OCTOBER 2006

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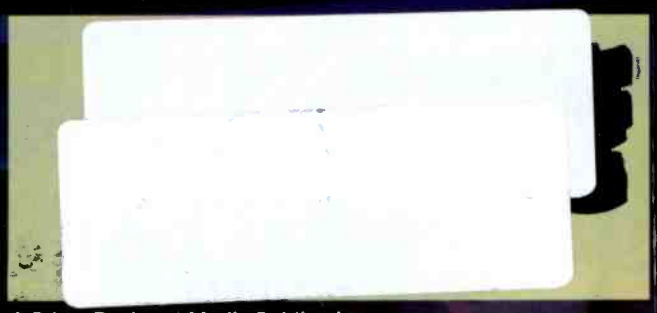
HD NEWS STUDIOS

The news never looked so good

CBS EVENING NEWS *with Katie Couric*

CBS NEWS



A Prism Business Media Publication

ALSO INSIDE:

NETCASTING
TV over IP isn't broadcasting ... yet

CHARTING CAMERAS
Improving a handheld's performance

COMPRESSION PLATFORMS
MPEG-4, Win9, H.264: Confused?

THE POWER OF 10GigE
Lightning-fast connectivity

D-12: Compact Enough for OB
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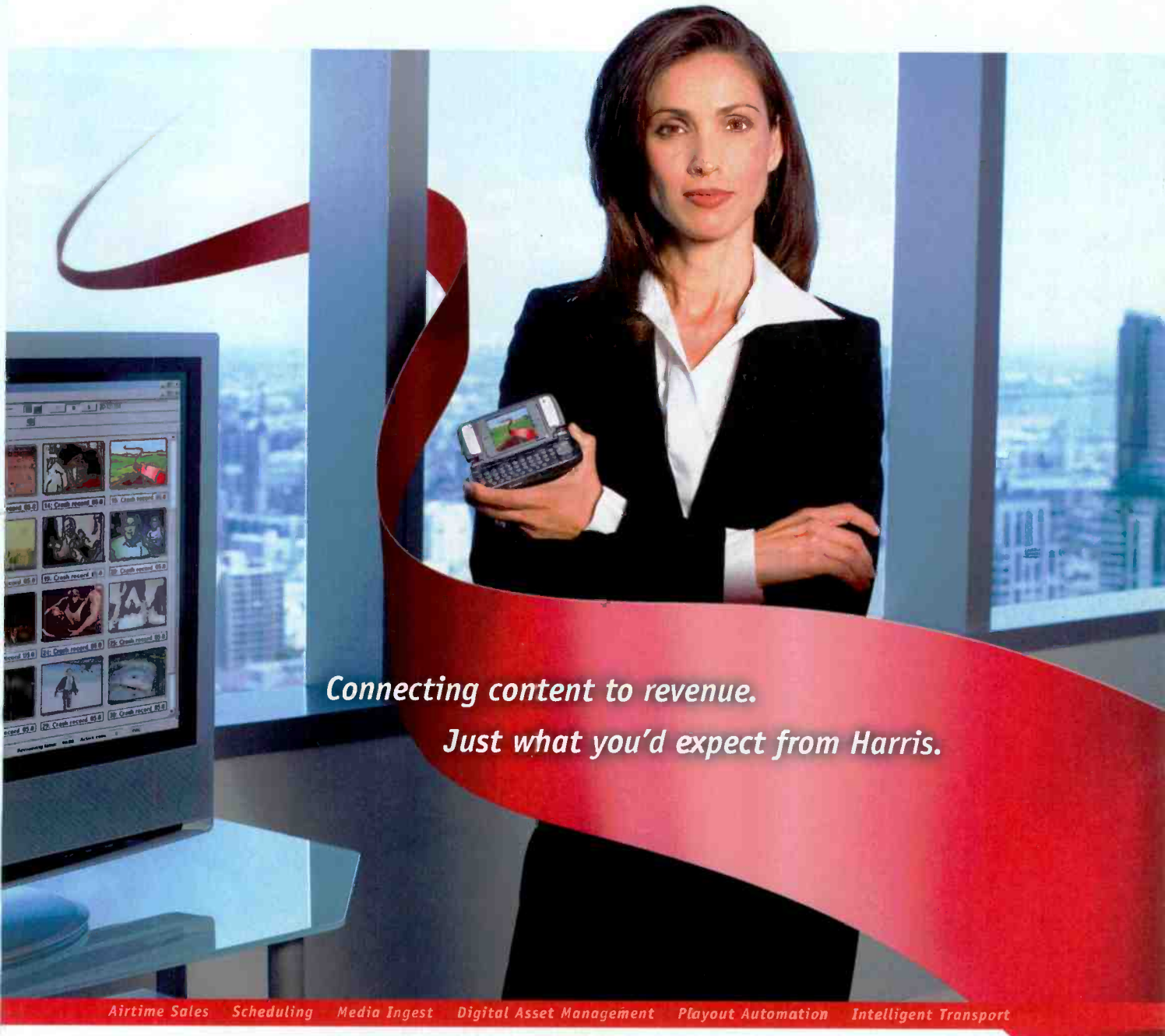

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DOWNLOAD

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TRANSITION TO DIGITAL

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PRODUCTION CLIPS

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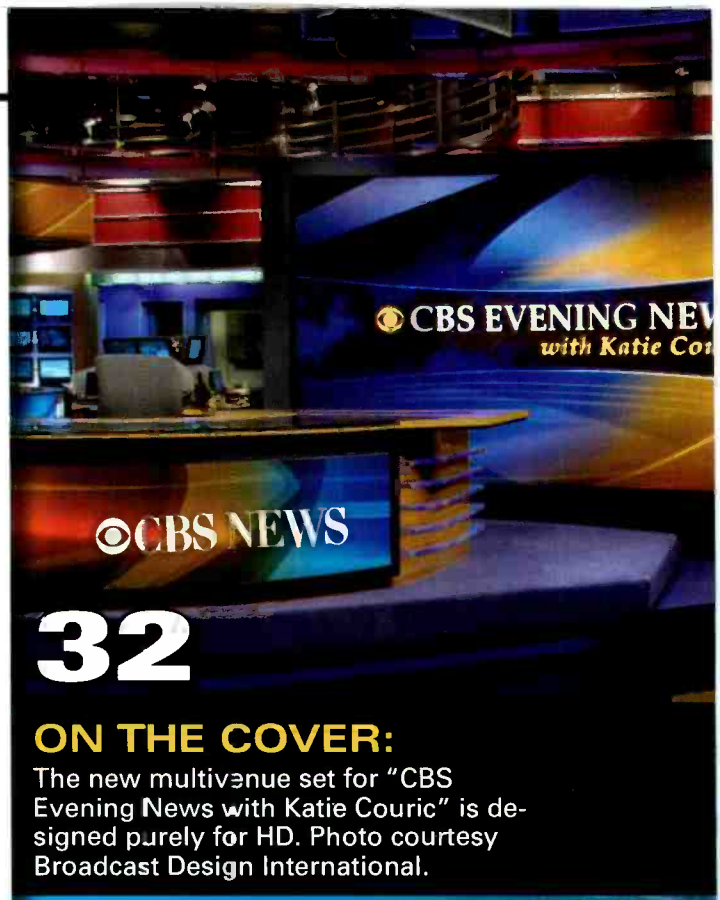
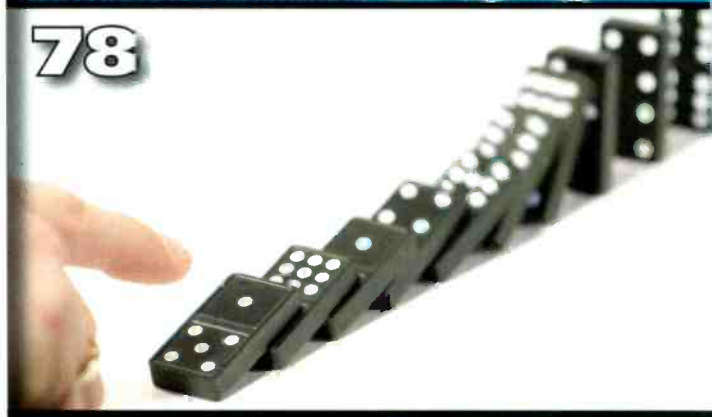
THIS MONTH'S FREEZEFRAME QUESTION

1TB disk drive will provide approximately how much actual storage capacity when installed into a computer? Disregard any difference between raw and formatted capacity.

The question comes from Al Kovalick's new book, "Video Systems in an IT Environment." Readers submitting winning entries will be entered into a drawing for *Broadcast Engineering* T-shirts. Enter by e-mail. Title your entry "Freezeframe-October" in the subject field, and send it to: editor@prismb2b.com. Correct answers received by Dec.1 are eligible to win.



ON THE COVER:
The new multivenue set for "CBS Evening News with Katie Couric" is designed purely for HD. Photo courtesy Broadcast Design International.



Amazing color reproduction - Broadcast-quality gradation, split-screen freeze-frame for scene comparison, color space conversion and different color temperature settings are a few of the ways Panasonic HD mon tors let you achieve true color matching.

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BT-LH1700W - 17"

BT-LH900A - 8.4"

Panasonic ideas for life

For more information visit www.panasonic.com/broadcast or call 1.800.528.8601

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TECHNOLOGY IN TRANSITION

NEW PRODUCTS

DEPARTMENTS

JUNE'S FREEZEFRAME ANSWER

Q. MPEG-4 compression is frequently described as an _____-_____ compression method where an _____ is any part of a picture and can be assessed and processed independently.

A. object-based, object

JUNE WINNERS:
No winners

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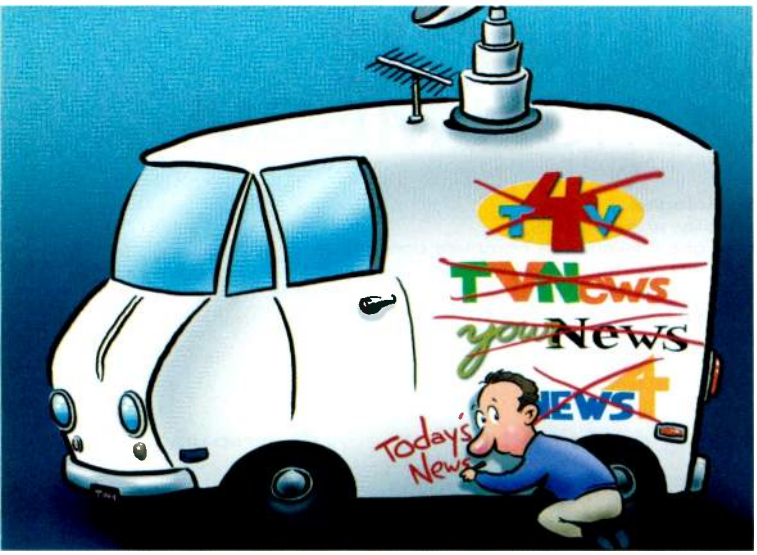
Changing labels

I was surfing around on cable television the other night — just looking to see what was on, comparing different channels. Then I began thinking about how things have changed since early television.

My first TV set received only one station — channel 8, I think — and was black and white. When my family moved to another city, we could receive three channels — 3, 10 and 12. Three TV channels — wow! I thought television couldn't get any better. We could view three TV stations, each carrying a national network. What more could a viewer ever want?

Fast forward to today. I have more than 300 cable channels. All of them are color, and 20 are HD. And if all this



linear delivery isn't enough, there is pay-per-view, video-on-demand, and premium sports and movie channels. I can spend a half hour just flipping through channels, looking for something to watch. Talk about interactive television.

In addition to the quality and quantity of broadcast television, something else has changed. OTA broadcasters are no longer "channels." Today's broadcasters must support both analog and digital transmitters, each operating on a different RF channel. Should a station call itself "Channel 4" because it transmits analog on RF channel 4, or should it be "Channel 12" because it broadcasts digital on RF channel 12?

In addition, though many broadcasters might not want to think about it, perhaps 85 percent of their audience doesn't get their programming from those expensive transmitters anyway, but instead from cable. For them, the TV station's "channel number" means even less. Cable and satellite viewers may flip to 12 to watch OTA channel 4. If most of your viewers see you on cable channel 213, why would you promote yourself as "News 4"?

Let's rethink how stations should brand themselves. Station WCBS-TV, channel 2, in New York might become WCBS, or just CBS. Who cares what RF channel a station uses any more?

Plus, viewers increasingly expect to consume their TV programs on multiple platforms, including the Web, portable viewers like iPods or Zunes, and perhaps even cell phones. None of these devices recognize OTA channel numbering. These factors combine to make a station's OTA channel number almost meaningless for branding

Some of you may remember when phone numbers began with a two-syllable name preface. Examples include Murray, abbreviated MU; Whitehall, WH; and Stetson, SS. A five-digit number followed these letters. The abbreviation stood for numbers on the telephone dial. Murray's MU was for 6 and 8. Whitehall's WH was for 9 and 4. That's why telephones dials were marked with numbers and the alphabet in the first place, as surprising as that may be to the text-messaging generation.

In the late '60s, alpha prefixes were dropped and replaced with the matching numbers. Whitehall 3-7446 became 943-7446. The phone number didn't change — only what we called it. It'll be the same for broadcasters.

A reader once signed his letter to me with something like, "WZYZ-TV, CBS News Center 4, Springfield." The station was clearly trying to identify itself in as many ways as possible — possibly too many. Soon, branding will need to market to the core image of a station, not just the station's OTA channel number.

So, next time the ENG trucks need painting, think about using cheap paint. You may have to change that station logo sooner than you think.

Brad Dick

EDITORIAL DIRECTOR

Send comments to: editor@prismb2b.com

HD + SD simulcasting graphics from one box

Vertigo XG represents the ultimate channel branding and production graphics processor for HD/SD simulcasting. With integral up/down/cross conversion plus dual outputs for HD and SD, your programming can be converted and then independently branded in HD and SD, without aspect ratio compromises. A single playlist drives HD and SD outputs, streamlining operations and reducing costs. Additionally, the Xmedia Suite workflow tools make it easy to create, manage and playout dual resolution, template-based graphics. So for a simpler simulcasting solution, call Miranda.

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FOR THE CHANGING FACE OF TELEVISION

Monitor walls

Dear John Luff:

I need to install a monitor wall. Can you send me a list of monitor wall manufacturers? Also, do these processors combine both video and VGA signals? Do the processors provide multiple outputs that can be configured independently? What is the maximum resolution available?

Ravi Saksena

John Luff responds:

I hope my June 2006 *Broadcast Engineering* article on monitor walls was informative. As a matter of policy, my articles contain few, if any, specific references to manufacturers or products. Naming any individual company without including all companies would create a problem that I am sure you can understand.

However, the *Broadcast Engineering* Web site has a Digital Reference Guide that will allow you to identify key manufacturers. The Guide is organized by equipment categories and is available online at *www.bedigitalreference.com.*

This link will take you directly to the video monitor wall category: *www.bedigitalreference.com/Video_walls_a459dd6c/page_2.html.*

Make sure to read the December 2006 issue of *Broadcast Engineering,* which will include an updated Digital Reference Guide.

IT training for engineers

Dear Brad Gilmer:

As an avid *Broadcast Engineering* reader and vice president of technology at my company, I always read your articles about IT and network technology with interest. With the rising tide of IT-based technology in our industry and the need for engineers and techs to handle and even embrace it, some retraining seems necessary.

I know there are schools in most cities, mine included, that offer certification programs and a variety of classes, some even online. But it's hard to know how these classes might be useful in our field. What formal training would you recommend for television engineers who want to establish a good, firm footing in the world of IT and network administration?

Ed Fraticelli
PMI

Brad Gilmer responds:

A great starting point is Al Kovalick's new book, "Video Systems in an IT Environment," published by Focal Press. (For more information about the book, visit *www.theavitbook.com.*) This is the first book I have seen that specifically covers IT for broadcast video professionals. It is an excellent read.

Books are a great way to learn. Pick a task that you need to perform, such as configuring a server so that you can use FTP. Go to the bookstore, and be prepared to spend some time looking through books until you find one that has a writing style easy to comprehend and that thoroughly covers the task at hand. Buy the book, and use it to solve your specific problem.

I must have 30 computer books on my shelves, and each was purchased to help me solve a particular problem. Soon you will have a library that is capable of providing the answers to most of your questions. Not only that, but you will find that the information you read will stick with you. I do not recommend buying a general book on computer networking and reading it from cover to cover. That information never seems to stick with me, with the exception of Al's book, of course.

If you are looking for basic information on networking, introductory classes at community colleges, universities and technical/vocational schools are available. Right now, the dominant technologies are Ethernet and TCP/IP, so classes related to these would be most useful.

I also suggest that an engineer become a system administrator for any type of UNIX system, including Linux and FreeBSD. Many graphics and post systems are UNIX-based, so working with these systems is a good way to get direct experience with hands-on networking. UNIX systems are a little more work to set up, and may require a little digging to get all the information needed to configure networking properly. However, when compared to a Windows box, this can be a perfect way to pick up the networking knowledge you need.

Both Microsoft and Cisco offer extensive classes and certification. At the risk of getting myself in a little hot water, I have to say I do not know if the average broadcast engineer really needs to go through all of this, unless you plan to administer several complex Windows servers or design a corporate network. Certainly these classes are a way to deepen your knowledge of the subject, but this approach will not provide you with the broadcast-specific training you might desire.

Editor's Note: Are you looking for high-quality broadcast, IT or operations training? Broadcast Engineering *will begin offering online training soon. Look in the November issue for more information.* BE

Test Your Knowledge!

See the Freezeframe question of the month on page 6 and enter to win a *Broadcast Engineering* T-shirt.

Send answers to editor@prismb2b.com

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A growing family of SD and HD models

With 14 models spanning 1 M/E to 3 M/E in ½ M/E increments, there's a Grass Valley™ Kayak™ switcher that's perfect for your production budget.

Our new HD-ready Kayak SD line and our expanded Kayak HD™ line come in two frame sizes and let you add M/Es as your needs change. And it takes only a software upgrade to move from SD-only to multi-format HD switching, protecting your investment.

The new switchers also support our revolutionary MatchDef™ scalars, an option that lets you match SD sources into an HD production, HD sources into an SD production, and cross-match HD formats—without sacrificing critical elements such as keyers. The Kayak HD and Kayak SD lines also support complete machine control, powerful internal effects and animation capabilities, and an intuitive user interface with an integrated touch-screen display.

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THOMSON images & beyond

Beyond MPEG-2

No one said transitioning to H.264 would be simple.

BY CRAIG BIRKMAIER

For the past few years, analysts who watch the rapidly expanding universe of video distribution options have been waiting for Apple CEO Steve Jobs to take the next big step — to bring about the long anticipated convergence of video and computing. Last year, they were tantalized when Jobs announced the video iPod and the availability of several hit ABC television shows through the iTunes Store. When Jobs successfully negotiated the merger of Disney and Pixar, taking a seat on Disney's board of directors, some analysts expected that he would soon announce a movie download service and a consumer-electronics-oriented product for the big-screen TV in the family room.

Hans Hoffman, EBU and past SMPTE engineering director for television, points to the picture-quality differences when over-sampled HDTV source is encoded as 720p/50, 1080i/50 and 1080p/50 for emission using H.264 compression, during an EBU format demo at IBC.

Will the quality of the content stand up to the demands of big-screen TV, which is filled with HD imagery?

The wait is almost over. In September, Apple announced a movie download service, bringing titles from Disney movie studios to the PC and the small screen of a video iPod. During the announcement, Jobs noted that in less than a year, offerings grew from five shows to 220 shows, drawing from more than 40 networks. Customers have downloaded more than 45 million TV shows.

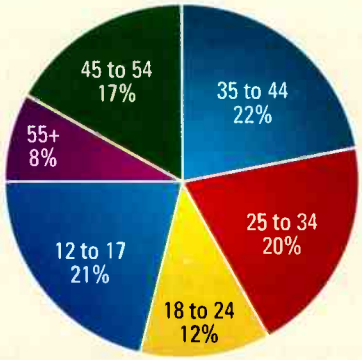
Then in an uncharacteristic move, Apple's CEO pre-announced a new product that will be introduced early next year. Code named iTV, this diminutive box will bring TV shows, movies, podcasts, and the music and digital photo collections to a user's big-screen TV via analog component or HDMI connections. iTV will use WiFi wireless or a wired Ethernet connection to link to the Mac or PC.

All of this raises an important question: Will the quality of the content stand up to the demands of a big-screen TV, which is increasingly being filled with HD imagery? Apple claimed to be increasing the encoding parameters for all of the video that will be downloaded from the iTunes Store from 320 x 240 to 640 x 480, calling it "near DVD quality." But even at this resolution, it will take 30 minutes to download a movie via a 3Mb/s broadband connection.

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

Podcast consumer demographics

Twenty-two percent of podcast listeners are between ages 35 to 44.



Source: Arbitron/Edison Media Research *www.arbitron.com/www.edisonresearch.com*

From the umpire's call to the roar of the crowd, nothing delivers surround sound like Dolby® E.

Today's HDTV viewers expect surround scund with their programming, and Dolby® E makes t happen. With Dolby E you can easily deliver surround sound from the remote truck to the network, from the network to the local station, and within cable and satellite operations. Dolby E converts your two-channel broadcast plant to a multichannel audio facility.

Dolby E carries audio metadata to ensure the integrity of your program's original sound. It automatically controls the complete audio delivery path—from production to the viewer's home. And with all the other broadcast products now incorporating Dolby E, you can deliver surround sound more easily than ever. Join the hundreds of broadcast and postproduction facilities that already know how well Dolby E delivers. It's the right call to make.

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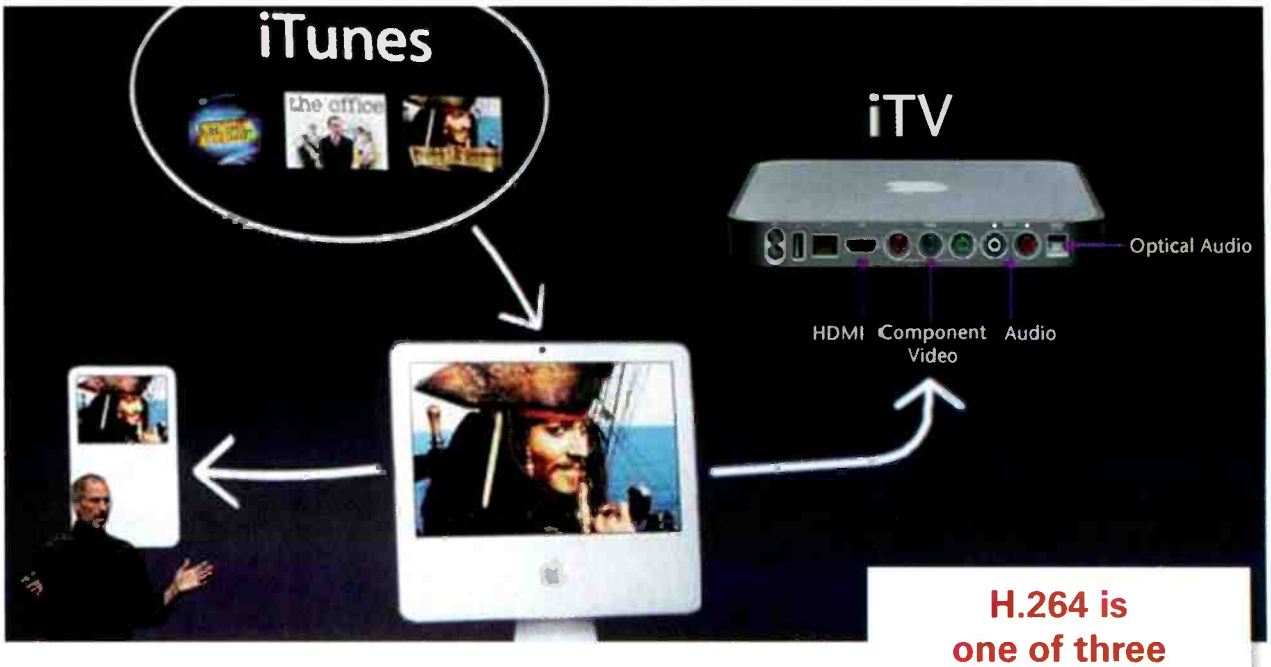


In a rare pre-announcement of a product, Apple CEO Steve Jobs shows an iTV prototype, which will bring digital media content from a Mac or PC to the big-screen TV in the family room.

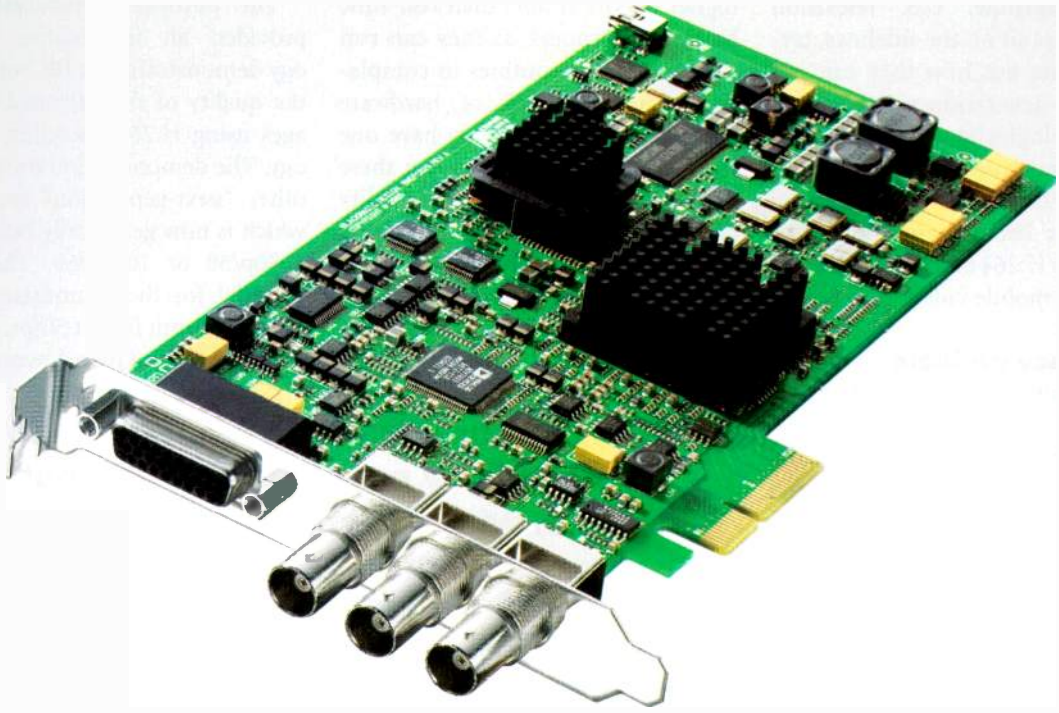
Users may need to wait for even faster broadband connections to download 720p HDTV.

The H.264 (MPEG-4 AVC) encoding technology being used by Apple is proving that it is up to the task over a wide range of resolutions for mobile video, SD and HD television, and digital cinema applications. H.264 is one of three approved encoding technologies for the next generation of high-definition DVD formats — HD-DVD and Blu-ray. These new DVD formats will also support MPEG-2 and the Windows Media codec developed by Microsoft (recently standardized as SMPTE VC-1).

Not to be outdone, Microsoft has announced Zune, an iPod/iTunes

H.264 is one of three approved encoding technologies for the next generation of high-definition DVD formats — HD-DVD and Blu-ray.

Blackmagicdesign



Only DeckLink HD Extreme has SDI and analog connections in HD and SD for only $995!

The new DeckLink HD Extreme features both SDI and analog I/O connections that instantly switch between HD and SD. Use with the latest PCI Express Mac and Windows computers for the world's highest quality editing, effects and broadcast paint solution.

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DeckLink HD Extreme
US$995

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competitor, which will also handle video and will likely use the Windows Media audio and video codecs. Meanwhile, U.S. television broadcasters sit on the sidelines, trying to figure out how they can put these next-generation video encoding technologies to work in a digital broadcast world still locked into legacy MPEG-2 video compression technology. For now, the hotbed of activity for H.264 and VC-1 is the Internet and mobile video.

The legacy problem

All digital video encoders use software algorithms. These algorithms can be run on virtually any PC platform and can be accelerated using several PCs in parallel. When the application requires that content be delivered in real time, a dedicated hardware encoder may prove a better option than a software encoder.

Software encoders can produce higher quality results than real-time hardware encoders, as they can run the algorithmic routines to completion. The drawback of hardware encoders is that they only have one frame period in which to run these routines. This may affect the quality of interframe predictions, resulting in lower compression efficiency.

This issue is amplified by the newer algorithms, which are significantly more complex than MPEG-2, requiring about four times the computational power of MPEG-2. Fortunately, this level of power is now available, and encoder manufacturers have learned the benefits of developing real-time products atop programmable computing hardware, which can be upgraded as their implementations evolve.

As the opportunities for new channels of video distribution proliferate, the demands on video encoders will increase as well. It may be necessary to produce multiple versions of your video content for different distribution networks: low resolution/bit rate for mobile applications; somewhat higher quality (approaching SD/DVD quality) for Internet downloads; and SD and HD versions for broadcast, cable, DBS and IPTV. Manufacturers are responding with platforms that can ingest content at the highest quality level and produce multiple versions for distribution, often in real time.

A crowded field

As a final note, these new encoding technologies took center stage at IBC2006. European broadcasters waited to adopt HDTV. They now benefit from that decision with the opportunity to employ next-generation codecs for HDTV.

The European Broadcast Union provided an informative technology demonstration at IBC, examining the quality of the delivered HD images using H.264 encoding technology. The demonstration included another "next-generation" technology, which is now generically being called 1080p/50 or 1080p/60. The source material for the demonstration was shot on 65mm film at 50fps, digitized at 2160p/50, and then downconverted to 1080p/50, 720p/50 and 1080i/25. Other material was shot in native 1920 x 1080p/50 with a HDC1500 CCD camera and also converted to 1080i/25 and 720p/50. All material was encoded using H.264.

European broadcasters waited to adopt HDTV. They now benefit from that decision with the opportunity to employ next-generation codecs for HDTV.

According to David Wood, head of new media in the EBU's technical department, "The initial results suggest that even with next-generation displays (full HD 1920 x 1080 pixel resolution), 720p delivery will give better moving picture quality than 1080i/25," he said. "We know that 1080p/50 is virtually as efficient a broadcast format as 1080i/25. Using content adaptive compression such as MPEG-4 AVC progressive is as efficient as interlacing or more so." BE

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

Send questions and comments to:
craig_birkmaier@prismb2b.com

Web links

- "A lasting compression standard?" Download, *Broadcast Engineering*, March 2006 *http://broadcastengineering.com/mag/broadcasting_lasting_compression_standard/index.html*
- "It's only software," Download, *Broadcast Engineering*, November 2005 *http://broadcastengineering.com/newsrooms/broadcasting_software/index.html*
- EBU HDTV demonstration at IBC *www.ibc.org/cgi-bin/ibc_dailynews_cms.cgi?db_id=23146&issue=2*
- Information about the test sequences for the IBC demonstration *www.ebu.ch/en/technical/hdtv/test_sequences.php*
- MPEG-4 Products and Services, MPEG Industry Forum *www.mpegif.org/products/mpeg-4.php*

"Sony was the only supplier to step up to the plate."

