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JUNE 2004

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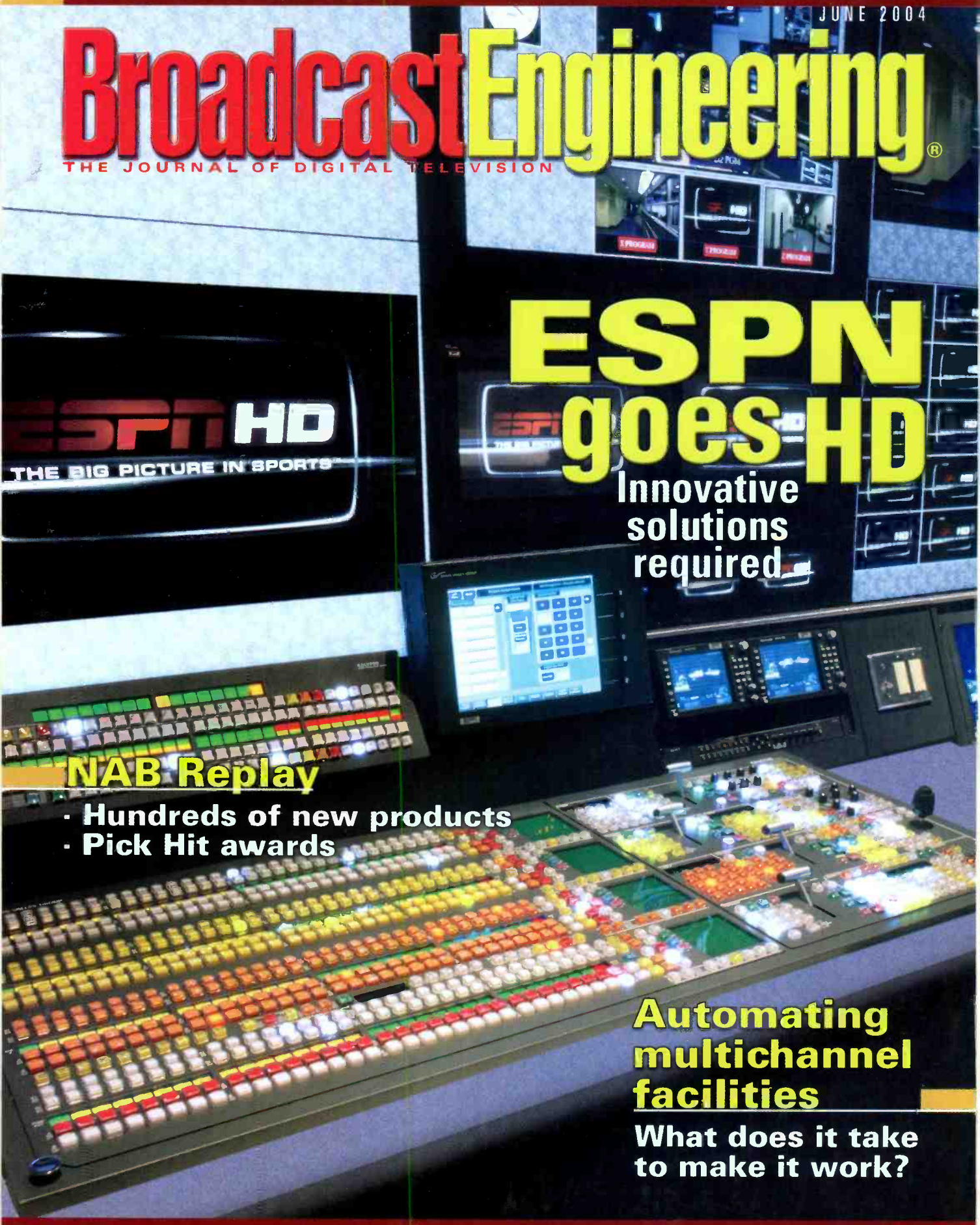
THE JOURNAL OF DIGITAL TELEVISION



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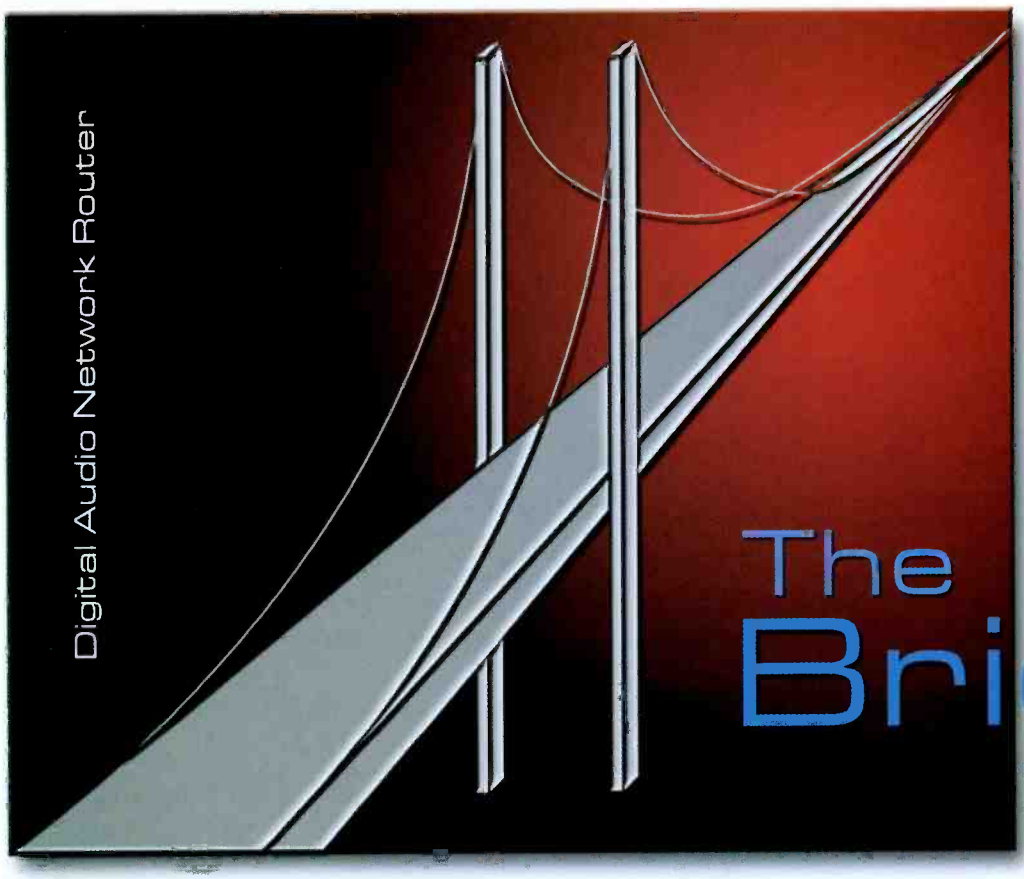
Automating multichannel facilities

What does it take to make it work?

A PRIMEDIA PUBLICATION



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

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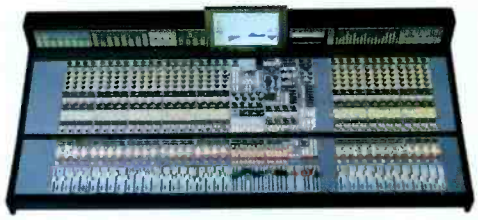

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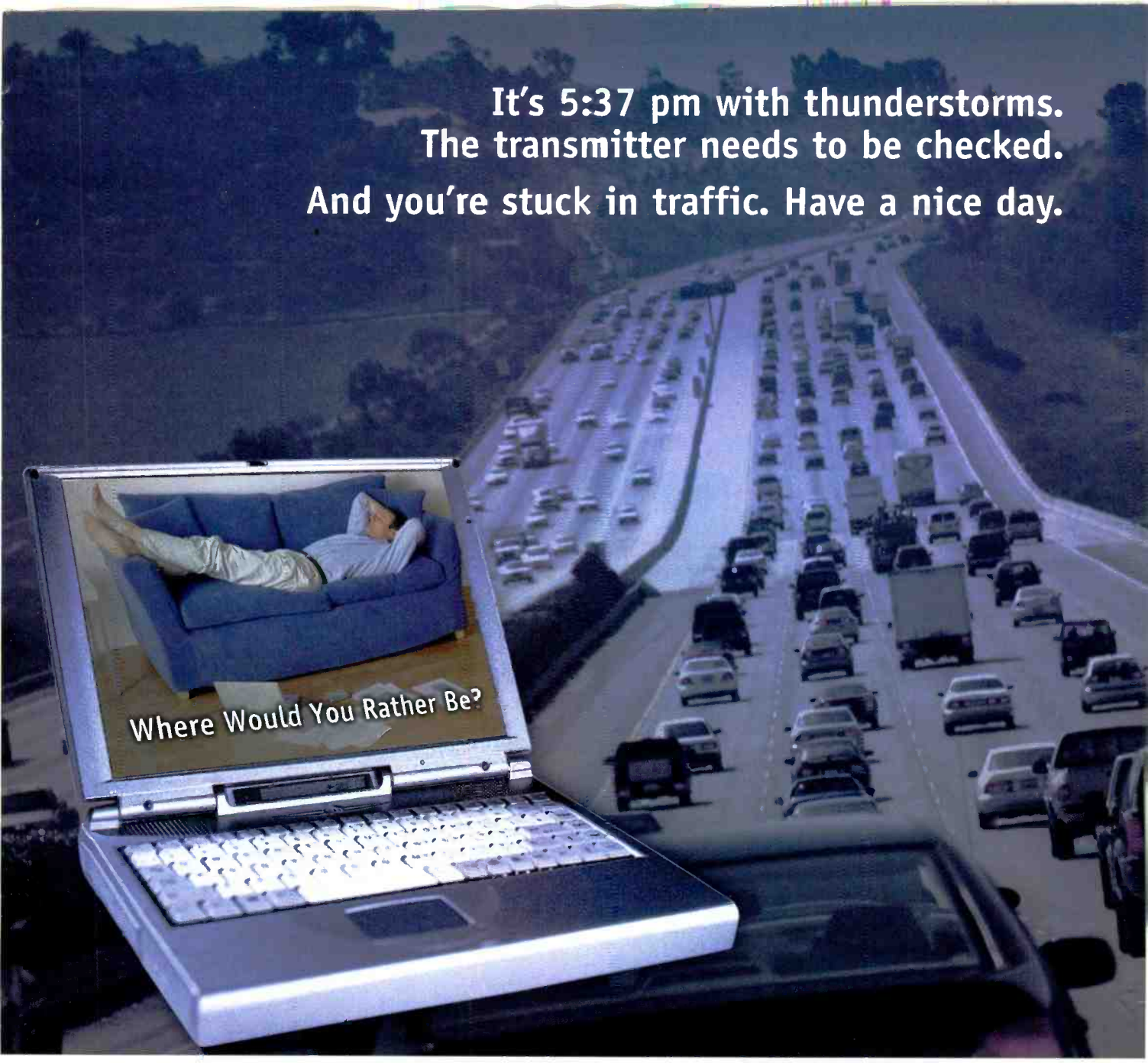

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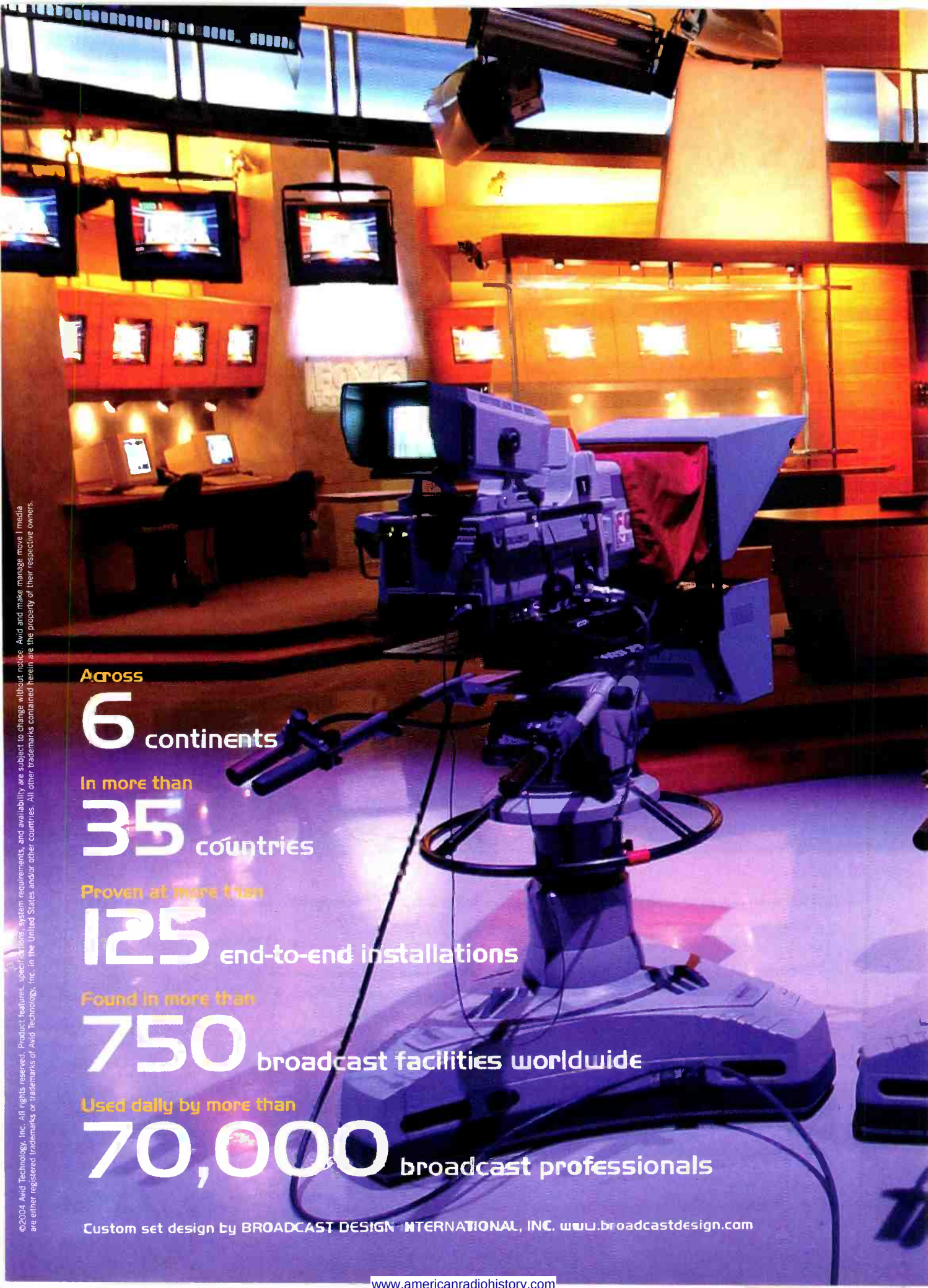

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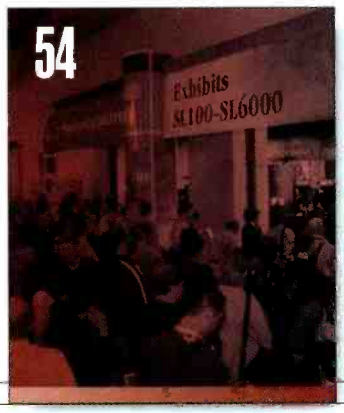

ON THE COVER: Each of the three HD studios in ESPN's new digital center has its own production control room equipped with a Grass Valley Kalypso HD switcher. Photo by Andy Washnik.

BEYOND THE HEADLINES

DIGITAL HANDBOOK

(continued on page 8)

instant access

n our "get the news first...and faster" world, Panasonic's DVCPRO P2 Series provides the instant advantage, with no moving parts, no consumed media and no need for digitization prior to editing. P2 solutions offer low operating costs and seamlessly connect original-quality DVCPRO data to laptop editors, servers and IT media. Just what you'd expect from DVCPRO. To find out how Panasonic can improve your news operation, call **1-800-528-8601** or visit **www.panasonic.com/p2**

DVCPRO

Panasonic ideas for life

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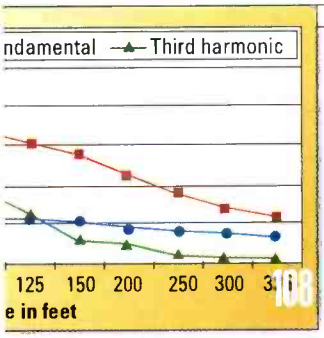

New Products & Reviews

Technology in Transition

Applied Technology

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Freezeframe

Laying claim to being the first true broadcast video server isn't easy. In fact, no less than 12 "video serverlike products" were first introduced at the same NAB. In what year were these 12 server products introduced? Correct entries will be eligible for a drawing of *Broadcast Engineering* T-shirts. Enter by e-mail. Title your entry "Freezeframe-June" in the subject field and send it to: editor@primediabusiness.com. Correct answers received by Aug. 1, 2004, are eligible to win.

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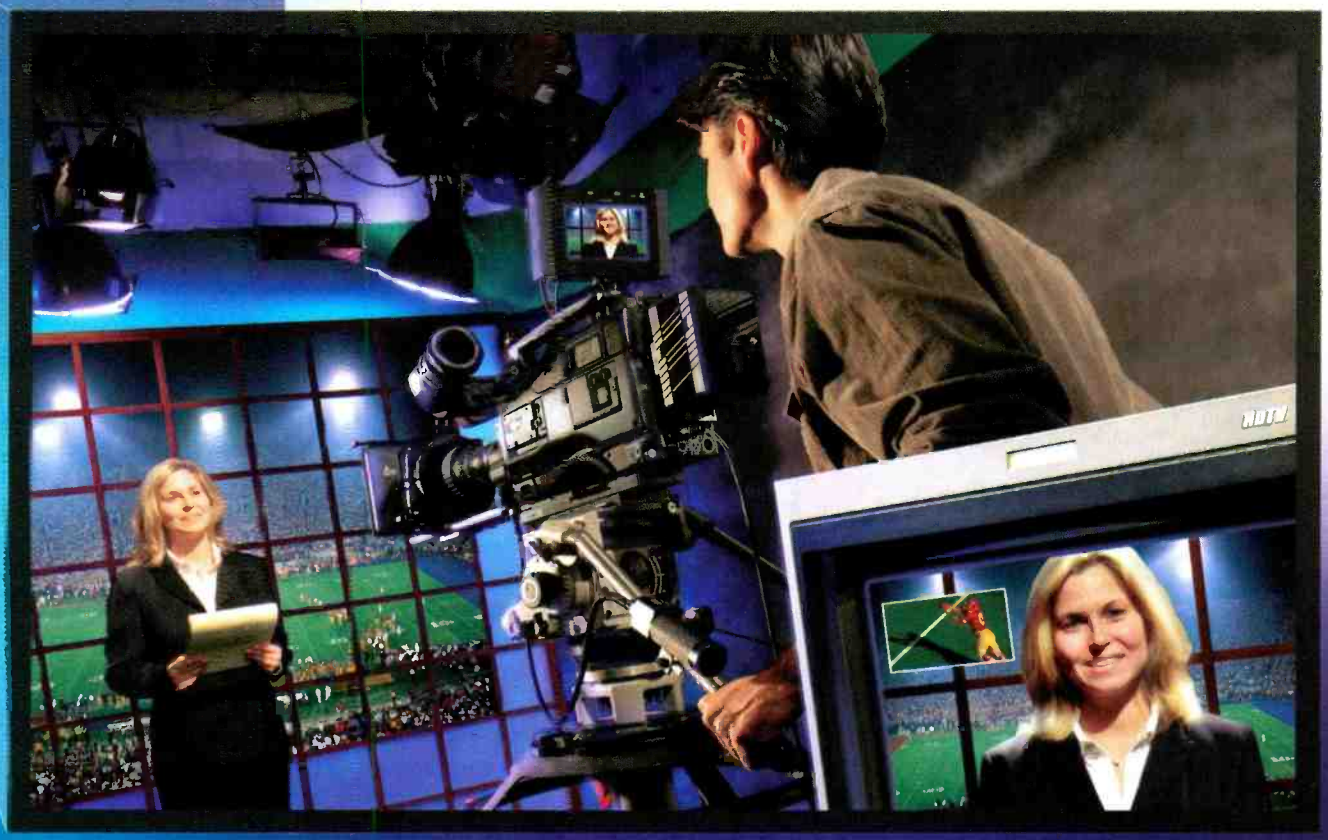

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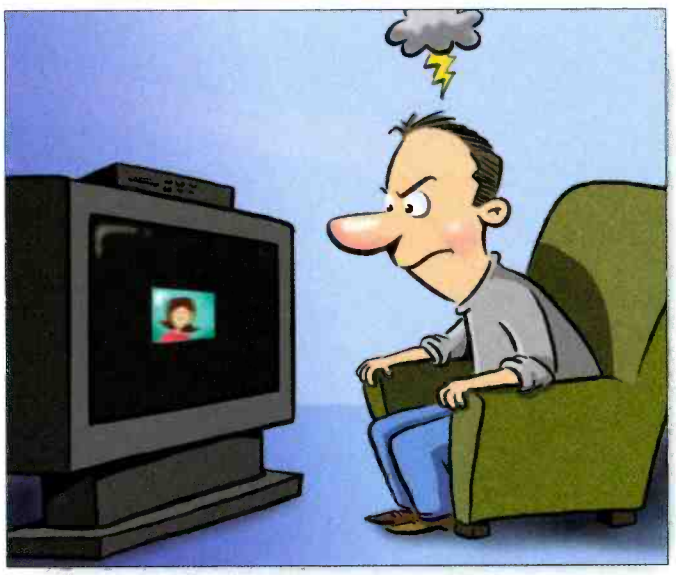
Hollywood obsoletes six million HDTV sets

Once you reach 50, your eyeballs see things in a new light — often, a fuzzy light. Now, with Hollywood's and the FCC's help, everything you see on your new HDTV set may get fuzzy too.

While the FCC recently prohibited cable and satellite providers from down-rezzing OTA broadcast programming, the commission has not been so kind regarding non-broadcast programming. This leaves open a viewer's disaster for high-def networks, such as HBO HD, Showtime HD and Cinemax HD.



You see, Hollywood is threatening to withhold what it calls "high-value content" unless these and other networks down-rez their programming on analog interfaces. The threat came from retiring Motion Picture Association of America (MPAA) president Jack Valenti, "The perpetual availability of content over unprotected high-definition analog outputs is not an option," he said.

Hollywood claims that all those analog inputs on today's HDTV sets represent gateways for the illegal distribution of movies onto the Internet. The MPAA's goal is to force us early adopters to buy new TV sets with built-in DVI and HDCP interfaces to plug the so-called "analog hole." I say, "What hole?"

The facts are that MPAA and its minions have never submitted any evidence that any analog HD content has ever been transmitted over the Internet. Valenti and his lapdogs cannot produce one iota of evidence that there is or would ever be an analog hole allowing so-called high-value content to flow from those YPrPb jacks directly onto the Internet. Their argument of an analog hole is totally specious.

Somehow, I just don't believe that anyone is going to lock up his or her Internet connection for a couple of days to download the latest HD movie. And, no matter how fast broadband gets, 10- to 20Mb/s isn't going to happen during the life of today's HDTV sets.

Yes, I can already hear you WM9 and MPEG-4 advocates saying, "But, but ... new compression is just around the corner and someday it won't take such bandwidth to send these signals." My response is that, for consumers, those compression schemes are years — yes, years — away. By the time that WM9 or MPEG-4 are doing HD on your desktop, today's HDTV sets will have been long dead.

Today's six million HDTV-equipped homes represent the early adopters, like myself, who believed in HD. We put our money on the line when this entire industry and the FCC was pleading for someone to invest in HD. Well, we did invest in HDTV and effectively launched an entire new class of service, benefiting consumers, electronics manufacturers and broadcasters.

I call on Chairman Powell to marshal his fellow commissioners and protect the American consumer. Chairman, you asked the American public to believe in DTV, and the six million HDTV sets we bought prove that we did. We've supported the U.S. transition to DTV with our money, and we must not be penalized for that investment.

Protect American HDTV investment by prohibiting the down-rezzing of content on nonbroadcast cable and satellite channels, just as you've done for broadcaster signals. Americans deserve nothing less.

Brad Dick
editorial director

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

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Measuring SDI

To the editor,

While reading your magazine, I was impressed with the high level of knowledge people such as Michael Robin have in regards to new technologies. I remember that EIA/TIA 250-C was clear on how to measure the video and audio signals after a long-haul or short-haul transmission path. Now that video compression techniques such as MPEG-2 are currently used to transmit the digital audio-visual signal from point A to point Z, the use of EIA/TIA 250-C is no longer valid. This is mainly because the interfaces are now bit-serial digital video and audio as per SMPTE 259M-C and SMPTE 272M. Does it make sense to measure the SDI signal at the output of the MPEG-2 decoder? Would the MPEG-2 decoder 'create' a brand-new SDI stream? How do we measure transmission-path problems at video level (SDI) over MPEG-2 networks? Is it only possible to check TR 101 290 at the DVB-ASI level? These questions have been around our facility for some time now, and nobody seems to know the answer.

RUBEN

Eduardo Gudis of Videotek responds:

It makes sense to measure SDI signals on the output of an MPEG decoder, but you should look at MPEG-2 encoding/decoding errors, such as macroblocking, frame dropping and audio-video lip-sync. The MPEG-2 decoder should in theory replicate what was fed into the MPEG-2 encoder at the source. But, because MPEG is a compression algorithm, that isn't always the case. Transmission-path problems can cause timing errors when MPEG-2 packets arrive and that causes PCR jitter. If too much PCR jitter is present at the decoder end, it may lose its ability to lock to the video/audio signals of a specific program present on the MPEG stream. At the DVB-ASI level, the TR 101 290 defines the important measurements, including PCR jitter.

Economic patriotism

Mr. McGoldrick,

Thank you for the editorial "Cutting Corners" in the February issue. I agree with you, and your article reminds me of an old saying, the gist of which is "penny-wise — pound-foolish." I also coined the rhetorical question, "Do you know how many people die each day because someone assumed something?"

