced by Exmor technology; Exmor technology features a column-parallel analog-to-digital conversion technique and dual noise canceling, resulting in high-quality digital signals with low noise; G Lens incorporates Sony's optical design and quality control and has been optimized to complement the camcorder's advanced image sensor and image-processing technology; offers a wide 29.5mm angle lens and new 20X optical zoom.

201-930-7330
www.sonybiz.net/hdv

OTOT-EM55X/OTOT-EM55XL — Olson Technology

External modulation transmitters allow analog, QAM and digital CATV signals to be transported over distances exceeding 200km at bandwidths up to 1GHz and features two usable outputs; high-performance model XL is available with DWDM capability that can be tuned to +/-1 ITU DWDM channel via front-panel controls, offers bandwidth up to 1GHz and includes adjustable SBS suppression from +13dBm to +19dBm.

209-586-1022; *www.olsontech.com*

Micro-Sun Gun X2 — Frezzi Energy Systems

Ultra-compact, camera-top HMI light has nearly twice the brightness and battery life of the original; features a dual-power switchable ballast, 1000+ lumen lamp, rapid-on function, 5500K color balance; high CRI color rendering, high-performance heat sink, specially designed optics for 80-degree beam angle for HD and break-away power system for multiple power options.

973-427-1160; *www.frezzi.com*

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Ideal candidate will possess a minimum of 5 years of Broadcast Engineering project management, experience with digital and analog HD / SD Broadcast Audio, Video and Control Systems, including Video Servers, Automation, Media Asset & Archive Management, Graphics & Editing Systems, Satellite & Terrestrial Transport Encoding and Encryption, thorough working knowledge of MS Windows application environments including MS Office, MS Visio, MS Project. Full AutoCad 2000 to 2007 experience, strong mathematical, written and verbal communication skills, ability to work flexible hours and willingness to travel a must. Degree in engineering field(s) a plus

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REQUIREMENTS:

- 5 years experience in television broadcast facility
- Has UHF TV transmitter and microwave experience.
- Is able to multitask under pressure.
- Demonstrates strong interpersonal skills and the ability to interface with all departments.
- Understands FCC rules and regulations.
- Is willing to work days, nights or week ends, as circumstances require.

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541 North Fairbanks Court, Suite 1100
Chicago, IL 60611
Fax: (312) 467-5848
E-mail: **avelazquez@univision.net**

Help Wanted

CHIEF ENGINEER

WANE-TV is seeking a Chief Engineer to assume the responsibility for the technical facilities in Fort Wayne, IN. Position involves technical planning, project management, staff development, and administrative functions. This is a department-head level position that requires close interaction with other departments and the ability to effectively present information and respond to questions from managers, clients, customers, and general public. Candidate must be able to prepare and administer capital and operating budgets for technical facilities and ensure station compliance with all FCC and OSHA regulations. The ideal candidate will have an extensive knowledge of TV broadcast station systems and integration in a progressive media environment. Broad RF experience is necessary in areas including broadcast, microwave, and satellite communications. Practical knowledge of electrical, plumbing, HVAC and basic construction techniques are important. Candidate must be able to design, install, and document new systems as we progress through high definition production and pursue new media avenues through digital distribution. Technical degree in Electrical Engineering or related field or equivalent level of experience. SBE Certification is preferred. Candidate must have 5+ years experience maintaining modern broadcast equipment. No phone calls please. Send resume to: Alan Riebe, Station Manager, WANE-TV, 2915 W. State Blvd., Ft. Wayne, IN 46808. WANE-TV is an Equal Opportunity Employer-M/F

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Editorial Director: Brad Dick, brad.dick@penton.com
Editor, World Edition: David Austerberry, editor@broadcastengineeringworld.com
Managing Editor: Susan Anderson, susan.anderson@penton.com
Assoc. Editor: Collin LaJoie, collin.lajoie@penton.com
Assoc. Editor: Angela Snell, angela.snell@penton.com
Assoc. Editor: Spring Suptic, spring.suptic@penton.com
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Marketing Dir.: Kirby Asplund, kirby.asplund@penton.com
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Penton Media, Inc.
249 West 17th Street
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Chief Executive Officer: John French, john.french@penton.com
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emily.kalmus@penton.com

INTERNATIONAL

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Fax: +44-1295-278-408
richardwoolley@btclick.com

Israel
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Talbar Media
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talbar@talbar.co.il

JAPAN
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mashy@fa2.so-net.ne.jp

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Content is king

Reverse compensation will not overcome the shortcomings of ineffective programming.