— Jason Taubman and Paul Bonar, Game Creek Video

HDemanding

Jason Taubman, VP of design for mobile production company Game Creek Video, faced contradictory demands. He tells us, "Some clients required the highest quality in 1080i and others demanded the same in 720p. Some venues only had fiber and some strictly triax. Sony was the only supplier to meet all these requirements in a single camera."

"We committed to the HDC-1500, Sony's 1080/60p camera before it was even a model number," says Paul Bonar, VP of engineering. "And Sony committed to us. Their engineers heard our input on the large lens 'sled,' which works like a charm. We gave them distressed cable to help design the triax adaptor, which is brilliant. And in service and support, Sony has risen to every challenge and met every need. We're now on our fifth consecutive truck with the HDC-1500, the best HD camera we've ever seen."

Fiber, triax, 1080i and 720p multi-format support... that's the new way in HD.

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Broadcast ownership

The FCC seeks comment on multiple ownership rules.

BY HARRY C. MARTIN

In late July, the FCC released a Further Notice of Proposed Rule Making about the fate of the 2003 broadcast ownership rules. The rule making largely recites the history of the previous multiple ownership rule makings and asks for public comment on the issues raised by the Third Circuit Court of Appeals when it remanded the rules in 2003.

MMTC proposals

The notice begins with proposals by the Minority Media and Telecommunications Counsel (MMTC) for advancing media ownership by minorities. These proposals include:

- a new tax certificate program;
- sales of stations to minorities when divestitures are required;
- requiring station sellers to give early notice to minority groups; and
- requiring nondiscrimination provisions in advertising sales contracts.

The commission asked whether these and other MMTC proposals would be effective and practical ways of advancing minority ownership, as well as whether the commission has the statutory or constitutional authority to adopt such proposals.

Localism

The notice treats localism as a focal point of the FCC's consideration. There is a substantial record on this topic, compiled from testimony at the various public hearings and other presentations held around the country. The Media Bureau is compiling a summary of all of the comments to be submitted in the new ownership proceeding.

The comments on localism will come into play in the re-examination of the limits imposed by the local television ownership rule. The commission asked both for additional evidence to support the more relaxed rules it previously adopted and for comments as to whether those limits should be revised. It also seeks evidence to support fluidity of television market shares and requests comment on whether the ownership limits should vary with the size of the market.

In situations where a waiver is requested because a station is in distress, the commission asked whether it should reinstate the requirement that the applicants demonstrate there is no out-of-market buyer.

Cross-ownership

The FCC seeks comment as to whether the current numerical limits on local radio ownership should be changed, either by adding more ownership tiers or otherwise. It also asked whether it should retain the "subcaps," which limit the number of stations that may be owned in a particular service (AM or FM). The notice also asks whether the current rule is even necessary to serve the public interest in light of existing competition in the radio marketplace.

The commission found that the "Diversity Index," which it had previously adopted to evaluate the likely impact of broadcast/newspaper cross-ownership, was an inaccurate tool for measuring diversity. Accordingly, the FCC seeks suggestions for new methods to determine whether a broadcast/newspaper combination would serve the public interest.

In particular, the commission asked whether limits should vary depending on the characteristics of markets. It also asked whether there should be different limits for newspaper/television combinations as opposed to newspaper/radio combinations.

Finally, the commission seeks comments on whether it should retain the dual network rule (which prohibits mergers among any of the top four networks) or the UHF discount (which reduces the number used in calculating a UHF station's audience reach under the national TV cap).

Initial comments are due Oct. 23. Reply comments are due Dec 21. BE

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

? Send questions and comments to: harry_martin@prismb2b.com

Dateline

Dec. 1 is the filing deadline for renewal applications and EEO program reports for TV stations in Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont. This deadline also applies to TV translators, LPTV and Class A stations in those states, except for translators and LPTV stations that do not originate programming. These stations do not have to file EEO reports.

Dec. 1 is the deadline for TV stations in the following states to file their biennial ownership reports: Alabama, Connecticut and Georgia.

Dec. 1 is the deadline for TV and Class A stations in the following states to place their 2006 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, Rhode Island, South Dakota and Vermont. 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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Sound connections

Get the maximum performance and quality from your digital audio interfaces.

BY ALDO CUGNINI

When Sony and Philips introduced the compact disc digital audio medium in the early '80s, it was a significant successor to the vinyl record and Philips compact cassette. However, industry players were in no hurry to provide a digital interface for the medium, as that would have enabled direct access to the digital data and would have too easily allowed illegal copying and pirating.

Nonetheless, once digital storage of audio became feasible, an efficient means was needed to convey the signal between devices. Sony developed SDIF-2 (Sony digital interface), which used three coaxial cables carrying the left and right channels and a Word Clock. However, SDIF-2 was cumbersome and limited in cable length and data speed.

The AES formed a working group to design a better interface. This group created the first professional digital audio interface standard, AES3, later designated AES3-1985, and subsequently updated. The standard was also ratified by ANSI, EBU and EIA-J, with one result being that the interface is sometimes referred to as AES/EBU.

Channel subframe breakdown

AES3 uses either 20- or 24-bit sample words, allowing for the quantization of between 16- and 24-bit samples. While various sampling frequencies of between 22.05kHz and 192kHz can be specified, the most frequently used rates are 44.1kHz for CD audio and 48kHz for professional audio. An alignment level can also be specified.

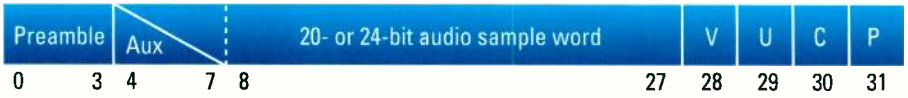

Figure 1. The organization of the AES3 channel subframe, where aux is auxiliary sample bits, V is the validity bit, U is the user data bit, C is the channel status bit, and P is the parity bit.

While one or two channels can be carried in the interface, up to 16 channel numbers can be defined, aiding in the identification of multichannel bundles of signals. The samples are organized into alternating left- and right-channel subframes, with each pair forming a frame. And 192 such frames compose a block. A 32-bit subframe with its various components and bit positions is shown in Figure 1.

The preamble is used to identify the start of a block, the start of the left-channel subframe or the start of the right-channel subframe. The audio sample word is carried next, followed by four data bits. When less than 21-bit audio is used, the auxiliary sample bits can be used for other applications, such as carrying talkback or cueing audio. The other parts of the subframe include the:

- *validity bit* — essentially defines the payload as audio;
- *user data bit* — any private data;
- *channel status bit* — used to convey channel status information (metadata); and
- *parity bit* — used for error checking.

The channel status information is carried as a serial string of channel status bits from each subframe. With 192 pairs of subframes per block, the channel status information is organized as pairs of 192-bit blocks, subdivided into 24 bytes. Information that can be conveyed uniquely for each channel includes sampling frequency, channel numbers, reference signals, pre-emphasis and options such as the use of nonlinear pulse code modulation (PCM). SMPTE 340M, for instance, specifies a method for transmitting AC-3 compressed audio over the interface. A cyclic redundancy check character (CRCC) can also be transmitted to test valid reception of the entire channel status data block.

FRAME GRAB

A look at tomorrow's technology

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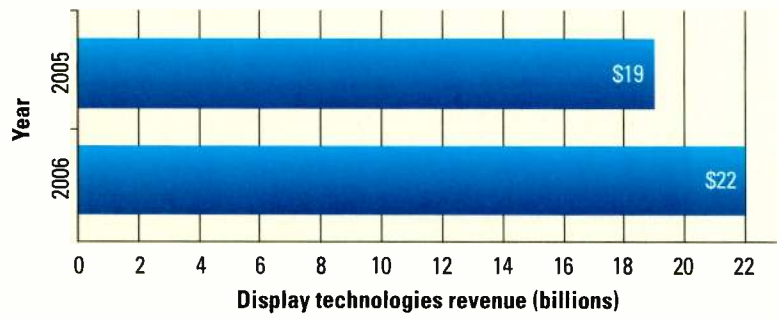

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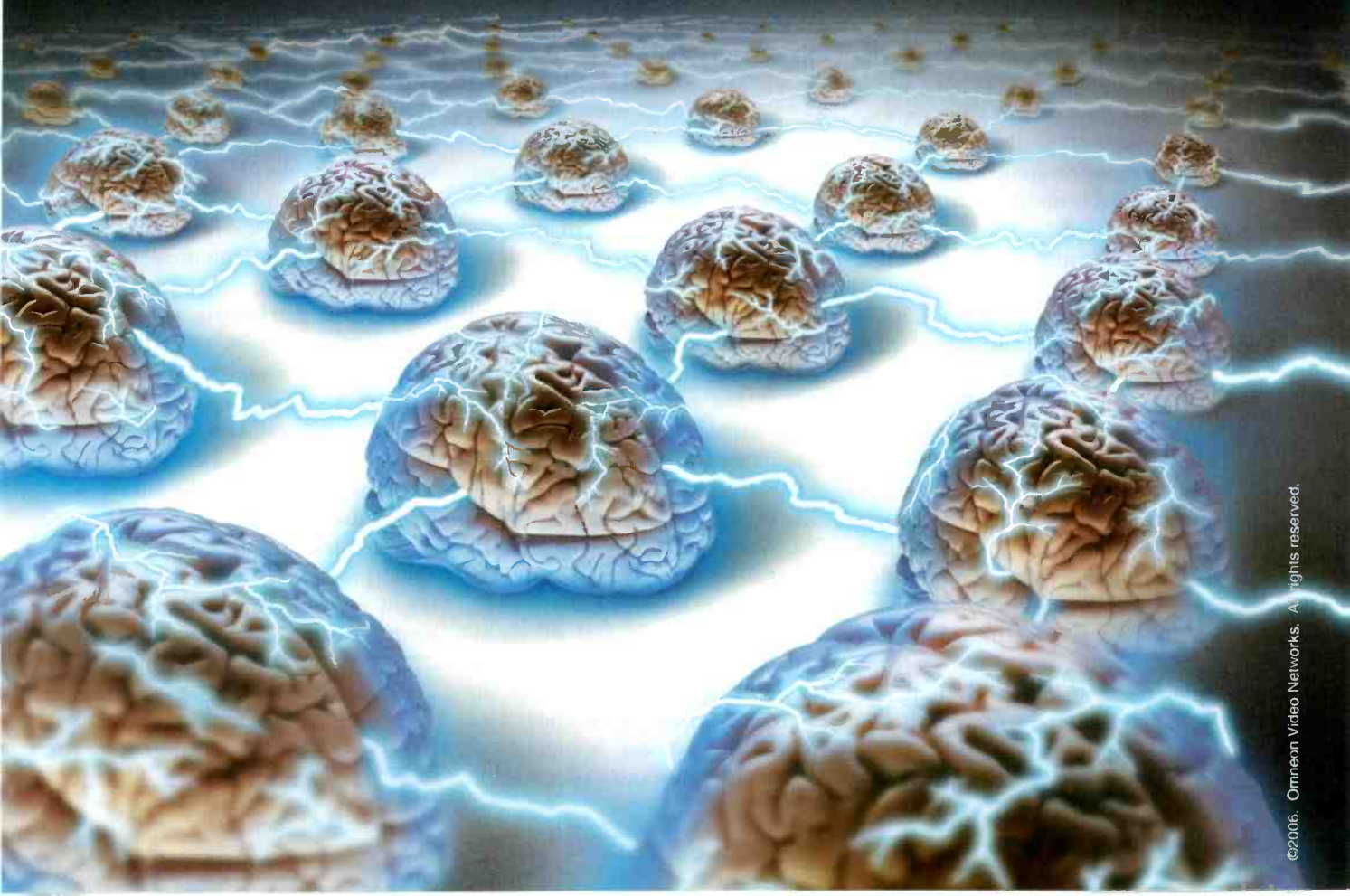

Audio's video issues

There can be advantages to locking the audio and video clocks, such as for editing, especially when the audio and video programs are related. Although digital audio equipment may provide an analog video input, it is usually better to synchronize both the audio and the video to a single higher-frequency source, such as a 10MHz master reference. This is because the former solution requires a synchronization circuit that will introduce some jitter into the signal, especially because the video itself may already have some jitter. To accommodate possible clock differences between 59.94Hz and 60Hz video processing, AES3 also provides a flag to indicate whether the audio sample rate indicated in the channel status should be multiplied by 1000/1001.

Because the AES3 signal has a bandwidth of several megahertz, some users may be tempted to use video distribution amplifiers to fan out a signal. While this may work in some applications, a large proportion of video signal processing equipment uses clamping or synchronization circuits that rely on the black level, sync and other components within video for routine operation. So, user beware!

From a physical standpoint, AES3 uses balanced 110Ω lines and XLR connectors, with a nominal signal voltage between 2V and 7V peak-to-peak. Coaxial 75Ω lines are also sometimes used, as well as cable bundles (or ribbons) carrying up to 16 lines, terminating in 50-pin subminiature-D connectors. The modulation used is Biphase Mark Code, which provides various features, including:

- Clock recovery is achieved easily.
- The DC component (and hence the power transmitted) is minimized.
- The interface is insensitive to polarity reversals.

In order to provide synchronization within one audio sample, the preambles present a unique sequence (which violate the Biphase Mark Code) but nonetheless are DC-free and provide clock recovery.

Like AES3, but not

A consumer version of AES3 — called S/PDIF, for Sony/Philips Digital Interface Format (more formally known as IEC 958 type II, part of IEC-60958) — is also widely used. Essentially identical to AES3 at the protocol level, the interface uses consumer-friendly RCA jacks and coaxial cable. Despite the primary intent of consumer use, the interface also appears on some professional equipment.

Although specified for use with 75Ω cables, many consumers use "plain vanilla" audio cables for this purpose, which, over short distances, generally work fine. Optical TOSLINK connectors are also sometimes used.

One key difference between the AES3 and S/PDIF protocols is the channel status information. The format (location) of some information is different, and AES3 carries much more information. Thus, an interconnection between the two different interfaces could cause problems, if certain equipment needs specific status information to function properly.

One flag that is carried within S/PDIF but not AES3 is the Serial Copy Management System (SCMS) copy protection info. An early attempt at digital rights management, it is not clear that all sources correctly set the flag. Worse still, the system could be defeated by surreptitiously recoding the bit stream information.

When the availability of multichannel digital audio recorders made multiple circuit cables impractical, the proprietary Alesis Digital Audio Tape (ADAT) format was introduced in 1991 to allow the transfer of up to eight channels of audio over a fiber-optic interface. This has since been superseded by AES10 (or MADI, Multichannel Audio Digital Interface), which supports serial digital transmission of 28, 56, or 64 channels over coaxial cable or fiber-optic lines, with sampling rates of up to 96kHz and resolution of up to 24 bits per channel. The link to the IT world has also been established with AES47, which specifies a method for packing AES3 streams over Asynchronous Transfer Mode (ATM) networks.

It's also worth mentioning Musical Instrument Digital Interface (MIDI) for broadcast operations. MIDI is essentially a protocol that allows electronic musical instruments to exchange performance information. (For example, an MIDI command could be "Start_Playing Clarinet_Sound, B-flat_above_Middle_C, 50%_Volume.") Thus, MIDI is described more appropriately as a control interface, rather than an audio interface.

However, two subsets of MIDI are useful to know about. One is MIDI Machine Control, which provides transport commands for controlling recording devices such as multitrack tape recorders. The other is MIDI Time Code, which embeds SMPTE time code information in a MIDI stream. While the MIDI specification calls for the use of 5-pin DIN connectors, nonstandard connectors are occasionally used on equipment.

Optimum performance

The idiosyncrasies of audio interfaces, while somewhat more constrained than that of video, still merit attention to maintain the highest quality plant. Knowing the way these interfaces work can help ensure a trouble-free installation, as well as provide ideas for tracking down an audio problem — and perhaps, one might even implement some useful novel features. BE

Aldo Cugnini is a consultant in the digital television industry.

Send questions and comments to: acugnini@prismb2b.com

An early attempt at digital rights management, it is not clear that all sources correctly set the flag.

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THE NEW WAY OF BUSINESS℠

Netcasting's catch

TV over IP is not broadcasting ... yet.

BY BRAD GILMER

Internet-based efforts such as YouTube and Google Video are increasing the demand for video to the desktop. Newscasts with video have been available for some time, and many of you have attended webinars that included video.

Many forward-thinking broadcasters and content creators see the Internet as another outlet for their programming. Companies such as CNN have been repackaging their Internet content for more than 10 years. But is the Internet just another antenna for broadcasters? Is it just another way to distribute our content, or are there challenges and issues that make the Internet fundamentally different from broadcasting?

There is no doubt that many companies would like to send the same content to many hundreds, if not thousands, of people over the Internet at the same time. Aside from broadcasters, educators and even the government are interested in this technology. However, those interested in using the Internet for broadcasting should know that distributing Internet content is fundamentally different from traditional linear broadcasting in terms of bandwidth, cost and equipment load.

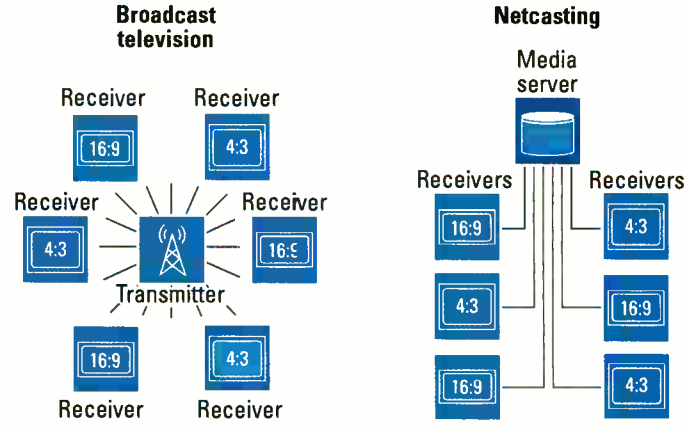


Figure 1. In broadcasting, the transmitter is completely unaffected by the number of receivers. In netcasting, the media server must establish a 1:1 connection with each receiver.

Bandwidth

Broadcasting takes up the same amount of bandwidth no matter how many televisions are tuned in. The transmitter puts out a 6MHz-wide signal one time, and everyone in the viewing area can watch it. The load placed on the transmitter is exactly the same at 3 a.m., when two people are watching as it is during a popular event such as the Super Bowl, when hundreds of thousands of people are watching. (See Figure 1.)

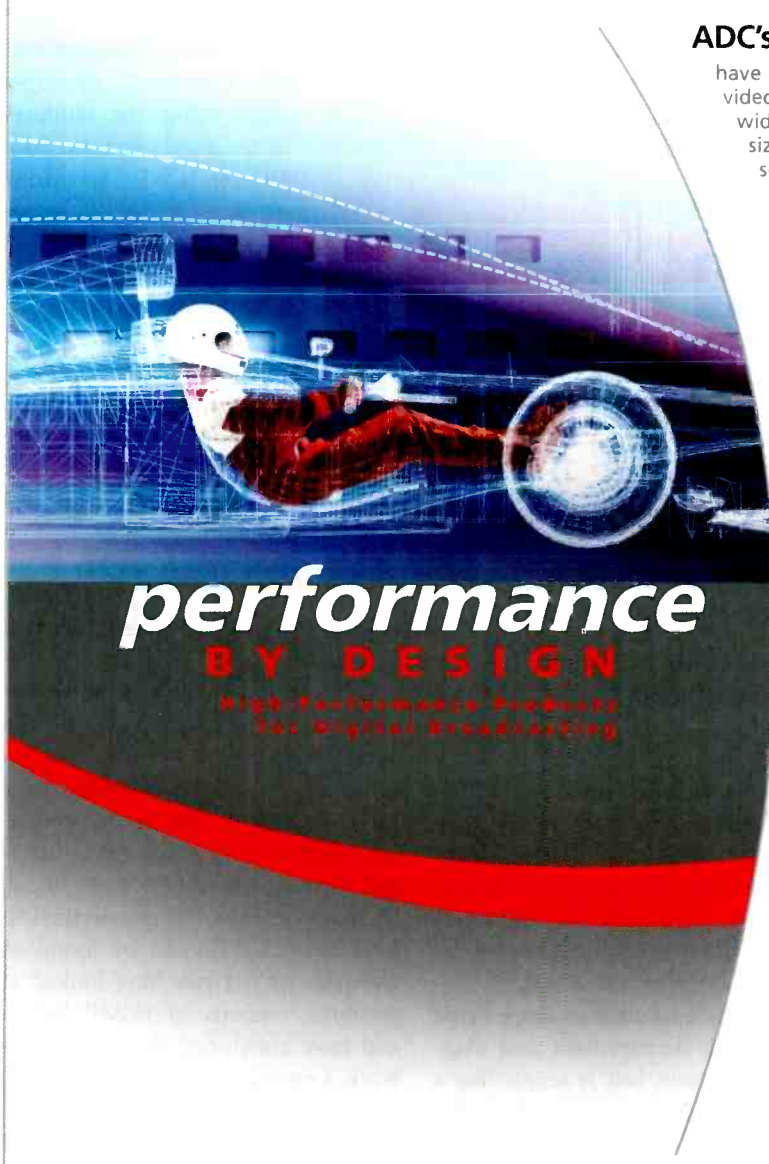
Compare this with an Internet video feed. Because traditional Internet data protocols are connection-based, an Internet transmitter (typically a media server) will need to establish a connection with each device receiving the stream. Then the media server will need to originate a stream to feed that device. If two people are watching the stream, the server will need to generate two streams. If 100,000 people are watching the stream, the server will need to generate 100,000 streams. Ouch!

The load placed on the transmitter is exactly the same at 3 a.m., when two people are watching as it is during a popular event such as the Super Bowl, when hundreds of thousands of people are watching.

Cost

The cost structure of broadcasting is significantly different from the Internet. In the linear broadcasting model, the broadcaster pays the power bill. The consumers buy television sets, plug them in and are free to watch whatever is distributed. (This rather simple model has been changing over the years with cable, satellite, pay-per-view and video-on-demand.) Because the number of people watching does not affect the load on the transmitter, the broadcaster's power bill remains steady.

The Internet broadcasting model is quite different. Because the demand on the source of the stream is directly related to the number of people watching, the more people watching the stream, the more bandwidth the combined streams consume. And because bandwidth cost is a function of bandwidth consumed, the more successful an Internet broadcast is, the more it costs to distribute it.



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Typically, network bandwidth is sold based on 95 percent of peak demand. Usage is metered, and the top 5 percent of peaks are thrown out. The user is then billed for the month at 95 percent of peak. This means that when a popular event is shown, the bandwidth consumed will go way up. If the event lasts several days, or interest remains high for several days, then the cost of the bandwidth for the broadcast will be high for the entire month. (Note: There are other billing options available, especially to customers who consume large amounts of bandwidth.)

There is also a cost to the consumer for watching more Internet content; the user has to pay for more bandwidth. Anyone who has a simultaneous computer user in the house (a teenager perhaps?) knows the benefit of opting to pay for higher-bandwidth service. This is fundamentally different from the linear broadcast model, where the number of TVs in a house does not affect the consumer's experience. (Cable and dish distribution have modified this cost structure somewhat.)

Equipment load

There is also the issue of equipment load. A broadcaster can use the same physical plant regardless of how many people are watching. Internet broadcasting requires the originator to increase its physical plant as the number of clients increases.

The costs are not linear, but are step-wise. For example, if you purchase a media server, it is capable of delivering up to 100 streams. After that, you will need to add another server. At some point, you will want to add fault tolerance and probably use shared storage. Of course, as your computer facility becomes more complex, you can gain economies of scale by making smart decisions about equipment configurations.

The solution

It seems obvious that the solution for IP networks is to create a network that behaves more like traditional linear broadcasting. A single computer would send out packets to the network, and the computers that want to receive the broadcast would listen to that stream.

This capability exists in Ethernet networks. You probably have heard of a network broadcast address. The network broadcast address is a reserved address; anything sent to this address is delivered to all computers on the network.

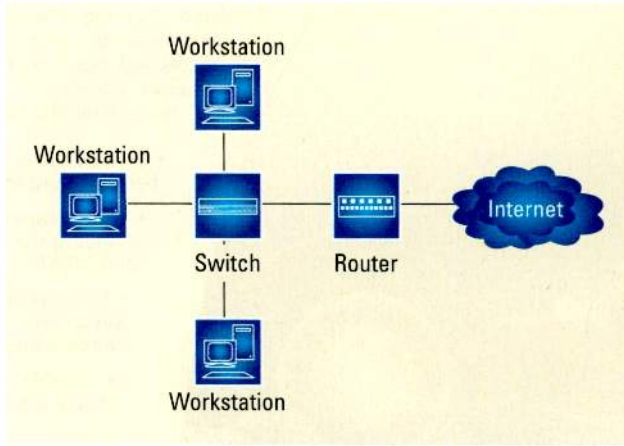


Figure 2. A message sent to a broadcast IP address will be received by all other workstations on the network. The router will not allow this message onto the Internet.

Broadcast IP addresses end in .255. (See Figure 2.) If you wanted to send broadcast packets on a 192.168.1 Ethernet network, you would send packets to 192.168.1.255. All computers listening on the network would receive and interpret these packets.

The broadcast address was created for network management and diagnostic purposes, but it seems like a perfect solution to our broadcast Internet issue. Unfortunately, things are not that simple.

While it is true that a broadcast message will go to all computers on a network, the key word is "network." Remember, Ethernet is designed so that traffic is segmented. Messages are only sent to computers that need to see them.

A large network could quickly run out of bandwidth if every message from every computer was presented to every other computer in the company, or on the Internet. To accomplish this segmentation, Ethernet routers check the source and destination of each packet. They either keep the packet local or pass it on to other networks, depending on the source, destination and routing table.

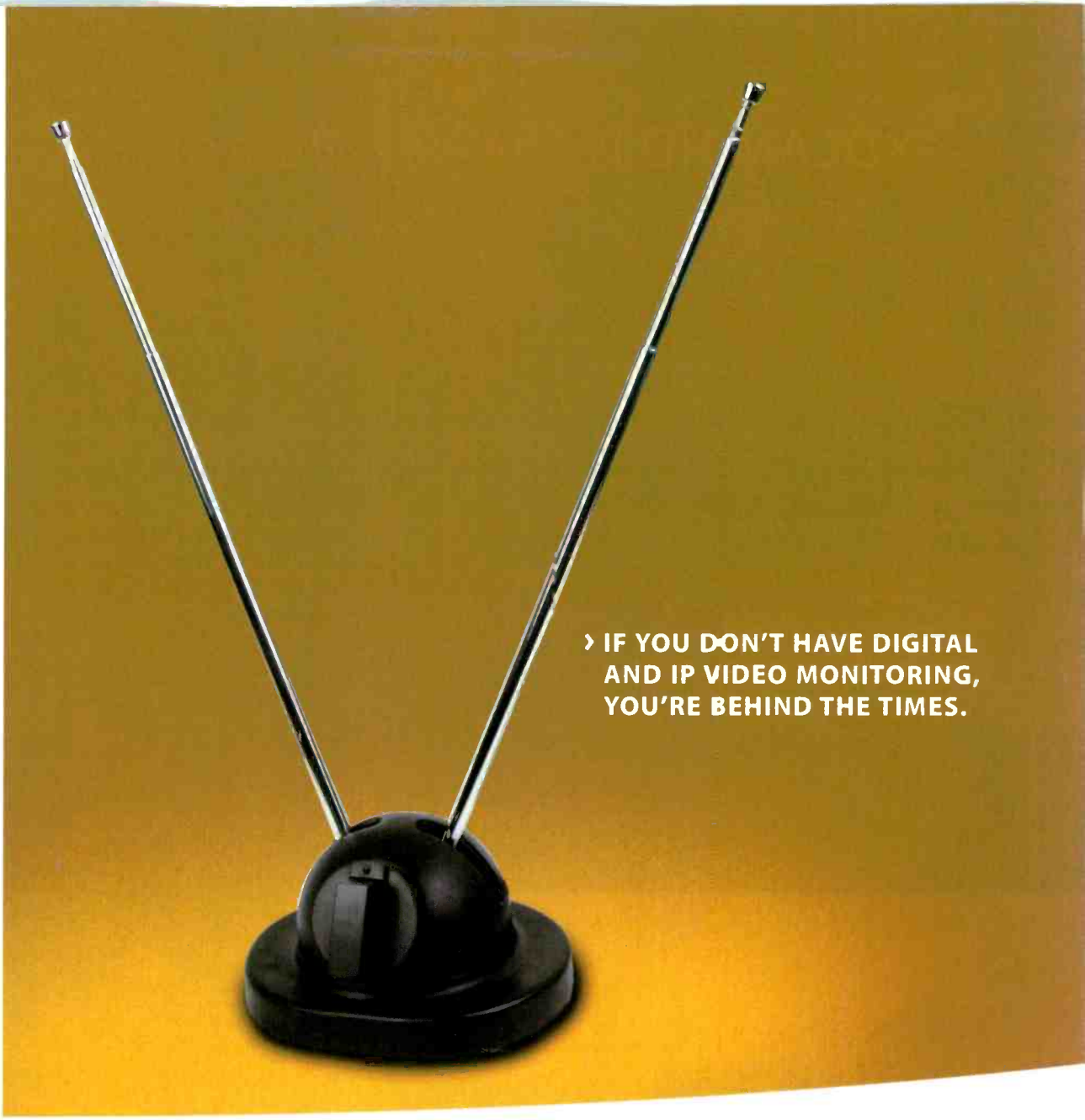
By definition, broadcast messages are not routable, meaning that all broadcast messages stay within the confines of the local network. So a 192.168.1.255 broadcast message will never be allowed on the Internet. Furthermore, the router would also drop a broadcast message sent to a remote network.

By now, the hardcore computer readers are probably jumping up and down saying, "No one does Internet broadcasting that way, and what about IGMP?!" Well, we are almost out of space in this month's column.

But seriously, the computer industry has been well aware of the issues surrounding broadcasting on the Internet, and it has worked hard to resolve them. The most promising solution at the moment is Internet Group Management Protocol, Version 3 (IGMP V3) as specified in RFC 3376. (RFCs can be found at *www.rfcs.org*.) If you have looked at previous versions of IGMP before and have concluded that it will not work, I encourage you to look at the third version, which contains several significant additions. Next month, we will look at IGMP as part of a wider discussion of IPTV. BE

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

Send questions and comments to:
brad_gilmer@prismb2b.com



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"To do time lapse, I put the camera on my tripod, easily set up the frame count on the LCD display and hit the trigger. It was that fast. Overcranking at 60 frames per second, you can see slow motion of the dogs' paws kicking up snow and the ears and tongues flying. And you can play it back immediately in the camera. The PDW-F350 gives me a toolset that I never imagined having, especially at a price of $25,800 [MSRP]."

"It's way too good."

-Jody Eldred

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–Mark Falstad

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Jody Eldred came to a similar conclusion. "I'm very impressed with the skin tone, the way the reds work, the good detail in the darks and the highlights. I have $160,000 invested in my F900 HDCAM™ package. But the F350 really deserves to wear its CineAlta™ badge. In fact, it's way too good for a camera at this price."

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THE NEW WAY OF BUSINESS℠

HD set design

News never looked so good.

BY MICHAEL GROTTICELLI

Most stations have invested in digital transmitters and HD production gear, which are more affordable than ever. Now broadcast stations are turning their attention to the news studio for the next phase of the HD migration.

News studio sets are getting bigger and better looking, evolving from static news desks to news environments with multiple venues. Even the newsroom, with its cluttered desks and frenetic activity, is getting airtime. Set designers are incorporating these new on-air staging areas to keep the newscast fresh and interesting, which is what viewers (and advertisers) want.