Ironically, in this same issue is a quote from Glen Sakata, director of sales for Harmonic, which says in essence, "Why employ 20 people when automation can replace 18 of them?" While I do not advocate returning to the days of one tech for each piece of equipment the station owns, I like what one former presidential candidate said: "There needs to be an economic patriotism in this country. If you can still make a profit, keep your shareholders happy and save some jobs, more American companies ought to consider doing that." My prediction is that one day technology will bring us to the point where master control and ingest operations will be farmed out to a company overseas that can hire techs for far less than the kingly sum of $7 that most U.S. non-union stations pay.

CHARLIE FARR

Paul McGoldrick responds:

I love the idea of "economic patriotism"! Watching the export of technical jobs just to make a marginal difference to the bottom line is depressing. Although I'm sure you're right that master control could be run from somewhere like India, one would hope that owners will realize that the security of their operations is as important as continuity switching. One can imagine the FCC's reaction to hackers hijacking ABC.

I read an interview with Marc Andressen in which he said that the history of U.S. business is to replace jobs with new industries and opportunities. That has always happened, he said. He couldn't say what those new opportunities would be or how people could be trained for them. But it would be nice to think that he was right. **BE**

February Freezeframe:

Q. Name the nonlinear AV workstation introduced by Panasonic at the 1995 NAB.

A. The Panasonic WJ-MX1000 Postbox

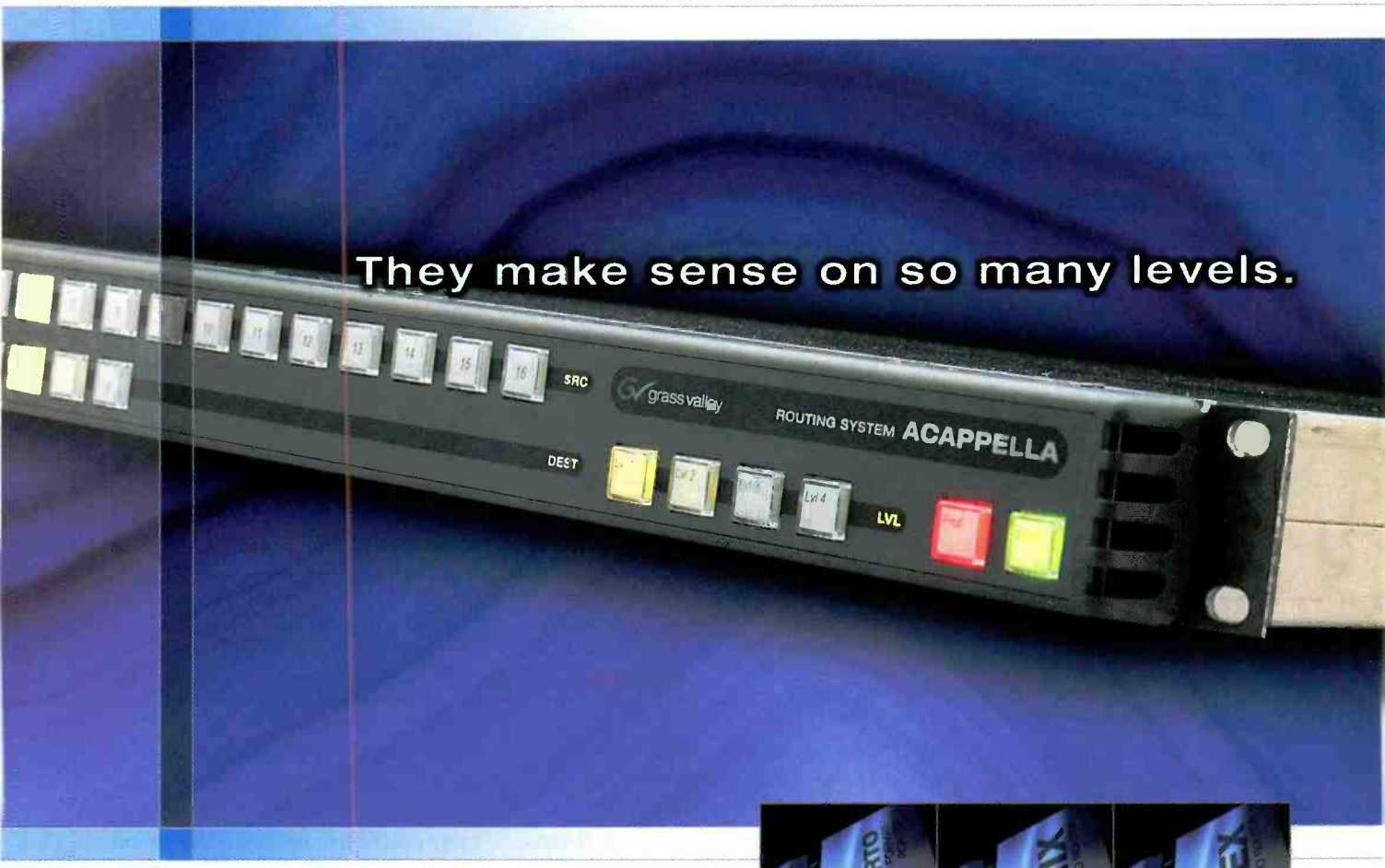
Winners:

Tim Costley
Guy St-Arnauld
Bobby Saggu

Test your knowledge!

See the Freezeframe question of the month on page 8 and enter to win a *Broadcast Engineering* T-shirt.

Send answers to *bdick@primediabusiness.com*



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Whether it's a handful of crosspoints or 10 million in a single installation, Grass Valley™ routers deliver the reliability, scalability, and multi-format capabilities that fit your facility best. This balanced approach has made Thomson the undisputed market leader in router technology.

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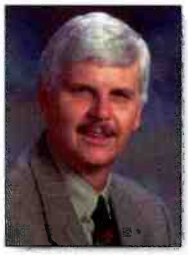
Real convergence

BY CRAIG BIRKMAIER



The annual NAB conference in Las Vegas is advertised as the world's largest electronic media show. To accommodate all of the new technologies that have been converging during the past decade to create and distribute electronic media, the NAB expanded the show to include the multimedia world.

While the NAB has been officially promoting convergence, for most of the past decade the multimedia world exibits were segregated from the broadcasting exhibits and inconveniently located in the Sands Convention Center. Now that the Las Vegas Convention Center (LVCC) has expanded, the multimedia world exhibits have gradually been integrated into the NAB mainstream.

This past April, as I walked into the lower level of the LVCC South Hall — the hall that the NAB calls multimedia exhibits — I could not help but feel that the much-ballyhooed convergence was finally happening.

Apple and Avid dominated the entrance to the lower level of the south hall, much as they have come to dominate the new landscape of digital media. Farther into the hall you could find Adobe and Discreet Logic. Together, these companies now command the markets for tools used to create TV, video and film. Thanks to convergence, the concept of digital motion imaging is being devoured just as the world of digital audio was a decade ago.

The myth of convergence

The classic myth of convergence is that the worlds of television and personal computing would become one, and that everyone would surf the Web on their TVs or watch TV on their PCs.

But the TV has traditionally been a device viewed passively at a distance. This has become known as the lean-back viewing experience. TVs, especially the big screens in the family room, are often viewed by groups of people. Interactivity has been limited to the remote control; efforts to make the TV viewing experience more interactive have largely been met with disapointment. This may change, but the big-screen TV in the family room will likely continue to be used primarily for the lean-back viewing experience.

The PC has traditionally been a device used up-close and interactively, by individuals. This has become known as the lean-forward viewing experience. Studies suggest that millions of people multitask and use their PCs while watching TV. Many people have equipped their PCs with TV tuners, but it is both easier and cheaper in most cases to put a TV in the same room with the PC. As the average screen size of a PC increases, however, it is becoming more practical to use this relatively expensive digital-media appliance as a PC, TV and stereo.

Studies suggest that millions of people multitask and use their PCs while watching TV.

The classic definition of convergence misses an important point. With a myriad of choices in cheap consumer-electronics gear, consumers have become accustomed to buying purpose-built devices. People are more interested in having these devices share their media content, and consumers tend to choose appliances that are appropriate for the venues in which they will use them.

The reality of convergence

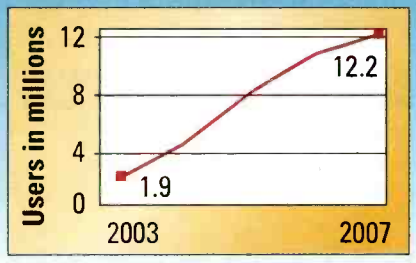
The unreality of convergence for the past decade has been due more to political concerns than technical limitations. We are experiencing a classic technology shift, and it is shaking the foundations of several media industries. These industries are converging around a new reality: Virtually all forms of media can be represented as bits.

In the legacy analog world, media and the appliances people used to

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

Wi-Fi use climbs

Number of professionals using wireless Internet access is increasing



SOURCE: Gartner estimates and projections

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consume them were tightly coupled. In the new digital world, media are files, and the ability to use these files is more dependent on software than the underlying hardware that executes the programs and algorithms. Over the past two decades, there has been a relentless progression as all things digital consume one medium after another. The typewriter gave way to the word processor and the artist's paste-up board gave way to desktop publishing. Audio was consumed next, and SD video was swallowed up by the end of the last decade. Now it is HD video's turn. This progression will soon take over the world of film as well.

The reality of convergence has more to do with the underlying technologies for creating, distributing and viewing all forms of digital media content than the classic definition implies. Figure 1 shows that the applications are not converging. Instead, the technologies that support these applications are converging.

The venerable CRT display is finally reaching its end of life. In the past year, major manufacturers of CRT displays have announced that they are shifting investment to next-generation display technologies, including LCD and plasma panels, and LCD, DLP and LCOS projection systems. All of these displays have individually addressable pixels that create image rasters nearly free of the geometric distortions common with scanning CRT displays. All of these displays have the ability to present both Nyquist-filtered imagery (video, film and digital photos) and the unfiltered imagery common to many computing applications, including the ubiquitous Web browser.

This past December, these new display technologies began to outsell CRT-based direct-view and projection sets in the rapidly growing home theater/HDTV product segment. While cheap, CRT-based TVs still dominate the market, the era of the CRT is clearly drawing to a close. With it, one of the last barriers to real convergence is crumbling.

The increasing speed and/or storage capacity of cheap components used in the IT-industry continues to devour applications that place heavy demands on digital media, including high-resolution motion imaging. Compression-based desktop video systems soon gave way to uncompressed video systems. And, as HD production became a priority, cheap IT technology became a solution.

A prime example of how this avalanche of bit-processing power is impacting the future of digital media production can be found in the Panasonic P2 product line introduced at NAB2003. Based on Panasonic's SD memory-card technology, P2 camcorders will capture images directly to memory cards or to cheap hard disks using an IEEE 1394 cable. The first SD P2 camcorder is now shipping, and Panasonic showed a mock-up of an HD P2 camcorder at NAB this year. Figure 2 on page 18 shows how these P2 products will be able to leverage the geometric progression in storage capacity over their useful life.

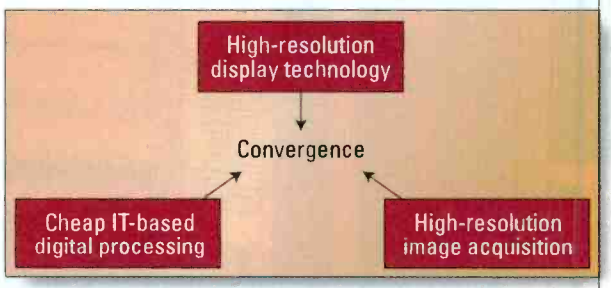

Figure 1. There are three important areas of technology that are facilitating the real convergence that is transforming the landscape of digital media. Perhaps the most important is high-resolution display technology. The most powerful force is cheap IT-based digital processing components. The most elusive is high-resolution image acquisition.

OverDrive

Production Control System

The pressure to produce more with less has never been greater. On air devices are more complex and controlling the production can be a real challenge. OverDrive™ simplifies live production control with a simple and powerful user interface.

OverDrive™

OverDrive™ is a Windows based production control system. It drives all of the devices during a production, extending the reach of the technical director to include video servers, audio mixers, robotic cameras and more. This means that you can get a more sophisticated production on the air without increasing your staffing levels. Productions are more consistent and less staff training is required to execute a production.

Synergy Series Production Switchers

The key to OverDrive™ is the tight integration to the Ross Synergy Series production switcher family. The interfaces to audio mixers, video servers and robotic cameras are connected through Synergy enabling a tightly integrated production system. This also means that the Synergy production switcher has direct control over these devices without the OverDrive™ system present.

OverDrive™ Benefits

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The ability to acquire high-resolution imagery continues to be the most elusive barrier to convergence. This is largely due to the fact that the core technologies are not being driven by the same geometric progression that is influencing all things digital. Cameras are, by nature, analog; they capture photons, not bits. The CCD sensors used in virtually all HD cameras today are analog devices devices that are nearing their practical limits in terms of resolution versus SNR performance. There are signs that the HD acquisition problem may be yielding to other technical innovations. Perhaps the most promising is a new generation of high-resolution CMOS image sensors that overcome some of the limitations of CCDs. These sensors take advantage of many of the chip-level manufacturing techniques that drive the relentless progression in CPU- and memory-chip performance.

HD for everyone

Apple has been riding the IT-performance curve through its support for the compression codecs used in Panasonic's DVCPRO products. DV-25 and DV-50 software codecs were introduced over the past two years. At this year's NAB, the companies introduced the DVCPRO HD codec (100Mb/s), which can support Panasonic's 1080i and 720p Varicam products.

At the Panasonic press conference, vice president of marketing Stewart English plugged an Apple Powerbook into a Panasonic DLP projector and played a three-minute infomercial at full 720p resolution.

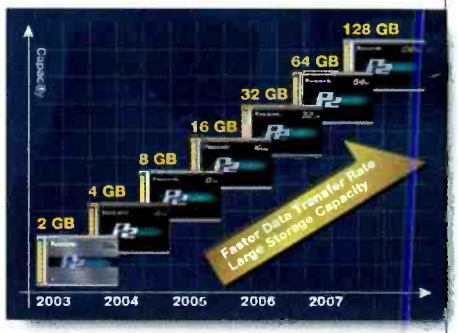

Figure 2. The progression in storage capacity for Panasonic's P2 storage cards is symbolic of the trends in CPU performance and hard-disk storage that are making the shift to HD affordable for everyone.

HD has been devoured. Soon, digital media professionals will look upon the soft, fuzzy images of interlaced SD video just as people looked at those jerky, post-age-stamp QuickTime movies a decade ago. HD is about to become the new currency of motion imaging. BE

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

Send questions and comments to: cbirkmaier@primediabusiness.com

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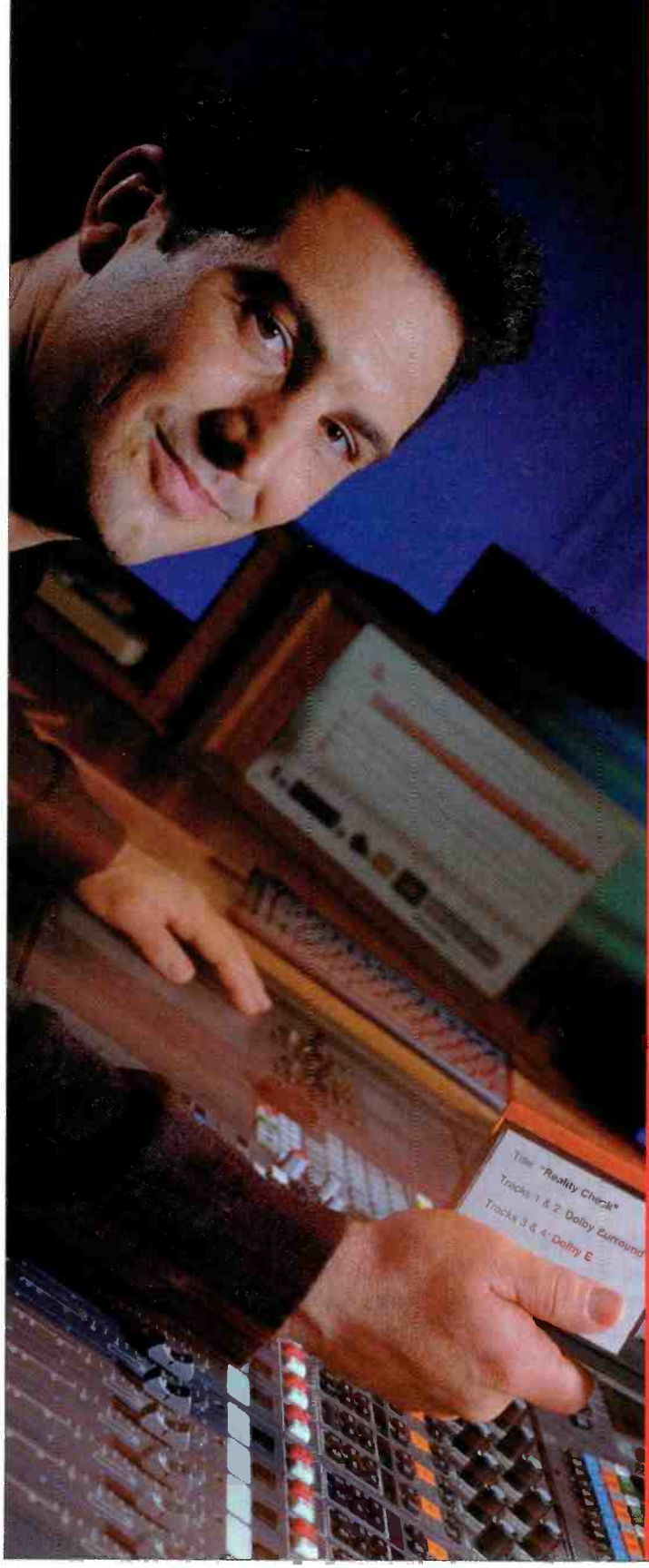

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BEYOND THE HEADLINES

The push for DTV conversion

BY HARRY C. MARTIN

Recent actions by the FCC and Congress may spur a speedier conversion to digital television service.

The Communications Act now requires that all broadcast stations convert to digital, and the spectrum presently occupied by NTSC TV channels 52 to 69 be returned to the FCC to be auctioned for use by other services. The deadline set by Congress for the completion of this conversion process is Dec. 31, 2006, or when 85 percent of the households in a television market are capable of receiving digital television service.

The Media Bureau's DTV Task Force proposed that the 85 percent penetration level be met by counting the delivery of digital service by cable and satellite services. The focus would not be on the actual coverage of digital OTA service, but on whether there is a digital signal in viewers' households, regardless of the delivery mechanism. Viewers would be considered in the 85 percent if they convert the incoming digital signal with a set-top box and retain their analog receivers.

Television broadcasters said that this plan would eliminate the incentive for consumers to purchase new digital sets. Moreover, because consumers would lose digital-quality signals when they were downconverted for delivery to analog television sets, programmers would lack the incentive to create new digital programming. This conversion to digital could eliminate OTA service to the 15 percent of the population that does not have cable or satellite service, or a new digital television.

Congress is looking at different ways to encourage the conversion to digital, most recently in the context of the reauthorization of the Satellite Home Viewer Improvement Act. A draft of the legislation contains a proposal to permit satellite service providers to bring distant network signals into local markets to fill in where local broadcasters are not providing quality DTV service. The idea is that, because many digital television stations are operating at reduced power, the threat of the carriage of distant signals would give broadcasters incentive to build out their full digital facilities.

Broadcasters are blamed for the slow conversion to DTV. But, the commission has not resolved the issue of digital must-carry. And the FCC has yet to set final DTV tuner/receiver standards or settle critical copying issues.

Dateline

August 1: Television stations in North Carolina and South Carolina must file their renewal applications, ownership reports and EEO program reports. Stations in Florida, Puerto Rico and the Virgin Islands must begin their prefiling renewal announcements.

2004 regulatory fees

The commission has released its Notice of Proposed Rulemaking on the assessment and collection of regulatory fees for fiscal year 2004. While the fees for some classes of licenses will actually be lower if the proposed 2004 fees are adopted, it should surprise no one that the majority of broadcast regulatory fees are proposed to go up for 2004. The proposed fees, which would be due for payment in September, are set out in the table.

Proposed FY2004 television station regulatory fees	
VHF TV	$
Markets 1 to 10	60,350
Markets 11 to 25	41,450
Markets 26 to 50	29,150
Markets 51 to 100	17,550
Remaining markets	4050
Construction permits	4650
UHF TV	$
Markets 1 to 10	17,775
Markets 11 to 25	16,175
Markets 26 to 50	9300
Markets 51 to 100	5550
Remaining markets	1650
Construction permits	5675
Satellite television stations	$
All markets	1050
Construction permits	515

Proposed FY2004 regulatory fees for miscellaneous broadcast-related authorizations	
Low-power TV, TV/FM translators/boosters	385
Broadcast auxiliary	10
Earth stations	200

The winners under the proposed fees are commercial UHF TV permittees. Regulatory fees for UHF permits will plummet by more than 30 percent (from $8300 in 2003 to $5675 in 2004). The losers will be commercial UHF licensees in markets 11 to 25, who are looking at an increase of more than 25 percent (from $12,875 in 2003 to $16,175) in 2004. BE

Harry C. Martin is an attorney with Fletcher, Heald & Hildreth PLC, Arlington, VA.

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Composite digital video

BY MICHAEL ROBIN

A long period of concept, product and electronic component development resulted in a large number of application-specific digital black boxes operating at incompatible sample rates, number of bits per sample and quantizing ranges. These products were developed to fulfill specific production needs and were designed for analog composite video interconnection compatible with the all-analog composite video production studios.

The composite digital video format constitutes a stepping stone toward the all-digital video teleproduction studio. In North America, there was an initial interest in composite digital videotape recorders. This had to do with the need to replace the obsolescent analog composite videotape recorders with digital videotape recorders featuring analog input/output ports.

Input signal	NTSC
Number of samples per total line	910
Number of samples per active digital line	768
Sampling frequency	$4f_{SC}$ = 14.32818MHz
Sampling structure	Orthogonal
Sampling instant	+33°, +123°, +213°, +303°
Coding	Uniformly quantized
Quantizing resolution	8 or 10 bits per sample

Table 1. Summary of coding parameters for $4f_{SC}$ NTSC composite digital signals

A number of manufacturers developed such products identified as D2 (Sony and Ampex) and D3 (Panasonic) digital videotape recorders. A wide range of compatible composite digital video studio-type production equipment appeared on the market subsequently. The SMPTE 244M standard defines the characteristics of the $4f_{SC}$ NTSC composite digital signals as well as the bit-parallel interconnect characteristics. The digital signal aspects defined by the standard are summarized in Table 1.

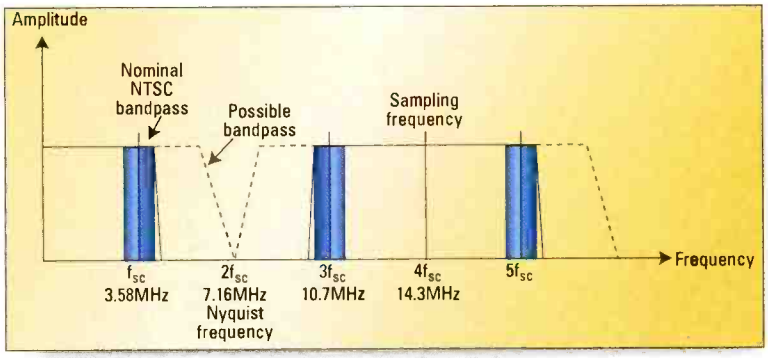

Figure 1. Spectrum of a $4f_{SC}$-sampled NTSC signal

The sampling structure

The sampling frequency is equal to four times the subcarrier frequency or 14.3181MHz (14.32MHz nominal). The sampling clock is derived from the color burst of the analog signal. Figure 1 shows the sampling spectrum of $4f_{SC}$ NTSC.

There is a significant gap between 4.2MHz (the maximum nominal NTSC baseband frequency) and 7.16MHz (the Nyquist frequency). The standard does not specify the characteristics of the anti-aliasing and reconstruction filters. The manufacturer has the choice of developing complex and costly wideband brick-wall ripple-free filters, resulting in an extended frequency response, or moderate-cost 4.2MHz low-pass filters with a gradual roll-off.

As a result, various $4f_{SC}$ products have different analog bandwidths. Note that a digitally generated signal fed directly to a digital $4f_{SC}$ unit will have an equivalent analog bandwidth equal to $f_{SC}/2$ = 7.16MHz. Severe overshoot and ringing of the derived analog composite signal may result unless special precautions are taken to ensure that digital blanking edges

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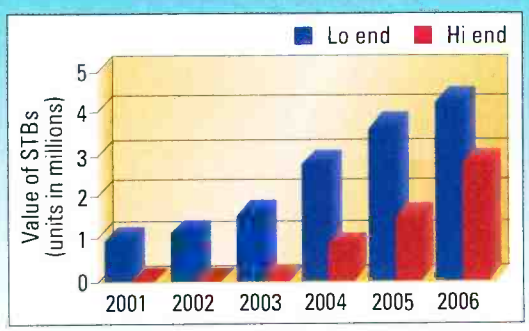

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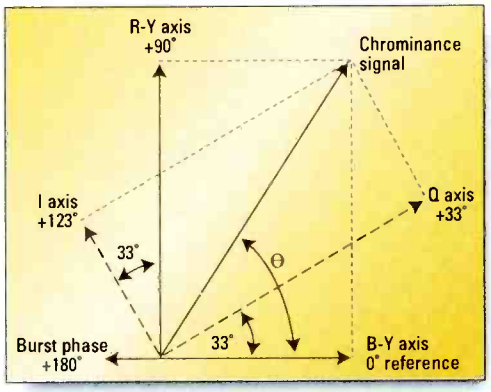

Figure 2. Phase diagram showing the relationship between the chrominance vector projections on the B-Y/R-Y axis system and the I/Q axis system

and rise times, compatible with the analog waveforms, are included as an integral part of the digital signal.

The SMPTE 244M standard was developed with reference to the original NTSC specifications that used I/Q encoding instead of B-Y/R-Y encoding, as is the current practice. Figure 2 shows that any chrominance vector can be represented by I/Q or B-Y/R-Y vectors. The original intent of the NTSC standard was to assign different bandwidths to the I signal (1.2MHz) and to the Q signal (0.6MHz), thus allowing for a better resolution for the orange visual information.