BY ANTHONY R. GARGANO

Put the financial geniuses in charge of the asylum, and they will invariably come up with the worst of ideas that favor short-term, bottom-line results. Of course, this all comes at the risk of the long-term fiscal health of the enterprise. Still in the process of swallowing the one-time financial elephant that the DTV transition has been for local stations, the financial wizards at one major network now want to wreak utter havoc on their affiliates by levying a new fee on them for programming.

Fix what needs to be fixed

Such unthinking reminds me of a meeting I had some years ago with a then new senior network exec who was a financial manager, brought in from outside the industry and placed in complete charge of a major network's engineering and operations groups. At that first meeting, he explained he couldn't understand why master control had to spend thousands of dollars for monitors when they could simply go out and buy television sets that were so much cheaper. Responsible at the time for a major manufacturer's broadcast equipment business, I knew we now had an important new challenge to tackle!

I am also reminded of what was the now extraordinary destruction of an iconic American company, Pan Am. When the company got into financial difficulties, it began to sell off assets. It sold its half interest in Falcon Jets, its landmark Pan Am building headquarters in New York City and its luxury InterContinental Hotels chain. Ultimately, it began to sell off routes and then aircraft. Each asset sale brought an inflow of cash, and each inflow of cash was squandered on areas other than fixing structural problems. The outcome was a sadly predictable, ever decreasing, downward spiral into oblivion. The simplistic moral from that classic business disaster is to recognize what it is that really needs to be fixed, and fix it.

Deliver the content, and they will come

But back to the issue at hand. Where would the affiliates be expected to find the funds to all of the sudden begin paying this network programming fee? By increasing advertising rates in the middle of an economic downturn? I don't think so. More likely would be a discussion of seeing how much more can be cut out of engineering's budget — along with everyone else's budget — and cutting head count at the station.

The life blood of a broadcast enterprise, station or network is advertising revenue. Advertising revenue rises or falls with the numbers of eyeballs that are confirmed as having viewed the message. Clearly, the number of delivered viewers is a function of two things: the desirability of the content within which the messages are interspersed and maximizing the distribution coverage for that content.

The partnership equation between network and affiliate is content on one side and distribution on the other. It would seem that the network's part of this bargain is to try to produce programming that generates ratings better than fourth place out of the four big networks. Several years' worth of consistent last-place ratings do not make for robust ad revenue generation. So, instead of looking to affiliates to make up any perceived revenue shortfall, perhaps the focus of the network needs to be a bit more introspective.

At this writing, NBC has just come off one of its most successful Olympics ever. NBC's ad revenue for the Olympics telecasts soared well beyond $1 billion. Ratings were at record levels; in excess of 200 million viewers watched the network's coverage of Beijing's closing ceremony. And, despite a major commitment to alternative distribution, NBC's own audience measurement activity determined that 90 percent of Olympics coverage viewing was television viewing.

This all proves the tried and true adage that content is king. Deliver the content, and they will come — a lesson learned long ago by any programming department. No amount of reverse compensation will overcome the shortcomings and inadequacies of ineffective programming. If you are on the content side of the equation, improving ratings by fixing the content — rather than imposing fiscally punitive actions against your distribution partners — will help the bottom-line problem.

The affiliates have certainly lived up to their side of the partnership by provid ing their part of the bargain — distribution. More recently, maintaining that side of that bargain has placed incredible strains on the engineering and capital budgets of the stations' community. If reverse compensation is going to be added to the financial equation that includes network compensation fees and affiliate fees, then how about another new one? Time for a distribution fee? BE

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

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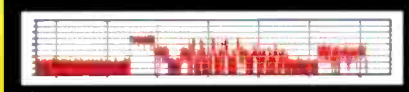

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