The need for new sets in the industry is potentially huge, as only about 10 percent of stations in the large markets have converted to local HD news production. Roughly 30 percent are in negotiations to do it within a year.

In the smaller markets, sets designed for the 16:9 aspect ratio are almost nonexistent. That's because new sets are not cheap. A new HD set could cost $100,000 to $650,000, with the average station spending $200,000. Of course, repainting a set, adding new lighting or using less expensive materials can get you a refurbished look for as low as $30,000 to $50,000.

Planning

The process of designing and building a new news set takes about three to six months, depending on the size and complexity. It starts with an initial meeting with the design team and station management, news director, operations manager and others. Then a design is developed with 3-D modeling and CAD software to show the client how the set will look in both 16:9 and 4:3. Professional set designers can simulate what a standard two-shot or wide shot will look like and guide clients through a virtual tour.

Most stations want sets that are HD-ready, meaning the composition of their designs, the quality of their construction and furniture, and other set pieces will be designed for the sharper images and wider aspect ratio of HD, even if the stations have yet to broadcast in HD. Stations must plan for a dual aspect reality. Mack McLaughlin, founder, CEO and creative director of the FX Group in Ocoee, FL, said stations should plan on using 4:3 framing for the next five years.

Layout

The wider sets built for 16:9 HD enable news departments to offer viewers wider shots with jib cameras or stationary cameras mounted on the ceiling. This makes the set look more spacious, which studies have shown is very appealing to viewers, according to Graham Blyth, president of New York-based Blyth Design.

The most important aspect for HD is the actual positioning of the talent, according to George Andrus, senior design consultant for The Express Group in San Diego. In the standard 4:3 format, he said, the news team usually sits shoulder to shoulder. But with HD's 16:9 format, the desk needs to be wider, with the talent sitting an additional 6in to 8in apart. This leaves room for over the shoulder graphics without encroaching on the person sitting next to the anchor on screen, Andrus said.

The notion of a single talking head,

The FX Group designed this flexible set for WFTV-TV in Orlando, FL. Two HD rear-projection systems enable the station to change the look of the set, based on the story being reported.

To make the newscast more appealing to viewers, Blyth Design created a spacious set for WNYW-TV that offers wider shots with jib cameras or stationary cameras mounted on the ceiling.

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or anchor altar, is changing rapidly. Many attribute this change to cable and European news channels. The trend is to place reporters in the newsroom at a desk or at a podium next to an electronic screen to read stories on-air. Main anchor desks sport a lighter, trimmer design to encourage the anchor to get up and move around. This is all part of the comfortable atmosphere designers are striving to create.

And sometimes achieving that atmosphere translates into no anchor desk at all. Most of the new CW Network newscasts, for example, feature talent standing next to a plasma or rear-projection screen, mounted either horizontally or vertically. This gives news directors the flexibility to change the set quickly for different stories.

Yet HD studio design is about more than just a wider set. Stations are adding HD graphics, virtual set technology, electronic displays and aesthetically pleasing furniture. The general thinking is that if you want people to watch your newscast, newscasters need to create a pleasing, familiar environment.

Weather

Weather is a big ratings booster for newscasts, so flashy weather centers are becoming the norm in many markets. Whenever a station upgrades its computer weather system, the on-air look of the entire newscast is affected, so careful planning is important.

The Express Group recently designed a new weather set for KNXV-TV in Phoenix, AZ. The new HD set features multiple venues around the studio where talent can report from. Two 50in Samsung and Toshiba HD DLP monitors act as a backdrop. And the station added new high-res graphics to prepare for future HD broadcasts.

Andrus said DLP technology offers a better value than plasma. Plasma screens larger than 50in are cost prohibitive for most stations. DLP allows stations to have a larger screen at a more affordable cost.

DLP also does not reflect unwanted light the way most plasma screens do. And plasma screens suffer from burn in when a graphic is left on a screen. This does not happen with DLP projection, he said, adding that color saturation can be controlled better with DLP displays, and maintenance (replacing an old bulb) is easy and cost-effective.

Materials

Physical materials used for HD sets are not that different from those for analog sets, said Mark Karlen, senior design rep at Broadcast Design International in Carlsbad, CA. Wood laminates are still used, but a greater array of smooth and textured surfaces, Plexiglas, frosted acrylics and metal stylings are now employed.

The trend is to place reporters ... at a desk or at a podium ... to read stories on-air.

The main difference between HD and SD set design is in the attention to details, such as the edges of furniture and the site lines between the weather set and the news desk. Quality construction is critical, according to Karlen, because news sets take a beating.

Stations can't get by with HD sets that are taped up or refurbished, said Blyth. Analog cameras can hide or minimize flaws so they aren't distracting. But in HD, everything can be distracting if you let it be. When designing a great HD set, every detail is important.

Dan Devlin, creative director for the Devlin Design Group in Breckinridge, CO, agreed. Tolerances are a lot tighter, and the cost of a new set is higher than it used to be, he said. Contrast is a big thing. And texture and

Phoenix ABC affiliate KNXV-TV's new weather set, designed by The Express Group, took six months to finish.

Creative lighting is key to any new HD set. Broadcast Design International added a combination of color-changing soft and incandescent lights to the spacious "NFL on FOX" set, in Los Angeles.

Continued on page 41 ...

Because the Lens Creates the Image...

Canon

*image*ANYWARE

HDGC

*Canon engineered its all-new **HDgc** line of affordable HD zoom lenses to support the new generation of economical mid-range portable HD camcorders and lower-cost POV HD cameras being introduced by all of the world's major professional camera manufacturers. These especially include the new tapeless HD camcorders that are lowering the cost of transitioning TV news and general programming to HD. Designed for budget-conscious HD production applications, these **HDgc** lenses leverage Canon's decades of expertise as a world leader in optics and as a manufacturer of superior HD lenses for portable ENG and EFP cameras. Featuring superior operational capabilities, these new HDgc lenses (four of which feature Canon's revolutionary digital eDrive technology) combine many of the best features of Canon's remarkable higher-end HD portable zoom lenses.*

portable lens	camera imager format 2/3"	1/2"	1/3"
>$35K HDxs High-End ENG/EFP Cameras	Established HJ series		
>$25K HDGC Tier 1 Economical ENG Broadcast Cameras	KJ16ex7.7B IRSE* More Lenses In Development	KH21ex5.7 IRSE KH16ex5.7 IRSE* KH10ex3.6 IRSE	
<$10K HDGC Tier 2 Economical Professional Cameras	KJ20x8.5B KRS	KH20x6.4 KRS KH19x6.7 KAS	KT20x5B KRS*

*Available late 2006

HDgc lenses:

- Include models for cameras with 2/3-inch, 1/2-inch, and 1/3-inch imagers.
- Support all of the new HDTV tapeless and tape-based broadcast camcorders.
- Are all well-suited for HD ENG use as well as professional/business-to-business video production, independent digital filmmaking, and institutional/government HD video production applications.
- Include lenses for broadcast/production: for 2/3-inch, the KJ16ex7.7B IRSE* standard lens; for 1/2-inch, the KH10ex3.6 IRSE wide-angle lens, the KH21ex5.7 IRSE telephoto lens, and KH16ex5.7 IRSE* standard lens; all of which have Canon's exclusive digital eDrive technology and 2X extenders. (* Available in late 2006)
- Will include more broadcast/production 2/3-inch HDgc lenses, to work with GVG's Infinity, Panasonic's HD P2, and other lower-cost camcorders and cameras.
- Include lenses for professional video: the KH20x6.4 KRS lens for 1/2-inch HD CCD cameras; the KT20x5B KRS lens for 1/3 inch HD CCD cameras; and the KJ20x8.5B KRS lens for 2/3-inch HD CCD cameras. All three feature a new ergonomic drive unit and Canon's exclusive Shuttle Shot function, an advanced servo system for zooming back and forth between any two focal-length positions.
- Includes the KH19x6.7 KAS, which incorporates the digital interface to Sony's auto focus system.
- Includes the KH19x6.7 KTS for remote-control applications.

digital cine

HD-EC

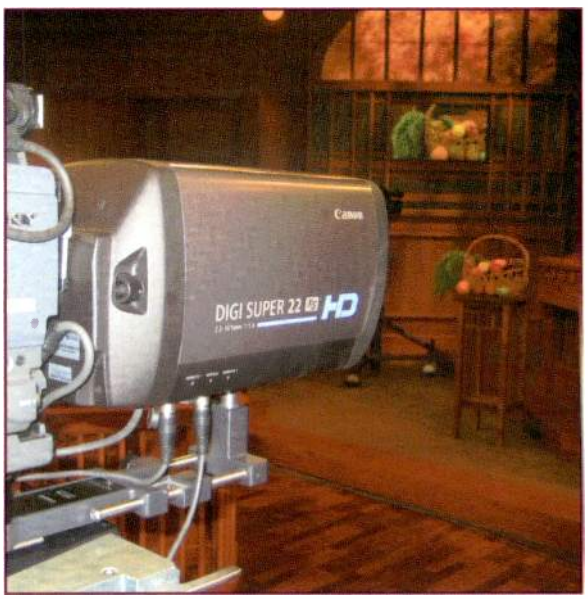
Motion picture, episodic television, and television commercial production are transitioning to 24p digital HD, and Canon's HD-EC (High Definition-Electronic Cinematography) lenses provide the optical performance and operational features these markets demand.

HD-EC lenses:

- Include six primes–the FJs 5mm, 9mm, 14mm, 24mm, 35mm, and 55mm–the smallest and lightest in the industry.
- Include three zoom (variable focal length) lenses—the wide-angle HJ8x5.5B KLL-SC (5.5–44mm/T2.1); the HJ11x4.7B KLL-SC, an especially wide-angle lens (4.7–52mm/T2.1); and the HJ21x7.5B KLL-SC (7.5–158mm/T2.1), which is great for long-distance shots.
- Are designed with the tactile feel and engraved markings vital to directors of photography and camera operators.
- Can be used with the unique ACV-235 Anamorphic Converter, which horizontally compresses the CinemaScope (2.35:1) image to a standard HD aspect ratio of 16:9 (1.78:1), for a significant improvement over previous methods of adapting HD cinematography to CinemaScope.

studio

HDxs



News and general production studios are another hotbed of HD production. Canon's HDxs DIGISUPER studio lenses are engineered to provide a wide range of creative HD studio capture needs with flexible price-performance options.

HDxs studio lenses:

- Include the DIGISUPER 25xs, DIGISUPER 23xs, and the unique and revolutionary COMPACT DIGISUPER 22xs.
- Include the COMPACT DIGISUPER 22xs (XJ22x7.3B IE-D), a significant new innovation designed in response to the trend toward the use of portable HD cameras in the studio. Packing true HD studio lens performance–but at 13.4 lbs., weighing less than a third of larger "box-style" studio lenses–the COMPACT DIGISUPER 22xs is scaled for direct docking to portable HD cameras. It provides a "best of both worlds" solution to HD studio production economy while delivering exceptionally high HD performance.
- Are ideal for robotic systems.

...You Can Be Confident When You Invest in Canon HD Lenses.

Don't put the wrong HD lens on the right HD camera! Remember: An HD lens is not a mere accessory to a camera, but the crucial first stage where HD images are created before entering the camera's imagers. That's why Canon—a world leader in optics for the broadcast, digital cinema, and professional video industries—offers a full range of HD lenses specifically designed for the many types of HD cameras leading manufacturers provide to the television and visual-entertainment industries.

Canon's new **HDgc** line of lenses is engineered for the new generation of affordable HD camcorders (tapeless and tape-based) using 2/3-inch, 1/2-inch, or 1/3-inch image formats.

Canon's ***e*HDxs** lenses include top-of-the-line telephoto, wide-angle, and medium-range lenses for a wide variety of high-end portable HD camcorders (such as Ikegami's Editcam, Panasonic's Varicam, and Sony's HDCAM) and portable cameras from GVG, Hitachi and JVC.

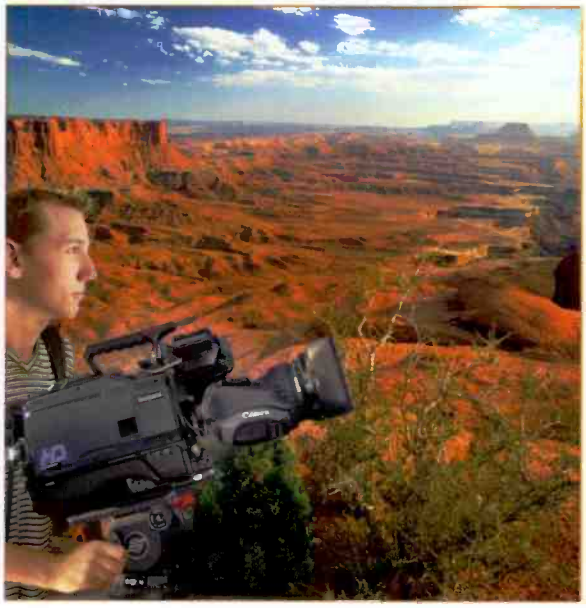
Canon's **HDxs** lenses include the line of DIGISUPER HD "box" lenses crucial to the field and studio cameras used in major sporting events and entertainment programming.

Canon's **HD-EC** lenses consist of six prime and three zoom lenses for digital High Definition Electronic Cinematography of theatrical motion pictures and episodic television shows. The ACV-235 Anamorphic Converter provides CinemaScope (2.35:1) image capture for 16:9 camera imagers.

Canon supports all levels of HD television, digital cinema, and professional video production, with specific lenses engineered to meet the needs of a diverse marketplace and a wide range of program genres. Canon HD lenses combine superior image performance, product durability, unsurpassed service and support, and appropriate pricing that add up to an excellent return on investment regardless of your purchase needs and budget.

production

eHDxs



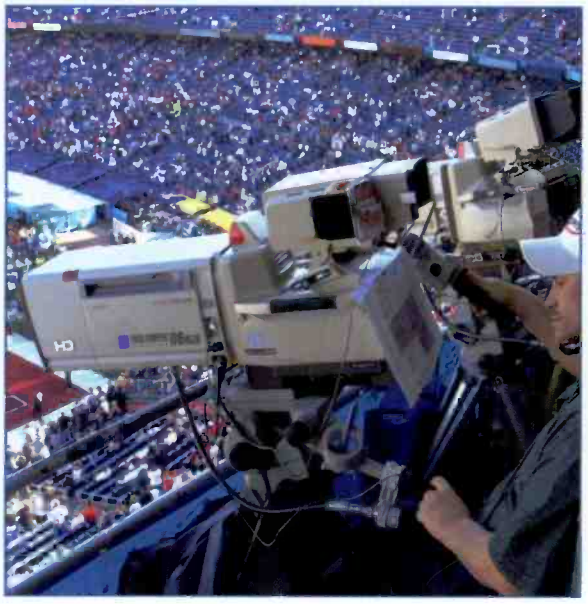
Canon's line of eHDxs portable lenses now includes eight models that collectively offer an extremely broad range of creative options to meet the needs of all forms of high-end HD production. Canon's eDrive employs microprocessor-controlled miniature 16-bit digital servo systems that enable users to automate control of iris, zoom, focus, and position memory, depending on user preferences; eDrive's programmable features provide value-added production capabilities.

eHDxs lenses:

- Are widely used to shoot "reality" and "magazine" shows.
- Are a popular choice in the production of HDTV documentaries.
- Are essential for entertainment and location production.
- Include models with impressive zoom capabilities, making them excellent for wildlife and nature videography.
- Include models with Canon's exclusive Optical Image Stabilizer (Shift-IS) technology, which is used extensively on helicopters and for other production applications.

field

HDxs



HDxs long field lenses have an extensive history of being first in the industry, and are constantly on the road with major mobile and broadcast production companies capturing the defining events of our time.

HDxs field lenses:

- Include four models (the DIGISUPER 100xs, DIGISUPER 86xs, DIGISUPER 86 TELExs, and DIGISUPER 75xs) featuring Canon's sophisticated Optical Shift Image Stabilizer (Shift-IS) technology for rock-solid image capture at telephoto distances.
- Include the DIGISUPER 60xs; as with Canon's other HDxs long field zoom lenses, the DIGISUPER 60xs features Canon's unique Power Optical System for superior specs and light weight.
- Incorporate Canon's second-generation Digital Servo System, which delivers improved ease of operation through multiple advanced programmable features.
- Offer a wide choice of controllers, including new manual-style digital servo zoom and focus controllers.

HDxs field lenses

XJ100x9.3B IE-D

XJ86x13.5B IE-D TELE
XJ86x9.3B IE-D

XJ75x9.3B IE-D

XJ60x9B IE-D

application

- Sports
- Concerts
- Other Live Events
- Government

HDxs studio lenses

XJ25x6.8B IE-D

XJ23x7B IE-D

XJ22x7.3B IE-D

application

- News Studios
- Drama Studios
- Game Shows
- Variety Shows

HDEC digital cine lenses

cine zoom

HJ8x5.5B KLL-SC HJ11x4.7B KLL-SC HJ21x7.5B KLL-SC

cine prime

FJs5 FJs9 FJs14

FJs24 FJs35 FJs55

anamorphic converter

ACV-235

application

- Movie Making
- Sitcoms
- Episodics
- Television Commercials
- Documentaries

eHDxs portable lenses

2/3" format

HJ17ex7.6B IRSE/IASE
HJ17ex7.7B IRSE/IASE
HJ11ex4.7B IRSE/IASE
HJ22ex7.6B IRSE/IASE
HJ21ex7.5B IRSE/IASE
HJ18ex28B IASE
HJ40x10B IASD-V
HJ40x14B IASD-V

application

- News Magazines
- Reality Shows
- Dramas/Episodics
- Documentaries
- Wildlife

HDGC portable lenses

1/2" format

KH16ex5.7* IRSE
KH10ex3.6 IRSE
KH21ex5.7 IRSE
KH20x6.4 KRS
KH19x6.7 KAS

2/3" format

KJ16ex7.7B* IRSE
KJ20x8.5B KRS

1/3" format

KT20x5B* KRS

application

- HD News
- Lower-Budget Productions
- B2B Productions
- Digital Indie Filmmaking

*Available late 2006

Canon

imageANYWARE

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... continued from page 34

patterns can affect a set negatively or positively, depending on how they're used within an overall design.

The other consideration is the materials you use. If you spend money on good materials, it will show up on the screen, Andrus said. Cameras are getting sharper and sharper, so you have to be more careful of what you put in the background. Depth of field is critical in HD.

According to Andrus, The Express Group tries to put as much physical depth as possible between the talent and the background without sacrificing camera positions in front. This helps to soften background elements, such as monitors, that would distract viewers. Using scrim material and frosted glass is another way to resolve this issue, he said.

Color and light

Lighting is also key to any HD set, so set designers work closely with professional lighting designers. Many set design companies even have a veteran lighting person on staff.

The trend, McLaughlin said, is to incorporate more lighting fixtures, but at lower intensities (about 80 to 100 foot candles) than used for SD. A combination of soft and incandescent lights can create the desired look and feel.

Soft lighting is often used to front light talent because these lights are more evenly distributed, more forgiving to the anchors, draw less power and heat, and last longer on the set. Devlin recommends using a dimmer to help smooth out differing complexions and hair colors among the news team members. He also uses

WFMZ-TV, in Allentown, PA, currently broadcasts in SD. Planning for an HD future, the station worked with Devlin Design Group to create a large-market on-air look with wood grain, new lighting and native HD graphics to highlight the talent.

McLaughlin creates a sense of depth in his designs by diffusing the background printed graphic or city skyline with Plexiglas or frost glass and by strategically positioning overhead and background lighting. The FX Group recently completed a new set for WFTV-TV in Orlando, FL. The set includes two HD rear-projection systems that serve as the focal point of the newscast. This enables the station team to change the look of the set based on the story being reported. This will be particularly helpful during November elections coverage.

fluorescent and incandescent lighting for key, fill and backlight positions.

Adding RGB color-changing lights to sets gives stations increased flexibility. These special RGB lights help set the mood and enhance the set significantly. Red might be used for a breaking report, while a subtle blue might work for a feel-good story. FOX's NFL set makes extensive use of color-changing lights.

Bright, saturated colors are sometimes used, depending on an individual station's view of the brand and its marketing direction. Broadcast Design International recently finished the new studio set and newsroom for the "CBS Evening News with Katie Couric" in New York. (See this issue's cover.) The multivenue set is designed purely for HD and includes wider set components, reflecting a stronger 16:9 design composition, brighter colors and strategically placed lights in the grid and anchor desk to compensate for the vivid HD picture.

HD reflects very vividly, even if a set uses earth tones, Karlen said. A set designed for a New Mexico newscast will look very different from one for a northern California news show because the brand of the two stations is completely different.

To make a set pop on screen, Blyth likes to use metal and reflective materials — even a high-gloss black desk — to add brightness and small

Web links

- Blyth Design
  www.blythdesign.com
- Broadcast Design International
  www.broadcastdesign.com
- Devlin Design Group
  www.ddgtv.com
- The Express Group
  www.theexpressgroup.com
- FX Group
  www.fxgroup.tv

Set inspiration

Looking for new set ideas? The SetStudio features more than 1000 photos of sets from 100 stations and networks around the world. Founded in 2003 by Michael P. Hill, the Web site is a great resource for any engineer or station employee looking for set design inspiration.

The site is not affiliated with any set design firm or manufacturer. Hill relies on user submissions for his collection of photos. Users are encouraged to submit photos of their station's set for consideration. The site is accessible free of charge at *www.setstudio.com*.

silver accent lights with star filters. In the past, cameras couldn't handle reflective surfaces, he said. But today's HD cameras and lighting equipment do a much better job of bringing out the highlights without producing an ugly burn in that is visible on screen. Instead, Blyth said, it can make a set sparkle.

Moving

It's not enough to plan for what a new HD set should include. You must also figure out how to get the new set in place. The trick is to move the newscast from its existing stage to another area while new construction occurs. This process is perhaps the most challenging because a station's newscast can't go off the air. Extensive planning by the station's operations manager and chief engineer is critical.

Often, sets are built off-site and then assembled at the studio to decrease the disruption. Another option is to temporarily move the newscast elsewhere and build the new set on-site. This is what WNYW-TV in New York City did. The old set was sliced into pieces and reassembled in another studio in the parent company's building. For four weeks, the station produced its three-per-day newscasts from this secondary location while a new set, designed by Blyth Designs, was built in the home studio. According to those involved, the move was smooth and seamless, and most importantly, viewers didn't experience a disruption.

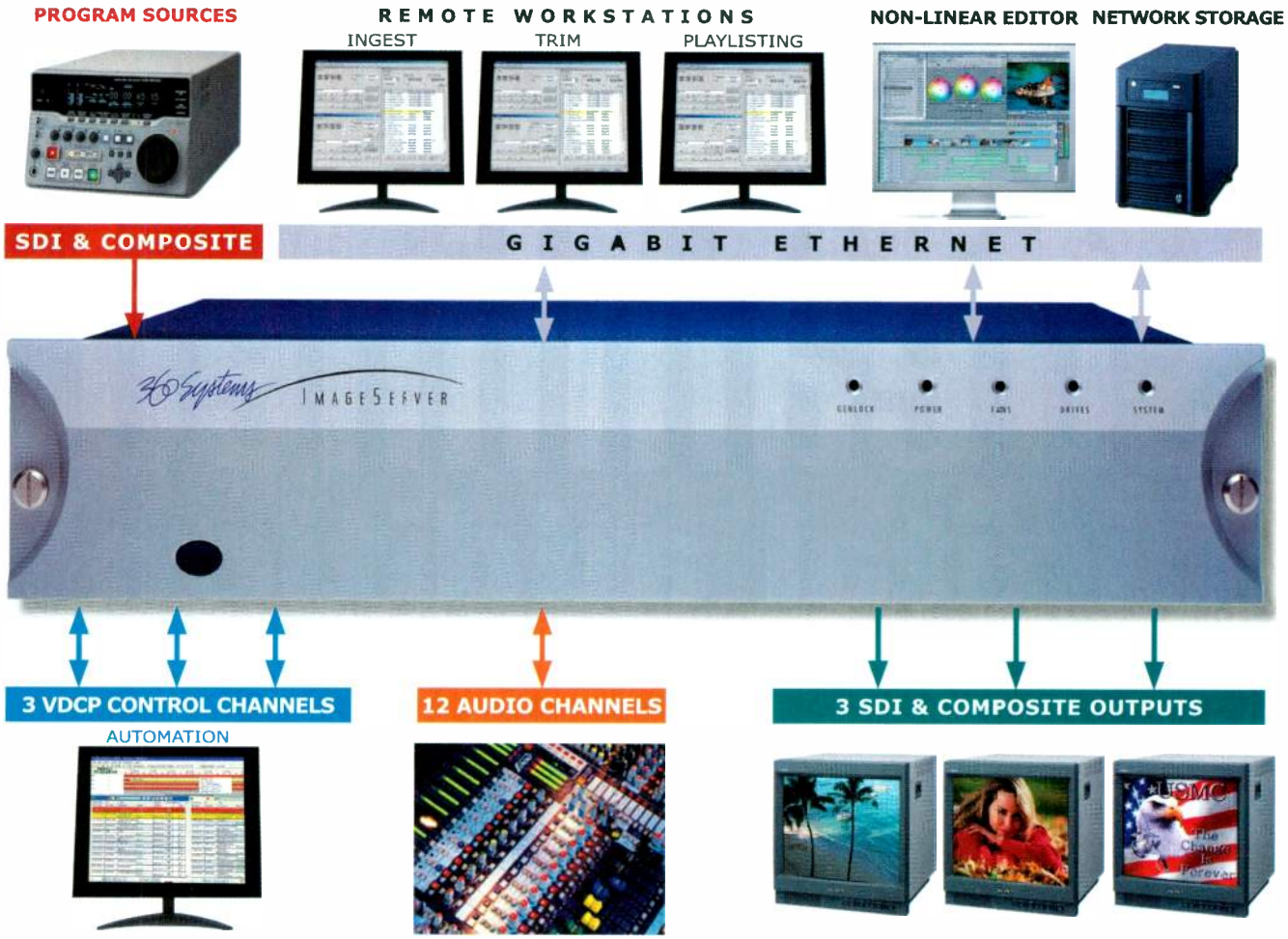
The final set

Changing sets every time a new news director is hired is no longer feasible. Today, stations are expected to live with a news set for five to seven years. With HD's emergence and limited budgets, new sets must be as flexible as possible without looking temporary.

Designs have to be versatile, yet, with many stations using robotic cameras and automated station-in-a-box systems, must accommodate new and existing production technologies and the limitations they bring, Devlin said. Many times camera movement, location and proximity don't always work well together, and that's affected by technology, lighting and studio space, he said. Having the freedom for the talent to move around a set may be nice, but often that works against the benefits of new developments like robotics that were championed over the past few years. The key is to know what you have and what you plan to keep in a new design and then make it work. BE

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

Talk about intelligent design...



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SYSTEM DESIGN SHOWCASE

NECN's streamlined digital addition

The new, digital workflow improves flexibility and breaking news coverage.

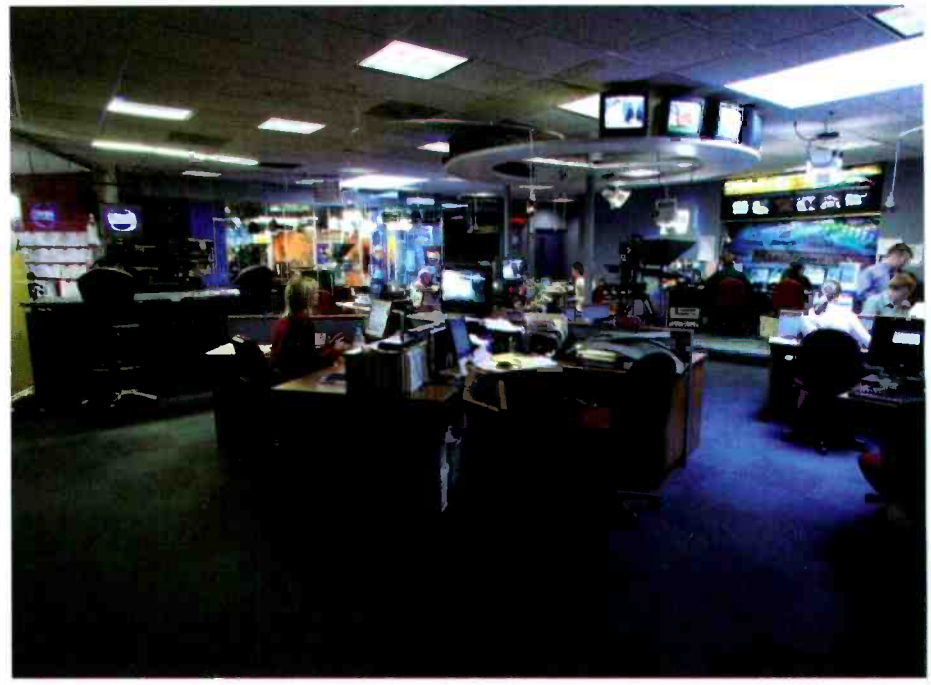
BY MICHAEL GROTTICELLI

When NECN launched as a cable news channel in 1992, the mission was clear: Provide original local and regional news, as well as national news from a regional perspective, fast. The station produces 11 hours of live programming on weekdays and seven hours on weekends from a 19,600sq-ft facility in Newton, MA.

Since its inception, the station acquired field video on Betacam SP tape and edited in a tape-based "cuts only" workflow (along with a single Sony BVE-600 system for A-B roll editing). A few Fast Forward Video editing workstations and Autodesk Discreet Edit 6.0 and 6.5 systems provided craft editing capability for longer-format programming and weekly shows that were preproduced.

The idea was to use this basic technology to deliver a local perspective into viewers' homes throughout the New England region in a timely fashion. Thirteen years later, the response from viewers and critics alike has been phenomenal. NECN currently reaches 3.2 million homes with a zoned distribution system that serves the Boston DMA and the New England region (i.e., Connecticut, Maine, Massachusetts, New Hampshire and Vermont).

NECN's Audio A control room features a Wheatstone D-9 digital audio console and a Grass Valley Kalypso SD switcher, which are used to produce its main newscasts and other news segments. The router-based D-9 allows Audio A to act as a backup control room for the Audio B control room.



Having Grass Valley NewsQ Pro software on every ENPS workstation in the bustling NECN newsroom allows producers and reporters to quickly assign story slugs and file footage, write scripts, and begin the process of digital asset production prior to the editing and playout process.

In 2004, NECN made the leap into digital news production in an effort to take advantage of file transfers, nonlinear flexibility and fast news package turnaround times. The station chose the Grass Valley Digital News Production system to optimize its workflow. Everything but the switchers is connected to a dual-chassis Grass Valley NAS, allowing the station's news editors to share material and producers and journalists access to stories from anywhere in the building.

Taking a phased, multistage approach to full digital production over the past two years, NECN's chief engineer, Greg Roehr, said the biggest challenge was migrating while keeping the channel on the air. There could be no downtime, and space limitations didn't allow for prebuilding work areas. Another major challenge was to create a new, collaborative way of working, and train operators on the new systems as they simultaneously put out the day's newscasts.

The biggest challenge was migrating while keeping the channel on the air. There could be no downtime.

The facility now maintains 10 NLE suites with Grass Valley NewsEdit SC systems, several with 2-D DVE and CG capability. Three additional NLE systems are on board SNG and ENG production trucks covering news in the field.