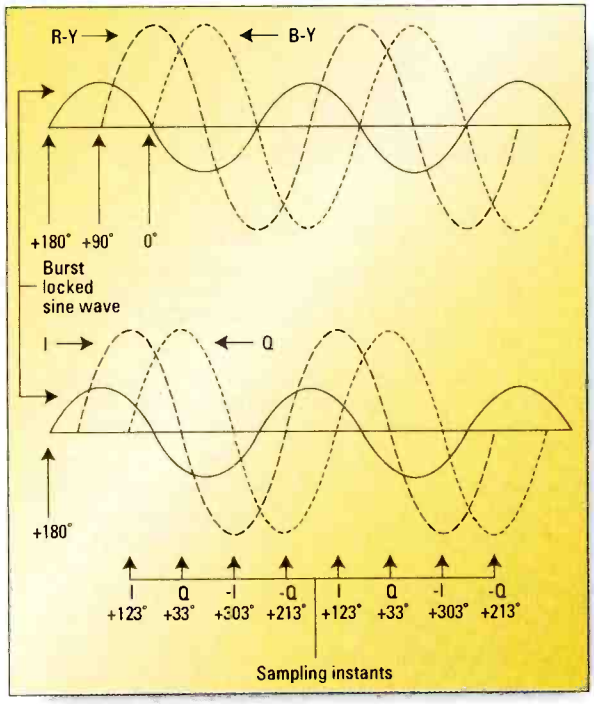

Figure 3. $4f_{sc}$ sampling instants of an NTSC composite analog signal

The I/Q-encoded NTSC signal can be decoded along the I/Q axis, with equal or unequal bandwidths, or the B-Y/R-Y axis with equal (equiband) bandwidths. Because the transmitter video frequency cutoff occurs at 4.2MHz, the wider-bandwidth I signal is transmitted with unequal lower (-1.2MHz) and upper (+0.6MHz) sidebands (vestigial upper sideband), unlike the narrowband Q signal, which is transmitted with equal lower (-0.6MHz) and upper (+0.6MHz) sidebands. Few I/Q decoding monitors and receivers were built because of decoding circuit complications resulting in no visible picture improvements.

As shown in Figure 3, the NTSC $4f_{SC}$ standard requires that the sampling instants coincide with peak positive and negative amplitudes of the I and Q subcarrier components. The upper part of the drawing shows that sampling instants provide an adequate $4f_{SC}$ representation of the B-Y/R-Y information.

Given a sampling frequency f_S = 14.3181MHz (nominally 14.32MHz) and a horizontal scanning frequency f_H = 15734.25 Hz, the number of samples per total line is equal to f_S/f_H = 910. The digital active line accommodates 768 samples (numbered 0 to 767). The remaining 142 samples (numbered 768 to 909) comprise the digital horizontal blanking interval.

Figure 4 depicts the sample numbering for a nominal NTSC signal. The half amplitude point of the leading (falling) edge of the analog horizontal sync signal falls between samples 784 and 785. The first of the 910 samples represents the first sample of the digital active line and is designated sample 0 for the purpose of reference. The 910 samples per line are, therefore, numbered 0 to 909.

Figure 5 on page 26 details the digital horizontal blanking interval, showing the location of some significant samples. Note that unlike component digital video, where the horizontal digital blanking interval is not used — with the exception of two four-word timing reference signals (TRS) — the $4f_{SC}$ digital signal carries horizontal sync and subcarrier burst signals as well. The standard was designed with bit-parallel distribution in mind. Bit-serial signal distribution, as detailed in SMPTE 259M, requires the reorganization of the horizontal and vertical blanking intervals.

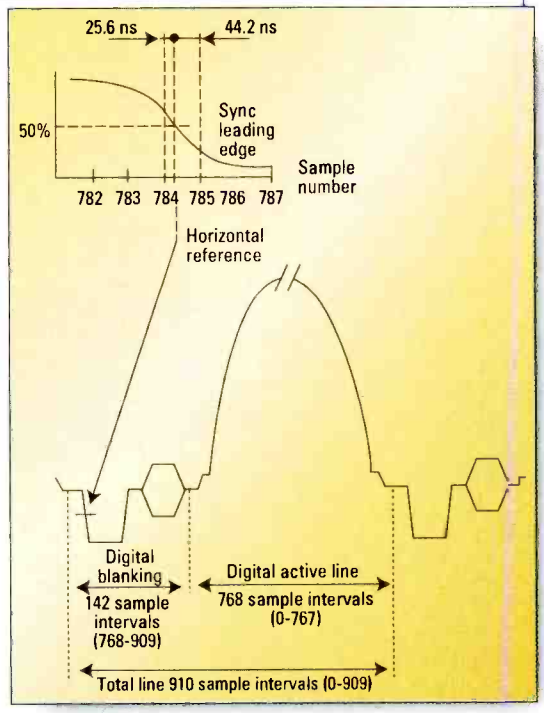

Figure 4. $4f_{sc}$ NTSC sample numbering and horizontal sync relationship

Figure 6 on page 26 shows the location of the added five-word TRS (samples 790 to 794), as required by SMPTE 259M. This leaves space for 55 ancillary data words (samples 795 to 849), which could be used for

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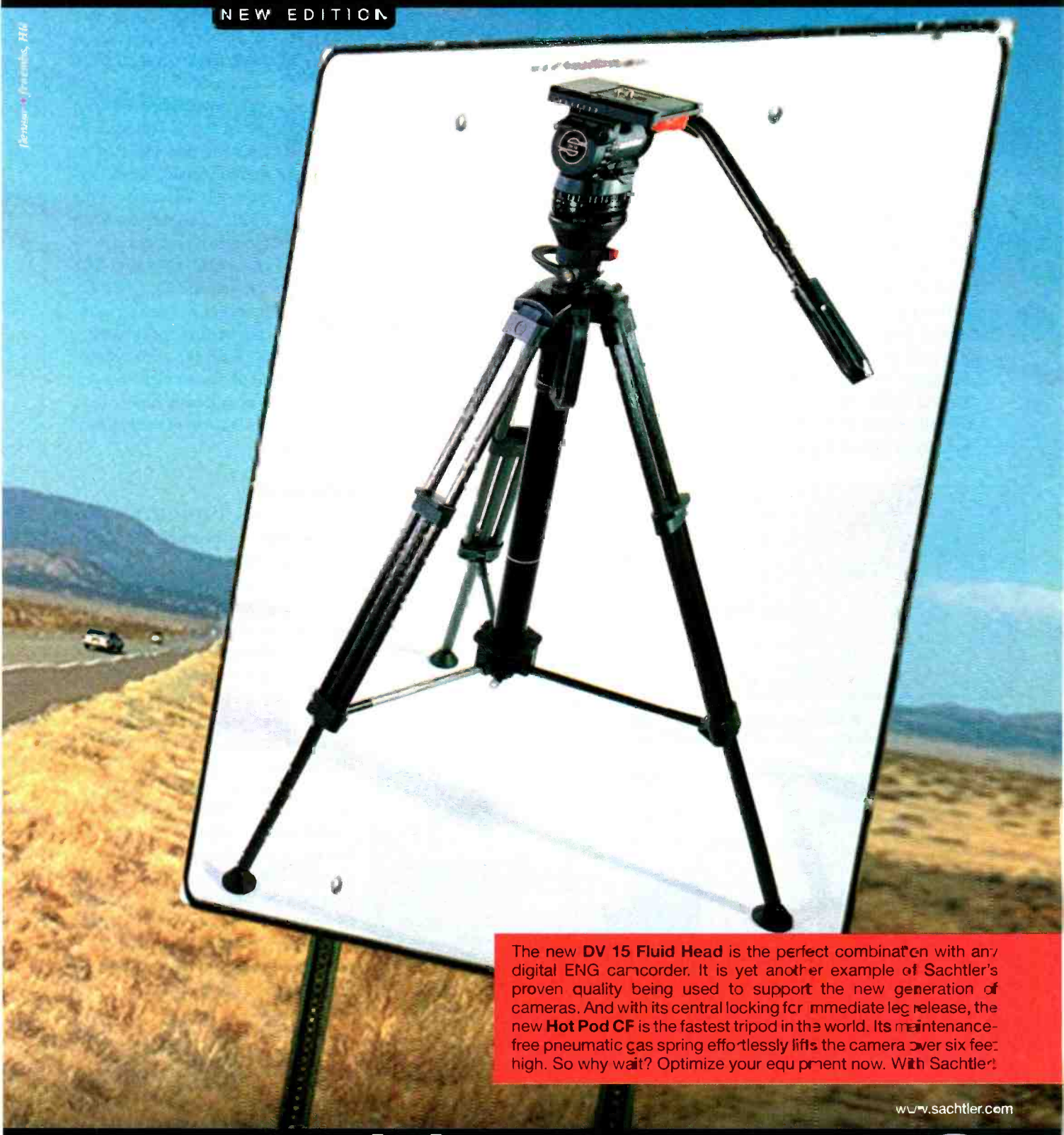

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The quantizing range

Figure 7 shows the relationship between analog NTSC signal levels and eight-bit and 10-bit sample values of a 100/7.5/100/7.5 color bars signal. The 10-bit approach provides for 1024 digital levels (2^{10}) expressed in decimal numbers varying from 000 to 3FF. Digital levels 000, 001, 002 and 003 as well as 3FC, 3FD, 3FE and 3FF, are protected and not permitted in the digital stream. This leaves 1016 digital levels, expressed in decimal numbers varying from four to 1019 or in hexadecimal numbers varying from 004 to 3FB, to represent the video signal.

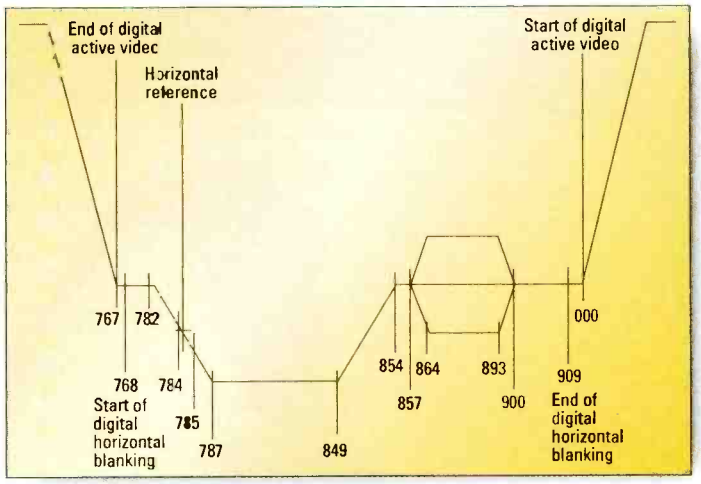

Figure 5. $4f_{sc}$ NTSC digital horizontal blanking interval showing the location of some significant samples

The sync tip is assigned the value 16 decimal or 010 hexadecimal. The highest signal level, corresponding to yellow and cyan, is assigned the value of 972 decimal or 3CC hexadecimal. The standard provides for a small amount of bottom headroom (some call it foot-room), levels four to 16 decimal or 004 to 010 hexadecimal, and top headroom, levels 972 to 1019 decimal or 3CC to 3FB hexadecimal.

The total headroom is on the order of 1dB and allows for mis-adjusted or drifting analog input signal levels. This reduces the S/Q_{RMS} (signal-to-RMS quantizing error) ratio by the same amount. The theoretical S/Q_{RMS} of a $4f_{SC}$ product featuring analog in/out interfaces is 68.10dB for a 10-bit system and 56.06dB for an eight-bit system. This is considerably higher than any composite analog or component analog VTR.

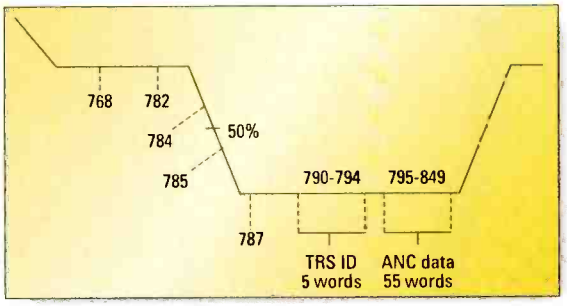

Figure 6. $4f_{sc}$ NTSC horizontal sync period details showing location of TRS-ID and optional ancillary data

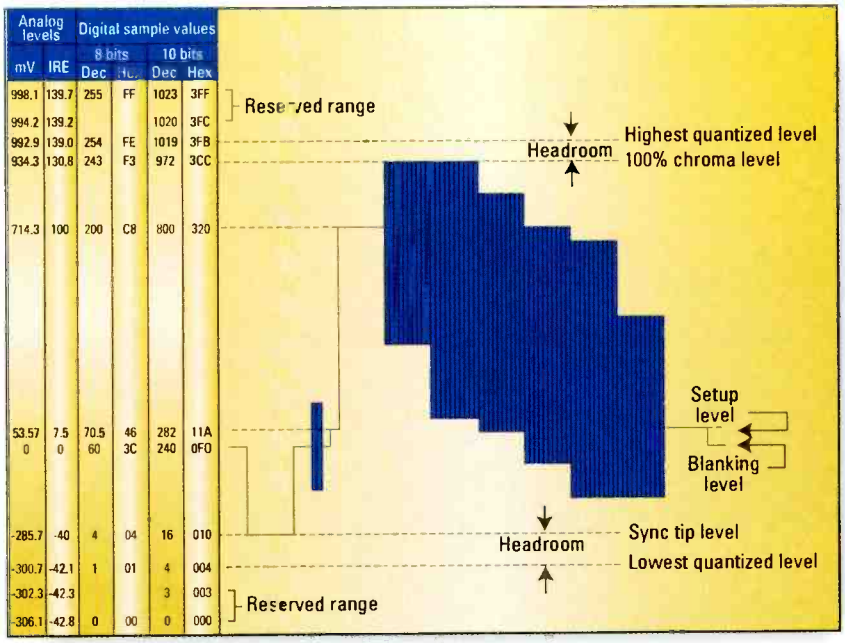

Figure 7. Relationship between analog signal levels and digital sample values

Conclusion

In most cases, D2/D3 VTRs were used as drop-ins in an NTSC analog composite environment. Their performance figures were superior to older analog composite as well as analog component (BETA-CAM) VTRs, especially if parallel or serial digital (143Mb/s) interfaces were used.

The major handicap of composite digital video was the fact that $4f_{SC}$ could not be compressed using highly efficient contemporary transform coding methods typical of MPEG. Consequently, VTRs used a high recorded data bit rate, 127Mb/s, resulting in large videocassettes and no portable camera/VTR gear. The appearance on the market of competitively priced component digital video equipment has tilted the market toward the adoption of component digital video equipment. BE

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

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SAN and NAS:
A practical guide

BY BRAD GILMER

Storage-area networks (SANs) are composed of computers and remote storage devices. The computers are typically connected to the remote storage devices using SCSI over Fibre Channel (see Figure 1). Other implementations of SAN exist, but this is the most common. In a SAN, all the storage appears local, just as if the remote disk were directly connected to the computer and physically located inside the computer chassis.

Network-attached storage (NAS) devices appear to the user as a remote drive letter or are named remote storage device. Typically, the operating system employs a protocol such as Network File System (NFS) or Common Internet File System (CIFS) to discover, log in, and transfer content to and from a storage device. NFS and CIFS both communicate over Ethernet. The user typically enters a username and password, and then is granted access to a particular device.

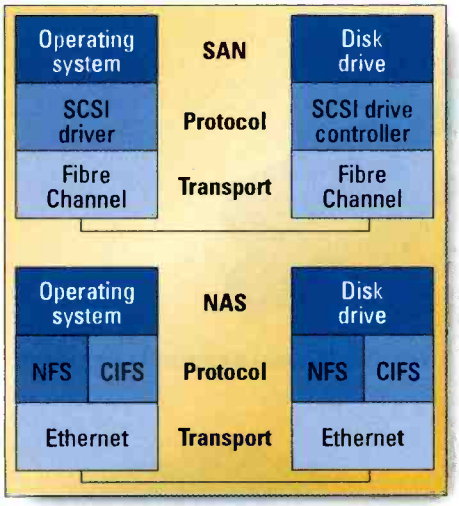


Figure 1. SAN and NAS use different protocols and transports.

The SAN and NAS storage schemes evolved to meet different needs. Some possible benefits of SAN include access to large amounts of data; sharing data among different applications on different computers; real-time or near-real-time access to data updates; legacy support for SCSI devices; fast speeds; and avoidance of network congestion common with Ethernet.

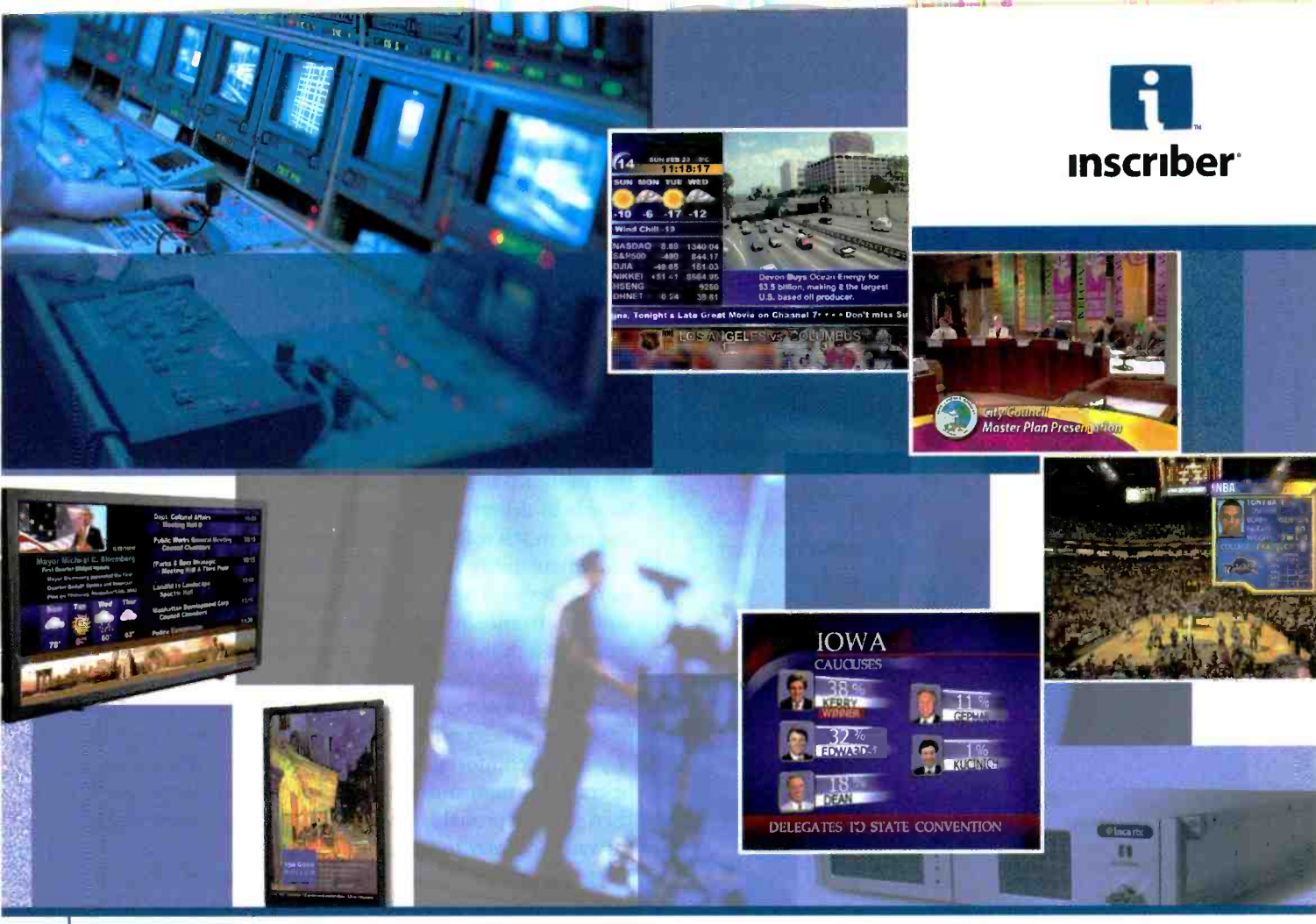
Possible benefits of NAS include relatively simple user configuration; compatibility with existing username/password access systems; compatibility with legacy networking and server-sharing systems.

In many cases, either scheme can now meet all these needs. But, in earlier implementations, the distinction between SAN and NAS was useful.

For initial installation and configuration, SAN usually requires some specialized knowledge of network hardware, such as how to install the appropriate SCSI drivers and Fibre Channel card. You should also know how to configure your Fibre Channel network properly. Once the installation and configuration are complete, access, administration and authentication are all handled in the background. Access to the knowledge needed to build a SAN system is usually not a problem given that most SAN installations are part of a larger system involving a vendor that can assist in the initial setup.

NAS typically does not require specialized hardware knowledge, although familiarity with Ethernet is a plus. However, for a system administrator, getting all the users' computers to recognize a NAS through different operating systems and different versions of the same operating system can be a real challenge. Installing a NAS can be as simple as unpacking the device, plugging it in and attaching a network cable. Vendors have done an excellent job of programming these devices so that when they first power up, they recognize their operating environment and do a large amount of configuration themselves. Ninety-five percent of the time these devices work straight out of the box. That said, with a moderately complex network you should expect some challenges. Networks that could cause problems include ones that use manually assigned IP addresses, have internal firewalls, or implement complex routing based upon different protocols. For a more complex network, you might be better off purchasing a higher-end NAS system from a well-known manufacturer. It will probably provide a "smarter" NAS box that is more likely to work in your environment. In addition, such systems typically come with better product support. With a complicated network, you may need it.

Be particularly aware of where you plug the NAS system into the network. While you can plug a NAS box into any Ethernet connection, it is not wise to do so. The NAS should be connected at a point in the network you are sure will have sufficient bandwidth to support the traffic the NAS will generate. Example: If you connect the NAS box to a $78, 10-port Ethernet switch, it may not work very well (see Table 1 on page 30). Low-cost Ethernet switches do not have sufficient backbone capacity to provide full bandwidth to all ports at the same time. A 100Base-T Ethernet switch might have a throughput of only 200Mb/s. Once you subtract the overhead, the actual available throughput is somewhere around 130Mb/s. If the load is shared among the 10 ports, each port has only about 13Mb/s available. NAS performance will suffer if it is limited to 13Mb/s. On the other hand, if



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Type of connection	Total backbone bandwidth	Average bandwidth per port
10-port, 100Base-T Ethernet switch	200Mb/s	13Mb/s
Nonblocking 10-port 100Base-T Ethernet switch	1Gb/s	70Mb/s

Table 1. Connecting a NAS server to an inexpensive Ethernet switch may severely limit its performance.

you connect the NAS device to a nonblocking Ethernet switch, which can deliver 100Mb/s (70Mbit/s after subtracting overhead) to all ports simultaneously, then the NAS will be able to deliver data at its maximum performance limit, and the switch will not limit the speed.

Maintainability is a key factor in selecting any shared storage device. The choice between SAN and NAS is a matter of preference. As a general rule, you maintain SAN systems through the SAN device's operating system. Maintenance tools tend to be powerful and reasonably well documented, but may be command-line-based. Some SAN vendors have developed nice GUI-based maintenance tools. If you are comfortable with the command line of your operating system and don't mind getting under the hood, then you will probably find that SAN systems are straightforward and easy to maintain.

Typically, you maintain NAS systems through a Web interface. NAS systems tend to be relatively simple to maintain unless you are using them on a complex network. While NAS maintenance interfaces are generally complete, occasionally I have found that there were things I could do on a SAN that I could not do on a NAS. So the ultimate choice is yours. SAN and NAS have both matured significantly over the past few years. Both provide users with a way to access and share content, but the two use fundamentally different approaches to facilitating access to shared storage.

Many excellent tutorials are available on SAN and NAS. Just do an Internet search on "SAN or NAS tutorial." If you need information on their implementation, search for "SAN or NAS how to." These articles give practical information on installing and configuring these devices. BE

Brad Gilmer is executive director of the AAF Association and the Video Services Forum. He is also editor in chief of the "File Interchange Handbook."

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Audio consoles

BY GARY ESKOW

Manufacturers of broadcast consoles are helping engineers who need to simultaneously deliver 5.1 and stereo audio by incorporating fold-down capability, single fader control of multiple audio channels and increased monitoring into new boards.

Both the Wheatstone D-9 (top) and Solid State Logic C100 5.1 feature metering and panning as part of their surround package.

Solid State Logic's (SSL) C100 digital broadcast console incorporates monitoring-insert features that help the engineer keep track of how audio will be received in home environments that are equipped with multichannel, stereo and mono playback systems. In an ideal world — the one that music engineers often get to live in — time is allocated to the creation of separate stereo and 5.1 mixes, but this is obviously impossible in live work. The down-mixing monitoring capabilities of the C100, which allow for instant switching between the two, offer a working compromise.

Wheatstone's D-5.1 and D-9 boards also offer automatic 5.1 to stereo down-mixing, as does the Euphonix System 5 console. Many of the new features on Calrec's Alpha, Sigma and Zeta 100 consoles that were shown at NAB have been custom-designed for NBC, which will use two Alpha and two Zeta boards in their broadcasts of the 2004 Olympic Games in Athens, Greece. All Calrec consoles incorporate both stereo and mono down-mixing capabilities.

Keeping track of six channels of audio can be difficult in real-time applications, and having the ability to control the volume of all channels from a single fader can be critically important. Since its launch in 2003, the SSL C100 console has incorporated this feature. The C100 also lets the engineer break out and rebalance the channels that contribute to the LCRSSSu mix with a single button push. All Wheatstone boards have a similar capability, and the engineer can define all sources as either mono, stereo or 5.1 in origin.

AMS Neve digital consoles have had the ability to control multiple input and output channels from a single fader for several years. But Neve believes that many broadcast applications will remain two-channel for the years to come. It says forcing 5.1 technology onto these customers would be unreasonable.

Calrec's market includes few users who are broadcasting in 5.1 at this time. However, the company recognizes that some of its base will require this functionality in the near future, particularly those broadcasting sporting events. Essentially 5.1-capable by design, Calrec will be introducing 5.1 fold-down channels later in 2004, and this functionality will be available to all existing users as an upgrade.

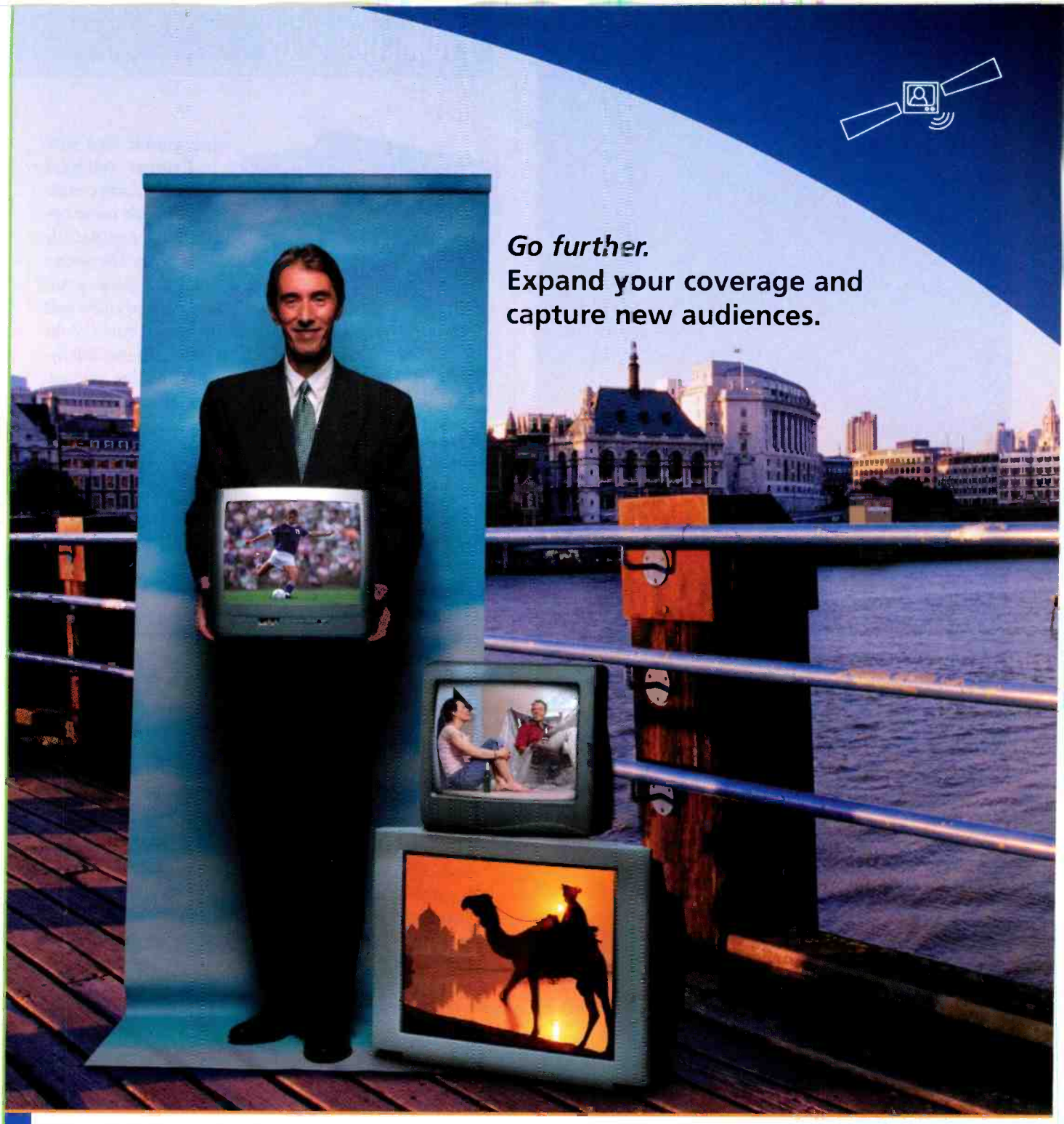
All Calrec consoles incorporate both stereo and mono down-mixing capabilities. Shown here is the Calrec Alpha 100.

Multichannel metering is also becoming increasingly important as 5.1 broadcasts gain in popularity, and all of the manufacturers we spoke to are including this capability in their consoles. Neve is moving to a more simplistic method of signal routing, and its boards now offer graphical representations to make it easier to keep track of multiple audio channels.

Both the Wheatstone D-5.1 and D-9 have dedicated 5.1 buses, 5.1 metering and 5.1 panning, and both boards feature 5.1 panning displays. SSL's C100 also features 5.1 metering and panning as part of its surround package. Calrec's bar graph metering provides surround metering to its customers, who can also purchase third-party jellyfish displays from outside vendors, such as DK-Audio and RTW.

Networking multiple control surfaces together is becoming a more prominent aspect of broadcast work. Longer runs — once looked upon with great suspicion — are proving reliable, allowing live boards to communicate with multiple on-premise audio post rooms.

Euphonix recently announced the release of two different models of its System 5 broadcast console. The System 5-B now includes the same bus structure and features as the Max Air, supporting 96 channels, 24 mix buses, 24 groups/clean feeds and 16 IFB/aux sends from a single DSP Core. The new 2004 System 5-B also includes an N-1



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The System 5-B from Euphonix includes an N-1 mix-minus feed with individual talkback from each strip, making the console and Max Air much more operationally compatible.

mix-minus feed with individual talkback from each strip, making it much more operationally compatible with the Max Air. The System 5-BP is targeted at stations that require both on-air and audio post capabilities in the same console, so the system includes full dynamic mixing automation and support for more than 300 audio channels.

Wheatstone's D-5.1 and D-9 surfaces also can be networked together, with multiple boards sharing both input and output resources. Console manufacturers have come to understand the need for flexibility in routing and busing architecture. The D-5.1 and D-9 boards can, for example, operate independently and interoperate for larger productions, with output buses of one control surface appearing as input sources to the other control surface.

AMS Neve consoles use a computer — the Encore PC — to manage and store console configuration and automation data. Console settings can be transferred across a network to and from other consoles or to a PC for offline management, and surface configurations and automation settings can be created or adjusted offline.

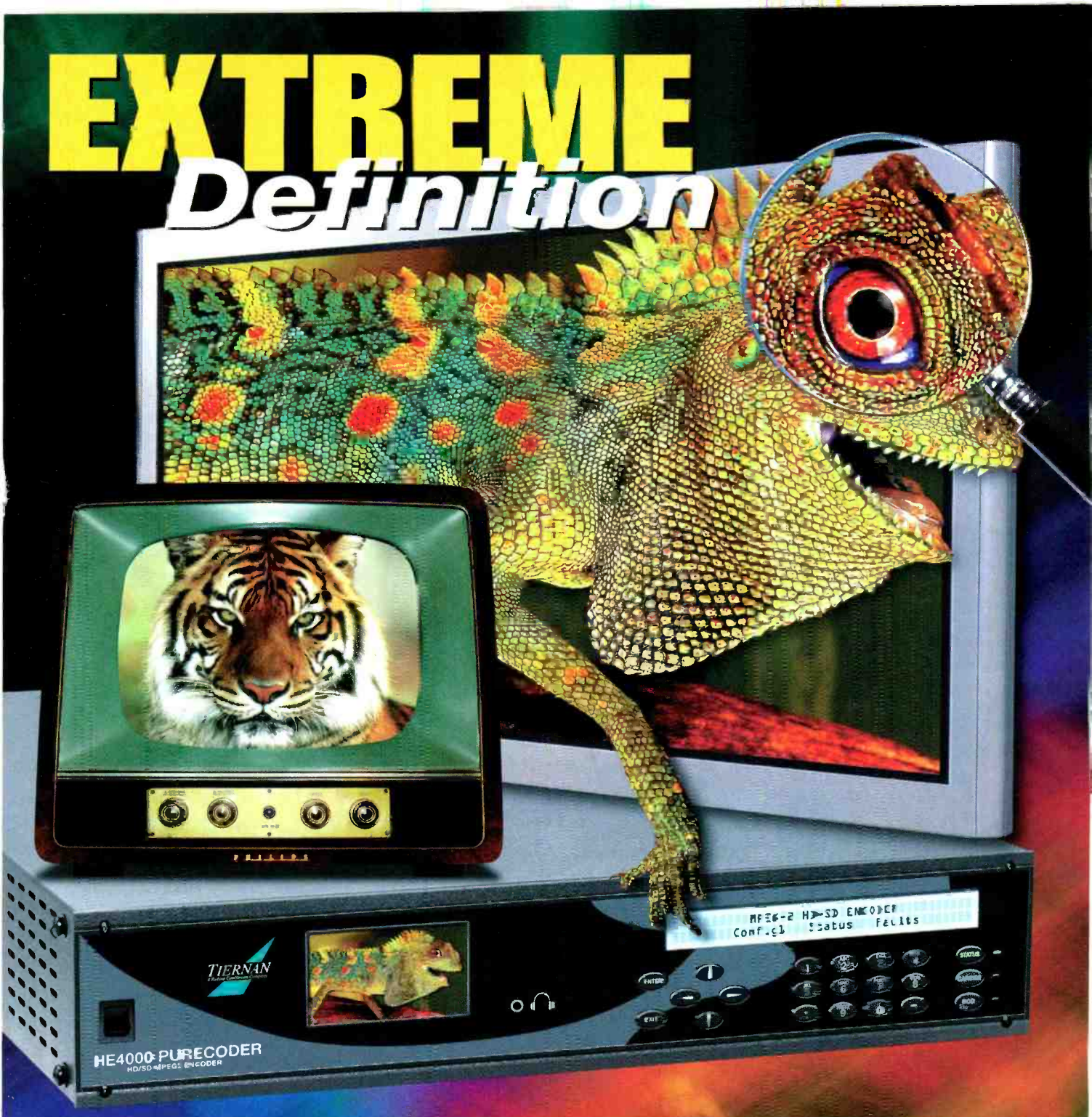
Neve extends its networking capabilities by the use of its modular I/O system (MIOS), which introduces bidirectional communication to Neve systems. Remote control mic amps in multiple studios can be routed between consoles on demand. Cable runs of up to two kilometers are now routine, allowing physically removed studios to be networked on demand. MIOS circuits are based on Neve's classic mic pre, and signals may be passed at resolutions up to 24-bit and 96kHz.

SSL also sees the inevitable move into wider plant routing schemes. The development of router protocol integration into both the C100 and C200 is evidence of the company's belief that broadcast applications will require this kind of interoperability.

Calrec's new Hydra audio network lets users gang mic pre-amp and I/O resources throughout their range of digital consoles. Hydra is built on Gigabit Ethernet technology to provide a high bandwidth. Connections can be made with fiber (MTRJ) or copper (RJ45). The connection between the digital I/O rack and the Gigabit Interface Unit allows up to 128 bidirectional channels. BE

Gary Eskow is a composer and journalist who lives in New Jersey. He has held a number of editorial positions in the field of audio journalism and is currently a contributing editor at Mix *magazine.*

EXTREME Definition



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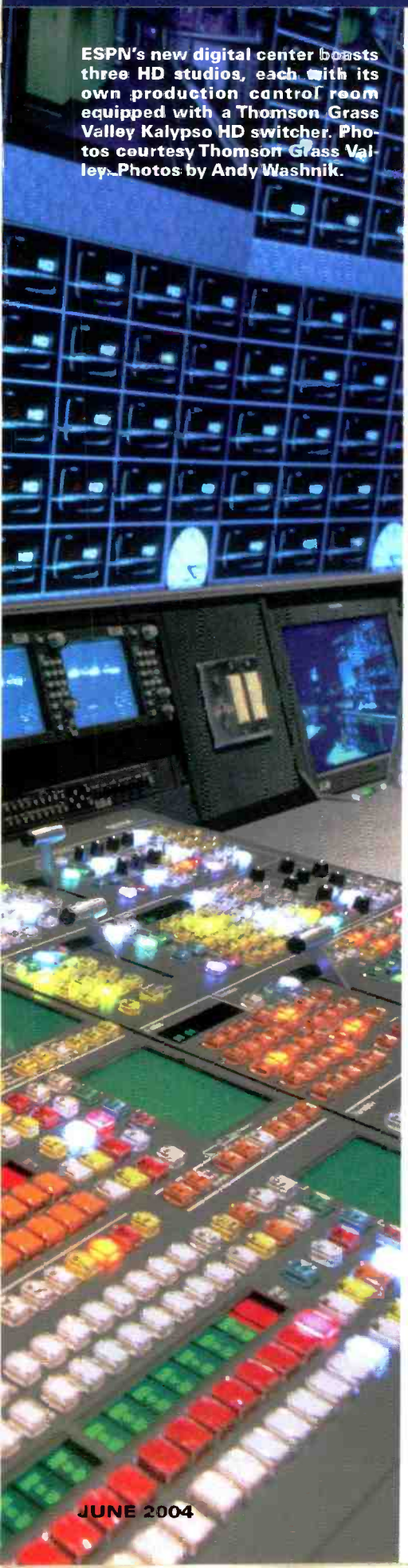

ESPN's new digital center boasts three HD studios, each with its own production control room equipped with a Thomson Grass Valley Kalypso HD switcher. Photos courtesy Thomson Grass Valley. Photos by Andy Washnik.

ESPN's "SportsCenter" begins HD production

By Michael Grotticelli

The June 7 premiere of ESPN's "SportsCenter" in pristine widescreen HD with multichannel AES audio was made possible by a new signal distribution infrastructure and a comprehensive collection of multiformat broadcast equipment. The telecast was also the first step in an operational move to a new digital center. The 120,000-square-foot, all-digital HD facility is located in Bristol, CT, directly behind the network's existing production and post-production headquarters. Not only is the new HD version of "SportsCenter" originating from the new building, most of ESPN's HDTV operations will be moved to the digital center in January 2005.

Most of ESPN's HDTV operations will be moved to the digital center in January 2005.

A Thomson Grass Valley Trinix digital routing switcher lets ESPN frame-accurately switch a large number of crosspoints simultaneously.

Signal distribution

To manage the network's production workflow, the project design team combined multiple racks of Grass Valley Trinix routing switchers from Thomson (configured as a 1024x512 I/O matrix for HD video signals), with a similarly dense Grass Valley Apex router to handle all incoming audio sources. The Trinix router can handle both SD and HD video signals in the same frame, and allows the network to execute frame-accurate, on-demand switching on a large number of crosspoints simultaneously. Router control is handled by an Encore facility control system from Thomson.

All of the routing switchers are monitored and controlled via SNMP, as well as HTTP, for Web-based content. This support allows a routing switcher's status to be checked by remote. To support its signal distribution paths, ESPN installed Miranda Densité control probes and several hundred Grass Valley Kameleon 16-channel output DAs. These route digital audio and video signals to the Trinix and Apex routers and throughout the building.

Moving content from tape to servers

In the new digital center, each of six equipment rooms and seven production control rooms operate independently, although they're completely networked together, should engineers

need to combine resources.

The digital center's massive signal routing architecture supports 19 nonlinear edit rooms, four master control suites (with expansion to 10 planned), and a large sports-content ingest screening facility. Signal paths can also be changed quickly to accommodate new channels and future internal growth.

The Grass Valley Encore facility control system from Thomson features tight integration with automation and UM systems.

The ingest area of the existing facility employed 32 PC workstations to log more than 220 hours of game footage, and record, individually screen and archive it to Betacam videotape each day. In the new building, this process is handled by 50 ingest workstations and about 35 VTRs networked to a series of nonlinear editing systems and video servers with several terabytes of storage.

Editing, file sharing and playback is handled by networked systems from BBC Technology (Colledia) and Quantel (generationQ). The Colledia software has a built-in application for screening the daily incoming video and was developed for ESPN to help quickly identify and retrieve clips. This has dramatically streamlined the video workflow and asset management at the network (in both the old and new buildings) by fostering collaboration between production departments and individual employees.

The new digital center also features a large complement of Quantel editing and server equipment. When it's completed, there will be 19 QEdit Pro (five more will be in the old building) and eQ systems tied to 68 sQ servers to move data on and off the SAN, which currently has a storage capacity of more than 360TB.

A series of SeaChange International broadcast servers serves as a set of proxy SANs that can be accessed anywhere in the building and from outside the facility with a security code.

System redundancy is handled by effectively running two independent power sources to each key device in the building.

Master control

The design team is still evaluating systems, but has installed automation systems from Pro-Bel to handle the initial load and is considering several IBIS master control switchers. Signals are routed through this area, where logos and channel bugs are inserted into the transport stream before going to air.

HD studio production

The second major goal for the facility was to provide the network with more studio space. The digital center boasts three HD studios (9000, 5000 and 3400 square feet) that will be home to all Bristol-based studio shows, beginning with "SportsCenter." To shoot in its preferred digital format, widescreen 720p, ESPN will use 16 Grass Valley LDK 6000 mk II multiformat cameras. Evertz transmitters and receivers and SumiTomo multimode fiber gear interconnect the seven studios via 1000 fiber-optic circuits.

Each studio has its own production control room equipped with a Grass Valley Kalypso. A set of Calrec Alpha

The Grass Valley Apex router from Thomson offers a high-density matrix for large-scale infrastructures.

Design team

ESPN:
- Bill Lamb, VP, systems engineering
- Kevin Stolworthy, VP, production ops
- Jim Servies, VP, tech. planning
- Jackie Bracco, VP, facilities planning/ops
- Ted Szypulski, dir., engineering special projects
- Mitch Rymanowski, sr. coordinating dir., production ops
- Rob Hunter, dir., new media tech
- Robert "Biff" Longfield, mgr., planning/construction
- John Cistulli, mgr., plant engineering

Architects:
- HLW International
- Facilities Engineering Associates

System integrators:
- National TeleConsultants (NTC)
- Doyle Technology Consultants
- The Systems Group

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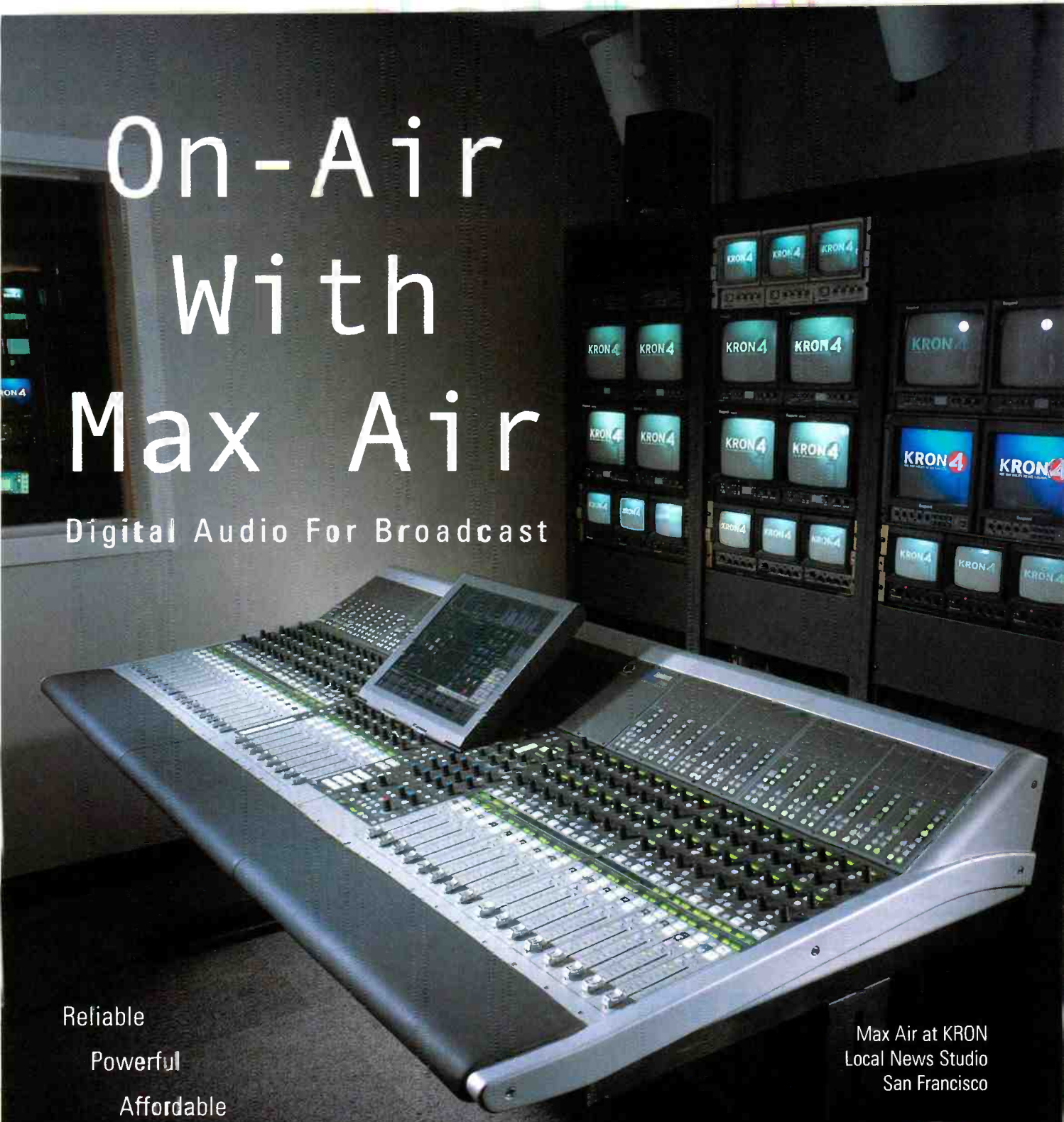
Digital Audio For Broadcast



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100 and Sigma 100 consoles outfit each audio room, connected to an ENCO audio clip server, while an RTS/Telex ADAM intercom system ties all of the operational seats together from a communication perspective. Pro-Bel and Miranda supplied the master control switchers and automated playout devices (for lower-third crawls).

Thomson's Grass Valley LDK 6000 mk II Worldcam camera system captures progressive HD images natively, in multiple formats and frame rates.

At the center of it all

As the network continues to expand its reach throughout the world, the digital facility will remain at the center of it all. BE

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

Equipment list

- Thomson Grass Valley
  - NewsEdit edit systems
  - Kalypso HD video production center
  - Trinix and Apex routing switchers
  - Kameleon DAs
- Quantel
  - sQ servers
  - eQ and Qedit Pro editors
- BBC Technology Colledia for sports
- Evertz
  - MVP display processors
  - fiber-optic gear
- Christie Digital
  - GraphXMASTER CS70 70-inch rear display cubes
  - FP40 40-inch LCD flat-panel displays
- Calrec Sigma 100 and Alpha 100 audio consoles
- RTS/Telex ADAM intercom system
- Stagetec MADI microphone distribution system
- SeaChange broadcast servers
- IBIS
  - ServerLoad
  - SportServerPlay
- Pro-Bel
  - Master control switchers
  - Automation systems

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Digital STLs

BY DON MARKLEY

Let's look at the problem of getting the signal from the studio to the transmitter. Like most things in television, it sounds like a simple, little task. It isn't.

Join the band

Most stations prefer to use the 7GHz auxiliary broadcast band for the STL. These paths are less fussy than those at 12GHz or higher, because the equipment is a bit easier to troubleshoot and dish alignment is simple. Also, the channels in that band are nice, big 25MHz channels. So manufacturers have designed sytems to squeeze both the analog and digital television signals into one microwave channel, along with data, with mixed results.

The system *du jour* is a 16QAM system with an 8-VSB modulator. This appears to provide the most dependable service. The digital side of these systems transports the ATSC 19.39Mb/s datastream along with at least a T1, two RS-232 channels and some additional logic circuits. The analog side provides a channel for standard video with several FM audio subcarriers.

Separate and unequal

The scheme usually includes separate power supplies and amplifiers for the two channels. At some future date, when analog video goes away, the facility can change that channel to a second digital channel with just the purchase of a bunch of electronics. Sounds good. And it is — for the most part.

There is a large school of thought that recommends using a separate link — completely separate transmitters and receivers — for analog and digital signals. Separate antennas can avoid a lot of loss in the combining/splitting/filtering system, resulting in a better fade margin for the same antenna size. Equipment for that simpler function is readily available for those locations where its use is feasible. Where band occupancy won't allow such single-channel equipment, the dual systems may be necessary.

Togetherness

Another scheme is to combine all the signals, NTSC, ATSC, logic, audio, etc. into one big digital datastream, then use one of the big digital-microwave systems to carry the signal to the transmitter site. There, the signals are decoded as necessary to feed the separate transmitters. It works, but it is a bit expensive. And it's certainly too complex for most station staff members. So, back to the simpler world of broadcast STL systems.

There is a large school of thought that recommends using a separate link for analog and digital signals.

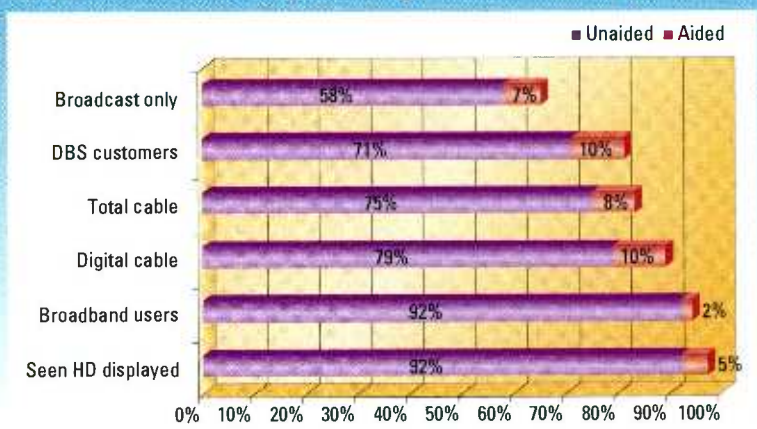
Using a combined system isn't necessarily bad, as long as you do the right calculations. First, base the numbers for transmitter power output and receiver threshold on the actual input/output connectors of the equipment, not on the whole system. When joining the two systems into a common antenna, the dual-stream system adds loss in a combiner. There is another loss at the receiving end when the signal splits for the two receivers. If hot standby is involved, split the signals again at the receive site. You have to include those losses in the overall path loss or the fade margin isn't going to be what you expected.