All field material is ingested using FireWire connectivity. And the functionality of the NLEs allows editors to begin their work before the file is completely uploaded onto the network. Once a package has aired, it's copied to Sony XDCAM disks or Betacam SP tape and archived in a tape library for long-term storage.

Video A control room features an efficient layout that enables live news programs production with only two people.

Tapeless acquisition

In 2005, NECN made its second major leap into digital news production by purchasing 11 Sony XDCAM camcorders and source players for edit systems and viewing stations. The XDCAM's optical media discs are compatible with the NewsEdit systems and have helped the station produce news packages in a third of the time it took with the previous tape-based workflow.

In tandem with the move to optical disc acquisition, the station also changed the way it handles media for news production. Where previously it sneakernetted tapes between editors and played out programs to air from tape, the station implemented a segmented Gigabit Ethernet backbone to support a file-based network. This

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includes a Grass Valley NAS system, Telestream FlipFactory for externally produced content and dual two-channel M-Series iVDR servers for each of the two on-air control rooms. The iVDRs are mirrored to provide redundancy and online security.

Edited material is fed to the M-Series units using a Gigabit Ethernet pipeline. The units then play stories directly to air via the production control room with a Grass Valley Kalypso or Kayak switcher. Two 1.21TB (110 hours at 25Mb/s) of in-house storage support the centralized NAS system. And by using metadata generated by the Associated Press newsroom ENPS and Grass Valley NewsQ Pro systems, the NAS allows all editors, producers and journalists to have access to the same content.

While NECN video is distributed with analog (mono) audio throughout the region, its audio production is handled by a Wheatstone D-9 audio console from its main control room and a 56-input Mackie audio board in its secondary room, which also includes a Kayak HD switcher. The lack of multichannel audio is due to prior distribution arrangements with the station's transport provider.

Two 1.21TB of in-house storage support the centralized NAS system.

At the heart of NECN's network MC, a Utah Scientific MCP-2020 MC switcher, a Harris Leitch Panacea router and a SeaChange MediaCluster server system — all under Sundance NXT automation control — manage main program and dual-zone commercial content.

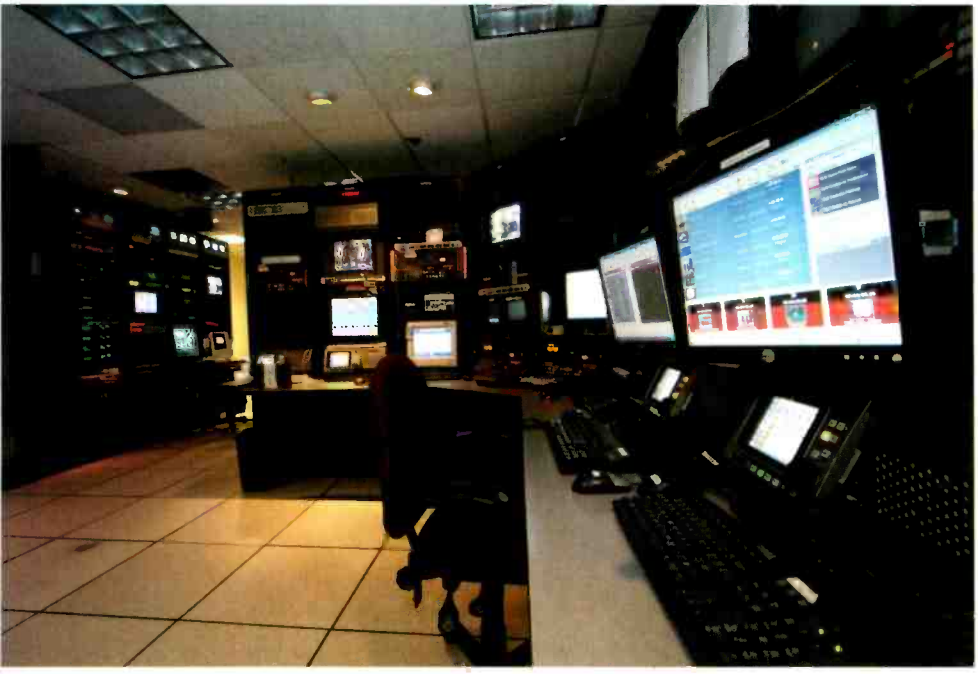
NECN is carried on most of the multiple system operators (MSOs) in the region, including Comcast, Charter Communications, Metrocast and Time Warner Cable. The station's two outbound program channels are carried to the cable headends via a terrestrial fiber and microwave distribution network.

Automated playout and tape archiving

The facility includes two similar production control rooms. Control Room A includes a Kalypso switcher, while Control Room B features a Kayak HD switcher. Room A is used for the main newscasts and some other segments, while Room B handles breaking news, a zoned newscast and other programs that air throughout a typical news day. Grass Valley Profile servers, which store prebuilt animations and other stock elements, support both control rooms.

Added to this mix is the NewsQ Pro system, which manages identical playout facilities for NECN's two production control rooms. It enables producers and journalists to quickly and easily search, locate and retrieve material associated with a particular story.

Producers use the system via their



The operations control area (shown here) allows monitoring and operation of NewsQ Pro and playout servers for both control rooms from one central area.

The New Broadcast Standard.

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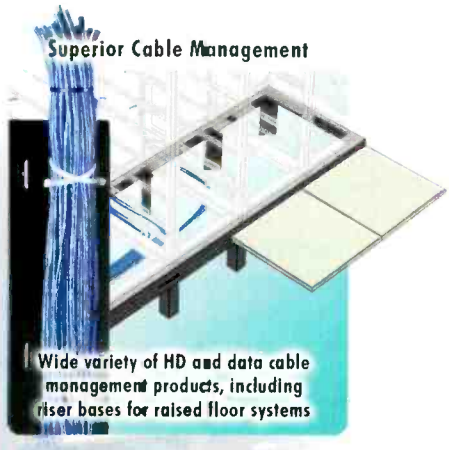

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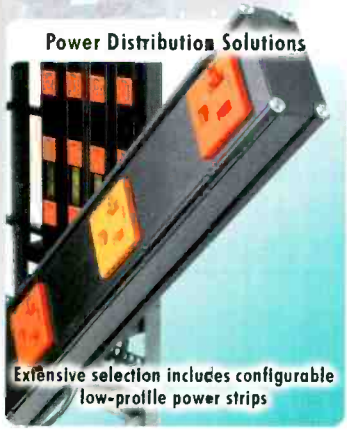

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Technology in action

Associated Press ENPS newsroom computer system
Grass Valley
- Kalypso SD switcher
- Kayak HD switcher
- M-Series iVDRs
- NewsEdit SC NLE systems
- NewsQ Pro
- Profile servers
- NAS

Harris Letich Panacea router
Mackie 56-input audio board
Pathfire media servers
SeaChange MediaCluster servers
Sony
- Betacam SP VTRs
- XDCAM cameras and player/recorders

Sundance Digital NXT automation
Telestream
- ClipMail encoder
- FlipFactory automation system

Utah Scientific MCP-2020 MC switcher
Wheatstone D-9 audio console

Design team

NECN
- Greg Roehr, chief engineer
- Dave Beauvais, director of operations
- John Mehrtens, IT manager
- Kris Kalanderi, assistant chief engineer

MOS-connected Associated Press ENPS desktops to slug each story and leverage any additional metadata generated by the cameras, Pathfire media servers, wire services, reporter info and so on. This metadata stays with a story from when it enters the building until it is dumped off to tape for archiving.

Internal training was key. News employees had to modify their old tape-based processes and embrace the new file-based workflow. Grass Valley is modifying the "Archive-To-Tape" function within the NewsQ Pro software to accommodate XDCAM equipment interfacing and will provide NECN with an update soon. The goal is to eliminate videotape from as many areas of the operation as possible.

The system design now in place is flexible and fast, allowing the news station to go live at a moment's notice. As material is ingested, it can be aired immediately.

Completed programming content is sent from the production control rooms in serial digital video with embedded AES audio to the station's network operations center. From here, commercials are inserted for the two regions served by the news station and then sent to the cable provider and into consumers' homes. A Sundance Digital NXT provides automation control for NECN's Utah Scientific MCP-2020 MC switcher at the heart of its network

operations center and manages three channels of SeaChange MediaCluster servers for playback of prerecorded programs and commercials. The system design now in place is flexible and fast, allowing the news station to go live at a moment's notice. As material is ingested, it can be aired immediately.

Where previously the newsroom automation system was used to find tapes on a shelf, material can now be retrieved much faster and more efficiently from the NAS system and married with live signals sent via fiber, microwave or satellite connection. NECN also maintains four news bureaus throughout the region that contribute news on a daily basis, with some stories sent via a Telestream ClipMail system.

This process has been used on several late-breaking occasions, such as the recent flooding in New England, and has helped the station scoop its much more established competition. NECN has to be prepared for any and all news stories as they break. The system as implemented allows the station to go live from two different control rooms and expand coverage of important stories at a moment's notice.

Rather than go for a high story count, there are times when the station will expand upon a single story. On Sept. 11, 2001, two of the troubled flights originated from Boston and Maine. NECN went live for six-and-a-half days, commercial-free. Throughout the current Middle East crisis, the station has been able to easily break away from planned stories as needed.

NECN's technology and systems have been designed for a maximum workload, yet the systems are flexible and ready to adjust to a different workflow. The station's approach to the news business is the reason NECN has remained an award-winning news source in the region. BE

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

Multichannel playout

Operational support systems can lower your OPEX today.

BY RICK BOLIN

Even the casual observer can see that the broadcast industry is going through a period of massive change in terms of how content is created and distributed. To those within the industry, this change provides massive challenges and opportunities. The seismic technology shift taking place — from analog to digital and beyond — is backed by the spread of IT-based solutions. We are witnessing the death of the dedicated hardware. A new era that combines these software solutions with years of experience delivering audio and video is now upon us.

There is an inexorable pressure to cap or reduce operational expenditure.

These significant changes in the basic infrastructure, plus the emergence of true multimedia delivery requirements and the move away from the linear broadcast model, means that network solutions are now performing a primary role for many organizations. And the importance of these network solutions is only going to grow.

It is clear that many broadcasters are still grappling with these workflow changes. As the industry increasingly moves to file-based digital content generation and playout, there is an inexorable pressure to cap or reduce operational expenditure. The rapidly increasing level of IT in the broadcast chain provides a higher level of machine and network intelligence than the industry has experienced. This provides a clear opportunity to track performance in a way that was previously impossible. By accurately tracking performance over time, operational efficiency can be improved and operational expenditure reduced. The question remains: How does the industry monitor performance?

BBC Belfast in Northern Ireland manages its broadcast systems with FBBT's Matador.

By looking at the telecommunications industry, we can draw some instant parallels. The industry has undergone technological and business model shifts throughout the last few decades. That industry is also trying to generate maximum revenue from digital content while providing a quality of service in a cost-competitive marketplace. Both shifts in the market require an increase in the customer base and loyalty.

The proven benefits of OSS

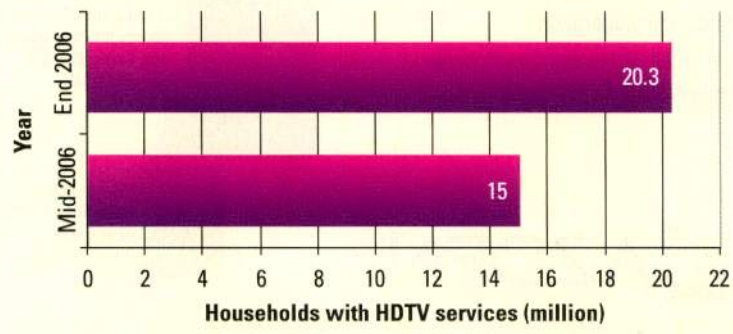
The telecom industry is way ahead in its deployment of network technologies. One of the key elements in facilitating the efficient deployment and subsequent use of new network technologies in that sector has been the use of operational support systems (OSS). There is now a major opportunity for the broadcast industry to move rapidly beyond the early adopter phase of exploiting enterprise applications — software that tracks separate business functions — to OSS, and therefore to be able to successfully view the network as a strategic tool.

So what are OSS and what do they do? OSS combine the real-time

FRAME GRAB *A look at the consumer side of DTV*

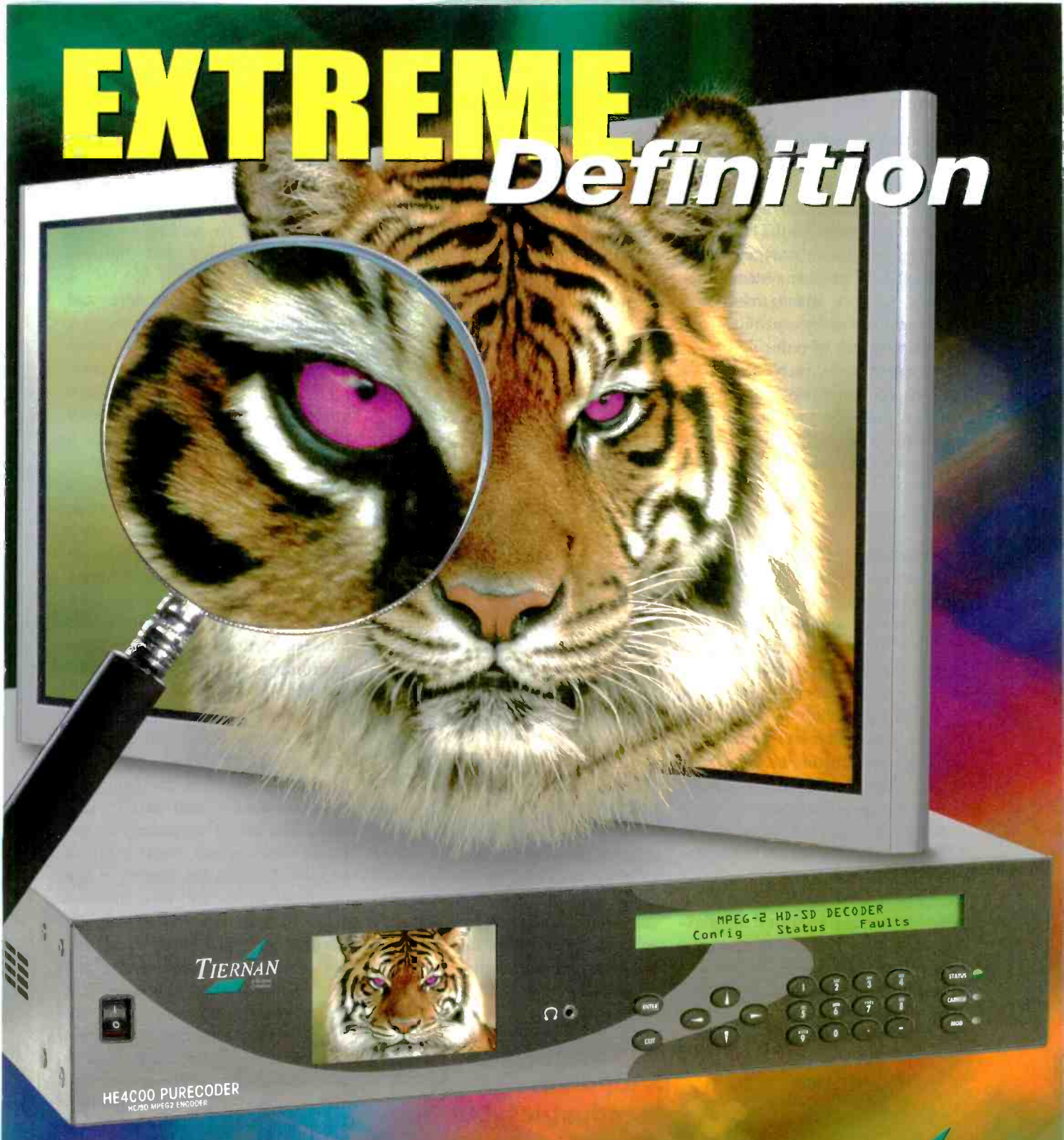
HDTV households continue to grow

By the end of this year, 20.3 million houses will have HDTV.



Source: In-Stat *www.in-stat.com*

EXTREME Definition



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monitoring of engineers with a historical view to reveal trends and patterns of management.

OSS first appeared on the telecommunications market in the late 1980s as billing integration systems. Newer breeds of OSS provide systems integration, network management and equipment inventory capability, with the ultimate aim of reducing operational expenditure, increasing profit margins and improving commercial viability. The OSS market is now a huge worldwide business in telecommunications. Consulting firm RHK predicts that it will top $31.52 billion in 2006.

Broadcast topologies

Of course, there are considerable differences in network topology between the telco and broadcast industries, but the fundamental principals remain the same. Today's broadcasters are rapidly switching over from analog to digital. And they are driven by new regulatory and compliance demands and customers who want more and show an increasing willingness to change providers.

While the next 15 years in the broadcast industry will not be a replay of the last 15 years in the telecommunications industry, enough overlap exists to warrant a serious comparison of winning and losing strategies. OSS present broadcasters with a significant opportunity to exploit existing telco experience, and to invest in OSS as a means of containing or reducing the cost of maintaining their infrastructures while they implement additional delivery paths for content.

Although digital infrastructures provide greater flexibility of resource deployment, it is vital to maintain the integrity of the signal path. This is labor-intensive and dependent on operator skill level. Traditional broadcast engineers have an ability to understand signal path configurations and to deal with any issues that arise, but such skills are not universal and are costly to attain and maintain.

FBBT's Matador uses a visual display so operators can see a virtual representation of the entire broadcast system.

OSS can significantly reduce operational expenditure by providing infrastructure management tools and information. These are closely related to those found in telcos, but with critical differences arising from the need to sustain signal paths and with special user interface techniques being developed to address this.

Of course, there are considerable differences in network topology between the telco and broadcast industries, but the fundamental principals remain the same.

The deployment of OSS does not in itself guarantee workflow continuity. The organization may need restructuring around the functionality of OSS to optimize business benefits. OSS need to address four primary business drivers:

- Provide the tools to enable the infrastructure to be viewed as an enabler of profitability.
- Support an increased diversity of program output at constant or reduced operational expenditure.
- Provide for an increased level of reporting capability and business continuity.
- Maintain a comprehensive and overarching monitoring system.

So, how is this achieved? In practice, OSS consist of a number of servers distributed around a broadcast infrastructure and then connected together through a normal WAN.

The analysis tools that a system provides must be flexible and easily accessible, e.g. from any PC client on the same network using a standard Web browser. Because of the inherent complexities in displaying the operational state of a given network, it is often necessary for a dedicated client to be used, particularly if a 3-D virtual environment is the chosen illustration method.

OSS are designed to capture events within the broadcast infrastructure nonstop. Events include everything from control system commands to low-level alarms such as GPI closures. The use of an underlying database structure will enable events to be viewed within the context of live broadcast paths. The time from an alarm being detected at the edge of the network to an indication on a user's screen should experience the least delay — a matter of seconds — in a typical WAN installation.

OSS provide statistical information on equipment use, frequency of alarms and compliance with service level agreements (SLAs). Traditional approaches to broadcast monitoring are static in that they attempt to replicate or mimic the wiring details. The difficulty is that there is never enough room on the computer screen to display all the features of immediate interest.

The user interface

A visual display solves both problems. Broadcast paths can be displayed dynamically. That is, the user selects an end point, and the path analyzer

#1 in routers and master control.

NVISION

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SAVE A BUNDLE: The NV5128-MC is the first to combine digital master control and multiformat routing switchers in the same frame. Less hardware means less cost – a savings of 50% or more over separate control and routing switchers.

ANALOG AND DIGITAL: Multiformat input capability protects legacy analog signals and saves the cost of external converters.

MULTIPLE PROGRAM STREAMS: Up to four channels of master control or 8 channels of branding in a single frame.

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- 128 system inputs – digital, analog, or mixed
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- HD and SD branding engine: multi-level keying & logostore
- Mix & match master control, branding, and routing in the same 8RU
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algorithm propagates backwards from there, displaying all the devices that comprise that path. This environment allows users to display as much detail or perspective as they are interested in, simply by navigating around and zooming in and out. This means that users do not lose contextual information even when they are looking at an individual device in detail.

One basis for visual display is the reference model developed by the EBU/SMPTE Task Force on Harmonized Standards for the Exchange of Program Material as Bit Streams and published as a report in 1998. The EBU/SMPTE model defined the broadcast infrastructure in terms of devices, paths, services, content and management services.

A visual console can, therefore, display the broadcast path and any redundant paths. This also works for multiplexed signal streams and broadcast services.

As well as showing signal path devices, this console can monitor sound and pictures. This is achieved by selective placement of streaming engines throughout the broadcast infrastructure.

It is important in OSS that previous configurations of the infrastructure can be examined. By recalling stored events and stepping through them, the user can examine the state of the infrastructure, a given event or sequence of events. Alarm analysis, report generation and trend analysis are also central to OSS and the benefits they will provide. This should include:

- SLA compliance;
- device use;
- signal path use;
- alert history; and
- event history.

OSS reports normally take the form of tables or graphs that can be exported as management reports. Trend analysis allows users to identify areas particularly prone to failure or areas of the infrastructure that are underused.

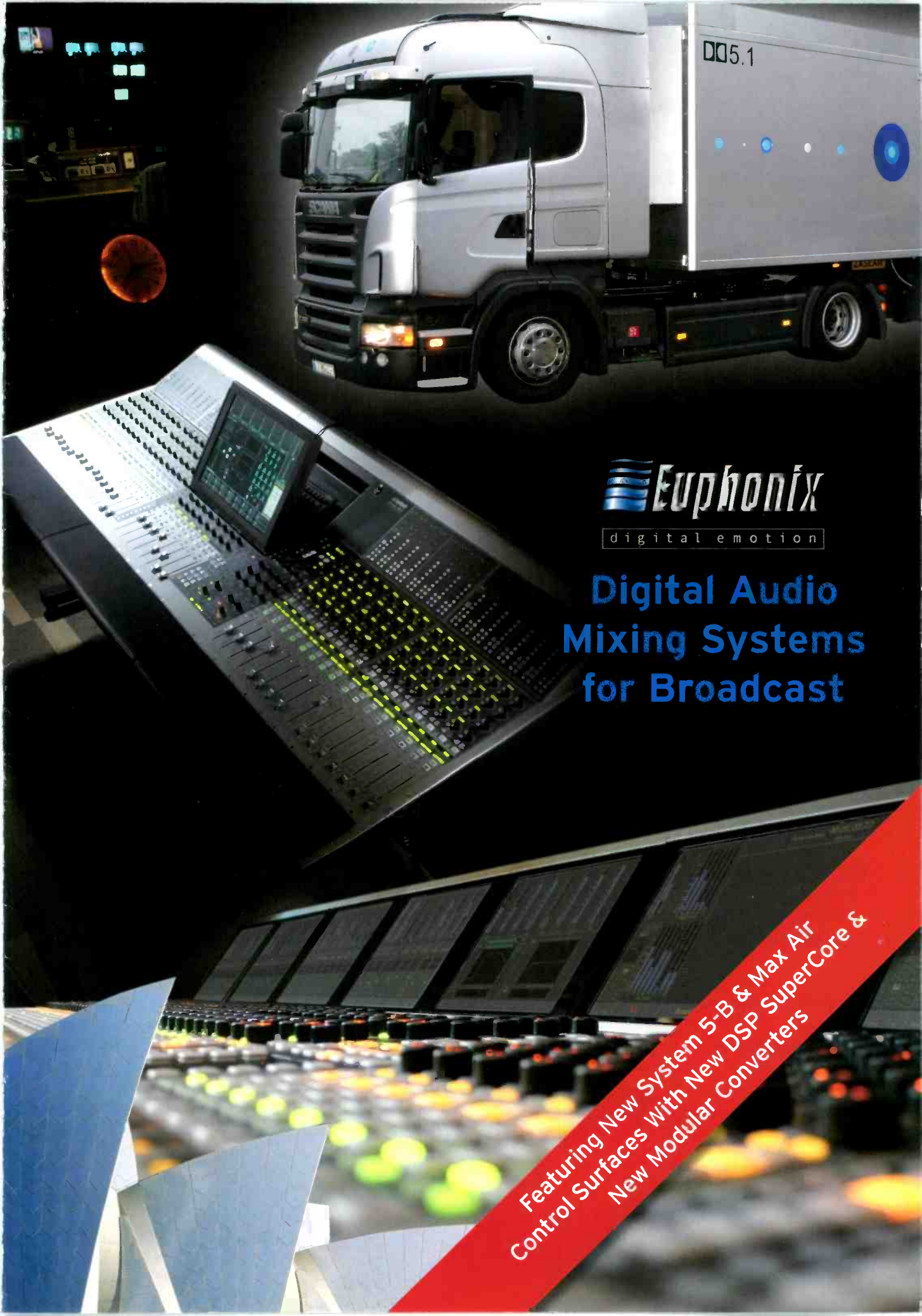
The detailed information that OSS collect is often used to define SLAs, which in turn define the commercial arrangements between broadcasters, suppliers and transmission providers. For commercial broadcasters, the cash flow controlled by SLAs determines operating profit or loss, which can be constantly monitored by the OSS.

As network-based IT solutions roll out and dominate, understanding the role of each piece of technology in a network becomes not only possible, but desirable.

This strategic tool enables managers to run the business efficiently, and also serves as a tactical tool for operators and engineers. Of course, the design architecture must be fully scalable with each of the components designed so that it can cope with future load issues and address the size of any potential installation.

We all understand the huge technological changes that the broadcast industry is currently experiencing. As network-based IT solutions roll out and dominate, understanding the role of each piece of technology in a network becomes not only possible, but desirable. By deploying OSS designed specifically for the complexities of broadcast networks, technological efficiencies can be achieved that will prevent outages — and, therefore, viewer dissatisfaction — and should also reduce costs over time. BE

Rick Bolin is director and CEO of FBBT.


DD5.1
Euphonix
digital emotion
Digital Audio
Mixing Systems
for Broadcast
Featuring New System 5-B & Max Air
Control Surfaces With New DSP SuperCore &
New Modular Converters

Mixing Audio for HD

With new HD standards currently being adopted by stations throughout the world, the audience demands higher quality audio and, in many cases, surround sound. Audio operators also have to handle increasingly complex productions with ease. From news to sports to production, in the studio or on the road, Euphonix has a range of flexible and modular digital audio mixing solutions, from 32 to over 1,000 channels, that can be tailored to exactly meet any facility's requirements.

Updates for Broadcast

The Euphonix broadcast line now features some significant new product updates:

System 5

Updated control surface with...

- New touch-sensitive LED color coded knobs
- Higher resolution screens
- Faster embedded processors for quicker boot times
- More memory for added features and faster response
- Improved fader resolution around 0dB

Max Air

Updated control surface with...

- Improved surface color coding
- New external screen metering option
- Faster embedded processors for quicker boot times
- More memory for added features and faster response
- Improved fader resolution around 0dB
- New speaker shelf design

New DF66 DSP SuperCore

New Modular Converters

System 5-B and Max Air

Two models are available for different applications and budgets. Both use the same DSP SuperCore, router and range of converters and share many of the same features. What sets them apart is the control surface.

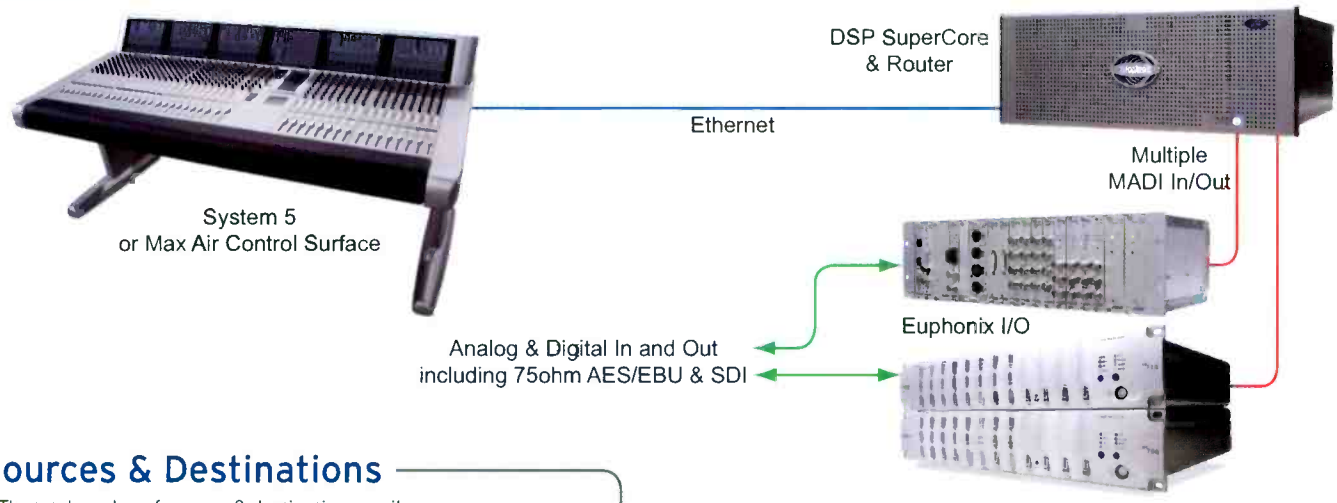
System 5-B

The most advanced digital broadcast mixing system available. It is designed for audio professionals who demand the best. With 8 knobs per channel and TFT displays for metering, routing and parameter display, System 5 is built for the ultimate in operational flexibility and visual feedback.

Max Air

A more compact control surface with 4 knobs per channel and a central touch screen interface making it very easy to learn and use. Max Air is ideal for one operator to handle everything from on-air news to production and outside broadcasts.

System Architecture



Sources & Destinations

The total number of sources & destinations available increases with each SP662 DSP SuperCore card added to the system. Each card includes 4 MADI (224) inputs and outputs. A typical 3 card system with 12 MADI inputs and outputs, each MADI stream capable of 56 channels of digital audio, will have 672 sources and destinations.

Channels

The sources are routed to the console's channels using the PatchNet software.