FRAME GRAB

A look at the consumer side of DTV

Total HDTV awareness by viewer type

HDTV awareness is high among broadband users



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loss or the fade margin isn't going to be what you expected.

Drive a hard bargain

This is a new technology and, as with most new technologies, it has its share of problems. So, when purchasing such equipment, be a tough negotiator. First, don't pay that last payment until the system is operating — properly. And the warranty shouldn't start until then, either. The manufacturer might not prefer such terms, but they will deal.

Reliability

When calculating the reliability of the system, the old numbers still apply. A good reliability rate would still be 99.999 percent (the classic five nines) for an STL system. A design fade margin of 40dB is still desirable.

A good reliability rate would still be 99.999 percent (the classic five nines) for an STL system.

The output power is somewhat lower for the digital systems. It's basically the same power amplifier, but the tuning is a bit different. Actually, the amplifiers must have a wider flat bandwidth for the digital signal. If the bandwidth goes up, the overall gain will usually go down (remember the old gain-bandwidth product?). At the same time, the receiver sensitivity is not quite as good as analog systems (again, the same bandwidth considerations). The result of all these issues is that the path loss should be a bit less than for a simple analog system. Usually, you can accomplish this by increasing the dish size, if possible. If all else fails, space diversity may be necessary. That can pick up several dB, resulting in the desired fade margin.

The short version

In short, the technology here is a bit different, as are all things digital. Some of the early channel-sharing systems were terrible. But that seems to be straightened out. Still, watch your back when dealing with any of these systems. A good fade margin with high reliability is still a must, whether you're dealing with analog or digital signals. BE

WTVP/WTVP-DT Peoria, IL uses a combined STL system for the NTSC and DTV signals. The hot standby system employs two MRC Twinstream radios. Photo courtesy D.L. Markley & Associates.

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

Send questions and comments to: don_markley@primediabusiness.com

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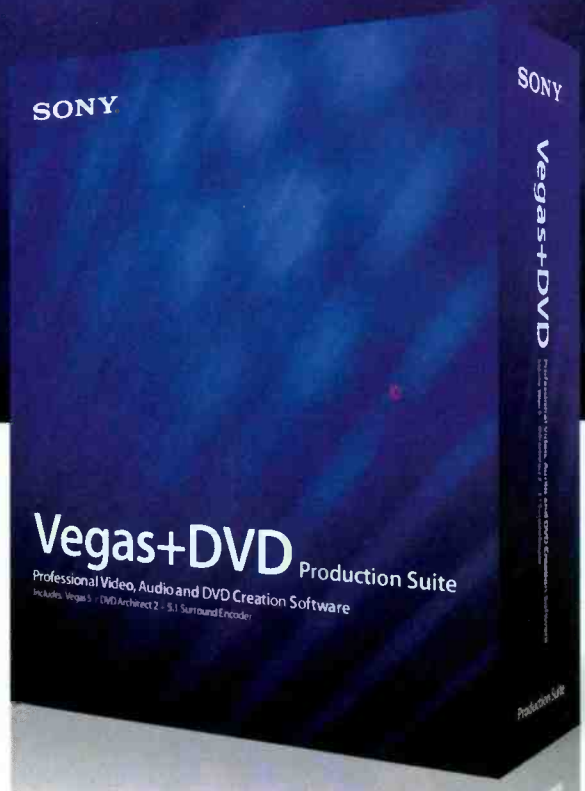

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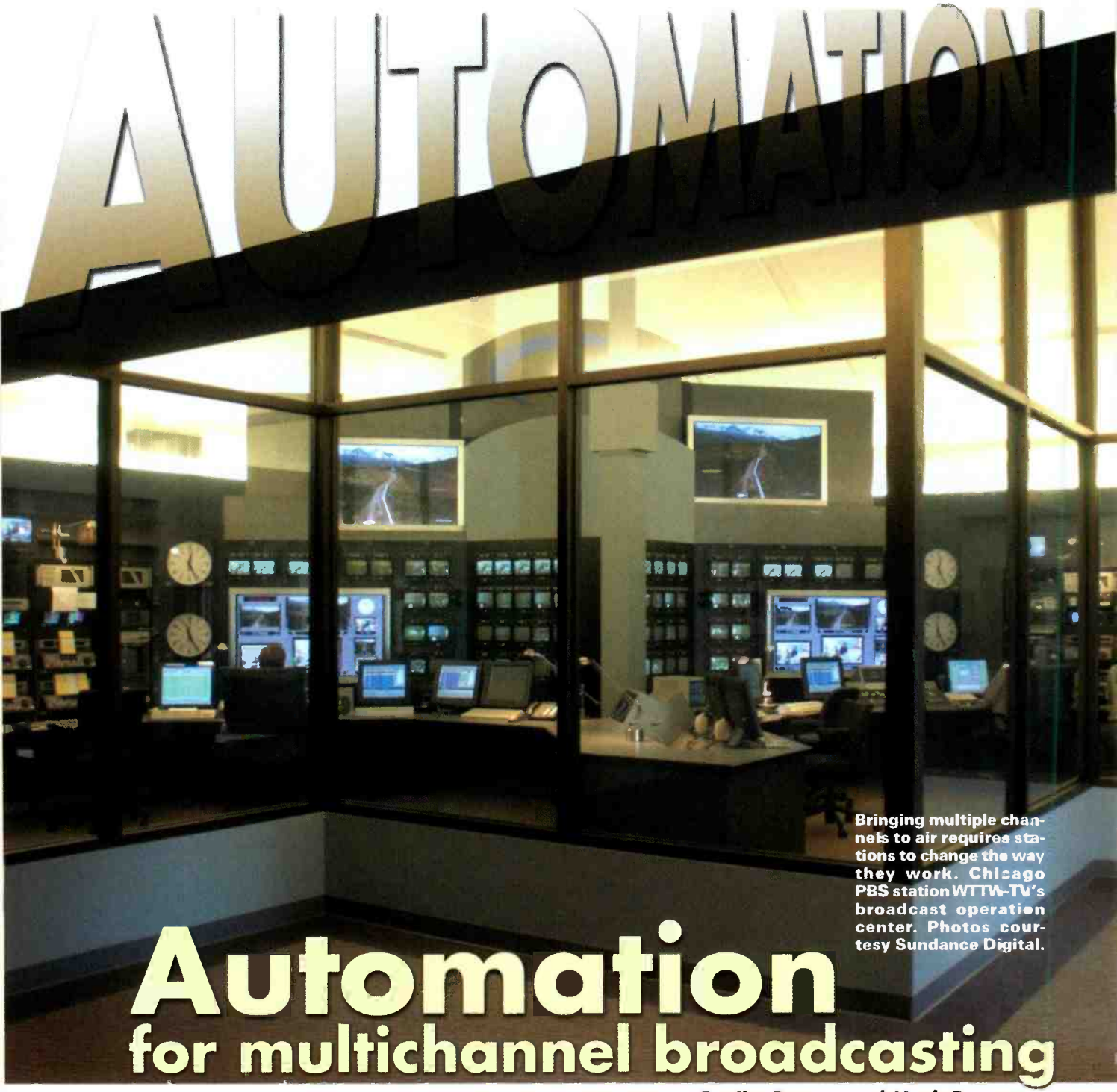

Bringing multiple channels to air requires stations to change the way they work. Chicago PBS station WTTW-TV's broadcast operation center. Photos courtesy Sundance Digital.

Automation for multichannel broadcasting

By Jim Boston and Mark Brown

A new broadcast facility should, in theory, be engineered and implemented based on a business plan and capital budget passed down from upper management. The problem today is that no solid future business plan exists for most broadcasters. The current broadcast business environment is unsustainable over the long haul — new revenue streams will be a necessity. It is becoming evident that stations will need to produce multiple real-time and non-real-time program streams.

If multichannel is the future, then the way business is conducted must change. The requirements for multichannel operations are radically different than those for traditional single-service operations. The challenge is to support the additional services with the same number and level of personnel. Current automated operations are typically governed by plant workflow and organized by a software layer presiding over hardware functions. Automation has evolved along the same timeline as digital video, starting with separate stand-alone islands and grow-

If multichannel is the future, then the way business is conducted must change.

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ing into a contiguous control layer. Media are increasingly being treated as object modules by client applications that control, manage and use data. Drilling down to basics, automation aggregates all scheduling information for allocated resources and ensures that media and associated metadata are available when and where they are needed. The basic automation applications include ingest, conforming, media management, playout and, potentially, archiving. Automation systems will need to be able to handle these functions for more services in the future, while decreasing the ratio of operators to program channels.

Automation must be flexible enough to migrate to new business models as they evolve. It must also manage essence and its associated metadata, as well as track rights management across multiple outlets.

Automation must be flexible enough to migrate to new business models as they evolve.

Multichannel applications

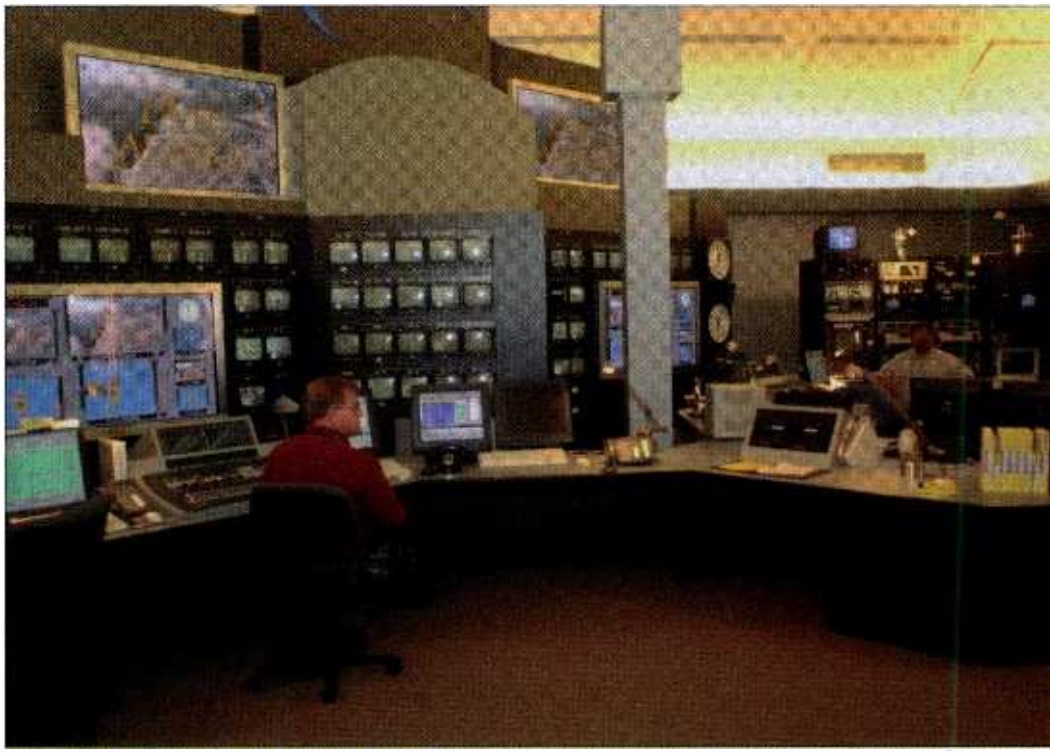
It's quite possible that, in the future, workflow will be geared for content management, rather than program-channel management, as is the case today. Most broadcasters will likely continue to use one real-time stream to carry live and network-pass-through content. Other content will increasingly be configured as files that are played out under automation control with little human intervention (aside from the creation of policies). The most talked-about repurposing of content today is an automated newsreel. A number of vendors are now offering applications that will build and play out a secondary news channel with little care and feeding by humans. Hopefully, creative broadcasters will discover other programming opportunities for DTV's additional channels, as most markets won't support multiple local newsreels.

Multichannel automation's ability to push tasks farther from traditional operating positions also makes it possible to share labor across multiple facilities. Stations in different markets airing the same programming don't each need to conform the show. Media can be delivered to each station by distribution groups such as Pathfire or DG Systems, or by a broadcaster's own distribution system. Each station can then add its own metadata, and programming will be ready for playout without additional media preparation.

Workflow changes

Multichannel presents a considerable change in what operators do and the tools they require. Operators in an automated multichannel environment tend to react to systemic problems and faults, rather than actively switching between sources. In multichannel operations, they need to react to alarms and problems in one program log that may ripple across to other logs. In fact, monitoring the health of multiple programs can consume a fair amount of the operator's time. Bringing more channels online reduces the ratio of operators to channels, thus lowering the cost of additional service deployment.

Application processes controlling the hardware in a multichannel environment need to be more collaborative and cohesive. Automation, typically driven by traffic, must control ATSC encoder/muxing elements to change their service profiles. Also, multiple traffic logs and dynamic PSIP tables must be kept in coordi-



WTTW uses a Sundance Digital FastBreak Automation system to bring multiple channels to air. Broadcast operations techicians Dennis Raymond and Barry Blue in the station's BOC.

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ONLY THE AZDEN 1000 SERIES UHF RECEIVER IS DESIGNED AS AN INTEGRATED PACKAGE!

The Azden 1000 Receiver can be purchased integrated into the Anton Bauer® "Gold Mount" (1000URX/AB), or the IDX "V" Mount (1000UDX/VM) for use with any V-Mount battery system, for easy and secure mounting to your camera. Designed specifically for broadcast ENG, the 1000 is a true diversity system with 2 complete front ends, and offers 121 user-selectable UHF channels in the 723-735MHz range.

Here's what Buck McNeely, of the TV Show *"THE OUTDOORSMAN WITH BUCK MCNEELY"* has to say about the 1000:

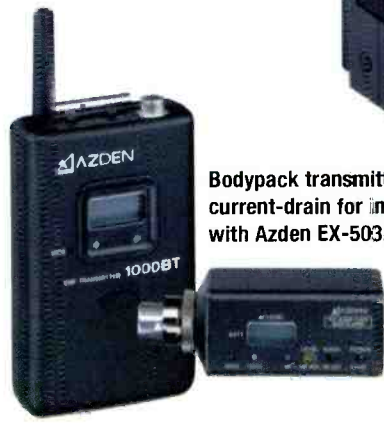
"My choice of wireless microphones is the AZDEN 1000 series. I can mount up to 2 receivers in line between the camera body and the battery on the gold mount adapter and it's powered by the attached battery with little noticeable extra drain. We have hundreds of channel options and appreciate the clear reception and range these Azden units deliver."

Craig Caples of Caples Productions in Las Vegas says

"When shooting at the LasVegas Motor Speedway and televising UNLV games at Sam Boyd Stadium we use the Azden 1000 series, the Anton Bauer® unit and both the 1000BT beltpack and 1000XT plug-in transmitter. We've used it for about 2 years in almost every condition and environment, getting a strong clear signal, without any problems, including on the ski slopes of Utah. Caples Productions is proud to use Azden."

Azden has been selected by both Ikegami and Panasonic for their "Slot-In" cameras (model 1000URX-Si).

For complete features and specifications visit our website: www.azdencorp.com.



Bodypack transmitter (1000BT) with reduced current-drain for improved battery life, is available with Azden EX-503H, Sony ECM-44H.

Plug-in XLR transmitter (1000XT) works with dynamic mics.

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nation so that programming matches the PSIP information. This coordination can become cumbersome with certain types of live programming, such as sporting events that don't run their scheduled length.

Middleware

Automation control is spreading as more hardware is brought under its umbrella — facilitated by an increasing amount of middleware. Automation systems have long relied on middleware to implement SQL protocol for database access, remote procedure calls via CORBA, and Microsoft's COM technologies through ActiveX controls for application collaboration and client/server processes. Now, technologies such as Microsoft's .NET are enabling Web services to become tools in the control and operation of the facility. XML now allows the sharing of information between subsystems that need to work together to implement the desired workflow, as long as they subsystems agree on consistent information tags. Many newsroom systems use Media Object Server (MOS) protocol, which is formed using XML. Other Internet-based protocols, such as Web Services Description Language (WSDL) and Simple Object Access Protocol (SOAP) are used for spreading control though the Web.

Automation control is spreading as more hardware is brought under its umbrella.

In fact, one of the goals of SOAP is to encapsulate remote procedure calls using the extensibility and flexibility of XML. At least one automation vendor uses SOAP as part of its bag of tricks. An important recent development that relies on XML is the Programming Metadata Communication Protocol (PMCP). This ATSC candidate standard will allow for greater interaction between a broadcaster's PSIP system and other system applications, such as automation and traffic. Ultimately, an automation system implementing PMCP will be able to support a more dynamic environment, allowing program changes to be made more easily and efficiently.

Another technology that is being incorporated in the automation arena is Simple Network Management Protocol (SNMP). SNMP is used in the computer networking and telco industries to get information from devices and to change the values of configuration parameters as required.

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For a device to participate in an SNMP network, it needs to be able to host a software database called a management information base (MIB), which responds to messages from an SNMP manager and notifies the manager when predetermined events occur. This technology will become much more important as multichannel operations staffs become monitors of systems (both locally and remotely, as in the case of multicasting) and are tasked with responding to developing problems and failures.

At CourtTV, automation systems lessen the amount of human intervention needed to move content. Photo by Andy Washnik.

A changing landscape

Today, automation systems must manage content and build program streams, relying on human intervention mainly media is missing. Multichannel operations will require a control layer that encompasses more processes and aspires to be much more than simply a machine- and device-control system. New multichannel automation systems will need to provide control over more process than most systems currently support. Automatic construction of secondary program offerings will be desirable. Non-real-time offerings could become common fare with Windows Media 9 and MPEG-4 support in future generations of set-top boxes.

It should be noted that the ATSC is currently evaluating new encoding technologies for providing these advanced services. Programming could be delivered through datacasting or IP, with embedded metadata instructing use and context of the media for reassembly at the receiver. The television broadcasting landscape could be radically different in a few years: The control layer in place to orchestrate programs and associated services should be radically different also. BE

Jim Boston is an industry consultant based on the West Coast, and Mark Brown is CTO of SignaSys.

NAB REPLAY

Continuing coverage of today's technology

New Tools..... 62

Broadcast Engineering's writers and consultants recap notable products and trends from NAB.

Everyone's an expert at NAB

The 2004 NAB convention was, by most standards, the best in years. Believing that the spring show would be good, *Broadcast Engineering* contracted for a range of writers and support staff to cover the convention. Some of the experts and engineers we hired are regular writers for this magazine, others are those with previous experience in reviewing technology for *Broadcast Engineering*.

This special NAB Replay package of coverage encompasses several hundred booth and staff visits during the show, hundreds of new product releases and more man-hours that I can calculate. One result is that we've ended up with way more content than space to present it here.

Web exclusive. Because space constraints made it necessary to limit what we could present from our writers, what you see here is just a good start. But wait, there's more.

We've repackaged each reporter's copy in its full length for Web presentation. To see the full-length articles, just go to the magazine Web site, *www.broadcastengineering.com*. I'd like to thank our reporters and judges for all their hard work (see the list at the end of this article).

Meanwhile, don't miss this year's Pick Hits. The top 40 products and technologies shown at this year's show — all selected by readers like you.

In addition, we've got hundreds of new products just a page turn away, so what are you waiting for? Read on!

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NAB2004 Pick Hits

By Don Keller

(alphabetically by manufacturer)

Apple Final Cut Pro HD NLE software

408-996-1010; *www.apple.com*

Apple's newest version of its Emmy-award-winning editing software plants a step firmly in the high-definition realm and ably straddles the gap between HD and SD; captures DVCPRO HD footage directly over an IEEE 1394 (FireWire) connector; supports several HD and SD formats.

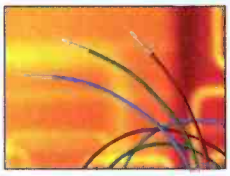
Barco iPresent video monitor wall

+32 56 368211; *www.barcocontrolrooms.com*

Create a large, bright, high-quality, on-stage video wall using an array of several rear-projection modules; hardware controller supports dynamic moving, scaling and cropping of image windows; iPresent software supports smooth image transitions between modules and provides several graphical effects.

Belden Brilliance DigiTruck 179DT coaxial cable

847-590-1110; *www.belden.com*



This lightweight, compact coaxial cable is specifically designed for mobile television broadcast trucks where equipment load weight is a prime concern and space is scarce; weighs 60 percent less and requires up to 40 percent less space than standard mini-RG-59/U cable.

Canopus EDIUS HD NLE package

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

This real-time HD NLE combines the company's HDRX-E1 HD-SDI input/output card, its HD software codec and its EDIUS Pro software to create a professional editing and content-creation solution; supports recording and playback to HD-D5, HDCAM and DVCPRO HD VTRs.

Chyron HyperX CG

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

A high-speed bus architecture and advanced 3-D rendering engine give this HD/SD CG exceptional power and performance; can be configured as SD- or HD-only CG, or can output SD and HD simultaneously; can output real-time HD for sports or entertainment environments.

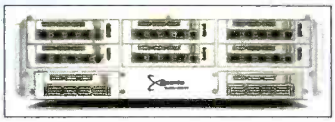
Electronic Visuals PenPalHD signal generator

+44 1483 771663; *www.electronic-visuals.com*

This mighty midget is a pen-sized HD test-signal generator that generates serial digital signals in 18 formats in 1080i, 1080p, 1080sF, 1035i and 720p; 26 video test patterns; four stereo pairs of AES embedded audio; operates from battery or mains power.

Exavio ExaMax MS platform

408-213-5500; *www.exavio.com*



This solid-state server acts independently of any attached online disk storage, allowing storage networks to scale throughput in real time, support multiseat uncompressed HD production, and link and share different files across dissimilar operating platforms without slowing down the network.

Horita Pocket PA wireless logging system

949-489-0240; *www.horita.com*

This system combines an off-the-shelf pocket PC with built-in Bluetooth wireless technology with the company's PDA-LOG program and its LTC-BLUETOOTH wireless transmitter; wirelessly allows the PA to capture time-code numbers and jot down notes associated with those codes.

Hughes SPACEWAY satellite system

301-428-5500; *www.hns.com*

This new broadband IP platform employs digital processing, packet switching and spot-beam technology, and offers peer-to-peer communications and on-demand bandwidth; allows SNG field crews continual access to voice and data applications independent of video transmission.

Jadoo NAB^{II} fuel cell

888-523-6648; *www.jadoopower.com*

If George Jetson were a videographer, this is what he'd use to power his camera; two-pound, hydrogen-fuel cartridge weighs about one-third as much as a standard battery brick, yet lasts three times longer; system consists of a power converter, a fuel cartridge and a refill station.

JVC DM-JV600 HD MPEG-2 encoder

973-317-5000; *www.jvc.com/pro*

This new encoder reduces a station's HD microwave- and satellite-link payloads to existing SD levels; allows broadcasters with remote facilities to perform HD ENG and EFP with their existing news vans and helicopters, and go straight to air with HD.

JVC KH-F870U HD CMOS camera

973-317-5000; *www.jvc.com/pro*

JVC's newest box-style camera uses three 2/3-inch CMOS imaging chips and is switchable between 1900x1080i and 720p/60 HD video; the CMOS chips reduce power consumption to about one-fifth that of a comparable CCD-based HD camera; CMOS chips also avoid skew lag.

Leitch Digital Turnaround Processor

800-231-9673; *www.leitch.com*

This MPEG-2 stream manipulation device allows broadcasters to overlay graphics/logos on precompressed HD and SD streams; allows remotely encoded DTV signal to be localized with such applications as logo overlays, time/temperature, stock information, and local weather and news.

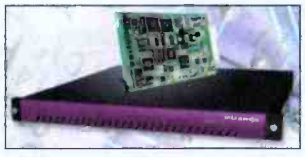
Leitch Velocity HD NLE system

800-231-9673; *www.leitch.com*

This HD NLE system comprises the company's new Altitude PC card and an enhanced version of its Velocity software; the system features full-quality HD playback of two video streams, two dynamic graphic streams, and dual-stream, real-time HD transitions and effects.

Miranda XVP 801i HD/SD universal processor

514-333-1772; *www.miranda.com*



This interface card offers high-quality up-, down- and crossconversion, providing relief from multiple SD and HD formats; also offers HD/SD signal processing, frame synchronization and 16-channel audio processing; accepts and simultaneously outputs SD and HD.

Modulus Video AVE-HD encoder

408-245-2150; *www.modulusvideo.com*

This encoder takes advantage of the new MPEG-4-AVC video compression standard, compressing HD signals up to full 1920x1080 resolution at 60i and encapsulating them in an MPEG-2 transport stream; can carry two to three times more channels over the same carrier.

NuComm CamPac camera transmitter

908-852-3700; *www.nucomm.com*

This miniature transmitter mounts on professional cameras using a standard Anton/Bauer battery clip or Sony V clip; uses MPEG-2 encoding and COFDM to transmit the camera's audio and video signals over 2- and 6/7GHz channels; power consumption is 12W.

Panasonic AJ-HD1200A DVCPRO HD VTR

800-528-8601; *www.panasonic.com*

This portable AC/DC-powered deck is designed for HD studio/field production and nonlinear editing; offers an IEEE 1394 interface operating at 100Mb/s for HD video streams; plays all SD DVCPRO formats as well as DVCPRO HD and can downconvert HD to SD.

Panasonic AJ-SD93 SD feeder VTR

800-528-8601; *www.panasonic.com*

This multiformat, SD digital VTR has an IEEE 1394 interface to facilitate 4:2:2 video transfers to nonlinear editing systems; records up to184 minutes of DVCPRO video or 92 minutes of DVCPRO50; plays back DV and DVCAM tapes.

Pinnacle Liquid HD NLE software

650-526-1600; *www.pinnaclesys.com*

Pinnacle's newest version of its Liquid NLE software now supports real-time, multistream HD editing; offers users the option to work with the bandwidth-efficient HDV format, low-bandwidth Pinnacle HD Elite or uncompressed HD SDI, all on standard PC workstations.

NAB2004 Pick Hits

Quantel QEdit Pro NLE software

+44 1635 48222; *www.quantel.com*

This news/sports editing software package is designed to run on a standard PC and dramatically lowers the cost per seat of editing; performs wipes and dissolves; Version 2 features sophisticated custom transitions; provides direct local ingest into the workstation.

Ross Video OverDrive production control system

613-652-4886; *www.rossvideo.com*

This control and automation software allows one person to perform the production functions of three or more staff; interfaces with and drives selected switchers, robotic cameras, VTRs, CGs and other devices; GUI lets user build rundowns and events and allows manual intervention.

Sencore DTU 225-SX USB-to-ASI adaptor

800-736-2673; *www.sencore.com*

This portable adaptor allows user to record, monitor and analyze an MPEG-2 transport stream through a laptop PC; high-speed input can be used for both DVB/ASI and SDI signals; operates directly from USB port without additional power supply.

Shining Technology CitiDISK DV portable DV-capture device

714-761-9598; *www.shining.com*

This portable, self-powered hard drive connects to a DV source through its firewire connector and captures and stores the video in a choice of file formats (.mov, .avi, .dv, etc.); eliminates time-consuming step of transferring DV footage into a NLE system.

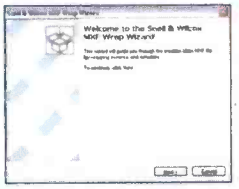
Snell & Wilcox Comet open standards ingest system

+44 20 8917 4330; *www.snellwilcox.com*

Comet takes advantage of open data-exchange standards such as the MXF SMPTE RP-210 metadata dictionary as well as the latest AAF edit protocol, allowing the broadcaster to create multivendor systems with complete interoperability; intuitive user interface allows simple and robust operation.

Snell & Wilcox MXF Express software development kit

+44 20 8917 4330; *www.snellwilcox.com*



MXF Express is a free, comprehensive software development kit that supports OP1a, OP-Atom, MPEG, DV, BWAV and AES profiles; includes C++ libraries to add MXF awareness to products, Directshow filters to help create MXF players and writers, and sample MXF files.

Sony Anycast Station portable live-production studio

800-686-7669; *www.sony.com/professional*

This live-content-creation system, roughly the size of a laptop carrying case, combines a six-input video switcher, a six-channel audio mixer, an F/X generator, a preview/program video monitor, a pan/tilt/zoom remote control for Sony VISCA robotic cameras, an RGB output, and an encoder and server.

Sony HDW-S280 HDCAM VTR

800-686-7669; *www.sony.com/professional*

This compact, 12-pound, half-rack-space HDCAM VTR can switch between 1080i/59.94 and 1080i/50; built-in downconverter allows it to play back Betacam SX, Betacam SP and standard Betacam; control panel includes LCD monitor; can be powered by AC as well as 12VDC battery power.

Sony Vegas 5.0 NLE software

800-686-7669; *www.sony.com/professional*

Sony's latest version of Vegas includes 3-D track motion and compositing, key-frameable Bezier masks, network rendering, transition-progress envelopes, subtitle/text export to DVD Architect software, Flash .swf import, and much more.

TANDBERG Television Intelligent Compression Engine (ICE) encoder card

407-380-7055; *www.tandbergtv.com*

The ICE card, which is included in the company's EN5930 encoder and can be used in the EN5710, allows encoders to perform MPEG-4 part 10 or Windows Media 9 Series video encoding; users can switch between these two codecs with a simple software change.

TDK Blue Laser Disc for XDCAM

516-535-2818; *www.tdk.com*

TDK's foray into XDCAM media may help drive down the cost of these optical discs; the company's 23.3GB discs accommodate the 405nm laser wavelength and high-numerical-aperture (0.85) lenses used in Sony's Professional Optical Disc (XDCAM) camcorders and decks.

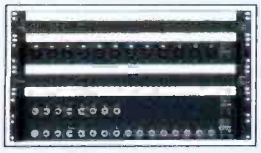
Tektronix WFMNLE waveform-monitoring software for Avid NLE

800-835-9433; *www.tektronix.com*

This software plug-in allows users to monitor the video quality of Avid Media Composer Adrenaline, Avid Xpress Pro, Media Composer and Symphony nonlinear editing and finishing systems; a nonintrusive tool to verify signal and picture quality.

Telecast Fiber Systems Mamba fiber-optic patchbays and converters

508-754-4858; *www.telecast-fiber.com*



Originally developed to help mobile production trucks save cable weight and congestion, this family of fiber-optic patchbays and converters has grown into a complete facility solution; especially useful for HD facilities that require the high bandwidth provided by optical cable and infrastructure.

Thales ADAPT IV exciter

413-998-1100; *www.thales-bm.com*

This exciter provides linear and nonlinear correction capabilities in a small, powerful hardware platform; combines key features of the company's previous exciters, such as Digital Adaptive Precorrection, with an improved local user interface and enhanced correction capabilities.

Thomson Grass Valley Triax repeater

415-558-0200; *www.thomsongrassvalley.com*

This repeater/line amplifier increases the maximum distance you can send SD and HD camera signals over triax cable from 3300 feet (1000 meters) up to 6600 feet (2000 meters), effectively doubling the maximum usable cable length with no significant loss of signal quality.

Thomson Grass Valley LDK 6200 HD Super SloMo camera

415-558-0200; *www.thomsongrassvalley.com*

This camera brings slow motion to HD by providing replays and super-slow-motion effects in native HD formats; supports switchable, multiformat and multi-frame-rate capabilities, including native image capture in 1080i and 720p formats; uses 12-bit A/D conversion.

Triveni Digital and Terayon Communication Systems ANDES-HD distribution system

609-716-3500; *www.3veni.com*
408-235-5500; *www.terayon.com*

The Advanced Network Distribution Enhancement System is a highly integrated, multifunctional HDTV broadcast distribution system that enables networks and affiliates to switch seamlessly between national and local digital feeds and brand programming with logos and program-guide data.

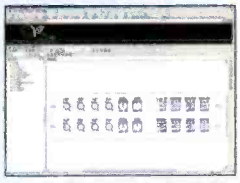
Videotek DL-850HD serial digital legalizer

610-327-2292; *www.videotek.com*

This device brings color correction, signal equalization and legalization to the HD realm; its auto-format-detect input accepts most SMPTE 292M formats and outputs in the same format; legalizes HD SDI to HD/SD color space and/or encoded (NTSC or PAL) composite color space.

VTG NetCAD design tool

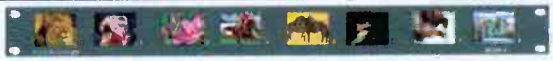
800-325-0266; *www.vtgcorp.com*



This is a free, online, end-to-end design and pricing tool for clients who need audio and video interfacing and cable equipment for their custom installations; it uses a drag-and-drop interface to link the client to a complete library of all the products offered by VTG's two daughter companies.

Wohler MON8-1 LCD monitor array

888-596-4537; *www.wohler.com*



This 1RU array contains a row of eight 1.8-inch LCD monitors, ideal for quick confidence checks of multiple channels. Each monitor has one composite video input and one composite loopthrough output connector; NTSC and PAL auto-sensing; internal AC power transformer.

PRODUCT JACKPOT

P2 STUDIO RECORDER

Panasonic AJ-SPD850

201-392-4127;

www.panasonic.com/broadcast

Real-time baseband video/audio recording and editing; five 4GB P2 card slots provide 80 minutes of recording in 25Mb/s DVCPRO or 40 minutes in 50Mb/s DVCPRO50; shuttle at 100x speed in forward, reverse, fast forward and fast rewind with full-color images.

QUARTZ-TUNGSTEN DIMMER LIGHT

Frezzi MFIC-PTS

800-345-1030; *www.frezzi.com*

Fifty percent increase in output; advanced pulse width modulator conserves power and minimizes color change; advanced noise filtering; new fuseless reverse polarity protection and robust potentiometer.

LIGHTWEIGHT CAMCORDER

Panasonic AJ-SDC615

201-392-4127;

www.panasonic.com/broadcast

16:9/4:3 switchable; IEEE 1394 interface and three 520,000-pixel, 2/3-inch CCDs; transfers digital component video to a laptop NLE in the field; sensitivity of F13 at 2000 lux; low-light shooting down to 0.1 lux; 12-bit A/D DSP circuitry; records up to 66 minutes.

SLO-MO EFFECTS

Quantel eQ/ARRI Tornado

212-944-6820; *www.quantel.com*

Using NAC fxCam digital HD camera capturing images at 1000fps, new eQ software provides high-speed digital image capture for ultra-slo-mo shots; HD-RGB or existing HD-YUV signal handling.

MPEG TRANSMISSION

Axon MStream

408-450-7973; *www.axon.tv*

Provides high-quality video transmission over digital networks; real-time video streaming and non-real-time store-and-forward applications over IP, standard T1 or E1 telephone circuits, or ATM networks.

New Tools

Digital audio

BY TOM PATRICK MCAULIFFE

From portable digital recorders and surround sound for video to DVD-audio, new mics, digital audio mixers and other audio tools, this year's show had it all. Approximately 500 audio companies had their new and established tools ready for all to see. NAB claimed that attendance was higher than last year, and the aisles seemed barren. But this year's show seemed even more ho-hum than last year. With the economy still in a slump and new digital technology for television coming over the hill, more than one vendor indicated they thought attendees were waiting to upgrade audio because of bigger issues (although none wanted to go on the record). That may be, but more American consumers are hooking up their TVs and VCRs to stereos and surround systems than ever before.

Broadcasters' attitudes are peculiar. Consumer demand for better audio has never been higher. The 5.1 surround-sound units are among the most popular home additions, according to the Consumer Electronics Association. Consumers are favoring 5.1 audio playback systems even more than HDTV, so making sure programming content is surround-ready seems like a safe bet. It was a bit perplexing then to learn that both exhibitors and attendees agreed that purchasing plans did not include audio this year. Perhaps with the digital transition upon us, broadcasters have put audio on the back burner.

Be that as it may, there were lots of new products (and refinements of existing technologies, such as MXF and MPEG-4) for audio at this year's show. There were also lots of educational opportunities. For example, in three seminars, audio expert John Travis showed attendees how to use Digidesign's ProTools software for advanced dialogue- and ambiance-sound editing, noise reduction, and 5.1/7.1 surround sound. There was also a new "Sound Operators Workshop" area, where anyone could take dry audio sources and learn proper EQ and mixing techniques from on-hand experts.

All the educational opportunities were almost enough to make one forget that the NAB gear-fest is where broadcasters come to try out and purchase new equipment. Space doesn't allow us to cover all of the new products being shown, but here are some representative highlights.

SRS showed a 6.1-channel matrix surround encoder for Digidesign's new 6.4 ProTools software, allowing users to not only encode up to 6.1 channels of audio, but also to precisely monitor what the audience will hear through a real-time decoder built into the software.

At this year's NAB, broadcasters seemed to have put audio on the back burner, but consumer demand for better audio is higher than ever.

One of the most interesting displays was put on by Dolby Laboratories. It showcased its new Dolby Digital Plus technology, which is part of the Enhanced AC-3 standard. Expanding Dolby's noise reduction capability, the new standard is designed to meet the

eclipse

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CHARACTER GENERATOR

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800-363-3400; *www.inscriber.com*

Provides render-free 2-D effects, including page-wipes, pushes, dissolves, rolls and crawls; includes serial digital key and fill I/O with bypass and analog preview; supports MOS protocol and integration with ENPS and iNews.

ENG TRIPOD

Miller SOLO VJ

973-857-8300; +44 1243 555 255; *www.millertripods.com*

100mm tripod is designed for 10- to 40-pound camcorders, with 74-inch maximum height; three-position leg angle locks take it down to 8.7 inches and eliminate the need for a ground spreader; tubes do not rotate when tightened, so users don't have to tighten from the top down.

New Tools

four main qualifications of a next-generation broadcast audio codec: spectrum efficiency, cost savings, backward compatibility, and compatibility with future audio and video formats. According to the company, the technology is less complex and requires fewer changes to the existing broadcast infrastructure than other codecs, making it more economical. As usual, Dolby offered numerous other new-technology demonstrations as well.

Sound Devices came to NAB2004 with a broad line of field audio production mixers, line amps, recorders and accessories. The new 722 and 744T portable audio recorders showcased file-based audio acquisition recording to two recording media: a hard drive and/or a Compact Flash card. Meanwhile, the 302 field mixer's light weight, extensive control and good audio performance was a hit, especially with the ENG crowd.

Wohler Technologies showed its new AMP2-S8MDA, a multichannel rack-mounted audio monitor and converter with dual SDI inputs and standard BNC connections. It can accept either HD-SDI or SD-SDI. This unit isn't just an audio monitor; it also provides powerful demuxing capabilities with eight channels of analog, as well as AES audio out directly from the dual SDI inputs.

The American viewing public will no longer sit still for poor audio.

For audio professionals who didn't make the show, NAB was a missed opportunity. 2004 is turning out to be a year of significant change, both for audio production and TV. Not only is the transition to DTV accelerating, the change to digital audio acquisition is complete, and the American viewing public will no longer sit still for poor audio. From educational seminars and expert panel discussions to the latest in production and TV audio products, digital audio has never sounded better. BE

Tom Patrick McAuliffe is a journalist, entertainer and a contributing writer with Video Systems magazine.

A Simple Solution For Wardrobe Malfunctions

HD/SD Audio Video Delay

The D1 Pipeline Delay

Live broadcasts are full of surprises. Some are welcomed, some aren't. Put an end to the unwanted shocking language, actions and wardrobe malfunctions that can plague some live events with Prime Image's popular Pipeline delay device.

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PRODUCT JACKPOT

New Tools

HD SERVER ENHANCEMENTS

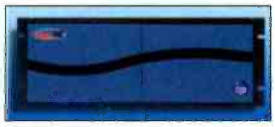
Omneon SPECTRUM
408-585-5000; *www.omneon.com*

Supports multiple HD formats, including DVCPRO HD, HD MPEG and HDCAM; scalable open architecture design allows addition of storage channels.

COMPRESSION PLATFORM

Scopus UE-9000 encoder
609-987-8090; *www.scopus.net*

Provides upgradeable modules for MPEG-2 to MPEG-4 or WM9; provides 50 percent improvement in bit rate; supported by Scopus IVN system architecture.



HD CLIP SERVER

Chyron Clyps HD
631-845-2000; *www.chyron.com*

Graphics environment features built-in keyer and up to 1.3TB of storage equaling 180 minutes of lower-third animations or 60 minutes of full-frame video; features include loop, pause, hold last frame, go to black, cue and hold first frame; three stereo AES/EBU digital audio I/O.

SURROUND SOUND SYSTEM

Harris NeuStar DTV
513-459-3400; *www.broadcast.harris.com*

Transports audio over the existing stereo backbone and automatically converts it to surround sound at the receiver; system uses proprietary Neural technology to reduce artifacts in compressed data formats, allowing bandwidth savings of up to 30 percent.

HD PREPROCESSOR

Snell & Wilcox Prefix-HD
800-827-4544; *www.snellwilcox.com*

Multistandard HD compression preprocessor; reduces noise-related artifacts in HD video, including film grain and video noise; offers linear filtering, color gamut legalizer and 4:4:4 internal processing; supports AES, AC-3 and Dolby E audio; provides advanced metadata handling and insertion, including flagging cuts and 3:2 cadences.

Automation

BY JIM BOSTON

This year's NAB demonstrated that a number of trends would continue developing well into the future. HD and the need to develop new business models for the future are leading broadcasters to rethink how they do business. New business models usually mean new workflows and processes. This puts automation at the epicenter of change in terrestrial broadcasting.

A common theme in automation this year was commoditization. You can expect to see the cost of automation systems drop. Vendors report fewer requests for product demonstrations, but more for workflow discussions. Broadcasters view automation no longer as a suite of software applications that automates a few tedious tasks, but rather as a system that streamlines the workflow process. Automation is shifting from device control to managing content storage and playout. Indeed, a number of vendors now combine automation and video-server functionality in a single system. More devices can now be controlled through LANs, and IP to serial conversion boxes is becoming more widely available to serve legacy devices. These factors are allowing MPEG encoding and decoding to take the place of real estate that used to be used for the serial ports.

Today, broadcasters have a growing need for and interest in tight asset management. Customers and vendors now view asset management as an inherent aspect of an automation system. The automation system only touches the assets throughout the process, so it is logical that it should handle asset management.

As the tentacles of automation reach further across the entire broadcast enterprise, automation systems are talking an ever-broader array of protocols and using more IT tools. Today's automation topology generally consists of an application layer that interfaces to client stations and external systems that sit above it. The application layer then communicates to a data- and device-control layer below it. Interfaces to external systems not traditionally controlled are tending toward open-standards-based approaches, such as Web services, SOAP, XML, MOS (protocol using XML) and SNMP. A number of vendors point to the Microsoft.Net framework as a good development tool. These methods enable rapid API development and easy extension as needs change. Most software development tools include SDKs that can be used to support rapid development.

Over the years, automation vendors have offered systems running on real-time OS kernels outside the Microsoft and Unix realms. Today, there are systems available running Linux and at least one vendor with a system running on its own proprietary OS.

Vendors at NAB reported fewer requests for product demonstrations, but more for workflow discussions at their booths.

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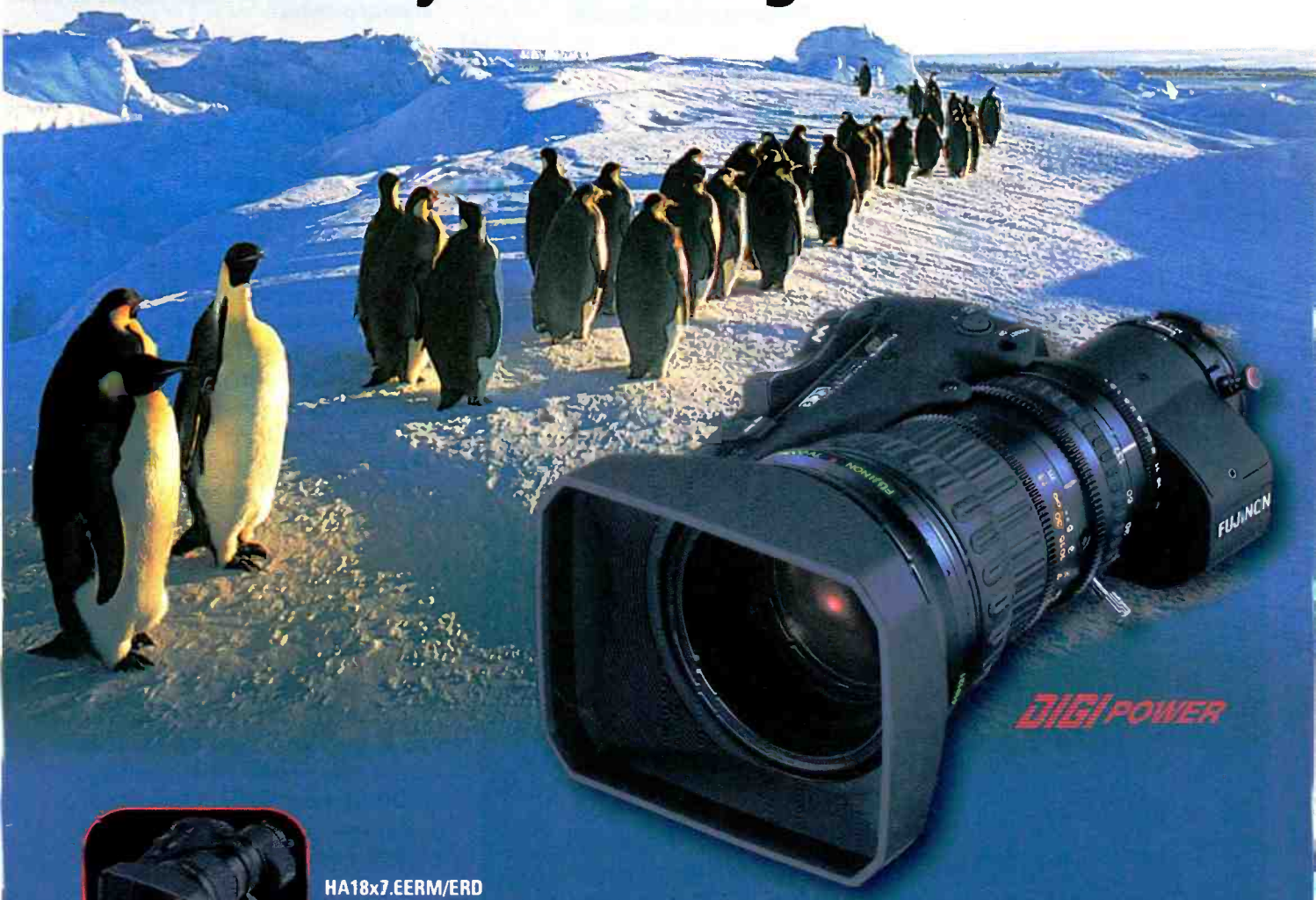

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PRODUCT JACKPOT

New Tools

PROGRAM RECEIVER

Scientific-Atlanta PowerVu D9850
770-236-5000; *www.sciatl.com*

Provides digital transmission for cable headends; 1RU height; 10Mb/s standard and 50Mb/s optional data output with Ethernet port; supports IP services; downloads files to servers; SDI output with embedded audio; ASI input for remote unlink monitoring.

Automation at NAB2004

Archive interfaces

Blueline Technology unveiled JustArchive, an interface between automation and DVD or tape archive. It runs on Unix, Linux or Windows operating systems.

Crispin introduced Near-line Archive, which allows users to extend the storage of their video servers using inexpensive disk arrays.

Asset management

Crispin has unveiled AssetBase, which provides catch-server management. This Web-enabled application allows catch servers to be treated as video servers in their system.

Sundance showed an upgraded version of Seeker that runs on Microsoft SQL. It automatically creates an indexed proxy anytime any other application touches a video asset.

Encoda introduced Broadcast Master, which integrates traffic and automation layers under a single system, combining customer-relationship-management, sales and asset-management tools.

Centralcasting

Florical introduced MediaTrans Plus, which provides an economical delivery of video/audio signals between locations using MPEG-4 technology.

Sundance introduced Sentinel, an SNMP monitoring package.

Device servers

Digital Transaction Group, the former engineering and support team from Odetics Broadcast, introduced AIRO XDS, a device-control server that controls up to 64 devices and can scale up to any number of channels and devices with an unlimited number of devices per device pool. The XDS server manages the devices, resources, state and history.

Ingest

Harris Digital Ingest now allows the ingest of media and metadata of Pathfire syndication and promotional

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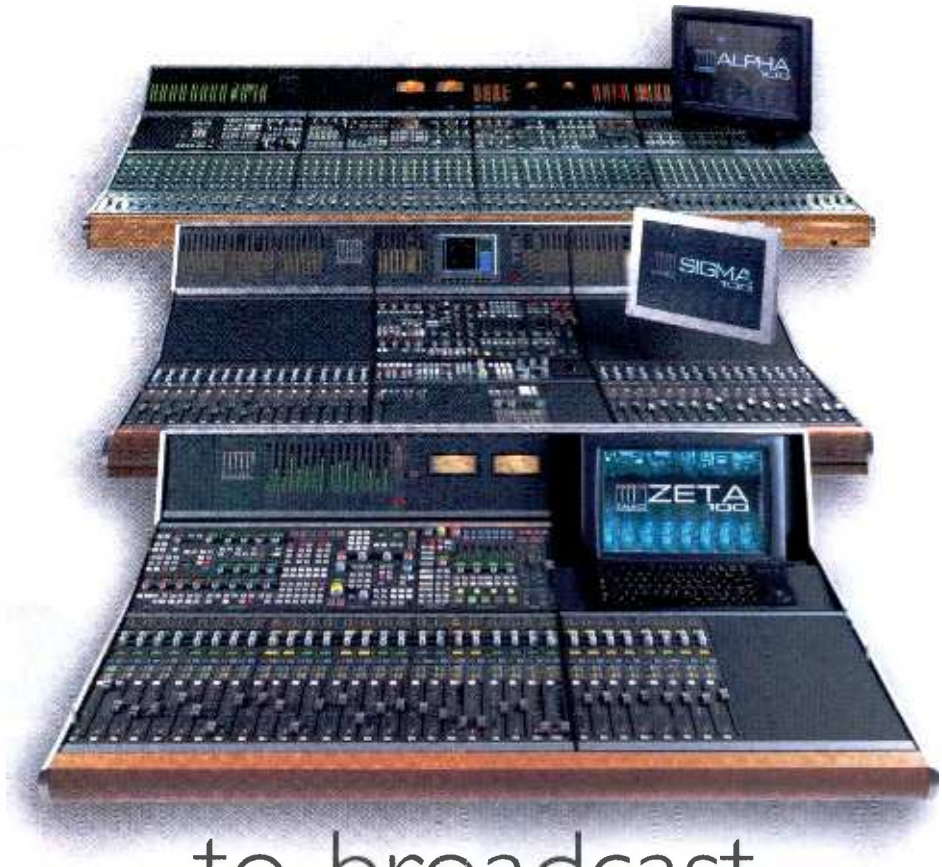

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- KXAS-TV Ch 41 Dallas
- KXTX-TV Ch 39 Dallas
- Maryland Public Television
- NBC Olympics
- NBC Television Network
- NEP Supershooters, Inc.
- Trio Video
- Univision Network
- WTVJ Ch 6 Florida
- WVTM-TV Ch.13 Birmingham
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Western States – TEL: (818) 841 3000 EMAIL: jschalier@audiospec.com

PRODUCT JACKPOT

New Tools

HD CROSSCONVERTER

Evertz 7710XC-HD

905-335-3700; *www.evertz.com*

Uses 10-bit processing, one reclocked HD serial output and two reformatted HD serial digital outputs; accepts two groups of SMPTE 292M embedded audio signals and re-embeds them into the output HD video; fully SMPTE 292M compliant; full proc control, including color correction, black level, luma level, chroma level and optional audio level.

AUDIO ANALYZER

Rohde & Schwarz UVP

888-837-8772; *www.rsa.rohde-schwarz.com*

Digital audio interfaces up to a 192kHz sampling rate; features expanded measurement bandwidths; can perform several measurement functions simultaneously.

content. The Invenio Starter Pack allows users to create and store proxies of WM9 content ingested into broadcast servers.

Sundance has also introduced a product that manages the transfer of new media out of Pathfire's cache server to other servers.

Last-minute changes

Crispin's PSIP software and Linx Electronics' TVLinx can communicate with one another, allowing real-time updating of PSIP tables based on last-minute changes at master control.