Each channel has:

- 2 inputs, that may be fed from analog or digital sources. Either A, B or A + B may be selected to feed the channel.
- Phase reverse
- Digital gain trim
- Delay - 2 seconds per channel
- Insert send & return
- 4 band fully parametric EQ & 2 filters
- Full dynamics inc. compressor and expand-gate, key input and side chain filter
- Touch sensitive moving fader
- Multi-format pan to mix & group busses
- Multi-format mix and group busses
- Mono/stereo group/clean feed busses
- Aux/IFB send busses
- Solo (APL, PFL, SIP)
- 2 direct outputs - pre-fader & post-fader
- N-1 mix-minus output from each channel

When Euphonix remote mic preamps are connected to the channel these controls are also available:

- Input impedance - hi/lo
- Phantom power
- High pass filter
- Analog input gain

Busses

The number of busses available depends on:

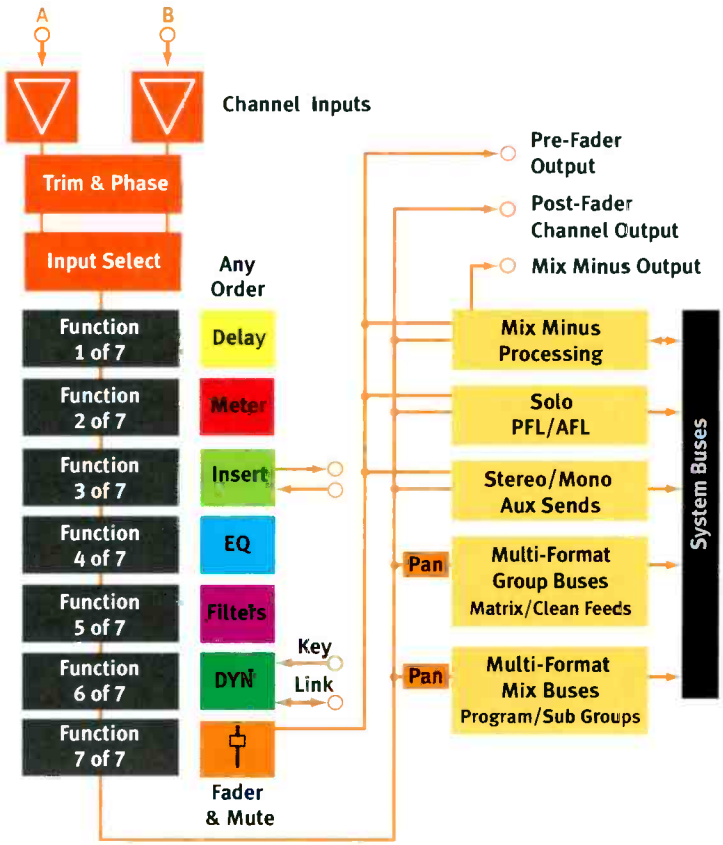
- Number of SP662 DSP SuperCore cards
- Mixer Model (software defined mixer configuration)

Three types of busses are available:

- Up to 48 for Multi-Format Mix Busses
- Up to 48 for Multi-Format Group Busses
- Up to 24 for Mono/Stereo Aux Sends

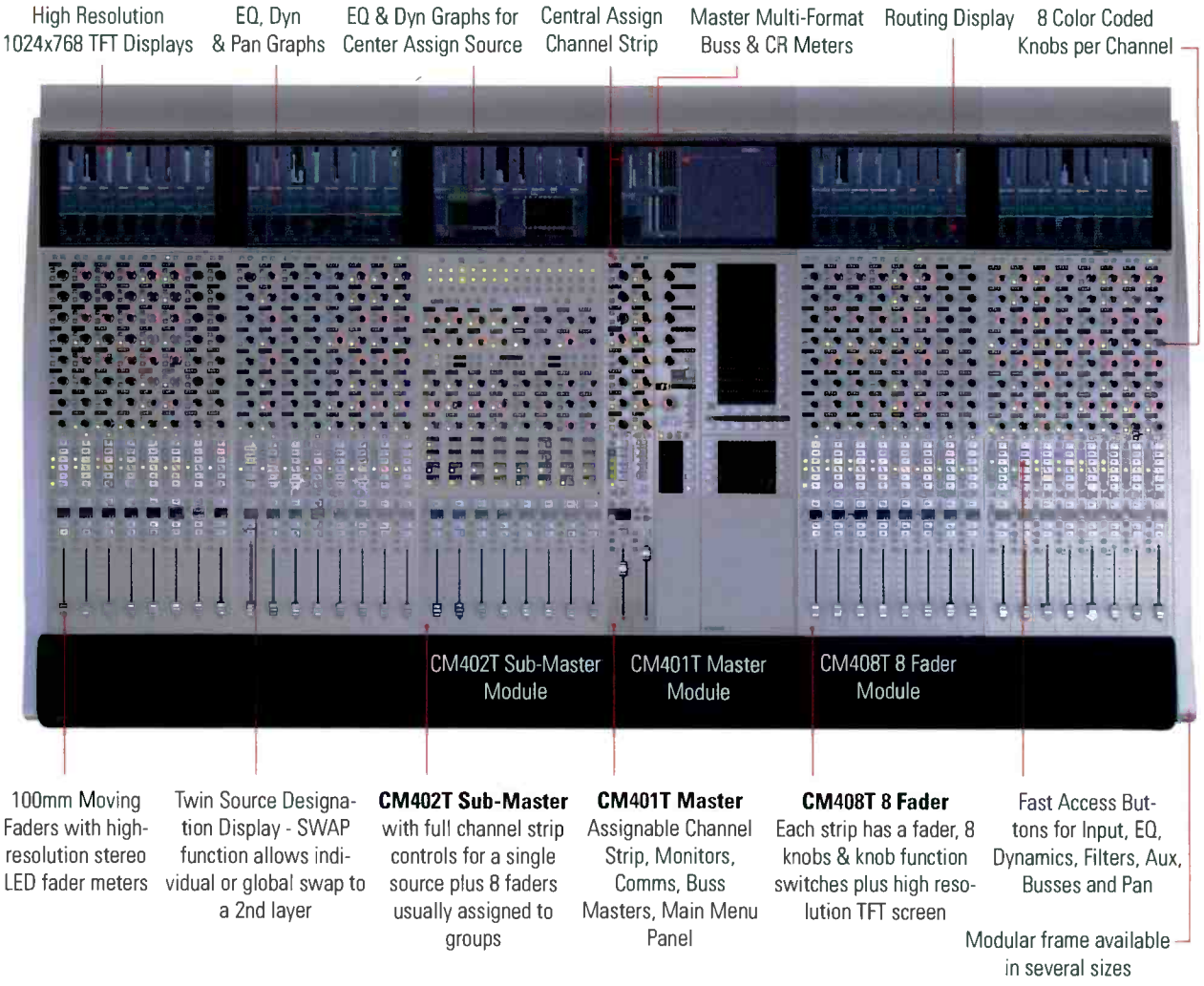
Mix & Group busses can easily be formatted in stereo or surround (up to 7.1 including LCRS and 5.1). Audio subgroups may be built when needed from available busses. Filters & Dynamics buss processing is available.

Busses may be placed on any channel strip for full control of master level and processing using the 8 knobs and screen displays.



System 5-B Control Surface

New LED color coded knobs, higher-res screens with improved graphics, & improved surface color coding for clearer display



Control Surface

Much like any audio console the System 5-B's surface includes channel strips and a center section for master facilities. The System 5-B surface is modular and comprises of 5 different modules:

- CM401T Master*
- CM402T Sub-Master*
- CM408T 8 Fader Strips*
- CM409 Blank Module
- CM411v Video Module*

All modules (1ft wide, 305mm)

* Includes TFT screen display 1024x768

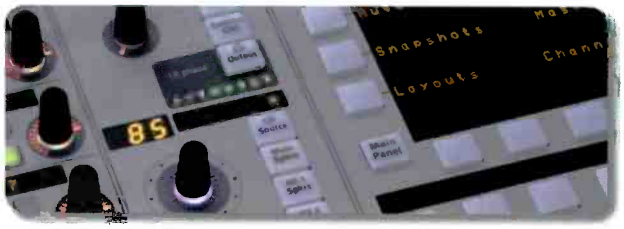
System 5 can be supplied without a frame for custom installs. Each module is self-contained with dual redundant power supplies and an Ethernet connection for control. Modules may be placed in any order and can easily be moved. If a fader module fails, there no loss of audio, and it is easy to use other modules to control those sources and to hot swap the module.

eMix

eMix is the application that integrates with System 5 and provides setup, file management and the PatchNet patchbay application. It supports the following features accessed from an external screen:

- Directory & File Management
- PatchNet
- System Diagnostics and Mixer Models
- Mix & Group Buss Setup
- Monitor Fold Down & External Inputs Setup
- Events & GPI System Programming

Modular Frame Sizes (Custom Available)			
Frame	Height	Width	Depth
6 modules	39.5" (1 m)	6'10" (2.08m)	41" (1.04m)
9 modules	39.5" (1 m)	9'10" (3m)	41" (1.04m)
12 modules	39.5" (1 m)	12'10" (3.9m)	41" (1.04m)



Channel Strip - CM408T

Includes 8 knobs, that can quickly be switched to control Input, EQ, Filters, Dynamics, Pan and Buss Routing, plus a high resolution screen for display, the System 5 is the ultimate channel control strip.

TFT Screen Display:

High Resolution
Multi-Format Metering up to 7,1

Router Source Name
Source Info
EQ & Pan Curves

Routing Indicators

Knobset Function

Touch Sensitive Knobset:
8 knobs each with
LED color coded outer rings,
4 character displays,
and two switches
for process on/off

Knobset Function Select:
selects the 8 knobs to control
Input, Dyn, Eq, Filters, Aux,
Pan or Routing

Swap the Strip between the
Main and secondary Swap Source

Fader:
twin 4 character designations
- may be linked to the facility
router, Talkback, Solo, Channel
On, Channel Select key for bringing up the source in the center of
the console, 100mm long-throw,
touch sensitive, motorized fader,
twin hi-res LED meters

Master Module - CM401T

Includes a full assignable channel strip, 8 knobs for Buss Masters, plus Monitoring and Comms. The Main Panel menu is used for setup and recall of Layouts & SnapShots, Channel Assign, Meters and Strip Setup.

Main Panel Menu System
24 buttons each with 10 character display

Central
Assign Strip

A,B,C & D SLS
Monitors

Solo

CR Monitors

Buss Masters

Buss Master Select
Comms Panel
Sub-Panel

Automation &
Transport Controls
for the System
5-BP ONLY.
This panel is
blank for
System 5-B.

Sub-Master Module-CM402T

The optional sub-master central assign module adds a complete set of channel strip controls including dedicated knobs for EQ, Filters, Dynamics and Aux Sends plus 48 dedicated Routing Buttons. There is also a section of 32 buttons and displays for selecting any source to the center as well as 8 faders that are usually assigned to control group masters. The high-resolution screen adds a further 8 programmable meter group displays as well as large EQ and dynamics graphs.

Metering

Every channel includes high-resolution multi-format metering on the TFT screen for display of sources, channels, auxes and groups as well as gain reduction. There is also stereo hi-resolution LED metering next to each fader. The central CM402T sub-master module offers 8 extra programmable meter displays and the CM401T master module has multi-format metering of the main busses and monitors. Meter displays may be customized and saved as setups - for example the channel strip meters can show both the SWAP and MAIN meters above each other.

eMix External Screen - Showing Mix Buss Setup

Title
Timecode Reader
Buss number

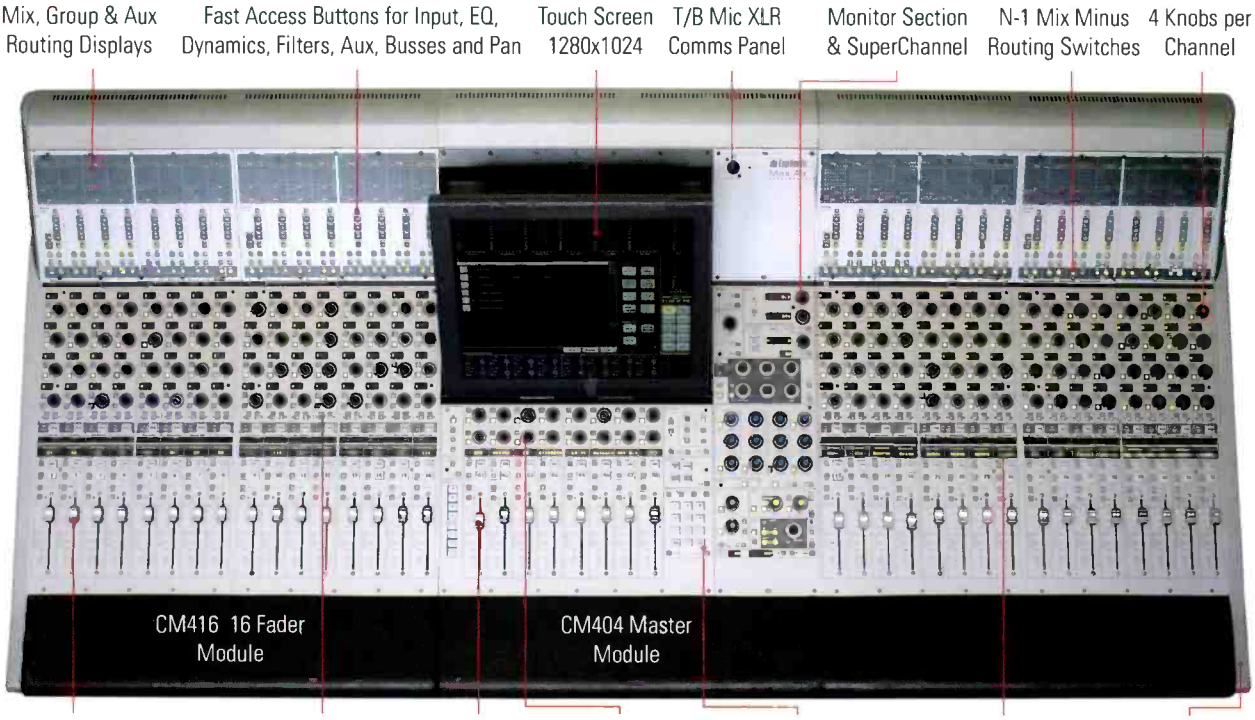
Names for
Mix Sections

Pan Law Palette
for setting format
of selected busses

Tabs to
Group Busses
eMix Pages

Max Air Control Surface

New color coded knobs & switches and improved surface color coding for clearer display



Control Surface

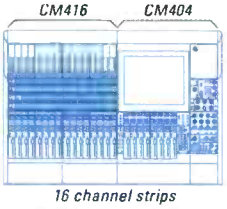
Max Air is easy to learn and fast to operate with controls and displays following traditional conventions and layout. The innovative central touch screen simplifies many of the master functions such as patching.

Each channel strip has 4 knobs for controlling input, EQ, filters, dynamics, aux sends as well as routing the source to busses. Custom knobset configurations can be setup to allow the operator to put the most often used controls on the surface at the push of a button. Any source may be brought to the central SuperChannel for access to all controls.

Two surface modules are available each with dual power supplies. Connections are CAT5 Ethernet so placement is not restricted by cabling. No audio flows through the control surface as the audio electronics are housed remotely. As with System 5, the loss of a fader module does not interrupt audio, control can be switched to other modules.

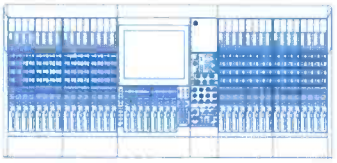
Control Surface Sizes

Max Air may be supplied with a frame or can be table/custom mounted.



CM416 & CM404 Modules width 22.3" (566mm)

16 channel strips
48.6" (1,234.5mm) wide



32 channel strips
72.9" (1,851.7mm) wide

48 channel strips
97.2" (2,468.9mm) wide

modules may be placed in any order
only connections are power & ethernet
front-back depth inc. buffer 35.4" (900mm), no buffer 29.6"(751mm)

The Touch Screen

The touch screen gives the operator simple graphical access to the master functions and setup pages for each area of the console. Mix and Group busses can be setup in any format plus there are pages for reverse interrogation. File functions such as saving the setup for a show, as well as the PatchNet digital patchbay are also accessed via the touch screen. When selected to show SuperChannel the screen shows all parameters of the centrally assigned channel as shown on the next page. Backup SXVGA and keyboard/mouse facilities are available.

Channel Strip

The Max Air channel strip can be swapped individually or globally between two sources - useful for backup source selection. All controls are clearly labelled and operation is straightforward and fast.

Routing Display:
Group, Aux and Mix Sections

Knobset Function Select:
selects the 4 knobs to control input, Dyn, Eq, Filters, Aux, Pan or Buss Routing

Knobset:
4 knobs with 4 character displays & switches

Swap the Strip between the Main and secondary Swap Source, Talkback button

Fader: twin 8 character designations (that may be linked to the facility router), Solo, Channel On, Channel Select, 100mm touch motorized fader, twin LED meters

SuperChannel

To the right of the touch screen in the center of the console is the SuperChannel. Any source can be quickly assigned to this area which includes full controls for all parameters in the channel.

Monitor Section:
Oscillator
4 Assignable Monitors
Solo

Main CR Monitor

SuperChannel:

Dynamics

4 Band EQ

Pan

Filters

Input

Channel Select

Metering

Every channel includes level and gain reduction metering next to the fader. The central touch screen can be programmed to show any combination of metering at the top including main program. An optional external metering package can be fitted offering 28 meter groups that can be custom arranged on an external monitor.

Touch Screen - Showing Mapped SuperChannel (screen center)

High Resolution Metering - 8 Programmable Meter Blocks

Main Screen Area
Dynamics
Cntrl Rm Meters
Routing

Process Order

Channel Meter

Touch Fader and Input Settings

16 Soft Knobs Screen Display

Pan Display EQ Filters Input Keypad Designations

DF66 DSP SuperCore with MADI I/O & Router

The new lightweight and compact DF66 DSP SuperCore is the primary signal-processing engine and router for System 5 and Max Air digital mixing consoles. It is comprised of a system board and up to six plug-in SP662 DSP cards. The new SuperCore has more than enough DSP horsepower, system functionality, and reliability to satisfy today's demanding broadcast applications.

The DSP SuperCore provides:

- **DSP Processing** - Massive amount of scalable DSP available for fully featured channels and busses with Delay, EQ & Dynamics processing. Each SP662 card adds 4.8 GFLOPS of processing power.
- **MADI I/O** - each SP662 card adds 4 MADI inputs and outputs (224 x 224 paths at 48KHz)
- **Broadcast Router** controlled by the console's PatchNet Software

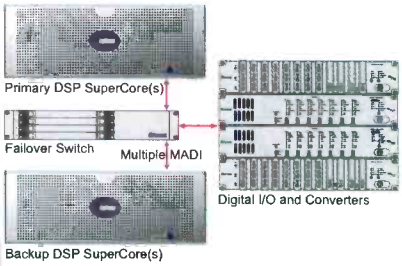
SP662 DSP Card

DSP SuperCore Features

The DSP SuperCore is packed with advanced features that stand out from the competition:

- Compact, lightweight, modular and scalable
- Accommodates from 32 to over 1,000 channels of audio with full EQ & dynamics at 48KHz
- Over 300 signal paths with full EQ & dynamics processing per DSP SuperCore at 48kHz
- Up to 4 SuperCores can be linked together - proprietary linking design maintains full floating-point resolution throughout the signal path
- Independent EQ and dynamics processing plus up to 2 seconds delay for each channel
- Buss processing with dynamics, and filters
- 4,096-path FPGA audio router on each SP662 DSP card
- Up to 24x24 MADI I/O (1344x1344 paths @ 48kHz) per DSP SuperCore
- Optional 100% failover redundancy
- Hardware compatible with 192/384 kHz
- DSPs support 40 bit, 32 bit IEEE floating point and 32 bit fixed point formats
- Hybrid FPGA and DSP technology to accommodate 40 bit floating point (extended precision) operation, for timing precision, and wide feature set
- Parallel signal processing utilizing SIMD (Single Instruction Multiple Data) architecture
- Optional SNMP System Management Controller remotely monitors operating conditions and notifies the user to take action to avert system failure

100% Failover Redundancy



For broadcast installations Euphonix supplies a backup DSP SuperCore in parallel with the primary unit and is the only total redundancy system available on the market - another Euphonix first. **This ensures Complete redundancy of the MADI I/O, Router and DSP Processing!**

All audio signals are distributed to both the primary and backup DSP cores. If the diagnostics system detects a fault the operator is notified and given the option to failover the system. In addition, the operator can, at his discretion, fail over the system at any time. Linked DSP SuperCores in the primary and backup systems work as one contiguous DSP core. Even with multiple linked cores, the failover function switches all I/O over to the backup system.

SNMP System Management

The DF66 includes dual redundant power supplies and can be fitted with optional SNMP System Management Controller which remotely monitors a wide variety of internal system conditions and notifies the user to take action to avert system failure via email, pager or the web. Battery backup ensures operation even when power fails.

Converters & I/O

Euphonix has a wide range of converters products to cover every installation – from highly modular racks that can be customized with individual cards, to larger 24-channel converter modules and 56-channel digital format converters. Converters and mic pre-amps may be shared between multiple consoles.

New Modular I/O System

The new range of modular converters is based around a 3RU 19" chassis conforming to the DIN 41494 specification with dual power supplies. Cards may be fitted in slots at the front and the rear for high density configurations. 10 different input/output cards are available offering many different combinations including:

- MADI Interface Module (coax or fiber)
- 4ch SDI De/Embedder Module
- 8ch SDI De/Embedder Module
- 8ch HD/SD SDI De/Embedder
- 4 Ch AES/EBU Input/Output Module
- 8 Ch AES/EBU Input Module
- 8 Ch AES/EBU Output Module
- 4 Ch Analog Line Input Module
- 4 Ch Analog Line Output Module
- 4 Ch Microphone Input Module
- Ethernet Remote Control Module
- Sync Module
- Power Module

Multi-Channel Converters, Remote Mic Preamplifiers & Fiber MADI Extender

2RU form factor multi-channel converters:

- **AM713**
  26 Analog XLR & 2 AES/EBU to MADI
- **MA703**
  MADI to 26 Analog XLR & 2 AES/EBU
- **DM714**
  24 75Ω or 110 Ω AES/EBU to MADI
- **MD704**
  MADI to 24 75Ω or 110Ω AES/EBU

- **ML530**
  24 Remote Controlled Mic Preamps
- **FC726**
  56-channel bi-directional Digital Format Converter AES/EBU, MADI, SPDIF-2, ProDigi, TDIF and ADAT Optical
- **FT730 FiberTran Extender**
  Extends MADI and Digital Sync or the Euphonix TCC control for the ML530 mic preamps or the MC524 monitor controller, up to 1km over fiber optic cable.

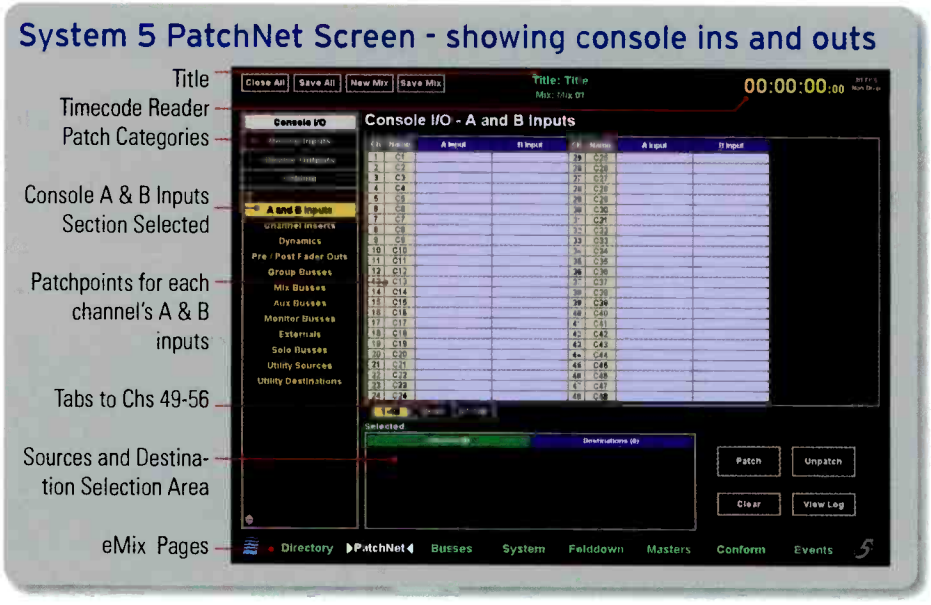
PatchNet & Router Integration

PatchNet Routing Software

The router in the DSP SuperCore is controlled by the PatchNet application which is simple to use and a very powerful digital audio patching system. PatchNet appears on an external screen with System 5 and on the central touch screen with Max Air.

Each of the MADI source and destination audio streams in the DSP SuperCore can be labelled, for example **Stage 1 Mics**, and each audio source within a MADI stream may also be individually labelled, for example **Mic 1**. All console inputs and outputs, for example **Channel 1 A Input**, also appear in PatchNet.

System 5 PatchNet Screen - showing console ins and outs



PatchNet is faster, easier and more flexible than an analog patchbay. Setups can be saved and recalled for each show, including a basic setup which includes all source and destination designations, as a starting point for new shows.

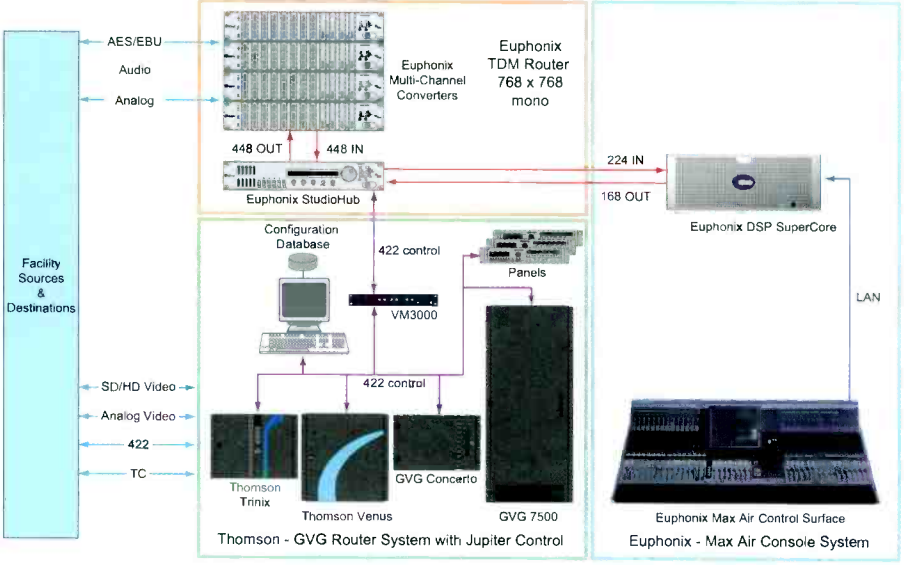
Integration with Broadcast Facility Routers

The Euphonix StudioHub, 2RU 12x12 MADI router can be added to the system, taking parallel MADI feeds of all console sources and destinations for distribution throughout the facility. StudioHub has been designed to communicate with most router control systems that utilize the ES-Switch protocol including Nvision, Pesa, Pro-bel, Sony, Grass Valley and Utah Scientific.

SH612 StudioHub Router

In some applications this ELIMINATES the need for two routing systems and two I/O systems while satisfying the demands of redundancy for on-air operation. The integration also simplifies patching, as the audio operator will no longer be required to patch console output busses to the destinations.

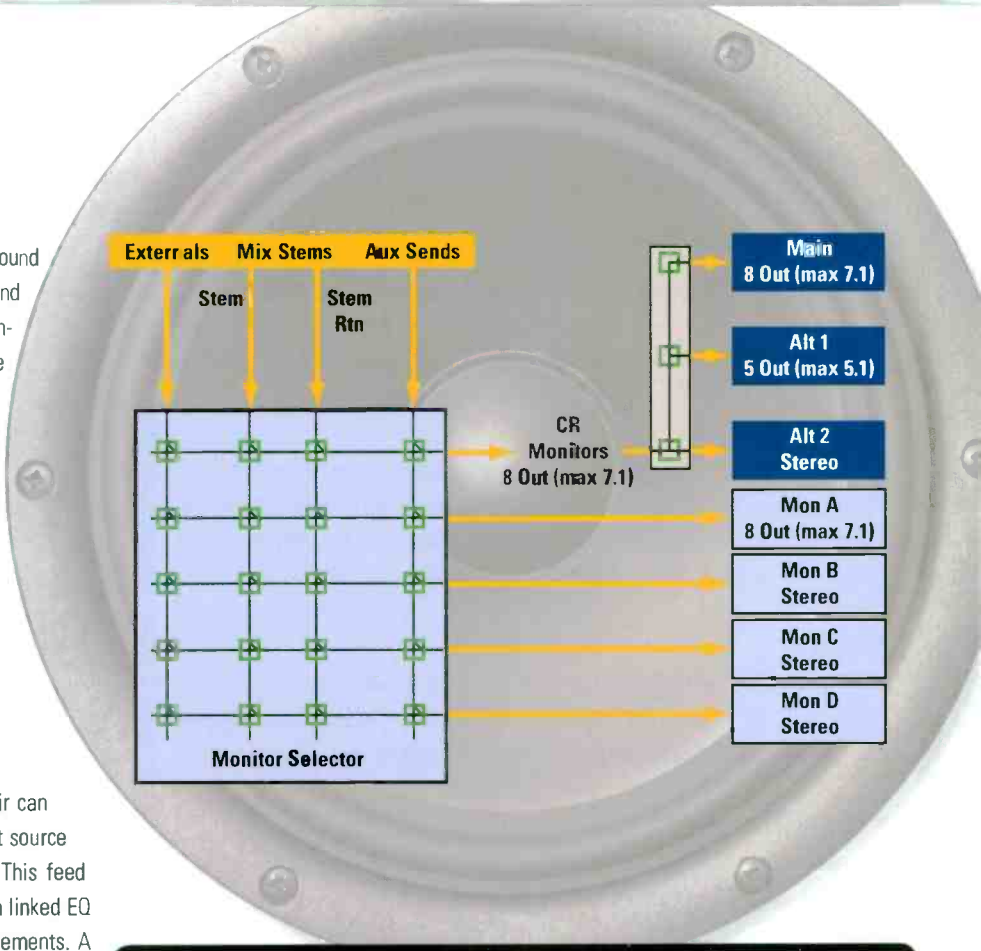
Console output busses such as main program, aux feeds, and IFB's automatically appear as sources on the router. Additionally, engineering then has full control of all audio sources from any router control panel, which means no more crowding the audio room during setup and troubleshooting for shows.



Other Features

Surround Monitoring

Both systems include a professional surround sound monitor matrix, the same surround facility used to dub Academy Award winning feature films. Source selection is made from dedicated controls and is very intuitive to operate as the matrix intelligently switches feeds in their correct format to the appropriate speakers. All formats up to 7.1 are supported. Matrix includes Main CR, Alt 1 & 2, 4 SLS speaker feeds, 32 External Monitor Playback Inputs, Buss outputs and returns, and Aux sends.



Multi-Format Control - Spill

Each strip on the System 5 and Max Air can control a single source or a multi-format source or group such as a 5.1 network feed. This feed may be controlled on a single fader with linked EQ and dynamics processing to all the 6 elements. A Euphonix invention, the elements may be SPILLED out onto the surface at the push of a button, which allows the individual elements to be controlled separately as needed.

Events System and GPI

Both Max Air and System 5 feature an Event system as standard. The event system allows the control surface to interface with other equipment in the studio and for audio-follow video. Events can be surface parameters (i.e., channel on, fader position, etc.) or external inputs/outputs via the GP132 (General Purpose Interface). Multiple events may be combined for custom combinations.