Florical announced Automated Join In Progress, which automatically calculates the necessary timelines for a join-in-progress to a program following a live event that runs long. Operators can drag and drop commercials to be aired into the schedule, and the application automatically recalculates the timelines to compensate by reducing program content to be aired.

Pro-Bel introduced Morpheus Velocity. Velocity is a client application of the Morpheus automation backbone that was introduced last year at IBC. Velocity allows breaks in live events to be changed by drag-and-drop operations at the last second.

Logging

Florical introduced AirLogger, which automates off-air logging and review by automatically creating off-air recordings on long-term storage media.

Media prep

Sundance introduced a revamped version of its Media Prep input mod-

Teeing Up For Perfect Audio

THE GOLF CHANNEL

Standing from left:
Steve Specht (Audio Operator),
Chuck Jones (Maintenance Engineer),
Jim McCabe (Audio Operator).
Seated: Derrick Beauregard (Audio Operator).

Performance shines as The Golf Channel chooses the SSL C100 Digital Broadcast Console

"It's the inherent design functionality that makes the SSL C100 the console of choice for The Golf Channel," states VP of Network Operations Andy Murphy. "The maximizing of console power in a compact space, while retaining the intuitive logic of one-knob-one-function control operation in a console with multiple layers is truly remarkable. Combine this engineering feat with SSL's great reputation for quality build, excellent service and great sound, and you have a product that is perfect for the live-to-tape and live-to-air programs we produce."

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C100

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PRODUCT JACKPOT

MULTIFORMAT SERVER

Thomson Grass Valley PVS 3500

800-547-8949; *www.thomsongrassvalley.com*

Plays out SD/HD from same server frame and same timeline; Fibre Channel and gigabit Ethernet connectivity; supports file-streaming protocols MXF and SMPTE 360; automatic conversions of MPEG SD to HD and MPEG HD to SD; aspect ratio transformation available during conversion.

VIDEO ARCHIVE

IBIS SprinTx ServerArchive

+44 1458 280 208; *www.ibis.tv*

For IBIS newsroom automation applications; provides common UI to control archiving video clips from server; supports VTR, DVD, MCM or data tape; manual or automatic process available.

New Tools

ule for Titan and FastBreak systems.

Florical announced that MediaTimer Desktop, which uses MPEG-4 technology to allow desktop viewing, now has the ability to designate in-and-out points for logo bugs, animated promotions and audio overs within programs. The application imports this information into the on-air schedule in the form of secondary events.

Multichannel

Harris introduced Broadcast Presentation Manager, which is part of the Harris Resource Suite, to manage scheduling, resources and playout of media content on multiple channels.

Sundance rolled out News Recorder, a product that automates content segmentation during live recording.

Crispin's RapidPlayX offers a simplified view of all channels running in the facility. At a glance, it shows the current state of each channel and warns the operator if attention is needed. Crispin also rolled out NewsPlayX Newswheel, which uses an MOS interface and allows stations to add a 24-hour newswheel without the need for an operator.

OmniBus unveiled its TX>Play automation system, which is able to control up to 12 channels and is based on the company's G3 technology.

MicroFirst Engineering introduced its Digital Automation System (DAS) multichannel automation system. DAS provides capacity for up to 16 separate, user-configurable event lists. Each can hold up to 1000 events.

DUAL MODE

not only analogue
not only digital

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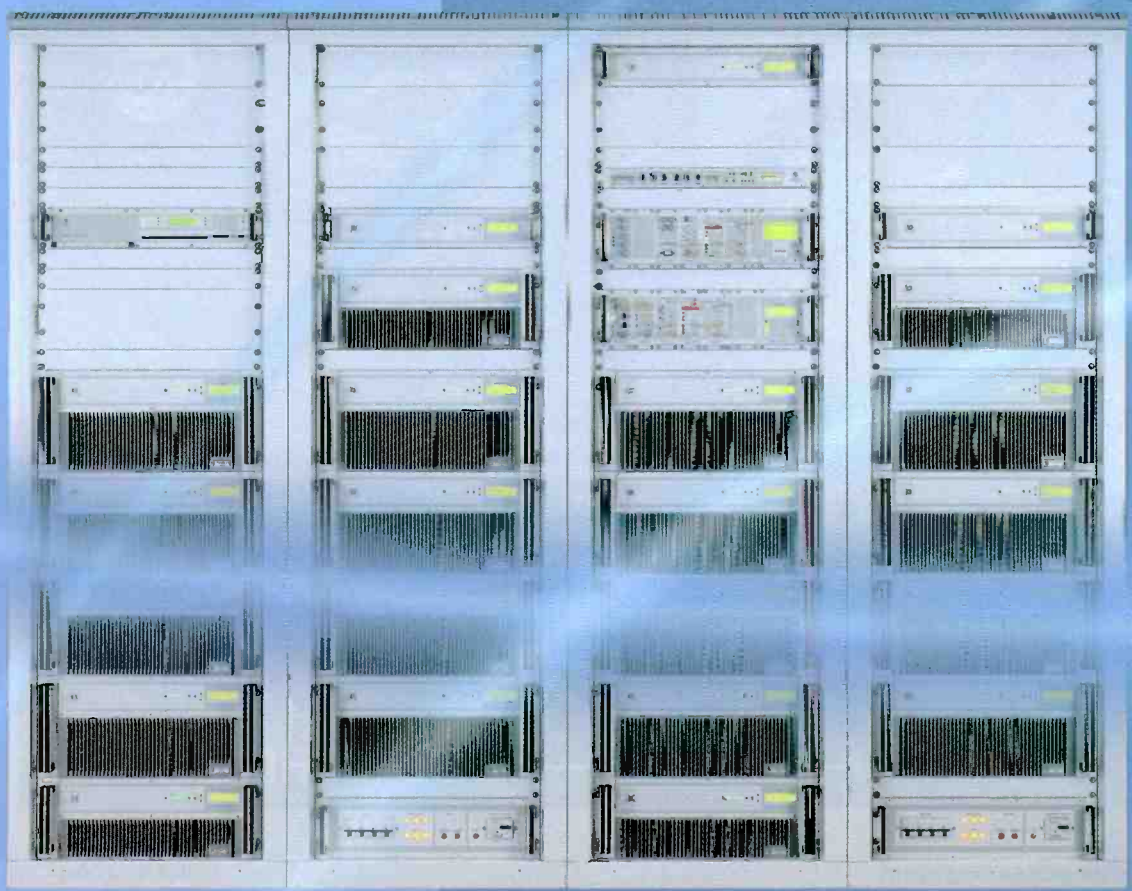

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PRODUCT JACKPOT

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Leitch NEXIO NX4000MTS

800-387-0233; *www.leitch.com*

Supports multiple SD/HD compression formats; ASI interface; records up to four separate programs within a multiprogram transport stream; allows timing of the content for seamless splicing and playback.

HD TAPE

Maxell HD-TV

800-533-2836; *www.maxell.com*

Family of videocassettes, includes DVCPRO HD, HDCAM and D-5 tape; uses Ceramic Armor metal particles and a durable binder system providing high output, low noise and low error rate; coercively of 2350Oe and retentively of 3800BR; tapes available in 33-, 64- and 126-minute lengths.

New Tools

Also introduced at NAB was the MicroFirst MPS-9810, which is an intelligent auto/manual multipoint A/B switch that enables redundant automation processors.

A first-time exhibitor at this year's show was Pebble Beach, which demonstrated three products. Anemone can handle up to four channels and is intended for small operations. Neptune is intended for larger systems and facilitates proxy browsing. Periscope is a client application that displays multiple playlists much as a program guide would.

Server control

A few companies have introduced integrated automation and video-server packages in the same technology. Matco is one of those. Although its integrated automation system has not changed, the underlying hardware is evolving and the delineation between the control layer and the underlying media continues to blur. Fission is another company that offers the control layer over SAN- or NAS-based computer technology.

Blueline Technology introduced its JustClips software package, which offers clip playback from any video server and gives manual control to the server. It runs on Windows, Linux and Unix platforms.

DNF unveiled boxes that fall under their Flex Control Network. They allow playout to control servers and other devices. Server control currently is under Odetics RS-422 now, but it will soon extend to the VDCP protocol. BE

Jim Boston is a West Coast consultant.

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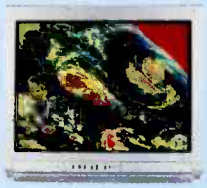

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EDUCATION

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LOCAL ACCESS

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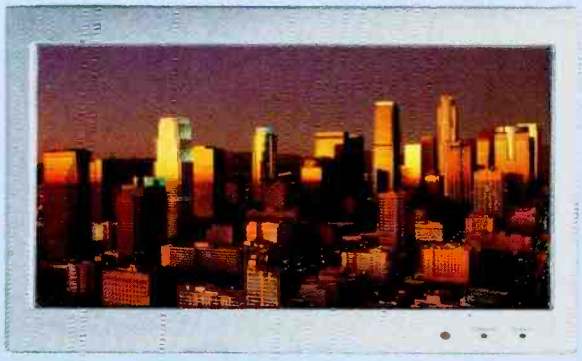

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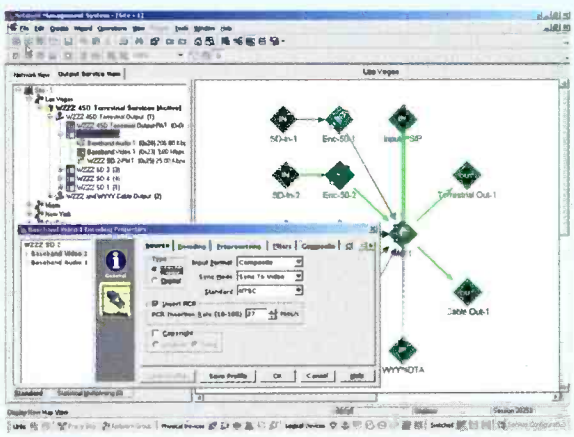

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- Manages video infrastructure as a series of services rather than discrete hardware and software components.
- Enables seamless change in system mode according to time-of-day and day-of-week.
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Cameras

BY DAN STARK

NAB this year offered several additions to evolving technologies, especially CMOS camera sensors and solid-state recording. One attractive capability of CMOS is its ability to switch between various video formats to provide different native resolutions.

Tape-based camcorders have been the norm in the industry, while disc-based cameras have started to make an impact with hard-drive and optical variants. This year, Panasonic showed working prototypes of their P2 technology. P2 technology provides more reliability with fewer maintenance costs because there are no moving parts in the camcorder. P2 camcorders record video on a series of PCMCIA RAM cards. These cards can then be inserted into a PCMCIA slot on a computer or in Panasonic's P2 studio deck. The video is then available for playback or editing without any capture process. P2 cards offer 100,000 rewrite cycles with immunity to severe shock and vibration.

Tape-based camcorders have been the norm in the industry, while disc-based cameras have started to make an impact with hard-drive and optical variants.

The P2 studio deck includes a DVD-R drive for archive or restore. A P2 card drive is also available to attach five P2 cards to a computer. Current cards offer 4GB capacity with 16 minutes of DVCPRO25 recording.

The P2 camcorder, AJ-SPX800, has five slots for P2 cards, allowing continuous recording onto all five cards in a sequence. Cards can be hot swapped, which essentially allows for continuous recording. The camcorder can record in 24p, 30p and 60i using three 2/3-inch IT sensors, each with 520,000-pixel resolution.

Panasonic also introduced the AJ-SDC905 DVCPRO50 and the AJ-SDC615 camcorders, which offer firewire capabilities. Both cameras use 520,000-pixel CCDs, are switchable between 16:9 and 4:3, have a sensitivity of F13 at 2000 lux and use 12-bit A/D. The AK-HC900 was introduced with variframe/cinegamma options. The 900 series camera with the AJ-RC905 CCU and AJ-CA905 camera adapter had 26-pin camera control functions added.

Clarity Image showed a vari-speed controller for the AJ-HD27F Varicam. It offers smooth, real-time frame rate changes with user-defined custom ramps that can be stored on SD memory cards.

Sony introduced the HDC-X300 compact HD camera. Based on new ½-inch, 1.5-megapixel HD CCDs, it offers 1440x1080 effective pixels with a low, -120dB smear level and a signal-to-noise ratio of 54dB. It can be used as an HD POV camera for a variety of HD applications, including studio, HD security and analysis. A slow shutter mode allows the CCD to operate from two to 64 frames. Coupled with 48dB gain, it features a minimum illumination of 0.003 lux, and it supports several frame rates, including 23.976PsF/25PsF/29.97PsF progressive and 50i/59.94i. Output signals include HD SDI

PRODUCT JACKPOT

HD CHARACTER GENERATOR

Miranda Oxtel Imagestore

973-683-0800; *www.miranda.com*

Interfaces to automation for branding graphics, clock insertion, lower-third text crawls; operators can build on-air graphics from a desktop gallery; two layers of animation/still insertion from internal storage.

AUDIO CODEC

Dolby Digital Plus

415-558-0200; *www.dolby.com*

Expands capability of Dolby Digital; backward compatible with Dolby Digital 5.1; increased efficiency, less complex and more cost efficient; currently an ATSC candidate standard for Enhanced AC-3.

HDV PLAYER/RECORDER

JVC JY-VH1

973-317-5000; *www.jvc.com*

Records and plays HDV; features a 3.5-inch LCD monitor and digital iLink interface for NLE and dubbing systems; component for multiformat playback and an SD memory card slot for capturing still from tape.

VIDEO CAPTURE AND EDITING CARD

Aurora Pipe HD

586-726-5320; *www.auroravideosys.com*

Works in either HD or SD; connects to most A/V devices; offers 10-bit I/O; can monitor video via composite, S-video or component analog outputs; genlock input provided; outputs two channels of 24-bit, 48kHz analog audio for monitoring.

BROADCAST MONITORING SYSTEM

Encoda VeriStream

303-237-4000; *www.encodasystems.com*

Identifies and corrects failures and errors in transport streams over an entire network, and specific channels, through all stages of transmission; multichannel and centralized controlled environments supported.

PRODUCT JACKPOT

VISUAL WORKSTATION

Silicon Graphics Tezro

800-800-7441; *www.sgi.com*

Workstation platform accommodates up to four 700MHz MIPS RISC processors with 4MB L2 cache; supports seven PCI-X slots, internal DVD-ROM and external drives; 48-bit RGBA with 16-bit Z buffer capability; includes support for HD, dual-channel and dual-head display options; DmediaPro options with support for dual streams of HD 10-bit 4:4:4:4 RGBA video.

HD EDITING SYSTEM

Avid DS Nitris 7.5

978-640-6789; *www.avid.com*

Real-time finishing system for SD, HD and digital intermediates 2K/4K; provides 10-bit HD encoding; fully compatible with the Media Composer Adrenaline system; operates in 4:2:2 color space; available in three user-selectable bandwidth configurations: 220Mb/s for 10-bit and eight-bit video; eight-bit configuration at 145Mb/s for 720p and 1080p/i HD resolutions; supports MXF.

VIDEO SERVER

SeaChange BMC 60000

978-897-0100; *www.schange.com*

Supports up to eight MPEG-2/IMX codecs operating at up to 62Mb/s per codec, four MPEG transport I/O cards, or three HD decoders; can combine up to seven I/O cards for up to 56 channels of 50Mb/s IMX I/O and more than 1600 hours of storage using 300GB SCSI drives.

DISK RECORDER

DVS Pronto2K

818-846-3600; *www.dvs.de*

Uncompressed real-time recording for SD to 2K; stores video data directly as BMP, YUV, TIFF, TGA, Cineon or DPX; audio stored as AIFF and WAV files; formats and resolutions handled include NTSC and PAL, 720p, 1080i, and film (2048x1556) in RGB 10-bit at data transfer rates of up to 306MB/s.

New Tools

and analog component signals. The HDW-730S is a reduced-feature version of the HDW-730. A more cost-effective 1920x1080 interlaced camera, its price is comparable to high-end SD camcorders. It offers HD SDI output standard and interfaces to most Sony optional products.

The Sony BRC-300 is a three-chip, robotic, pan/tilt camera in a small footprint with three high-performance 1/4.7-inch advanced HAD CCDs. A 12x auto focus lens is provided, and the camera has an additional 4x digital zoom, allowing a combined 48x zoom. Optional cards offer component analog or digital outputs.

The BVP-E30/E30WS camera uses Power HAD EX CCDs and new 14-bit A/D conversion. It operates in progressive or interlaced modes and offers sensitivity of F11 at 2000 lux with an S/N ratio of 66dB. Slow-shutter mode allows CCD exposure down to 7fps with 42dB of gain. The camera features a minimum illumination of 0.035 lux. The E30 interfaces to existing Sony CCU and VTR models, including the WLL-55 wireless camera system. The system converts the camera's signals into an MPEG-2 bitstream for transmission over the 2.4GHz band, does not require any licensing and is compatible with many Sony cameras.

Hitachi introduced the Z2500 camera, based on 2/3-inch IT sensors with 900 lines of resolution and a 65dB signal-to-noise ratio. The HVD15 box camera has three ½-inch IT sensors, a bayonet lens mount and SDI output, and features 900 TV lines of resolution at 64dB. Hitachi also featured the SK31B and SK31C HD camera backs. The B version has a fiber-optic cable from the camera back to the CCU, and the C version is a multicore system.

JVC unveiled a prototype three-chip HD camera recording to HDV format DV media. The camera will use 2/3-inch CMOS imagers with a native resolution of 1920x1080 pixels. The camera will be capable of both SD and HD recording, including 24p. JVC also introduced the KY-F650 and KY-F550 box cameras based on 1/2- and 1/3-inch CCDs. They offer 850 lines and 800 lines, respectively, and both cameras have an SNR of 62dB.

The KH-F87U HD CMOS-sensor box camera features three 2/3-inch

NAB attendees saw many unique exhibits and were introduced to new camera technologies.

CMOS sensors, 12-bit A/D converters and a 54dB signal-to-noise ratio. The camera operates at either 1080i or 720p natively with a dynamic range of 68dB and has two HD SDI outputs.

Ikegami introduced the HDK-725P and HDK-75EX handheld HD cameras. The HDK-725p is native 720/60p and the HDK-75EX 1080 at 60i. The 75EX offers an integrated fiber adapter. Both are cost-effective cameras. Ikegami's HDL-40C CMOS camera is based on two-million-pixel CMOS sensors operating natively in 720p, 1080i and 1080/24p formats. They are designed for a variety of applications, and one version offers slow motion. The company also showed a prototype of the HDK-79EC CMOS camera.

The company's TA-79HD series is an improved HD triax/fiber camera back and CCU. This series can switch between fiber and triax cabling.

In the interesting technology department, Ikegami's HDK-79NAR has a rotating optical block that allows an operator to spin the picture without

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www.bbctechnology.com

New Tools

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Utah Scientific SqueezeMAX
801-575-8801 ; www.utahscientific.com

Versatile dual-channel video effects with built-in graphics display capabilities; for on-air squeezeback effects, logo insertion and other channel branding operations; available for stand-alone use or integrated with the company's MC-2020.

having to rotate the camera. It has a feature that allows the operator to hold the image block level — regardless of the camera's angle. Ikegami offered the SD HK-399PW, which incorporates 14-bit A/D converters with a 68dB signal-to-noise ratio. The Editcam system was shown with the DNS-33W.

Thomson Grass Valley announced the LDK 6200 HD Super Slow Mo digital camera, providing 120fps in 1080i. It uses a DPM sensor and an EVS disc recorder. It is slated for use in the 2004 Olympic Games in Athens, Greece. Thomson's new SD cameras included the LDK 500 and LDK 300. The LDK 500 is based on the popular, remote-controllable LDK 200 camera head, which offers 14-bit A/D conversion, and optical and digital filters. It has a configurable processor, second-order color correction, a frame store and vertical shift for locking the camera to computer monitors. The LDK 500 is available in DPM, FT, IT and ITW versions. The LDK 300 is replacing the 100 and 200 series cameras.

Also new for Thomson Grass Valley was its Triax Repeater, offering HD transmission up to 2000 meters with 14mm triax. The C2IP camera-control system can accommodate up to 99 LKD series cameras over Ethernet via TCP/IP, compatible with all series 9000 control systems.

Dalsa announced that it is targeting its Origin CCD camera, offering 4K image size, for commercial rental availability by Nov. 1. ARRI also displayed updates to its D-20 project camera released at IBC2003. It features a single, six-megapixel CMOS sensor that has an image area comparable to a 35mm full-aperture film frame, accommodating 35mm cine-lenses.

This year's NAB highlighted some emerging and existing technologies. Next year's NAB promises to bring this year's ideas and concepts to market in production models. Practical cameras with CMOS sensors and non-tape-based camcorders will be the technology to watch. BE

Dan Stark is president of Stark Raving Solutions.

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PRODUCT JACKPOT

A/V SYNCHRONIZER

Fortel DTV FS-516

800-530-5542; *www.forteldtv.com*

Transcode, synchronize and process a variety of source types: NTSC, PAL or SDI with analog, AES, embedded or Dolby audio; create SDI with embedded or AES audio out.

HD SIGNAL ERROR HEADROOM METER

4sight HRM-1500

408-559-0255; *www.4sightproducts.com*

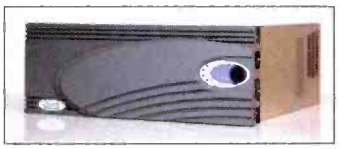
Portable handheld device that quickly displays the spectral health of an HD signal; has an easy-to-read LED gauge; LCD display gives detailed energy readings on the total spectrum, fundamental and harmonic bands.

AUDIO NETWORKING SYSTEM

Calrec Hydra

+44 1422 842159; *www.calrec.com*

Provides a network for the sharing of I/O resources and control data between Calrec digital mixing consoles; Gigabit Ethernet fabric; features high bandwidth and a scalable, flexible architecture; includes remote I/O units with up to 96 analog or digital inputs or outputs; units may be connected onto the same network.



HD/SD MULTIFORMAT ROUTER

Quartz Xenon

888-638-8745; *www.quartzus.com*

Available in two frame sizes; has signal processing technology modules on input and output cards; features optional dual internal controllers for deterministic switching; dual hot-swappable fans and power supplies; all active modules may be hot swapped from the front of the frame.

CONSOLE

Wheatstone Bridge Router

252-638-7000; *www.wheatstone.com*

Design consists of 7-inch rack-mount digital routing cages; handles 512 simultaneous audio channels on its backplane; features bidirectional fiber-optic or CAT-5 interlocation connectivity, all-digital domain AES switching, analog/digital I/O, and serial control and display with Wheatstone consoles.

New Tools

Compression products at NAB2004

BY STEVEN M. BLUMENFELD

At this year's NAB show, there were companies, big and small, showing off tools of the trade using compression.

MPEG is clearly the standard of choice for digital video. Whatever the MPEG incarnation, the digital video world is MPEG. Now, with the ratification of the MPEG-4 standard, a new, scalable coding technique has hit the market. MPEG-4 AVC represents a major improvement in compression technology from MPEG-2 and has been approved for adoption as a mandatory codec for the new HD DVD specification. MPEG-4 AVC and MPEG-4 AAF HE (another standard based on the same compression techniques) were evident in products all over the NAB floor.

KDDI R&D Laboratories

KDDI introduced several interesting H.264/MPEG-4 AVC products for the professional and prosumer markets.

MP-Factory is a software development kit for MPEG-1-, 2- and -4, and MPEG-4 AVC featuring real-time encoding/decoding/transcoding, frame-accurate editing, audio/video bit-rate conversion and content-based audio/video indexing. The functional APIs are available on multiple operating systems.

MPEG Edit Studio Pro is a nonlinear MPEG-4, HDTV MPEG-2, and high-definition video (HDV) editing tool. The LE version of this program is bundled with JVC's consumer high-definition camcorder, the GR-HD1, and with its professional high-definition camcorder, the JY-HD10. The program provides nearly lossless, frame-accurate, MPEG-4/MPEG-2/HDV editing. It features logo insertion, scene indexing, a variety of media-conversion capabilities and a software-based HDTV player with a jog/shuttle controller.

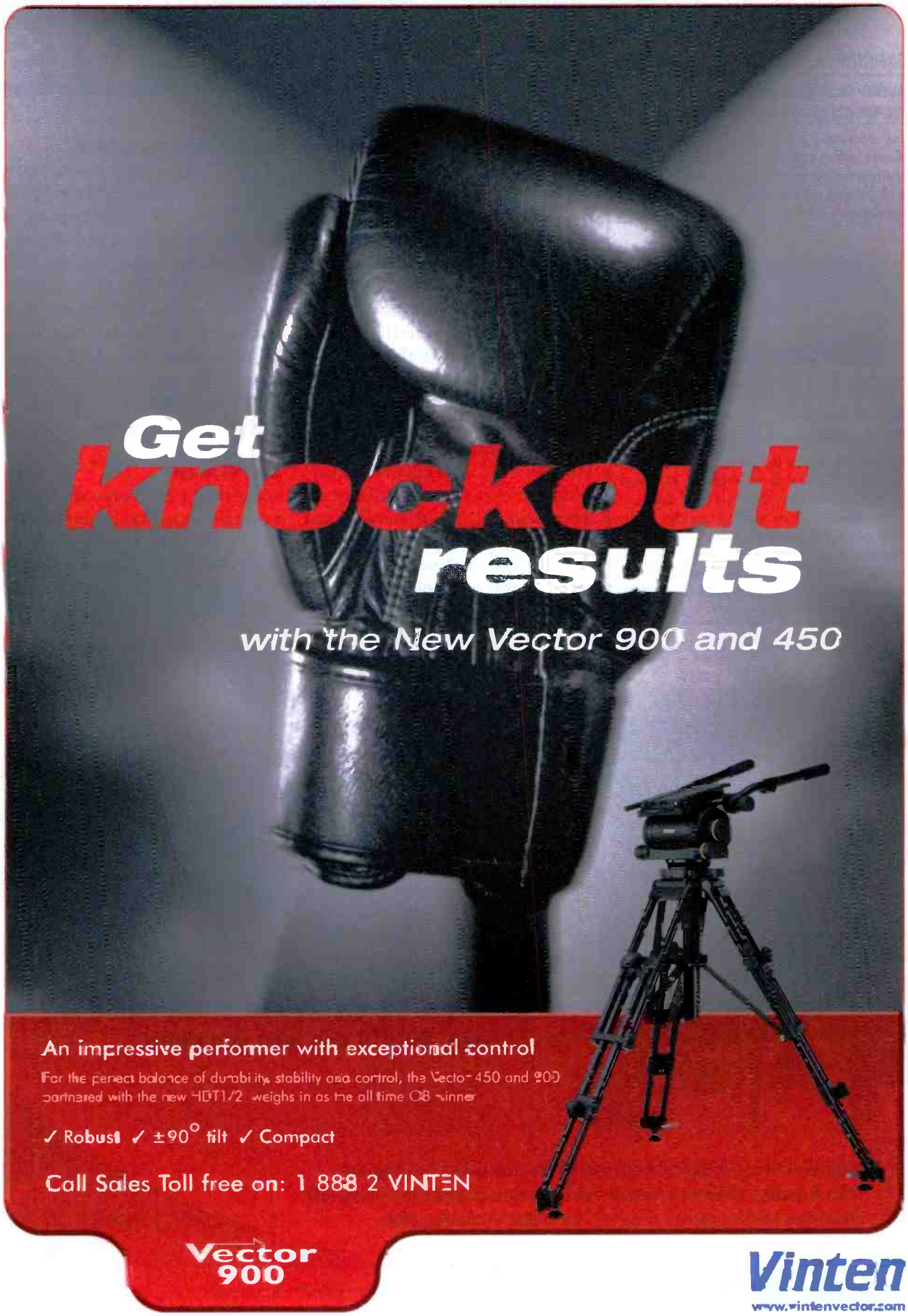
Another interesting product from KDDI is the Highlight Creator automatic summarization software. Based on content-analysis technology, it summarizes input video in two forms, skimming and highlights, and converts summarized video into various formats for streaming and mobile use. Skimming is an outline version of the original content with preferred duration, while highlights is a series of exciting events. Highlight Creator supports MPEG-7-based metadata description.