N-1 Mix-Minus Bus

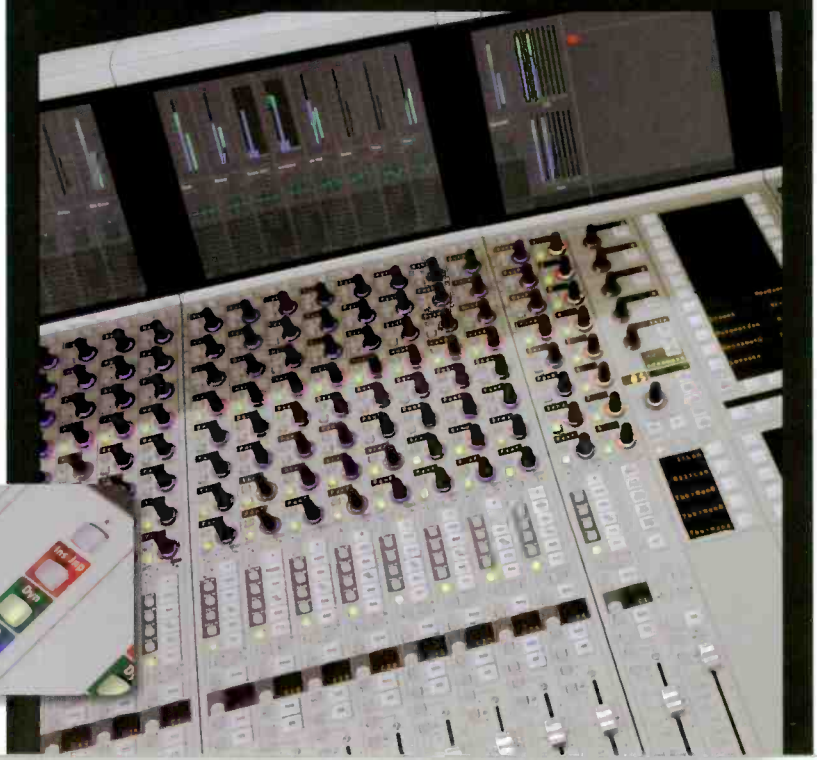
Both System 5 and Max Air (shown below) include a dedicated N-1 mix-minus bus. The Buss button for each strip includes that channel onto the mix-minus bus. A Mix-Minus button phase inverts the signal on the strip, adds it to the mix-minus bus, and routes the resultant N-1 feed to the channel's N-1 dedicated output.

Layouts

The position of sources on the console surface can be saved and recalled as Layouts. The operator can bring critical sources within easy reach and change Layouts at the push of a button between show segments making it easy to manage hundreds of sources on a smaller surface. Layouts take the stress out of mixing complex shows.

SnapShots

Console parameters such as a channel's complete settings or an element like an EQ's parameters may be saved to a SnapShot. This is very useful for saving different versions of an EQ, for example. SnapShots and Layouts may be named, saved and modified. The operator can also select what is to be included in a Layout or SnapShot.



ON-AIR with Euphonix

On Air

There are over 200 installations of Euphonix broadcast consoles throughout the world in many different broadcast applications. Both System 5 and Max Air are each suitable for any type of broadcast audio mixing, especially for HD where sound quality and surround are key factors in the choice of console.

Sports & OBs

For more complex sports applications System 5 is perfect due to its ultimate flexibility and visual feedback. MEDIAPRO's System 5 was used for mixing World Cup soccer audio. For OBs where physical space is a factor, but flexibility and sound cannot be sacrificed, such as TVM in Ireland, Max Air is the obvious choice.

News

News networks, such as CNN, and many local stations such as WMHT, choose Max Air. KNBC news in Los Angeles use a System 5 as a result of its compatibility with System 5 consoles on the *Tonight Show with Jay Leno* stage.

Production

System 5 is normally the choice for production, especially when shows include music recording such as KLRU's *Austin City Limits* show.

Live Venue & Audio Post

The System 5-BP is perfect for this application and has found favor with many top venues such as Sydney Opera House, Grand Ole Opry and Lakewood Church where there is a need to broadcast live and re-purpose shows for re-broadcast.

System 5-BP Model On-Air & Audio Post Applications

The System 5-BP has the same features as the System 5-B but with the addition of dynamic mix automation – the same automation of faders, knobs and SnapShots that is available on the Euphonix System 5 range of audio post and music mixing consoles. The System 5-BP includes the transport and automation panels at the bottom of the central CM401 Master Module.

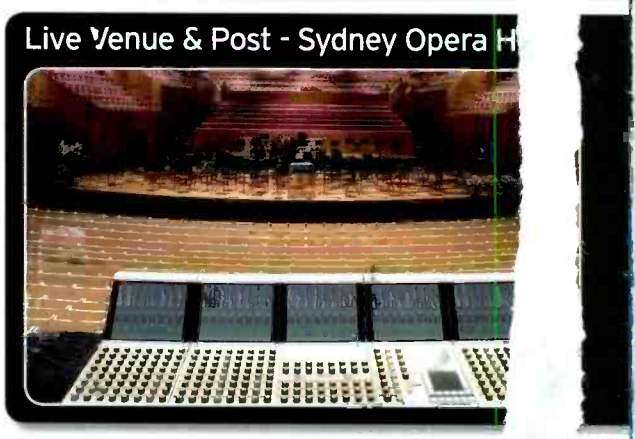
Sales & Support

During the sales process our knowledgeable and experienced sales and product specialist staff can work with your installation team to exactly match a system to your requirements. Euphonix prides itself on excellent after sales support that is second-to-none. We will do whatever it takes to get you on-air and keep you on-air.

System 5 & Max Air DVDs

DVDs are available for both systems which include hands-on training in easy to access chapters plus a guided tour of the system. These video clips are also available online for fast access to operational training questions as they arise.

www.euphonix.com



Hey, Good Lookin,' any more like you at home?

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The POWER of 10GigE

BY CORKY SEEBER

In his April 2006 "Computers & Networks" column, Brad Gilmer teased *Broadcast Engineering* readers about the future of 10 Gigabit Ethernet (10GigE) and its potential impact on the broadcast industry. The future is a lot closer than many in the industry think.

The 10GigE standard was adopted some four years ago. While it initially saw little application, the increasing demand for faster connections is moving it to the forefront.

For several years, there has been a discussion within the networking industry that 10GigE was going to sweep in and replace the current Gigabit Ethernet (GigE) infrastructure because of the need for ever increasing bandwidth.

While 10GigE offers huge performance improvements, this transition simply hasn't yet happened. The reason: As a backbone upgrade in the enterprise space, it is still too expensive compared to using GigE connectivity in the broadcast industry, where the pressure to support HD is being relaxed. Therefore, the resulting need to edit in true uncompressed HD format was not as time critical as initially expected in many facilities.

10GigE becomes practical

With the constant technological changes, it is often difficult to know exactly when something moves from being impractical to reasonable. An even worse situation may occur when a technology quickly becomes required and overdue, and a facility hasn't planned for its implementation.

With greater adoption of 10GigE occurring in other market segments, the price of 10GigE is trending lower. (See Figure 1.) With last year's introduction of the new CX4 copper interface for 10GigE, the cost of 10GigE will continue to decrease even faster.

Other factors also will contribute to the increasing market penetration of 10GigE, including new computers converting to higher performance PCI Express peripheral busses, which provide a full bandwidth solution for the 10GigE format. Also, there is growing interest in using 10GigE protocol in smaller LANs in combination with iSCSI, which will allow network attached storage (NAS) solutions to provide all editors quicker access to large video files than is presently available with Fibre Channel-based storage solutions.

With greater adoption of 10GigE occurring in other market segments, the price of 10GigE is trending lower.

With all of these different technologies leveraging the benefits of 10GigE, the price/performance crossover point will continue to be driven lower through 2009. These factors will make it easier for video equipment manufacturers to build HD products with both speed and large storage capabilities.

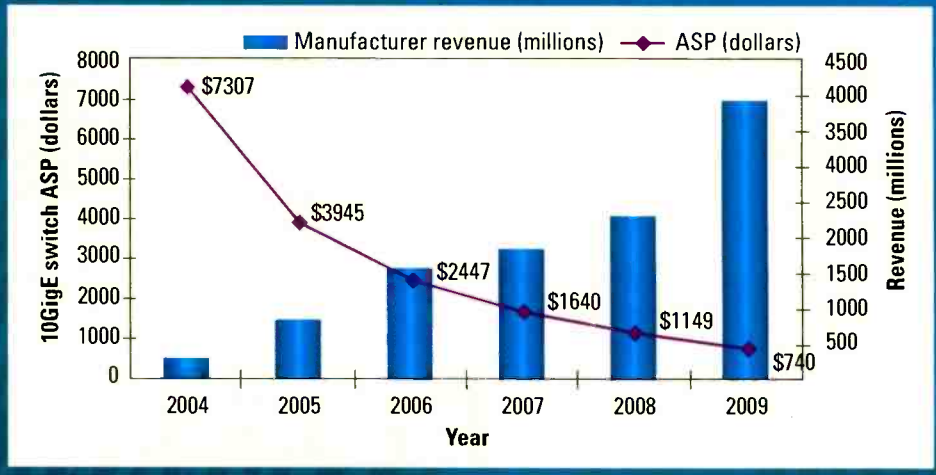

Figure 1. 10GigE will move from early adopter to mainstream by 2006. Figure courtesy IDC.


intel

Ethernet vs. Ethernot

The power of 10GigE will begin to change the way we will want to move our data. The Ethernet network protocol has withstood the challenges of fabric in the industry. (See Figure 2.) Other fabric options that provide like performance levels are proprietary and are lower volume, which lead to higher per connection (or port) costs.

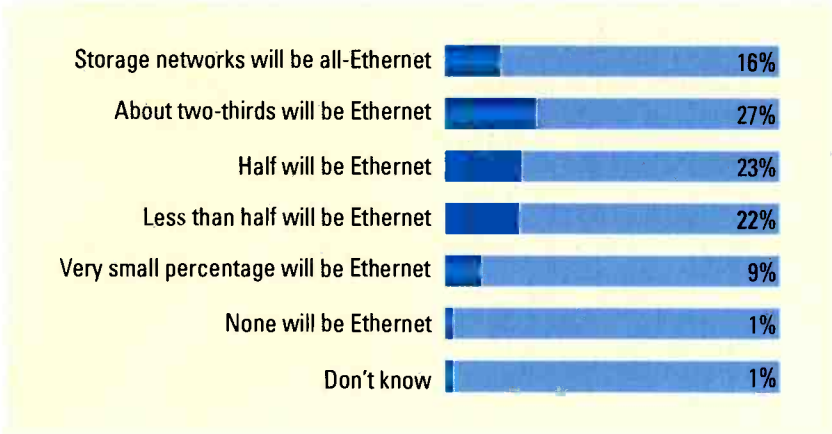

Figure 2. Ethernet will continue to gain market share in storage implementation. Figure courtesy Byte & Switch Poll.

FDDI, ATM and every other network-based protocol.

In the networking industry, there is the saying "It's Ether*net* or Ether*not*, and Ethernet always wins." Ethernet is the most commonly installed Proprietary fabrics require specialized skill sets to install, operate and maintain, generating a higher cost of ownership.

Complete interoperability with all Ethernet vendors' solutions is an accepted fact, providing the customer with more flexibility in selecting and maintaining their data storage solutions. Ethernet network switches are much less expensive than their proprietary fabric counterparts. Being able to transfer files 20 times faster with 10GigE will also eliminate the need for sneakernet via FireWire for moving your data between various locations in-house, providing improved security of your data.

High-performance results

10GigE is a flexible fabric, capable of supporting multiple market segments with different configuration types. Because of its high performance and comparatively low cost, 10GigE is being used as high performance computing cluster (HPCC) fabric. Clusters are many systems rack-mounted to provide a compact physical footprint and allow many processors to work on the same problem concurrently.

Typically driven by price-performance metrics, which are critical in

	2004	2005	2006	2007	2008	2009	2004-2009 CAGR (%)
10GigE							
Revenue ($M)	302	835	1536	1857	2300	3959	67.3
Ports (000)	41	212	628	1133	2002	5352	164.5
ASP ($)	7307	3945	2447	1640	1149	740	-36.7
1000MB							
Revenue ($M)	7691	9569	11,611	13,095	13,857	12,837	10.8
Ports (000)	31 109	59,436	106,458	157,021	208,360	265,822	53.6
ASP ($)	247	161	109	83	67	48	-27.9
100MB							
Revenue ($M)	6025	4728	3598	2712	1851	1100	-28.8
Ports (000)	175,551	175,372	165,536	147,457	122,753	83,260	-13.9
ASP ($)	34	27	22	18	15	13	-17.4

Figure 3. 10GigE price reductions begin to level out in 2006. Figure courtesy IDC.

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this application, 10GigE continues to enjoy market share improvement by driving for lower latency designs. 10GigE is also a viable fabric in server-to-server and server-to-storage network configurations. With 10GigE's inherit performance advantage over 1Gb, 2Gb or 4Gb storage solutions, 10GigE is capable of providing faster storage access. 10GigE fabric can improve server infrastructure costs by reducing the number of servers required to host the storage in typical SAN solutions compared to NAS configurations. 10GigE represents the next logical evolution for LANs as the need for ever increasing bandwidth from users will require the bandwidth improvements that 10GigE can provide over current GbE networks. (See Figure 3 on page 72.)

Plug-and-play operability

Installing a 10GigE fabric is not significantly different from the fabrics that are typically installed today. The first decision to be made is to determine the 10GigE fabric type — fiber or copper — that can properly support the site's requirements. There are tradeoffs to be made in fabric medium selection. While fiber will support distances of up to 300m between the switch and the computer systems, it carries a cost premium of 30 percent to 40 percent, depending upon the 10GigE vendor.

The biggest advantage to the 10GigE fabric is its plug-and-play nature.

For smaller distance requirements, the 10GigE CX4 copper medium supports up to 15m between the switch and the system.

The next step is selecting the right 10GigE switch. Some switches will allow concurrent support of both 10GigE and GigE, which offers the flexibility of upgrading the network in sections. This would allow the initial implementation costs to be staggered over a longer time.

The routing of the 10GigE fiber cables is comparable to the routing of current Fibre Channel storage networks. The 10GigE CX4 cable is a little larger diameter than standard GigE cables. It is similar in routing to InfiniBand cabling, which for 15m runs requires that some thought be given to routing paths to ensure that bend radius requirements are adhered to.

The biggest advantage to the 10GigE fabric is its plug-and-play nature. Most computer operating systems have the necessary code embedded

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to support the fabric. Additionally, most 10GigE vendors have enhanced software available to allow the customer to realize the maximum performance possible from their products. 10GigE can be a subset of an overall GigE network. This allows a more staged migration for situations where 10GigE performance is needed in only a subsection of the network between the power users while leaving the rest of the current infrastructure intact.

Improve workflow

Once a 10GigE fabric is up and running, there are additional steps that can improve a network's workflow. If the number of clients to the server exceeds two, consider configuring link aggregation into the server.

Link aggregation allows the server to support multiple Ethernet connections concurrently. For example, when moving large files that take several minutes to transfer, link aggregation allows the server to support more network requests while previously requested data is still in flight.

Another often-overlooked performance enhancement is jumbo frames. Jumbo frames allow higher bandwidths and reduce the required CPU use on the receiver side of the network. To be able to enable jumbo frames, both the sender and the receiver must support jumbo frames. The increased data payload from jumbo frames allows faster file transfers, reduces the traffic congestion on the network and improves the overall responsiveness of the network to the clients.

More to come

With the increasing interest in 10GigE network products, vendors are now working on new features to provide more performance and lower costs. One such feature, Remote Dynamic Memory Access (RDMA), will allow 10GigE fabrics to achieve even better latency performance, making it an even stronger challenger to the proprietary fabrics such as Myrinet and InfiniBand. This improved real-time performance will have benefits in the video edit space, where dropped frames are not tolerated. Improvements in the Internet small computer interface protocol will also drive innovation into the 10GigE fabric development.

As competition forces all industries to provide faster, more accurate products to be successful in the marketplace, the requirement for the power that 10GigE provides will meet that demand. BE

Corky Seeber is president of Small Tree Communications.

We Didn't Just Raise The Bar

WE CHANGED THE WAY YOU WILL THINK ABOUT ROUTING AUDIO FOREVER

Distributed Thinking, One Solution

The Cheetah DRS, PESA's newest multi-format audio router, uses patent pending distribution technology to route audio over Gigabit Ethernet with either a single CAT-5 or Fiber cable for multi-frame connectivity. This creates a Distributed Routing System (DRS) scalable from 64X64 (occupying 1RU frame in one location) up to 2048X2048 (in 36RU of space in one or many locations).

Cheetah DRS allows broadcasters to place input frames in equipment racks near satellite ingest from receivers, VTRs, or servers, while placing output frames closer to studio gear for distribution into audio consoles, or master control. This keeps cable runs extremely short, preserves signal quality and reduces cable costs, time of installation and maintenance. Additional inputs or outputs can be added by changing cards or increasing frames in any location. Format flexibility in the Cheetah DRS allows a mix of AES and Analog, Synchronous and Asynchronous audio, with support for Dolby-E.

Cheetah DRS

TV Technology STAR 2006

Winner of TV Technology's 2006 STAR Award

Television Broadcast TOP INNOVATION AWARD 2006

Winner of Television Broadcast's 2006 Top Innovation Award

Simple, Fast, Reliable

Cheetah DRS frames supports redundant power, redundant control, and quick access front-loadable, hot-swappable matrix cards.

Versatile Connectivity

Frames are available with a wide variety of interconnect options. Choose from BNCs for 75 ohm AES, as well as ELCO or DB-50 connectors for analog audio or timecode. RJ-45 connectors are used for optional RS-422 machine control. A 6-pin terminal strip version is also available.

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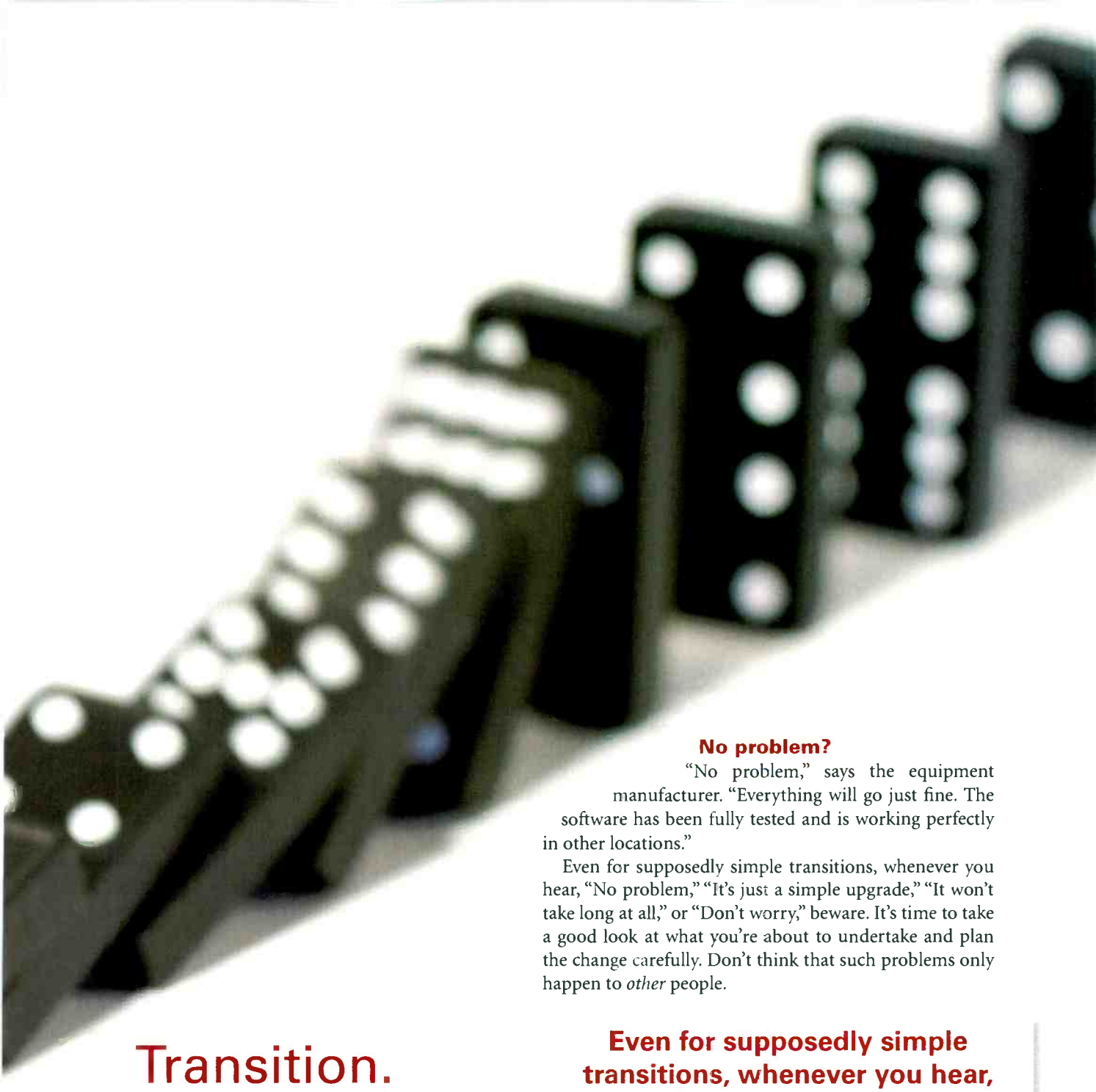
Plan with a STEADY hand

Even a small change to one piece of equipment could set up a chain reaction down the system line.

BY MICHAEL WRIGHT AND BRIAN REDMOND



Transition.

To a broadcaster that word can mean anything — activating a new cell phone, moving from one building to another or a major system upgrade.

Perhaps you don't worry about transitions. Maybe despite never making detailed plans for changes to your operation, you have been lucky enough to avoid disaster. Even so, chances are that sooner or later, you'll encounter a system change with the potential to create substantial problems.

This article explores some of the situations broadcasters could encounter, particularly in dealing with today's server-based, IT-centric systems. A seemingly simple software upgrade or transition can turn into a major undertaking fraught with potential disasters. More importantly, you'll get some practical advice on how to pave the way to a smooth upgrade from two people who've been there.

No problem?

"No problem," says the equipment manufacturer. "Everything will go just fine. The software has been fully tested and is working perfectly in other locations."

Even for supposedly simple transitions, whenever you hear, "No problem," "It's just a simple upgrade," "It won't take long at all," or "Don't worry," beware. It's time to take a good look at what you're about to undertake and plan the change carefully. Don't think that such problems only happen to *other* people.

Even for supposedly simple transitions, whenever you hear, "No problem," ... take a good look at what you're about to undertake.

Mitigate risks

Let's take a look at some of the risks in a system upgrade and what to do to mitigate as many of them as possible by following a careful transition process. Take a look at the example system in Figure 1 on page 80. The system uses two network switches, one for the broadcast high-res system and the other for the newsroom systems. It is a good practice to keep the broadcast system separate from the office systems.

For now, let's assume that this system has been operational for eight months. During that time, there have been

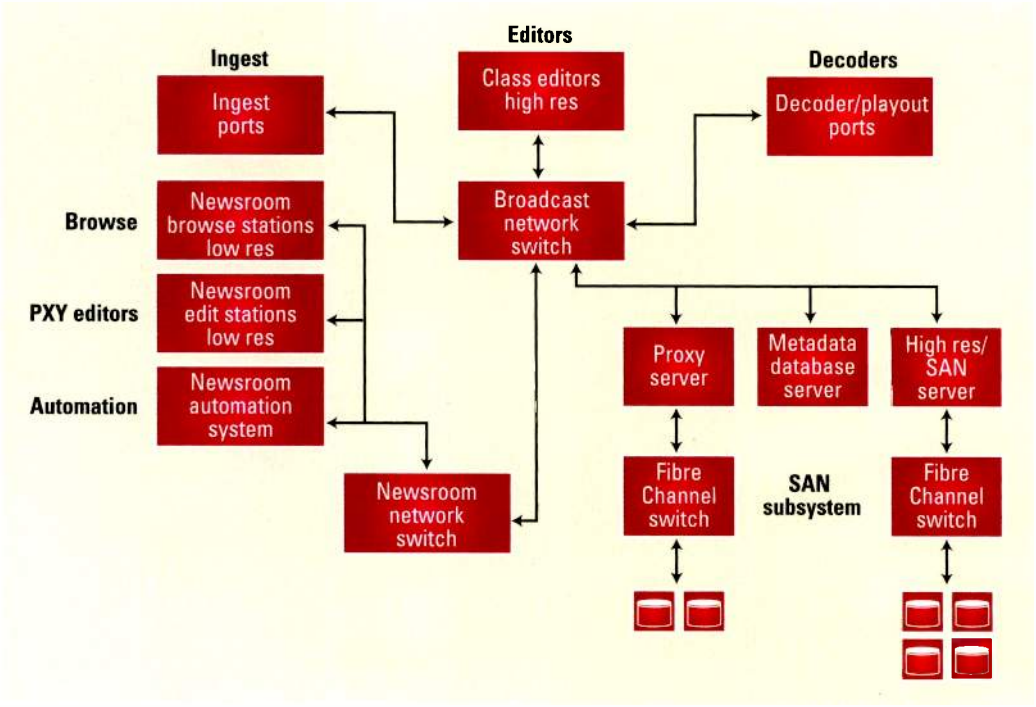


Figure 1. This diagram of a sample system includes ingest and decoder ports, class editors, newsroom browser and edit stations (both typically using low-res proxies), newsroom automation system, metadata database server, proxy server, storage, and a SAN. All elements in a system must be considered before any upgrade or change is made.

several known bugs and issues, some of which are fairly critical and others of a lower priority. Finally, a new software release that claims to fix many of the bugs and, specifically, some of the critical issues the operations people have been putting up with and working around. It's time to plan a clean, trouble-free transition.

Read the instructions!

First read the release notes carefully. Compare the issues the new software fixes with the system's critical issues to ascertain which of these the new release addresses. Next, determine which of the other, less critical issues in your system the new release is supposed to fix. Then, ask these key questions:

- Does the new software add or change any of the system's features or functionality?
- If there is a change, will it affect the workflow?

If your answer to either of these is "yes," you will need to communicate with the experts whose areas these changes impact. For instance:

- If there's a potential impact on the system's high-res editors, you will want to discuss the change with the lead editor for this area.
- If a change affects the metadata server and it affects archiving or the process by which you have been purging or searching for files, you'll want to talk with the operations lead for that function.
- If the new software affects the database, you'll need a thorough analysis. A change that affects the database can also affect search procedures. That, in turn, can have an effect on any device that has access to the media and on how each device interfaces with the search function and uses data.

To keep our example simple, let's assume that there are no feature changes and no changes to the overall system workflow. This new release simply fixes bugs.

Devilish details

That makes everything pretty easy, doesn't it? Maybe. But take a closer look, and you may find additional hurdles.

Because the edit interface is affected in our example, it requires an upgrade of the main file system controllers in the SAN servers before you can upgrade the high-res editors. In addition, upgrades to the ingest and playback servers and the database server cannot be undertaken until the SAN server has been upgraded. Furthermore, another change — this one to the database server software — must be completed before the system can handle I/Os and high- and low-res editors.

Still another issue to address: This upgrade affects both software and hardware. For example, you'll need to increase the RAM in the SAN servers to support the software upgrade.

What first appeared to be a simple upgrade ... has turned out to be more complicated. It will be time-intensive and must be carried out in a very precise order, or it won't fix the problems it is meant to address.

What at first appeared to be a simple upgrade, and one that may well be quite logical and fairly simple to actually implement, has turned out to be more complicated. It will be time-intensive and must be carried out in a precise order, or it won't fix the problems it is meant to address. In fact, doing things in the wrong order could introduce more issues.

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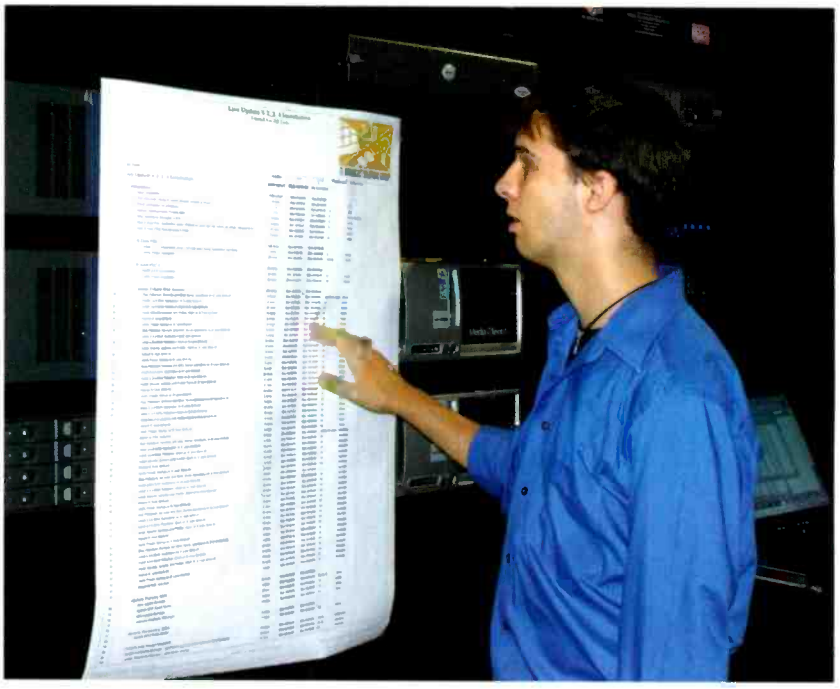
layers, it's clear that this simple upgrade touches critical components across the core of your system. If any part of the upgrade runs into a problem, it's possible that the database or even the entire online content could be corrupted. No wonder the chief engineer and operations managers are losing sleep!

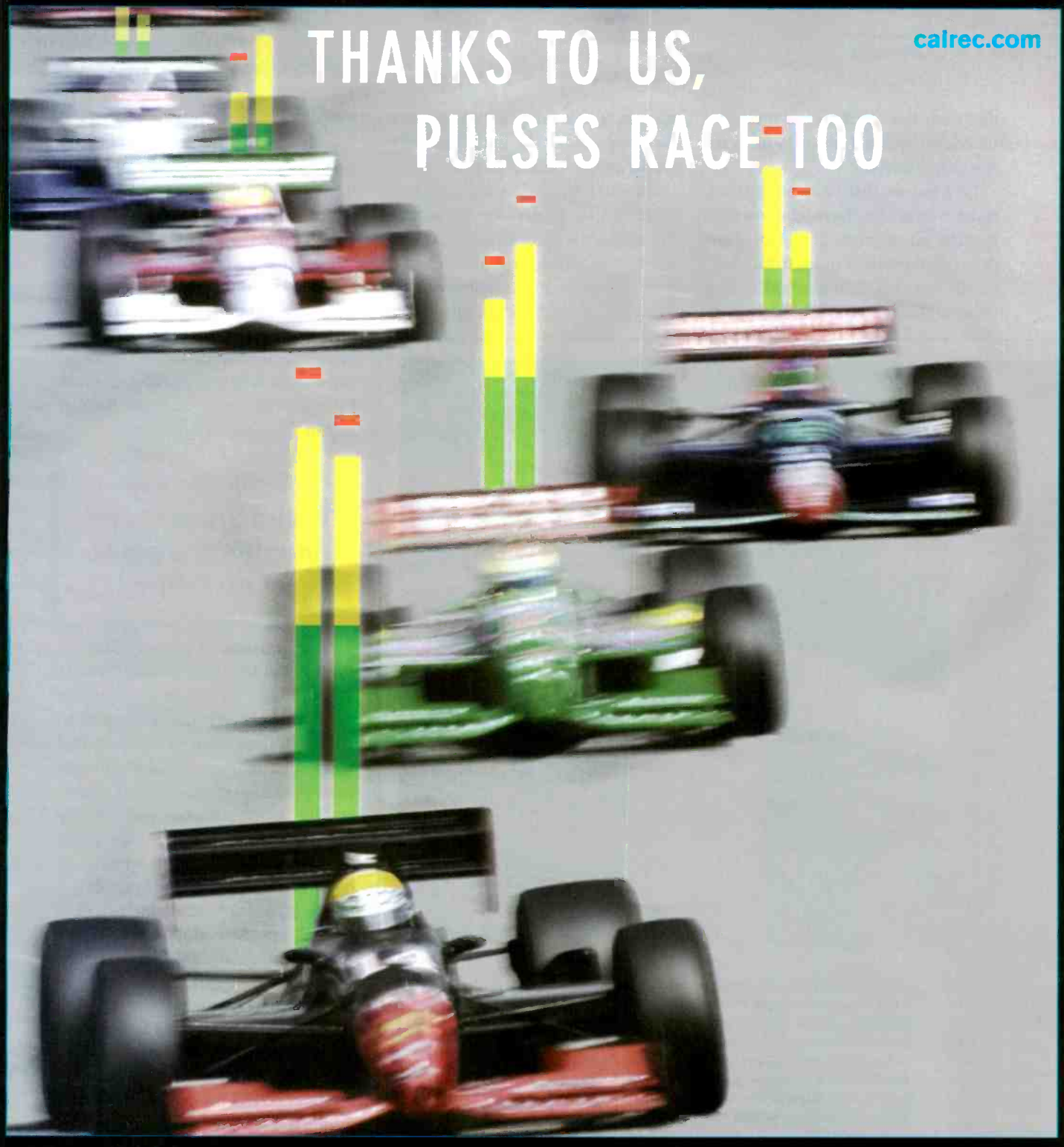
First things first

Minimizing risk is no simple task, but it is far easier than recovering from a disaster such as total wipe out of database or online content. The first step is to make a prioritized list of all the processes affected by the upgrade. That makes it easier to ensure that processes that have to be changed before others will be scheduled at the right point in the upgrade.

Second, further break down the list by detailing the step-by-step task for each of the processes. Make sure



When planning for a change to a system, start by making a prioritized list of the equipment that could be affected. And then go deeper, listing every step that must be taken with each piece of equipment and the order in which it must happen.



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that each task within each process is scheduled where it needs to be in the upgrade schedule.

Let's assume that every product category within the broadcast network requires an upgrade. Therefore, every device in the system needs to be placed on the task list. It's important to keep in mind that even though the upgrade process is the same for like devices, each unit needs to be in the task list to ensure proper time allocation.

Even in a relatively simple upgrade, there is a lot to do, and performing the upgrade will mean taking the entire system offline for some period of time. Typically, this requires working through the night when the system workload is light. And, of course, the system absolutely has to be back up and running reliably by the predetermined deadline.

Ready to go? Not quite!

Now that there is a prioritized task list of every step, it is time to take another look for potential risks throughout the upgrade process. Can the list be further broken down into essential tasks? If so, continue to revise the task list until every step is clearly defined and in the right order.

Evaluate the entire process and identify the point of no return.

Now, it's time to go back through the list, identify the key critical points and add tasks for test and verification along the way. It's also important to add contingencies to handle potential issues that may be revealed through testing and verification. Also, evaluate the entire process and identify the point of no return — the point at which you must decide whether to halt or continue with the upgrade.

The plan also needs to include time to back up essential data such as the metadata database. If there's even a possibility that other data, such as online storage, might be corrupted during the process, build time into the process for backup of that data, too. Backup needs to be scheduled and completed immediately prior to taking the system offline. It is far better — and less disruptive — to back up data than to deal with the loss of key data after a system fails.

As part of contingency planning, allow time for a worst-case scenario that would require porting the backup data back onto the system. Above all, build in test cycles at all appropriate points in the process so that you do not proceed to the next interdependent step or task until you are sure that the new component is doing its job properly.

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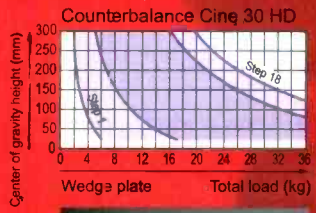

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set your ideas in motion!

It won't be known for sure if the entire system will work properly until the completion of all the interdependent upgrades. However, testing and verifying along the way, offers more assurance that the upgrade should come together and only require clean-up tweaking to operate correctly.

Because there are multiple system components, such as editors, ingest ports and decoders, save time by upgrading and testing several of these before bringing up the core of the system. If you don't find any issues after testing a few of each of the peripheral devices, proceed with upgrading the remaining components and move forward with core system testing.

Testing and verifying along the way offers more assurance that the upgrade should come together and only require clean-up tweaking to operate correctly.

The point of no return

Earlier, we established a point of no return. This is a very important milestone in the upgrade process, particularly if trouble happens along the way. For example, what happens if, after adding the required RAM upgrade for the SAN server, the server will not boot? What if the added RAM does not pair well with the RAM already in the server? The first thought is to scramble for additional RAM, but the clock is ticking away. Is there time?

If, while trying to troubleshoot this issue, the predetermined point of no return arrives, it's time to revert to the original configuration and schedule a new time for the upgrade — with the needed RAM ready and at hand. Do not make the mistake of going forward. To do so could spell disaster for your system — missed deadlines or, even worse, a crippled, inoperable system.

The shakedown

While the balance of the peripheral equipment is being upgraded, it's time to start a series of end-to-end tests and the shakedown of the core system components. Once every component upgrade has been tested individually, it is a good practice to perform a complete system worst-case load test to ensure that the upgrade process hasn't introduced restrictions in your system's capacity.

If the system performs as it should, the next step is to hand the system to operations to test again. If no major issues are revealed at this point, the system can be handed back over and put back online.

One last point

During the test cycles, confirm that the issues listed as fixed in the new release really have been fixed. If not, record discrepancies and report them so they can be addressed in a future release. Often, as an issue is resolved in a new release, it reveals other issues — hopefully issues that are less critical than the ones the release corrected.

It bears repeating that careful planning for each step in the upgrade transition is really the only way to proceed to protect the systems and to make the transition as trouble-free as possible. So, be careful, plan wisely, and mitigate risk by seeking help from experts who have been through the process before. BE

Michael Wright is president of IT Broadcast Solutions Group, and Brian Redmond is vice president of Broadcast Consulting Services.

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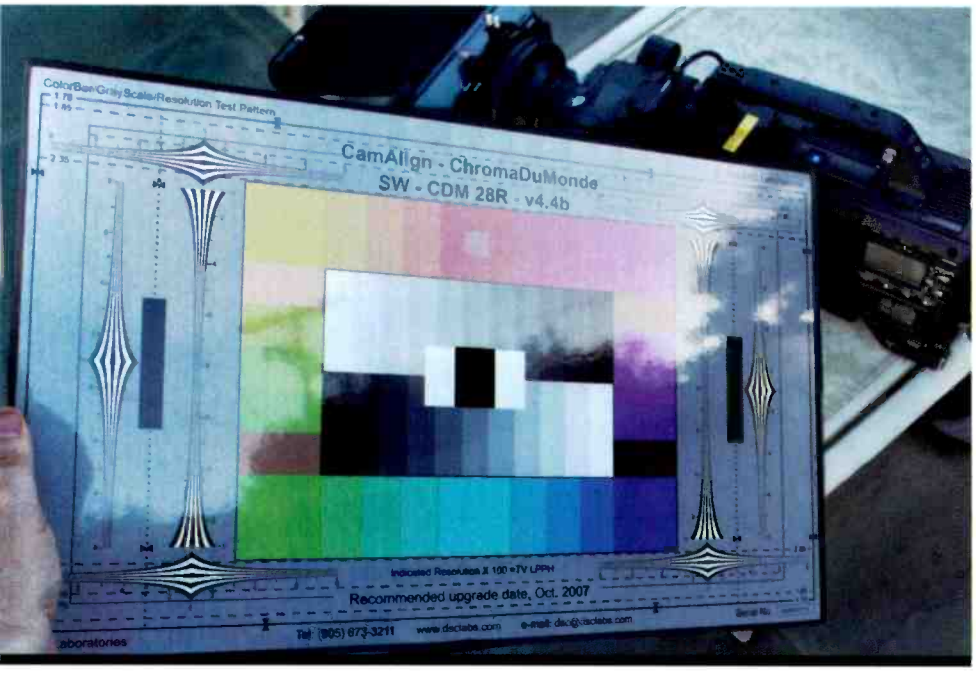
CAMERA CHARTS:

Essential tools for broadcast shooters



BY BARRY BRAVERMAN

An arcane camera reference chart, with its cryptic patterns and shapes interspersed with swatches of color, can be useful for some professional shooters. But for others, especially in the ENG realm, such an inscrutable tool is an alien concept that smacks of overkill.

Yet, for more and more shooters — particularly those toiling in the highly compromised realm of small-format HD — the all-to-often neglected reference chart is the key to establishing and maintaining consistent color, gamma and lens performance. For broadcast shooters, the simple camera chart has become a vital, indispensable tool that provides the foundation upon which we can apply every aspect of our craft.

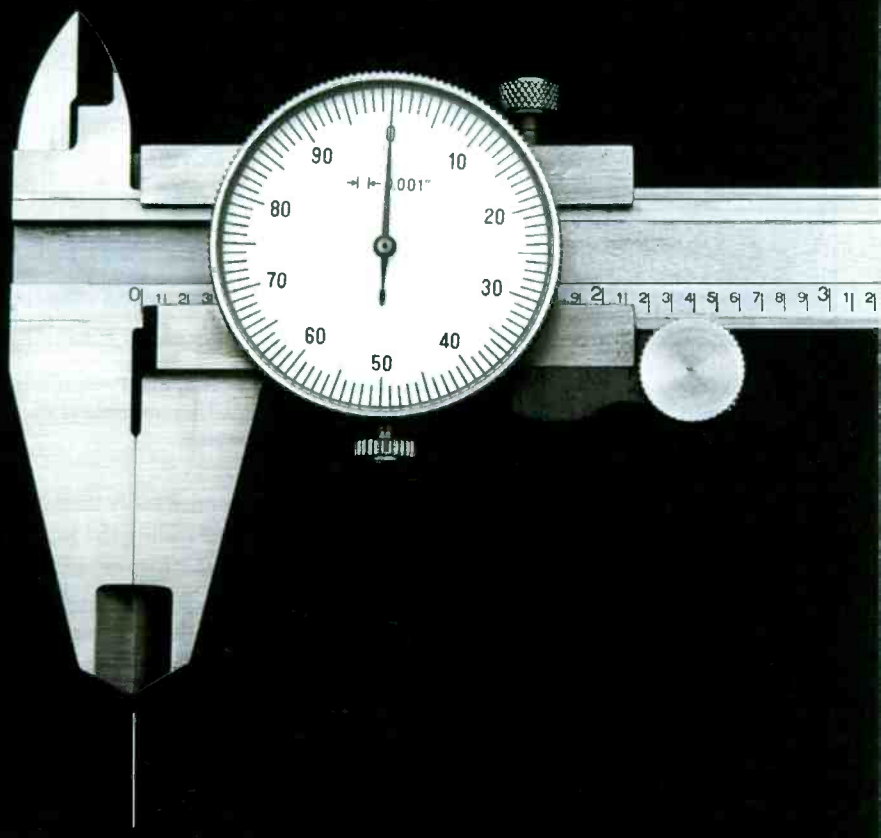
Setting up shop

Proper camera setup has always been important in the broadcast industry. Years ago, I recall using a waveform and reference chart to verify the proper registration of my three-tube plumbicon Ikegami 79D. Decades later, the advent of 3-CCD cameras, with their multitude of presets and features, such as auto knee and news gamma, greatly simplified or even eliminated the imperative of a time-consuming and laborious setup.

However, substantial user input and tweaking is still required for creative and technical considerations, especially in the context of multicamera and dramatic high-end assignments. With respect to the considerable automation built into most modern cameras, there is only so much the engineers in Osaka, Seoul or Guangzhou can or should decide for us.

Proper camera setup using basic camera reference charts may be more critical than ever because the 1/3in 3-CCD HD cameras can often display less than impressive images, especially under low-light conditions. Macroblocking, accompanied by abundant noise apparent in all three color

Photo: If you're shooting with professional gear, you should set it up properly using one or more camera reference charts.



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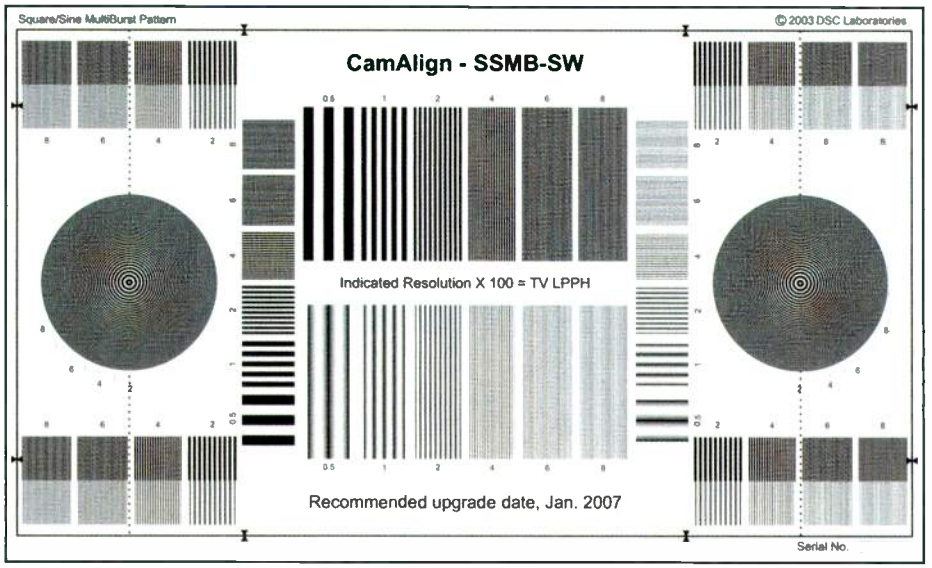


Figure 1. Every lens, no matter its cost, has one or more sweet spots. Professional shooters need to identify and exploit these points to their advantage. This multiburst chart can help ascertain the relative sharpness of a lens at various focal lengths.

channels, is not uncommon.

These maladies are attributable in large part to the cameras' tiny 5mm imagers. Just as fine grain film increases resolution at the cost of low-light sensitivity, the miniscule pixels packed into small-format HD cameras significantly reduce low-light sensitivity.

Conversely, highlight latitude is also similarly constrained with decreased pixel size, which only underlies the most significant challenge facing HD shooters today: how to handle the performance compromises inherent to HD image acquisition in broadcast environments.

The peril of shooting HD is only exacerbated by HDV's extraordinarily high compression, which produces obvious hue shifts that can wreak havoc on flesh tones in the shadow areas. Add to that the Achilles Heel of modestly priced camcorders: their mediocre lenses. These lenses, interchangeable or not, produce abundant flare and chromatic aberration.

Now, professional shooters widely use HD, so they must commit more than ever to understanding the limitations of the format and the principal image acquisition tools, and then devise effective ways to address them. The proper use of camera reference charts can be key to establishing optimal aperture, focus and baseline.

Aperture

You don't need to be the world's most ardent engineer to properly exploit the essential camera reference charts. The multiburst chart helps establish the optimum aperture setting for a lens by referencing differences in the upper and lower gratings in the chart grid. (See Figure 1.) Altering the f-stop, while adjusting the ambient light to maintain 100 IRE on the waveform, will give you a good idea of lens performance at a given focal length, especially to the corners of the frame, where mediocre HD (or SD lenses used in HD applications) tend to fall short.

Backfocus

Accurate adjustment of backfocus is critical for HD shooters because the additional resolution offered by the larger raster demands precise, defined

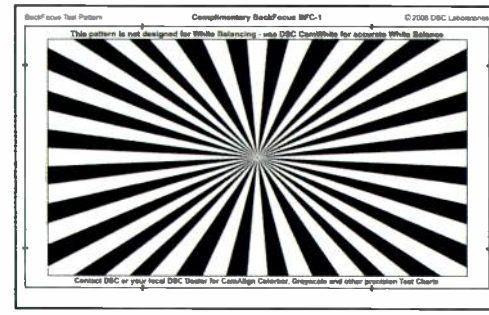


Figure 2. Savvy shooters have used the traditional star chart for years to set up accurate backfocus.

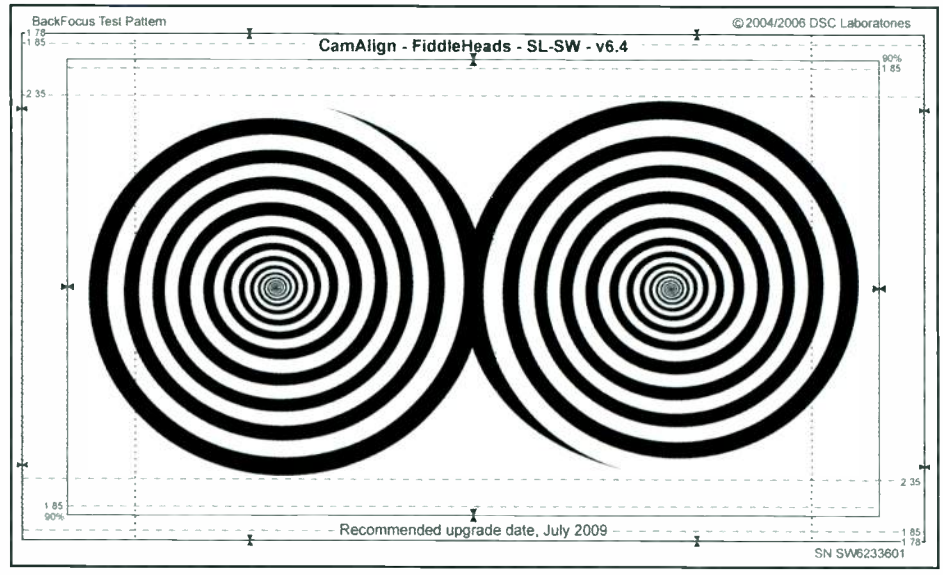
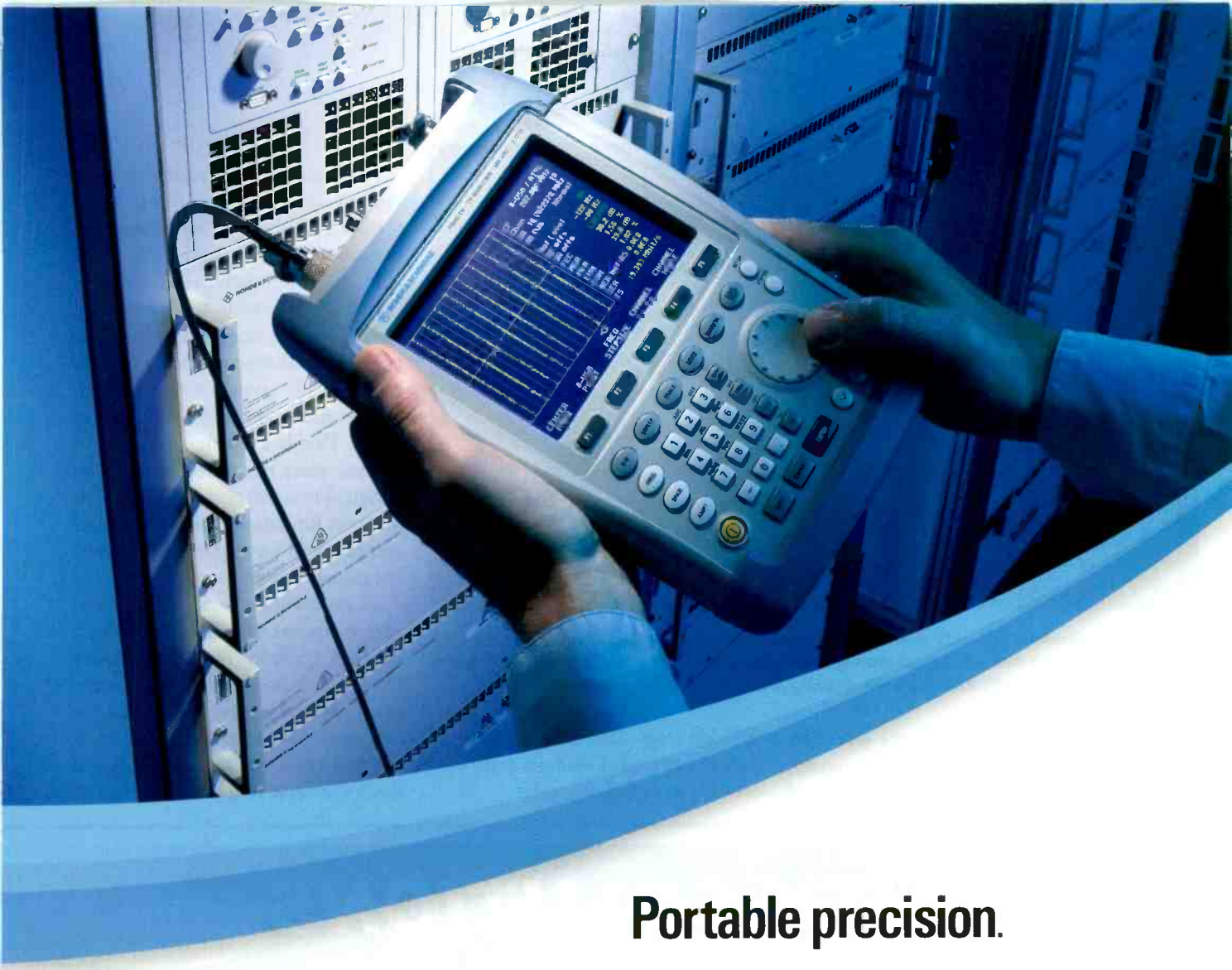


Figure 3. The FiddleHeads chart can greatly facilitate setting of backfocus. The high-contrast, dual spiral patterns will appear to snap into sharp focus.



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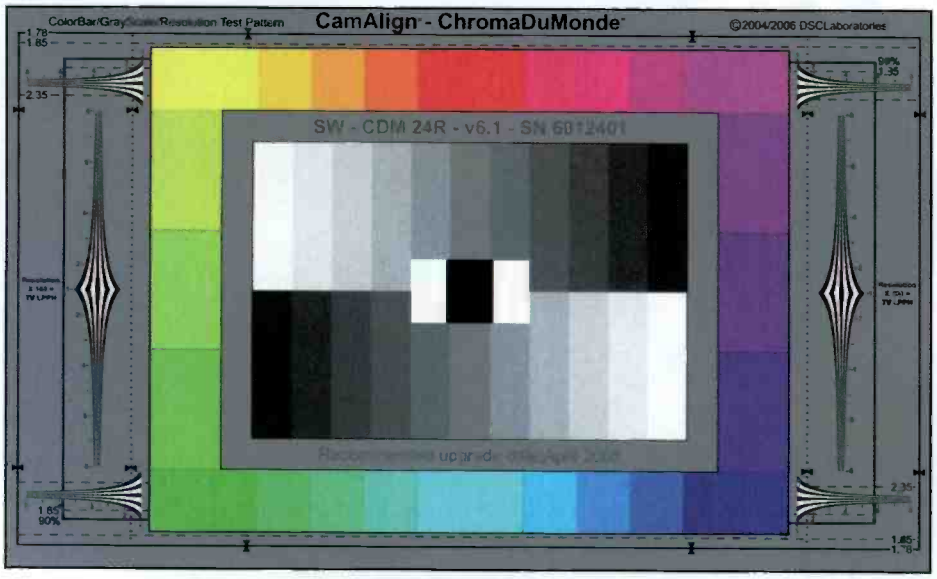

Figure 4. The ChromaDuMonde chart helps establish a normal baseline, which can then be modified to create a desired look. Shooting a few seconds of this chart at the head of every new camera setup greatly expedites the grading and correction process later.

focus. Errors here become especially apparent to viewers with large-screen televisions and displays. Because of the high magnification, even the most unsophisticated viewer can easily discern focus, or lack thereof.

HD shooters must therefore remain vigilant for undesired softness. Many professional shooters' hard-won reputations have been sullied by a lens with an improperly set backfocus. (Note: The backfocus in cameras that feature a noninterchangeable lens is properly shaded at the factory to electronically maintain focus without breathing throughout the zoom range. This is a major advantage of the one-piece integrated lens camera design. A lens will perform better if its inherent limitations are mapped and compensated for as part of the inherent camera design.)

To set accurate backfocus and ensure sharpness throughout the zoom range, I typically place the camera 8ft to 10ft from the chart and set the lens in full wide position. Setting the lens at maximum aperture is critical and may require adjusting the camera shutter or applying various levels of

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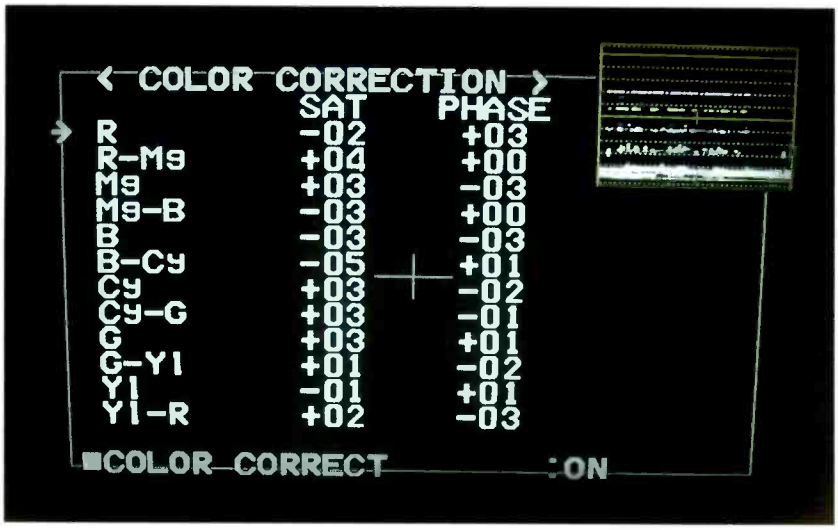

Figure 5. Professional cameras typically include a menu setup page such as this one to help establish a normal look.

neutral density filtration to achieve it. Viewfinder peaking should also be increased to about 80 percent to clearly see focus snap in and out.

In the past, I've used a simple star chart to perform this operation, and this pattern continues to serve me well. (See Figure 2 on page 90.) The new FiddleHeads dual spiral design from DSC Labs represents a significant step forward. (See Figure 3 on page 90.) The patterns, when viewed in tandem, more clearly snap into focus. This attribute facilitates accurate assessment of any breathing apparent in the zoom lens.

Cameras with an integrated lens system do not usually exhibit obvious breathing defects because the inherent soft spots in the lens are electronically mapped and corrected (i.e., shaded) at the factory. HD and HDV camcorder models with interchangeable lenses require scrupulous attention to backfocus, which should be checked daily during a production.

Look for a backfocus chart with a high dynamic range. The brilliant white and unusually dense black targets will greatly facilitate the setting

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Baseline

The ChromaDuMonde (CDM) chart can help the shooter establish a normal baseline for a particular camera and lens combination. (See Figure 4 on page 92.) This baseline is akin to the look of a particular film emulsion type and can be modified or tweaked without limitation to accommodate the demands of a particular scene or scenes.

Camera manufacturers often deliver

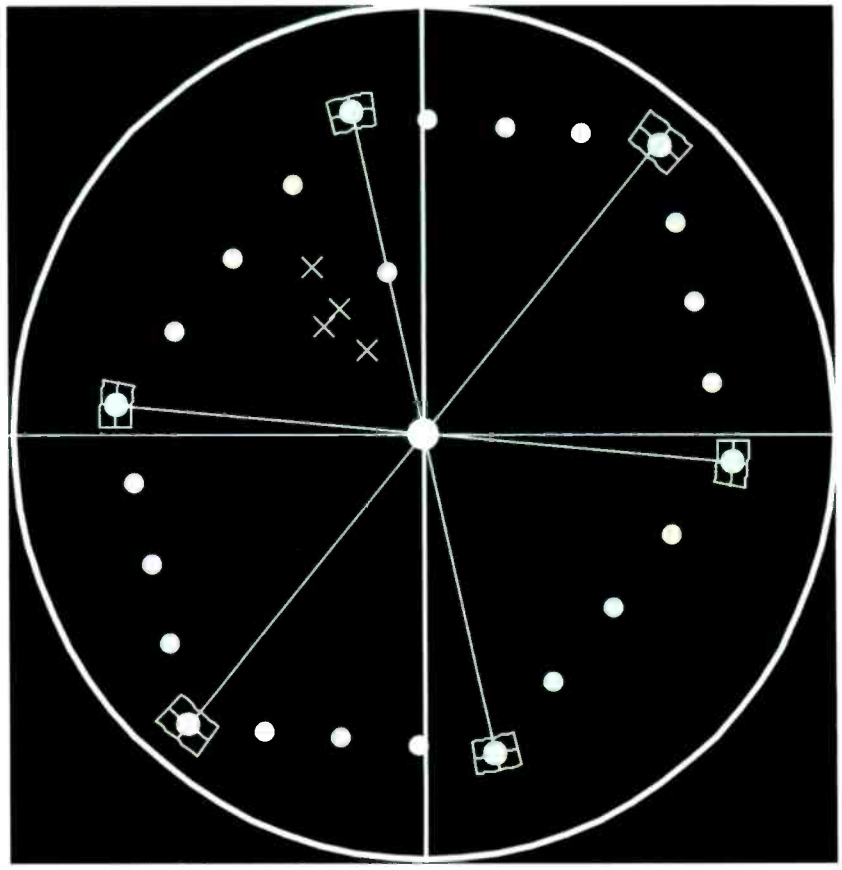

Figure 6. Normal setup using a ChromaDuMonde chart places the primary colors in their respective boxes on the vectorscope. Some increase in camera gain may be necessary to achieve this pattern because of reduced color saturation reflected off the chart's surface. The pattern shown is typical of a camera after correction is applied.

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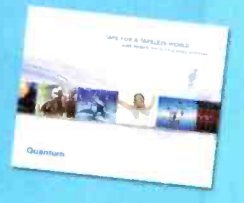

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their cameras with default settings to suit what they perceive to be their primary user base. For example, some cameras ship with color matrixing and gamma parameters optimized for ENG applications. Shooters of other genres will likely find the images to be unusually brash and unforgiving until a proper baseline is established and new scene file created to reflect a more appropriate and pleasing look.

HD broadcast shooters must be cognizant of the limitations of their image acquisition tools.

Using a vectorscope and evaluation grade monitor, the camera's normal color setup should be tweaked to place the CDM's targets in their respective boxes. (See Figure 5 on page 94.) The camera gain may need to be raised to accomplish this to compensate for saturation discrepancies. (See Figure 6 on page 96.) Of course, simply reproducing a full range of normal color may not ultimately be the look you're shooting for, but it's a valuable place to start. Skewing color one way or the other from normal to achieve creative goals will reduce the range of color actually recorded, so proper care must always be exercised during this camera chipping process.

Charting your own course

HD broadcast shooters, especially those working in small prosumer formats, must be cognizant of the limitations of their image acquisition tools. Notable defects appearing on screen, whether incurred due to high long-GOP compression, a mediocre performing lens or an anemic camera response in low light, can only be mitigated with the appropriate, optimal camera and lens setup.

Today, proper technique increasingly requires shooters to assert control over the extended post-camera workflow, to maintain their original look and vision. This includes precise color and density grading downstream. As professional shooters chart their destiny in this expanded workflow, one thing could not be in clearer focus: The proper use and understanding of basic camera references is critical to the exercise of our continued craft. BE

Barry Braverman is a veteran cinematographer with more than 20 years experience in feature films, documentaries and music videos. He is currently serving as a digital media expert and consultant to major studios. His latest book, "Video Shooter," is available from CMP Books at www.cmpbooks.com.

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Calrec Audio's Alpha and Sigma

The digital consoles make audio for sports a pain-free experience for Game Creek Video.

BY PAT SULLIVAN

Since 1993, Game Creek Video has provided mobile units for a wide variety of customer needs. Its trucks and engineers have covered major sporting events such as the World Series, the Super Bowl and the Kentucky Derby. It also has provided mobile facilities for entertainment customers such as HBO's coverage of the Rolling Stones at Madison Square Garden and CBS's coverage of "Celine Dion: Live in Las Vegas."

Game Creek Video installed a Sigma console in its Freedom HD truck. The console features Calrec's Bluefin high-density signal processing system, which provides more than double the processing power in less physical space.

We currently operate 17 units: four HD mobile trucks, five SD units, one analog unit, and seven B units for tapes, graphics and office space. In addition, we recently began building a four-unit HD truck, commissioned to provide FOX Sports with facilities to cover NFL and NASCAR events.

Lots of inputs required

From an audio perspective, these trucks must handle an increasingly large number of incoming feeds. As with any large sporting event, it is essential to have an audio console that can handle feeds from a variety of sources — everything from microphones positioned along the track or on the field to announcers, effects from instant replays and secondary announcer boxes.

All of these sources must be processed in real time, which makes it crucial to choose an audio console that can process this large number of sources simultaneously. The console also must be user-friendly and intuitive for operators.

The result was the demand for a console that could manage a large number of channels, including a variety of at least 160 stereo channels, plus roughly 150 other channels, all with full EQ and dynamics.

The need for surround capability

Surround sound is an increasingly important component of HD production. In a major sports production, it is not unusual to need up to 70 full 5.1 channels. Another important need is the ability for each channel to feed every bus at the same time, without restrictions. When mixing a big event, an operator doesn't have time to worry about a console's bussing capabilities.

With these requirements in mind, we installed Calrec Audio systems into our new HD trucks — a 96-fader digital Alpha into one and a 64-fader Sigma into the other. The Alpha will be used for the main audio for both NASCAR races and NFL games, while the Sigma will be mainly used as a support unit for the effects submix for NASCAR.

We chose the Alpha and Sigma because of their ability to process a lot of power in a package that could fit into the size requirements of mobile production units. Both feature Calrec's new Bluefin high-density signal processing system, which provides more than double the processing in less physical space, for roughly the cost of the previous technology. Bluefin provides 480 equivalent mono signal paths on the Alpha, and the capability for 78 full 5.1 surround sound channels on just one DSP card. It also provides EQ and dynamics, along with four main outputs, 48 multitrack outputs and 20 aux feeds.

Our new Alpha and Sigma boards both include spill panels, which offer fine adjustment of every leg of the surround channel. Calrec makes up a surround channel using two stereo channels for the L/R and LS/RS legs, and two mono channels for center and LFE. These are allocated from the available mono and stereo channels when the surround channel is assigned.

This method of building a surround channel gives us more control of the balance and width of the signal. Using stereo channels allows adjustment of the front and rear width of the surround signal. It also ensures that during adjustment, the overall

balance of the surround channel is not upset, which could happen when adjusting a surround channel with six monos. In addition, it gives us more flexibility and confidence if we need to manipulate the signal on the fly; we can isolate any particular element and adjust each one. For example, we could isolate the center channel and adjust the EQ if necessary.

It is reassuring to have full redundancy across all system-critical points; most of our work is live to air, and our trucks can take a pounding.

Fitting it all in

When planning a truck, space is at a premium. Therefore, the amount of space Bluefin saves is an advantage. Bluefin is designed to operate on just two cards, one of which is a spare to guarantee 100 percent redundancy. The cards can be located in the existing digital I/O rack. This removes the need for a DSP rack, saving us seven units of space in our equipment room and making the truck lighter.

It is reassuring to have full redundancy across all system-critical points; most of our work is live to air, and our trucks can take a pounding. Whatever manufacturers tell you, components can always fail. As an operator, full redundancy gives us absolute confidence.

Both the Alpha and the Sigma operate independently from the PC. In fact, the PC can actually be switched off, and the desks will still process audio and provide full control.

We already use Calrec consoles in three HD units: a Sigma in the Freedom, and Alphas in both the Patriot and Yankee Clipper. Because the consoles are based on the same basic user interface, it simplifies operation for experienced users and also makes training for new operators a snap.

Installation of the consoles into the trucks was easy. Calrec does an enormous amount of pre-planning, including at the point of installation, so it's really just a plug-and-play operation. BE

By Pat Sullivan is president of Game Creek Video.

Avocent AMX switches

WWE gains efficiency with new KVM solution.

BY JOHN JENSEN

Behind the scenes of "Monday Night RAW" and "Smackdown!," engineers at World Wrestling Entertainment (WWE) edit the live video at a technologically advanced production facility in Stamford, CT. There, the broadcaster produces seven television shows, consisting of nine hours of original programming, 52 weeks per year, delivered to more than 14 million viewers each week.

WWE is a fast-paced organization, and the ability to change in response to production is imperative. When the broadcaster purchased a new server, it quickly became apparent that a standard analog KVM solution would not be adequate. The facility's small, multiport KVM switching system had distance limitations and did not enable sharing, so multiple computers and servers handled the same functions.

Working with By Request Communications (BRC), a broadcast systems integrator, and reseller Revco, WWE commenced a digital upgrade project and searched for a more progressive KVM solution.

Savings

The broadcaster decided to implement an enterprise-wide Avocent AMX KVM switching platform. With the new switches, the facility gained the ability to consolidate control of its machine room computers and devices into a single user interface. This centralized interface allows operators and engineers in multiple locations to access the same devices from the live studio.

It also took advantage of the facility's large Cat 5 and Cat 6 infrastructure. The ability to run the switches over Cat 5 cable and use that infrastructure for workstations and machines produced a tremendous cost savings. An additional benefit was the overall improvement of IT response time.

Details

The broadcaster purchased four 32-port AMX5000 switches and one 64-port AMX5010 switch to connect standard PCs, graphics machines, broadcast servers, music machines (for MIDI files), editing systems and several corporate servers. Distributed throughout the broadcast department are 20 AMX5120 user stations, which enable engineers to easily switch between Microsoft, Mac and Unix platforms.

The station's video capability supports resolutions up to 1600 x 1200 at 75Hz, with a high-quality transmission rate — comparable to a direct computer connection experience. The switchers plug into a local PC at each user station, eliminating the need for a separate KVM at each desktop.

With the new switches, the facility gained the ability to consolidate control of its machine room computers and devices into a single user interface.

Another advantage is the ability to be multi-user connected. Sharing resources is a primary feature of the new switchers. This allows the engineers the ability to assign different user groups, different permissions to each user and different machines within those groups. This flexibility allows the engineers to maintain a secure network.

The switchers also enable remote diagnostics. With access to machines from desktops, engineers no longer need to travel all over the building to troubleshoot, resulting in a manpower savings.

In the MC QC area, the AMX KVM switching system accesses the various control PCs, which configure the routers and UMD-type display system.

Once WWE began using Avocent's AMX broadcast KVM switches, it found other uses for them and quickly outgrew the original purchase. When the broadcaster began daisy chaining the outputs of one box to the inputs of the next, it realized the solution was more than meeting its expectations. The system has a plug-and-play capability, making it user friendly in situations such as upgrades.

Growth

Ultimately, WWE's AMX switches cross multiple users and multiple locations from newsrooms to production control rooms, enabling the facility to function more efficiently. BE

John Jensen is a product marketing manager for Avocent, Connectivity and Control Division.

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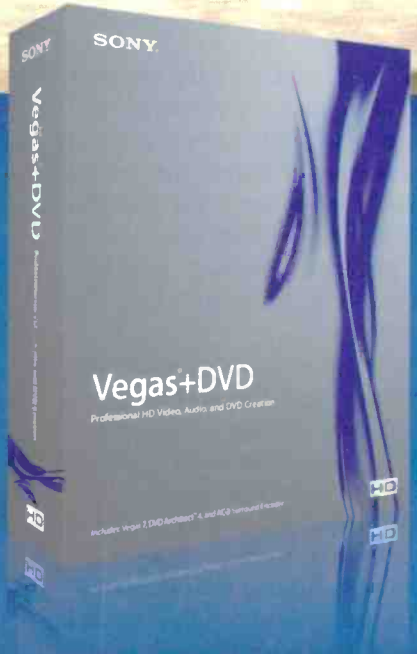

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Still stores and CGs

The line between the two technologies is blurring.

BY JOHN LUFF

Modern technology in still stores and CGs has evolved to the point where the platforms on which both are based have many similarities. The first practical commercial CGs arrived in the late '60s and early '70s. They had a lot in common with ASCII terminals, but had new features such as multiple fonts and sizes. Early units were often wire-wrapped card cages that were barely programmable. Updating was an adventure — and not for those with unskilled hands.

Over time and with the arrival of programmable microprocessors, CGs evolved into software applications running on special-purpose boxes. They required frame buffers designed to output video, which of course required tight lock-to-house sync and good control over signal parameters to assure legal gamut.

On the other hand, still stores were not practical until the development of digital recording technology. Ampex introduced a commercially viable still store — the ESS-1 — in 1977.

Compare the data content of a CG page with the sampled television image. Storing a television image effectively required two fields (a full frame) to avoid interline flicker in an image reconstructed from one field.

Avid's DekoCast delivers automated branding and localization with an array of functions, such as advanced CG, DVE effects on multiple graphic and video objects, and real-time video squeezeback.

Still stores and CGs were on course to arrive at similar technological solutions. Both required storage systems that could catalog and retrieve images with ease, conventional video interfaces and adherence to established standards. And both were initially expensive. However, once a news department got ahold of either, it couldn't let go. It is precisely this kind of market that convinces a company to invest in research and development. The result is continuous progress over a long period of time — to a point.

Jump forward to today. You will find that most companies investing in still stores and CGs are specialty firms.

Storage was limited by today's standards, and the ability to effectively browse and search content has evolved considerably since those early products. Although it was not a computer in the sense we know of today — meaning it was not reprogrammable — it was another step in the direction of fully programmable systems.

A migration to CGs

Jump forward to today. You will find that most companies investing in still stores and CGs are speciality firms. The reason is quite simple and obvious: The market size is just not large enough to attract the serious interest of many firms. For example, fewer than 10 CG companies worldwide produce broadcast products; three of these companies hold the majority share.

The broadcast industry is just not a big enough market to peak the interest of those with large balance sheets. As a result, the entrenched companies hold market share year after year. The positive side of this is that the players who choose to be in the market can invest in options that enhance the appeal of their products, knowing that the entry price is high enough to prevent most startups from entering.

One result of this interesting market dynamic is that many of the features of still stores and moving clip players have migrated into CGs in the

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Shawn Bartelt, General Manager, WFTV-TV

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last decade. A full-featured broadcast graphics system might be a better name for CGs these days. They play HD and SD moving graphics along with moving video, which in some models can be resized and positioned as part of the graphics look.

This is more than feature creep. The underlying technology I spoke of earlier has become less specific to a single product. For example, a programmable graphics engine that serves workstations and broadcast can output perfectly acceptable video. By leveraging display engines that have a broader use, the cost of increasingly sophisticated graphics systems is restrained by the decreasing investment in nonrecurring engineering.

Putting more effort into software can bring features and usability. This single fact has dramatically changed the cost structure and features available.

Where does this leave still stores?

An important dynamic for CGs in this time of technical transition is the ability to work in both HD and SD. Current HD options add cost, but over time, the differential will probably drop.

But all is not lost for still store companies competing in a graphics engine world. There are new markets, such as film and video color correction in production. Component digital video technology enhances the ability to grab a frame and maintain color perfectly. During a color correction session, the colorist will pull frames from many scenes and compare them with current sequences being worked on to ensure color match is maintained.

For this purpose, a good still store does not need multiple planes of graphics overlay, nor resizing and animation. Such systems are optimized for narrower applications, and the engineering investment can go toward a user interface and storage subsystem.

Another area where still stores shine is in news. News is all about search and retrieval from large databases. For example, if you need stills of someone who has just passed away, you don't have time to search through file folders in a cabinet. Thus, news-oriented still stores feature evolved interfaces that allow stills to be retrieved from within newsroom automation systems as well as from their own interfaces. This integration with newsroom systems is equally important for CGs, and both systems often use MOS technology as the point of connection.

In addition to the traditional role of still graphics repositories, all modern still stores are more properly termed clip stores, as moving images are equally important. The reason is simple: All recording is now file-based, and both long and short files hold the same spot in the database.

You should, however, ask the manufacturer what the recording format is. Some still stores offer composite inputs, though SDI is almost a universal option.

Protection and prediction

A word of caution about the general-purpose computer inside still stores and CGs: Keep production devices like these isolated from the public network. It is just too easy to fire up a Web browser and seek content that comes with risks. At the very least, install an industrial-strength virus protection program and popup blocker.

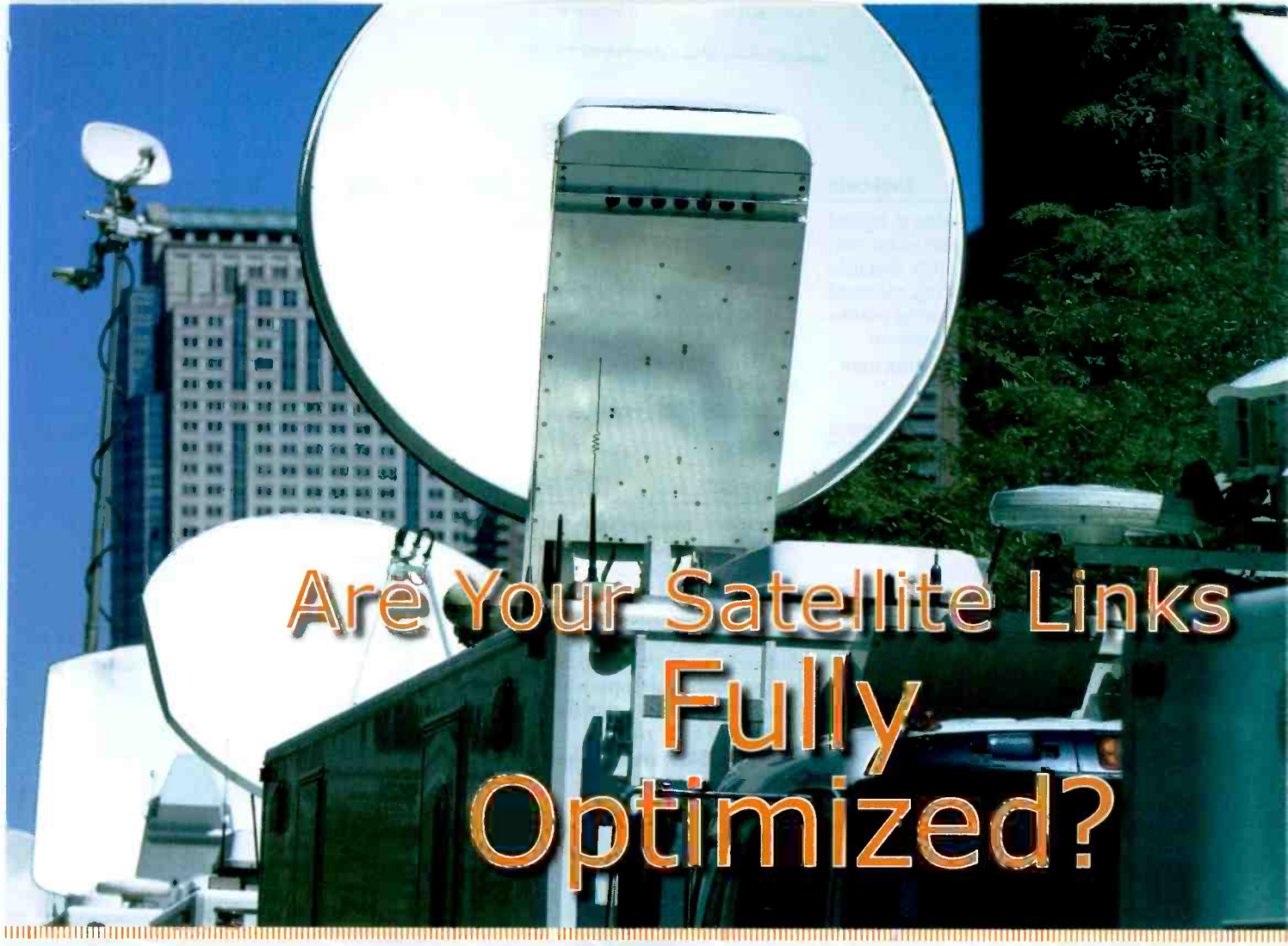
You might want to check with your management information systems department to be sure that newsroom computer system access over a network passes through the firewall as well. Some newsroom systems make calls through port 80 (HTTP), which is a potential conflict with a plan to isolate Internet browsing.

As time moves onwards, the line between still stores and CGs will likely continue to blur. The technologies they share (file systems, graphics output buffers and often elements of user interfaces) will assure that good business and engineering decisions move in that direction. BE

Quantel's Picturebox sQ has two output channels. The channels support either stills or clips and have an associated key signal.

John Luff is a broadcast technology consultant.

Send questions and comments to: john_luff@prismb2b.com



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DF66 DSP SuperCore — Euphonix

Modular converter allows users to expand System 5 and Max Air digital audio mixing systems from 32 to 1000 channels; features include bus processing, enhanced dynamics and SNMP monitoring; enables channel delays of up to two seconds.

650-855-0400; www.euphonix.com

MediaGrid — Omneon

Active storage system works with large digital media files; combines grid storage and computing; provides scalable, centralized storage; components communicate over Ethernet and generate bandwidth available to external clients; each storage component is a media-processing engine, making computational resources available to applications for media processing functions while content resides within the storage system.

408-585-5000; www.omneon.com

SyncCert — Tektronix

System checks and measures AV synchronization of file-based digital video content; can be set to run in batch mode for repeated and timed tests; logs errors with programmable alarm threshold; identifies the video and audio frame number based on embedded codes, and reports this to the alert mechanism, alert log and in various displays; analyzes test files captured at various points in the broadcast chain; allows the alert limits on audio lead and lag to be separately specified.

503-627-4753; www.tek.com

Streaming Video Card — Barco

Card supports multivendor and multicompression standards; allows digital streaming video simultaneously within the controller; nonstandard compression techniques and stream transport can be ported to the platform; may be used alongside Barco's other interface cards, allowing for simultaneous deployment of multiple video technologies.

678-475-8000; www.barco.com

7767VIP8-HSN — Evertz

Signal monitoring module fits into 7700FR-C frame; simultaneously accepts, auto-detects, analyzes and displays eight synchronous or asynchronous HD, SD and analog video signals; displays up to 1920 x 1200 resolution; has built-in VistaLINK support for remote monitoring and control via SNMP.

905-335-3700; www.evertz.com

ScheduALL 4.52 — ScheduALL

Operations management system offers integration of real-time scheduling of resources and automation; includes extensive network and Internet capabilities and security controls; is scalable to address individual business needs; detailed project management tracks workflow through the system; readily integrates with production systems as well as accounting, human resource and ERP systems.

954-334-5409; www.scheduall.com

Cheetah — PESA

Digital routing switchers handle SDI and HDTV, as well as nonstandard digital signals, in the same frame; both copper and fiber output modules are available in nine different frame sizes, including 64 x 64 in 4RU or 6RU, 128 x 128 in 7RU or 11RU, 256 x 256 in 18RU, 512 x 512 in 27RU and 1024 x 512 in 41RU; the HD multirate card set handles bit rates from 3Mb/s to 1.5Gb/s and re-clocks at 144Mb/s, 177Mb/s, 270Mb/s, 360Mb/s and 1.5Gb/s.

800-328-1008; www.pesa.com

VLS-20A — Harris

A visible light source; the unit outputs a visible red laser at 650nm and facilitates the testing of optical fibers by finding breaks, verifying continuity and validating patch cables.

513-459-3400
www.broadcast.harris.com

Intensity — Blackmagic Design

Features HDMI-in to connect to cameras and digital STBs for high-quality capture; allows users to capture and play back full-resolution HDTV uncompressed video; Windows and Mac OS X compatible; allows users to instantly switch between HD and SD video standards, including HDTV 1080i/59.94, 1080i/50, 720p/59.94, 720p/60, 720p/50, NTSC and PAL.

408-954-0500
www.blackmagic-design.com

iCR — Snell & Wilcox

Automated content repurposing station enables users to create high-quality digital masters of their content and then repurpose these for distribution on multiple revenue-generating platforms; integrates image conditioning, content mastering, QC and content repurposing functionality; concurrent processing capabilities eliminate the need for separate encoding and transcoding processing steps; allows multiple, simultaneous transcode processes to start as soon as the master encode process is under way.

212-481-2416
www.snellwilcox.com

mobilizePublisher — adactus

Allows for easy distribution and publishing of content on mobile terminals; users can design WAP pages and present content such as text, images and video; works with any type of video or image format; converts inserted video and image into formats supported by mobile terminals.

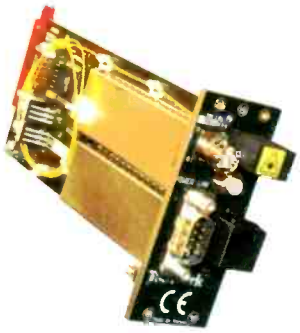
+47 91 17 65 35; www.adactus.no

LDK 8000 — Grass Valley

HD camera offers 14-bit A/D sampling and 24-bit resolution digital signal processing; includes support for 1080/50p or 60p; includes new high-bandwidth fiber system for delivery over 10GigE.

503-526-8150
www.thomsongrassvalley.com

LB-EO/OE — Network Electronics



L-band electrical-to-optical/optical-to-electrical interface is part of a series of Flashlink fiber-optic interfacility products for the transport of analog RF signals covering applications in earth stations, CATV headends and broadcast facilities; the transmitter/receiver permits distances ranging from 328ft (100m) to more than 30mi (50km); CWDM optical multiplexing technology enables multiple L-band signals to be transported on a single fiber.

800-420-5909
www.network-electronics.com

HD Branding Engine — NVISION

Occupies two slots in an NV5128 multiformat router frame; includes 16 HD-SDI inputs, an audio/video A/B mixer, three external keyers, and logo store with nonvolatile storage and keyer; features two voice-over mixers; manual and automation control protocols are the same as other NVISION master control products; features emergency bypass relay on program output.

530-265-1000; www.nvision.tv

DIVAnet 2.0 — Front Porch Digital

Solution allows global media companies to network any number of DIVArchive installations and achieve automatic content replication, disaster recovery and business continuance functionality among connected sites; provides a toolset for advanced content lifecycle control; ensures that multiple facilities share media libraries; enables one facility to duplicate and take over another facility's program transmission in the event of failure.

303-440-7930; www.fpdigital.com

ZFR100 stereo adaptor — Zaxcom

Stereo adapter and time code interface integrates with ZFR100 broadcast-quality recorder; provides two balanced audio inputs that eliminate ground loop problems; time code input synchronizes the time code generator and supports automated loading of audio onto the memory card; time code/audio out connector can be used as an audio monitor for playback; equipped with an 8V to 16V DC input.

973-835-5000
www.zaxcom.com

Kaleido-X — Miranda

Single, expandable chassis combines multiroom, multi-image display and HD/SD routing; can display 96 HD, SD or analog inputs any number of times, in any size, across eight displays of any resolution and orientation, without blocking or grouping restrictions; as a router, offers switching of 96 unprocessed inputs to 48 HD/SD outputs; can monitor up to 2304 channels of audio, including embedded, discrete AES or discrete analog.

514-333-1772; www.miranda.com

Fathom 2.8 — Inlet

Advanced encoding solution increases quality of SD video and lower-bandwidth applications such as mobile video and Web streaming; delivers SMPTE VC-1 and Windows Media output quality; includes S Series, which supports both live and file-based input and closed captioning (CEA 608, CEA 708 and SAMI) with advanced encoding; includes multichannel audio support, featuring AC3 Dolby Digital pass-through.

919-856-1080; www.inlethd.com

DTV-250 — MultiDyne

Analog and digital audio multiplexer and demultiplexer for serial digital video supports four channels of analog audio or two stereo AES/SPDIF channels per card; supports 143Mb/s, 177Mb/s, 270Mb/s, 360Mb/s and 540Mb/s serial digital video and 24-bit audio at 48KHz; supports up to eight channels of either RS-232, RS-422, RS-485 or CMOS/TTL in the analog audio mode; multiple cards can be cascaded to support up to 16 audio channels per SDI stream.

516-671-7278; www.multidyne.com

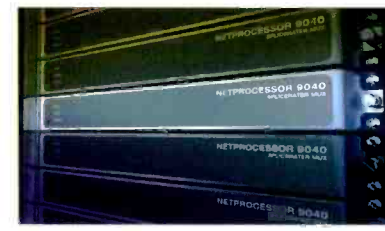
WatchPoint — TANDBERG Television

Scalable, automated solution streamlines the creation, management and distribution of media assets; based on a customizable open architecture with an array of installation options; supports linear and on-demand media, as well as interactive content and applications, including interactive advertisements.

678-812-6300
www.tandbergtv.com

NetProcessor 9040 — Grass Valley

HD MPEG-4 transrater and splicer bridges ASI transport streams, legacy ATM circuits and IP delivery over a GigE topology; adds splicing into the ASI transport stream, allowing content to be added to a channel regionally or locally; allows individual channels within a transport stream to be transrated; offers full support for SD/HD MPEG-4 channels.



503-526-8150; www.thomsongrassvalley.com

VikinX — Network Electronics

Router range includes the VD256256L with multirate support from 19.4Mb/s to 540Mb/s with re-clocking and the HD256256L with multirate support from 19.4Mb/s to 1485Mb/s with re-clocking; units provide fully hot-swappable module cards, built-in dual redundant power supply, and fully redundant control architecture and controller functions; includes TCP/IP control interface and interconnectivity with VikinX modular control panels and SNMP agent; allows various signal processing functions and fiber optics in the router with Bridge Lines; supports SD/HD-SDI video and digital and AES audio in one frame.

801-495-1635
www.network-electronics.com

Quasar Ph.C — Snell & Wilcox

HDTV upconverter uses motion-estimation techniques based on the company's Ph.C technology to produce clear HD outputs from a variety of SD inputs; combines four Snell & Wilcox technologies in a 1RU package, including Ph.C motion estimation, DEFT 3:2 cadence correction, Prefix compression preprocessing and FormatFusion HDTV conversion.

212-481-2416; www.snellwilcox.com

NDT 200 — Fast Forward Video

Portable DVR is designed for field use; offers simple operation for broadcast-quality DVR applications, including video assist, location recording, video analysis, and use in inspection systems and sports environments; features an AC/DC power option; records to a removable 2.5in disk drive; can serve as a direct replacement for tape-based recording systems.

949-852-8404; www.ffv.com

OFI-20B — Harris

Handheld optical fiber identifier pinpoints optical undamaged fibers by detecting the optical signals, power levels and signal direction being transmitted through the fibers.

513-459-3400
www.broadcast.harris.com

DTV-4000 — MultiDyne

Four-channel SDI and audio fiber-optic transport provides high performance with built-in SDI frame sychronizers; system supports four SDI, 16 audio or eight AES/SPDIF channels.

516-671-7278; www.multidyne.com

X-View Maestro — e-mediavision.com

Control enables monitoring of multiple video sources on a single display monitor; lowers power consumption, heat dissipation and space requirements; enables users to control routers or signal switching via touchscreen-based environment.

+44 20 87 55 2014
www.e-mediavision.com

RAGE N|Code — Bluefish444

HD MPEG-2 video compression system enables MPEG-2 acceleration from the user interface of many applications; allows ingest from live uncompressed sources such as HD and SD cameras and tape decks; provides 1920 x 1080 real-time HD encoding; supports all profiles, levels, resolutions, frame rates and MPEG-2 options.

866-314-7785
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Edge Blending — TV One

Feature added to C2-1000 and C2-7000 series converters; support high-res RGB images, composite video, S-video, YUV or YpbPr component video, SD-SDI, HD-SDI and DVI; employ gamma correction to compensate for problems when edge blending between projectors; can be used for other effects, such as adding a soft edge to single or dual picture-in-picture (PIP) windows on each output.

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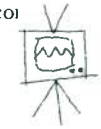

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NEWS 12

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Qualified candidates should send their resume to: Trio Video, 2132 West Hubbard, Chicago, IL 60612; resumes@triovideo.com; fax 312-421-0361

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Smart appliances

More household appliances with LCD screens are coming to a store near you.

BY PAUL MCGOLDRICK

Household appliances took a long time to grow into modern electronic devices. But when it was realized what could be done, the leap was impressive.

My family just bought a washer and dryer equipped with direct drive permanent magnet motors and extremely smart controls. It takes only a gallon of water to run a full load of laundry, and watching it spin at upwards of 1000rpm is impressive. As the inaugural load ran, we all found ourselves drawn to it, much like the proverbial families of the 1950s were to their television sets. My wife's friend later quipped, "I bet you can even get HBO on that thing!"

As a child, the only smart appliance I remember was an automatic tea maker that sat on my parent's bedside table. As a combination alarm clock and radio as well, it was pretty advanced for its day.

At the same time, fertile imaginations were dreaming up other futuristic appliances. One was a combination stovetop and fridge. With it, a lucky housewife could move food from the fridge underneath to the stovetop — without having to take a step.

Another was a complete stove with a built-in TV on the back control panel, which the inventors could envision displaying recipes. I doubt either product made it to the market. At that time, it would have been very difficult to make the display technology practical.

However, that's no longer the case. Flat-screen TVs have dramatically changed the possibilities that are available or can be conceived by the imaginative marketer. Although I haven't seen that smart stove pop up on the market (though, it would be practical, maybe allowing you to follow along with a chef on The Food Network), other imaginative products have emerged.

Everything but the kitchen sink

LG Electronics' latest smart fridge is a case in point. It has two displays. An LCD above the icemaker (cubed or crushed, darling?) features a stored photo album (USB downloaded), a calendar (with anniversary alarm) and lots of downloaded recipes and menus. A 15in color LCD TV on the other door has RF and video inputs. The fridge also features an FM receiver and a 162MHz NOAA Weather Radio receiver, closed captioning and the inevitable parental control V-chip, as well as stereo audio from 1.5W amplifiers. Everything, of course, can be remotely controlled.

I cannot imagine what sort of family would invest in all this technology in one place, but it presumably also has an easy chair in the kitchen.

I cannot imagine what sort of family would invest in all this technology in one place, but it presumably also has an easy chair in the kitchen. On the fridge, there should probably be a warning that says, "Using knives while watching your favorite soap opera can be hazardous!" As appliances continue to evolve, they make living easier and easier.

Futuristic need fulfillment

This reminds me of a Japanese proposal from some years ago. It was a fridge and pantry that could be accessed from outside the house, presumably with some security. You could call in your grocery order, and the delivery boy would stock the fridge and pantry from outside the house. Those were the days when deliveries were winding down, but deliveries are now back in some communities via Internet ordering and truck delivery. This proposal could be a practical solution in today's world.

Taking the idea a step further, maybe in the future, instead of physically calling in your grocery order, you would have a barcode scanner on the fridge. Every time you finished something from the fridge or pantry, you would scan it. Once a week, you'd hit a button on your remote control, and the grocery order would appear on a display in your favorite store. Presto change-o!

Darn it, LG, you nearly had me hooked on your fridge. But no scanner? What were you thinking?

Whether being so completely wired and interconnected in every aspect of our day-to-day lives is a *good* thing is yet to be fully answered. But I'm afraid that even pondering it will have to wait for now. An old favorite is now playing — on the spin cycle. BE

Paul McGoldrick is an industry consultant on the West Coast.

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