Everywhere on the floor were companies, big and small, showing off tools of the trade using compression.

Interestingly, KDDI also had a JPEG2000 hardware HDTV codec, the DHS-2000, which enables low-delay, high-quality transmission (50- to 100Mb/s) of HDTV programs.

Envivio

Envivio introduced the 4Forum Lite,



PRODUCT JACKPOT

New Tools

CARDIOID LAVALIER MICROPHONE

Audio-Technica AT898

330-688-3752; *www.audio-technica.com*

Subminiature cardioid condenser microphone offers high-quality, low-profile operation for lecturers, stage and TV talent, and houses of worship; 5mm diameter; operates on battery or phantom power.

DIGITAL MATRIX INTERCOM

Telex Cronus

952-884-4051; *www.telex.com*

32-port in 2RU; a maximum of four units can be linked to form a single 128-port matrix; allows two, three or four matrices to be combined by adding coaxial cable; USB ports for programming available on front and rear panels; fully compatible with all existing RTS matrix products; able to connect via an interface card to existing ADAM matrices.

an MPEG-4 webcasting system. This small, portable appliance enables a networked conference room to broadcast live and on-demand MPEG-4 presentations with synchronized video and the presenter's PC screen over IP networks. 4Forum Lite uses MPEG-4 to deliver interactive and synchronized webcasts with a subsecond latency and can scale delivery to thousands of viewers. Just plug the VGA cable into your laptop and you can be broadcasting in seconds.

Another Envivio product, 4Front MPEG-4 IPTV, is middleware for network operators. It creates a client-user interface and fills it with metadata and business rules defined by the network operator. 4Front allows a network operator to offer a complete set of digital TV services.

DG2L Technologies

DG2L Technologies boasts that its DG2L Neuron, with multinetwork and HDTV MPEG-4 capabilities, can deliver high-definition and standard-definition interactive broadcast and IP streams over DVB-S, DVB-C, DVB-T and IP networks. The Neuron STB also offers advanced digital services, including video on demand (VOD), pay per view (PPV), personal video recording (PVR) and MPEG-4 systems layer interactive program guides.

SkyStream

SkyStream Networks showed the real-time, broadcast-quality MPEG-4 AVC encoding capability of its Mediaplex-20 video-delivery platform. The delivery platform offers reliable IP video delivery with forward error

PRODUCT JACKPOT

MULTICHANNEL AUDIO MONITORING SYSTEM

Genelec 1029.LSE Powerpak
508-652-0900; *www.genelecusa.com*

Consists of five 1029A two-way, biamplified active monitors, one 7060A LSE series active subwoofer and an acousti/tape frequency/wavelength measuring tape; includes a setup guide for accurate speaker placement, wiring and fine-tuning.

PROGRAM-INSERTION MONITORING SOFTWARE

Pixelmetrix DPI Auditor
954-472-5445; +65 6547 4935;
www.pixelmetrix.com

Allows broadcasters to monitor and audit the accuracy of digital program insertion; built-in function for the DVStation and DPI Auditor; separate DPI analysis application with enhanced features.

DIGITAL MEDIA DELIVERY SOLUTION

DEMO ROOM

Telestream ClipMail Pro
877-257-6245;
www.telestream.net

Transmits MPEG signal to Telestream appliances or FTP servers anywhere; choose the transmission speed and video quality desired; send and receive approval to master quality video; deliver over any global IP network connection.

INTEGRATED MEDIA PLATFORM

HP Digital Media Platform
650-857-1501; www.hp.com

Simplifies and reduces the cost of content production, distribution and consumption; links production and post-production processes in a workflow-based system; enables shared use of a common set of media assets for rendering, editing, workflow, archiving and restoration.

PLUG-INS

VDS Synapse
631-249-4399;
www.videodesignsoftware.com

Features three new plug-in bundles for Quantel's generationQ range; supports After Effects plug-ins within the Quantel user interface.

New Tools

correction (FEC), transrating and video-stream replication to different platforms simultaneously, along with bandwidth-rate reduction and MPEG-2 and MPEG-4 encoding and transcoding, all in the same high-density, multichannel chassis.

Ahead Software

Now, even Ahead Software has jumped into the compression fray with an update to Nero Digital, claiming to take AVC and AAC to a level of performance not previously seen in any MPEG-4 audio and video compression technology. The company's AAC developers have created optimizations to Nero Digital's HE AAC core codec that includes a downsampled HE AAC mode to provide higher-quality playback for AAC devices.

Apple

Apple showed an updated QuickTime that incorporates an HD AVC video codec. The newest QuickTime AVC codec is scalable, allowing content creators to write their content for 3G phones, HD, and everything in between. At the show, there were announcements and demonstrations of AVC everywhere except in the Microsoft booth because Microsoft has its own proprietary format.

Other players

Microsoft was wooing media moguls with Windows Media 9 HD, mainly announcing integration partners for WM9.

Rainbow DBS' satellite service, VOOM, will use Windows Media 9 as one of the compression technologies to expand its available satellite capacity for HD offerings.

Akimbo Systems will launch an Internet VOD service using Windows Media Video 9 Series and Windows Media DRM.

U.S. Digital Television will use the technology to deliver 12 channels in SD.

Vistacast and WBT Systems will encode curricula in the format for datacasting to distance-learning students.

Harmonic showed the DiviCom MV 100 encoding platform running the Windows Media Video 9 Advanced Profile (4:2:0, eight-bit), producing SD digital video for IPTV applications.

Pathfire announced that it is adopting the technology for use in its new Point-to-Point newsgathering system.

Stradis announced that it is also adopting the technology and will support it on all its future video decoding and encoding products.

TANDBERG Television demonstrated the EN5920 real-time hardware encoder, the only dedicated hardware encoding platform for Windows Media 9 Advanced Profile that is currently shipping.

Microsoft was wooing media moguls with Windows Media 9 HD.

Digital Rapids demonstrated a real-time, software-based, WMV HD encoder featuring a multiformat HD capture card, extensive A/V preprocessing capability and Stream Pro encoding.

Inlet Technologies demonstrated HD Workbench, an application that streamlines professional encoding from AVI, MPEG-2 and other formats into high-quality, WMV HD content. Other features include batch-mode encoding, StreamRepair for reliable two-pass encoding, and controls for frame-accurate encoding from a file or tape.

Again, as in the past, compression is playing a large part in the digital revolution. But, this year, it is hidden behind a cloak of great products. BE

Steven M. Blumenfeld is president of StudioBroadcast.com

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HD/SD Multi Bit Rate products line-up

Digital Video Switcher

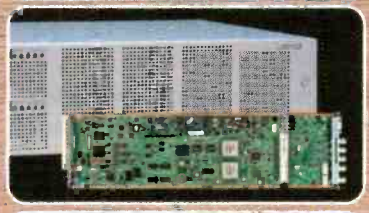
1M/E HANABI

More compact but yet maintaining the same knowhow of HANABI 2M/E model, the new 1M/E HANABI offers two types of control panels for live and edit applications.

Routing Switcher

RS-HD Series

It provides dependable and versatile signal routing capacity for HD-SDI or SD video based systems. Easily control routing setups and switchers via RS-RU series remote control units.



Frame Synchronizer

UFH-70FS

New frame synchronizer module for HD Universal Frames is capable for the synchronization for HD-SDI or SDI signals. Conveniently installed into the various UFH frames depending on the system requirements.

Character Generator

3D-VWS

It is an advanced and versatile character generator with full store capability. One of the multi use was implemented by adopting OpenGL technology.

RCG Solution / Virtual Studio System

digiStorm

Joint development of FOR-A and Brainstorm Multimedia, it is compatible with wide range of virtual studios and real-time computer graphics.

Digital Color Corrector

DCC-70HS

Compact digital color corrector offers superior 14-bit, 4:4:4 component signal processing circuitry and the ability to control Black, White and Gamma (RGB) levels individually or as a group.

Digital Super Keyer

DSK-70HS

Compact and lightweight multi-format digital super keyer supports both HD and SD signal formats using one line input channel and one title input channel.

Video Stabilizer

IVS-700HS

Uses a moving image processor to electrically correct the image shaking occurring in cameras. It can correct just the unintentional unsteadiness, while maintaining the panning or tilt movements of the camera.

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PRODUCT JACKPOT

UHF BROADCAST ANTENNA

Radio Frequency Systems Superturnstile UHF antenna

203-630-3311; *www.rfsworld.com*

Ultra-slim and lightweight super-turnstile UHF broadcast antenna supports the entire U.S. and European UHF bands; ideal for low and medium broadcast applications; low drag profile underpins the antenna's high wind-speed rating and low wind-load characteristics; horizontal polarization; base flange mount; 4, 8, 12, 16 lambda configurations.

MATRIX PLATFORM

Riedel Artist S

818-563-4100; *www.riedel.net*

Provides a decentralized infrastructure for broadcast-quality live audio and talkback applications via a unique fiber-based network backbone; able to create elaborate systems; ensures reliability via its redundant dual fiber ring; ranges in size from 8x8 up to 512x512.

VIDEO SERVER OPTIONS

360 Systems Image Server 2000

818-991-0360; *www.360systems.com*

Graphics and DV option provides for rapid import of files over Ethernet from graphics programs and format editors; enables ganged playout of key and fill; offers mixed-format playout including MPEG and DV video clips, full-screen graphics, and graphics with a key and animations; option can be ordered with new Image Server 2000s or installed in existing units.

MULTIFUNCTION PROCESSING MODULE

Teranex XM

407-858-6000; *www.teranex.com*

Gives broadcast, cable and satellite providers the ability to perform format up/downconversion of source feeds to support a customer's format infrastructure; addresses high-density traffic areas; fits in Thomson Grass Valley Kameleon modular chassis; suitable for advanced video and image-processing applications.

New Tools

Digital acquisition

BY CRAIG BIRKMAIER

NAB2004 may well be remembered as the turning point for interoperability. It set the stage for a new digital workflow based on the processing of digital media files containing both the essence media and the metadata that describe these media and the ways in which other applications can use the media. The benefits of this approach were visible everywhere at NAB, suggesting that the era of proprietary tape-based video formats, with the costs and constraints they impose, is drawing to a past-due close.

The era of proprietary tape-based video formats is drawing to a past-due close.

At NAB2004, Sony delivered a full-bandwidth HDCAM studio/field recording system, which will compete with the Panasonic D-5 format. The SRW-5000 is a full-bandwidth HD VTR that does not use prefiltering or resampling. Based on the MPEG-4 Studio Profile compression algorithm, the system can write 440Mb/s to tape at 10-bit resolution. It can record all 1080-line frame rates, as well as native 720p at 60Hz.

Sony also unveiled a prototype three-chip HDV camcorder that records HD imagery using long-GOP MPEG-2 at 25Mb/s. But the future for the HDV format remains clouded. The need for a highly compressed tape-based HD acquisition system is questionable, given the trend toward acquiring less-compressed, high-resolution images direct to hard disk or solid-state memory.

A partnership with impact

Several years ago, Apple and Panasonic announced their intention to develop software codecs that would allow DVCPRO audio/video files to be processed using affordable desktop and notebook computers. The DV-25 and DV-50 codecs allowed Apple to validate the concept that software like Final Cut Pro can be used to handle editing and compositing tasks without additional expensive hardware. At this year's show, the companies introduced the DVCPRO HD codec, which enables users to realistically work with and deliver HD using affordable off-the-shelf components from the information-technology industry.

Apple and Panasonic have set the stage for the real HD revolution. But they are leveraging the existing tape-based infrastructure for the moment, while Panasonic puts the finishing touches on P2, its SD memory-based acquisition gear.

To fill the gap, Panasonic introduced a new studio/portable DVCPRO deck that supports the entire range of DVCPRO codecs, from DV-25 to DVCPRO HD. The AJ-HD1200A is the company's first recorder to offer an IEEE 1394 interface operating at 100Mb/s data rate with DV high-definition video streams. Equipped with the 1394 interface, this deck will sell for about $30,000, within the price range of many independent producers. This will allow them to rent HD acquisition gear and finish their HD projects using the same tools they now use for SD production.

Roll your own

Across the aisle, Avid was proving that Panasonic and Apple do not have

Signal Acquisition Solution | SERIES

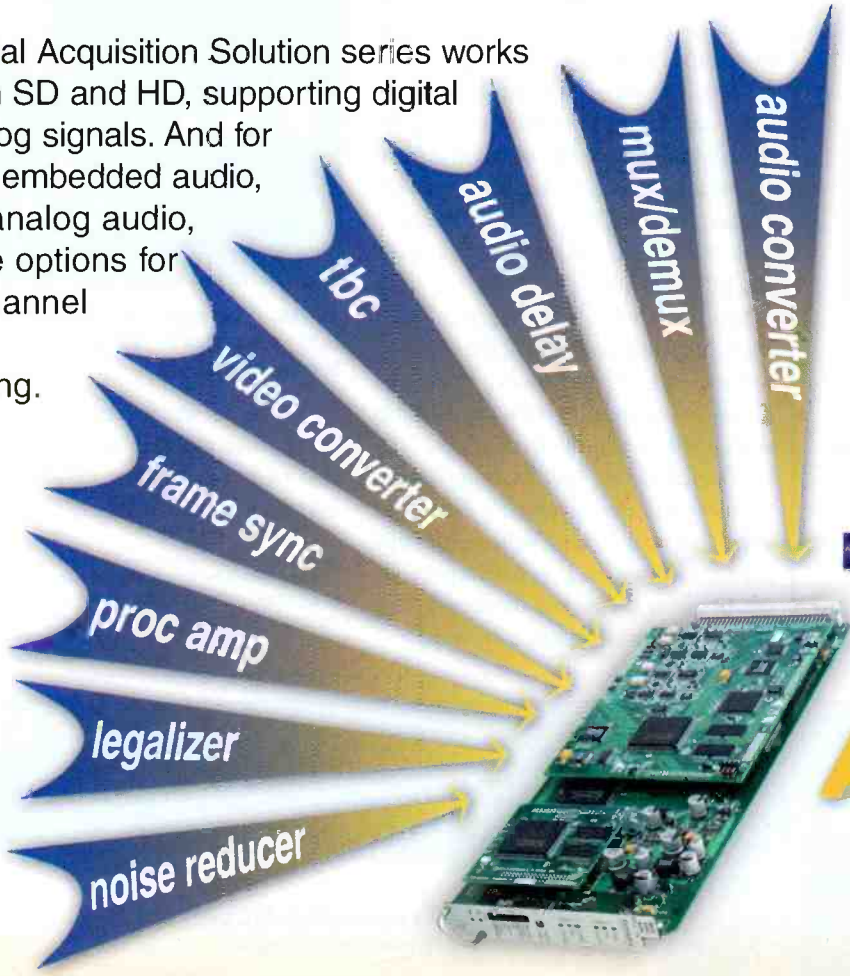
For incoming satellite feeds, ingest areas and remote trucks

Video Processing Frame Syncs:

▲ 7500 - HD SDI I/O ▲ 8400 - SD SDI I/O

▲ 8500 - SD SDI and Analog I/O

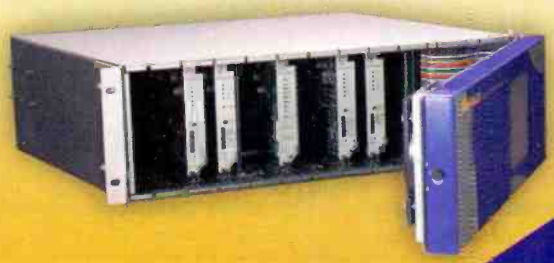
The Signal Acquisition Solution series works for you in SD and HD, supporting digital and analog signals. And for handling embedded audio, AES or analog audio, there are options for 4 or 8 channel audio processing.



These modules cleanly accept hot switched digital inputs and if there is a loss of input, the module will freeze or go to black.

The new Express Panel gives you control over all module parameters and has dedicated knobs for proc adjustments.

New Express Control Panel



AVENUE™

Signal Integration System

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www.ensembledesigns.com

info@endes.com

PO Box 993 Grass Valley CA 95945 USA

PRODUCT JACKPOT

HD ROUTER

Network Electronics Flashlink

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

Provides signal processing and signal distribution; features N-Box, new housing that offers a modular and flexible solution for applications where space is limnited or only card is needed; four N-Boxes can be mounted on a 1RU shelf.

BROADCAST CONSOLE

Harrison TVD SL

615-641-7200; *www.harrisonconsoles.com*

Offers 44 or 60 total motorized, touch-sensitive faders; streamlined layout allows for 33mm fader spacing while offering an eight-character channel display; instant reset-snapshot recall automation of all functions; stereo and 5.1 monitoring, routing, and panning; 16 auxiliary sends.

New Tools

a monopoly on HD innovation. Avid's DNxHD compression system operates in 4:2:2 color space and is available in three user-selectable bandwidth configurations: 220Mb/s configurations for both 10-bit and eight-bit video, and an eight-bit configuration requiring only 145Mb/s. The technology supports 720p at 60fps and 1080p/i HD resolutions at 30-, 25- and 24fps.

Avid is publishing the DNxHD algorithms, opening them up to any company that wants to implement the software. One of the first manifestations of the new codec will come from a longtime partner, Ikegami. At NAB, Ikegami announced it will develop a disk-based HD camcorder that uses the DNxHD codec.

And there were other signs at NAB that companies are taking the need for interoperability seriously. Thomson Grass Valley announced a partnership with Apple, opening up the Grass Valley Digital News Production products to allow the use of Apple's Final Cut Pro. Thomson Grass Valley will supply a Broadcast Plug-in software module to allow the editor to decode files stored on the company's servers.

The survivors of the interoperability battle will be the companies that are committed to working with everyone. Apple and Avid are emerging as the leaders — for now — of the shift from working with formats to working with files. Both companies also understand the importance of working with each other. And their partners understand

At NAB, Apple and Panasonic showed that they understand the importance of interoperability.

the need to work with both. When companies are free to develop tools that work for anyone, anywhere, then everyone wins. BE

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

Obviously, we've got it "COVERED"

Some of our consoles were featured on the covers of *Broadcast Engineering* magazine in 2003. Countless others appear in all the other major industry magazines.

Photo Courtesy:
A.F. Associates & Scripps Networks,
Photography by Robert Wolsch

Our industry is constantly changing, evolving, redefining or reinventing itself. At Forecast Consoles, we work very hard to provide the *Technical Furniture* for this moving target.
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FORECAST consoles

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PRODUCT JACKPOT

SINGLE-CHANNEL CG

Pixel Power Clarity 100

954-943-2026; *www.pixelpower.com*

1RU CG for master control graphics insertion and post production; compatible with all the major master control, branding and newsroom automation systems; can be expanded to offer dual 2-D live squeezeback capability and full-frame cell, text and logo animation effects; can play back and record up to four audio channels.

BROADBAND UHF ANTENNA

Dielectric TUA-M

800-341-9678; *www.dielectric.com*

Mid-power antenna designed for multiplexed digital and analog signals; customized beam tilt and null fill; stainless steel backscreen and radiating element; provides broadband impedance characteristics suitable for single or multiplexed stations; constructed to operate in severe environments subject to high winds and heavy ice loading.

MULTISDI MONITOR

Leader Instruments LV 5700

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

Monitors HD/SD-SDI signals with an XGA TFT color LCD in an adjustable tilt front panel; tests 20 HD-SDI and SD-SDI formats with total digital processing compliant to SMPTE 259M, SMPTE 292M and SMPTE 296M; input format, colorimetry and trilevel or black burst external reference inputs are automatically detected.

CARDIOID MICROPHONE

DPA Microphones Type 4021

+45 4814 2828;

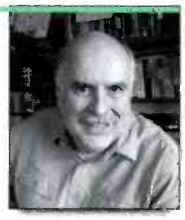
www.dpamicrophones.com/eng_pub/

Phantom powered (P48) condenser microphone uses the same type of cartridge as the Type 4011, but is preamplified using a built-in thick-film-mounted FET-preamplifier; no external preamplifier needed; 5m standard cable is side-mounted; linear frequency response from 40Hz to 20kHz (±2dB).

New Tools

NLEs at NAB

BY BOB TURNER



The 2004 NAB was an exciting show, especially for those looking at digital news editing solutions.

Avid Technology

Avid introduced version 5.5 of NewsCutter Adrenaline FX and NewsCutter XP news-editing systems, the AirSpeed ingest and broadcast playback server, and version 4 of Avid Workgroups.

The NewsCutters now offer support for DVCPRO25, DVCPRO50, DVCAM, and MPEG IMX at 30-, 40- and 50MB/s (including support for Sony XDCAM and Panasonic P2 media acquisition) plus integration with the AirSpeed system. In a release expected before the end of the year, they will also support HDV, DVCPRO HD, and Avid DNxHD. Version 5.5 also introduces MXF support.

Pinnacle Systems

Pinnacle Systems had major HD news: All Liquid turnkey NLEs now support HDV, Elite HD (long GOP MPEG-2) and uncompressed HD (Liquid Edition is HDV-only). The company introduced a Liquid HD application that will work with all Liquid editing products. Pinnacle's Liquid HD video editing was awarded a *Broadcast Engineering* Pick Hit award.

Liquid nonlinear editors are now MXF-native and support Sony XDCAM and Panasonic P2 media. They also integrate directly with MediaStream servers and Vortex systems. Pinnacle also introduced CinéWave 4.6, which now supports multiple streams of Panasonic DVCPRO HD in real time. There are over 70,000 Liquid seats sold and Pinnacle announced an annual growth rate of 40 percent.

Pinnacle's Liquid Editing for Workgroups is a complete, low-cost networked editing solution for SD (and soon HD) video that uses Pinnacle's Palladium Store 100 (PS100). This MSRP solution includes 2TB of storage with ultra-secure RAID 10 mirroring.

Thomson Grass Valley

Thomson Grass Valley showcased its digital news-production products, including the NewsEdit XT nonlinear editor, NewsEdit LT laptop-based nonlinear editor (now supporting XDCAM and P2 formats), NewsEdit SC software-based nonlinear editor, FeedClip interactive feed-capture system, NewsQ manual playback system, NewsQ Pro automated news playback system, NewsBrowse Web-based browser/editor, Network Attached Storage system, Open SAN system, Profile XP media platform and Profile network archive.

One of the big announcements was that Apple's Final Cut Pro will be integrated into the DNP family through a Thomson Grass Valley professional plug-in module. Final Cut Pro 4.0 and Final Cut Pro HD work with the Open SAN system or the M-Series iVDR.

Quantel

Quantel launched QEdit for news and sports editing. QEdit is a low-cost, software-only application accessing the powerful version 2 GenerationQ editing tools. One unique feature is custom transitions. It allows a TV station's graphic designer on a QPaintbox or QEditPro to create a customized template for effects that could include directional blurs, flashes to color, resizes in 2-D and 3-D plug-ins, then effectively clusters these effects into one

saved transition that any of the networked QEdit desktops can drag and drop onto a clip. This creates identities that help stations differentiate themselves from competitors — especially during sweeps periods. Quantel plans on making generic, customizable custom transitions available for download on its Web site.

The system offers a wide range of tools to clean up white balance, resize images for content or quality purposes, and track/blur or mosaic to hide identities. While other systems may offer similar features, QEdit has what are called one-shot effects, which enable users to fix white balance with a single key press. There is a single-key resize, a tracker that does not require complex key-frame programming, and a one-shot choice of blur or mosaic that tracks easily. You can even spotlight the desired area, darkening the background simply and easily. Direct-to-timeline editing through IEEE 1394 is another distinguishing feature. It is a perfect fit between the QCut cuts-only application and the QEdit Pro craft editor. Interoperability with P2 and XDCAM acquisition technology was also demonstrated.

Canopus

Canopus unveiled its EDIUS HD turnkey broadcast editing solution. It includes EDIUS Pro real-time HD/SD editing software, the Canopus HD and HQ software codecs and the Canopus HDRX-E1 SDI-HD SDI I/O card. BE

Bob Turner is a contributing editor to sister publication Video Systems *magazine and an editing consultant.*

PRODUCT JACKPOT

STUDIO LENS

Canon DIGISUPER 22xs

516-328-5000; *www.usa.canon.com*

Also known as the XJ22x7.3B IE-D; compact box-style design; 13.4-pound package; offers a focal length of 7.3- to 161mm (14.6- to 322mm with a 2X extender); maximum zoom speed of .5 seconds and focus of 1.5 seconds; F stop of 1.8.

NEWS PRODUCTION SYSTEM

Sundance Digital NewsLink v2.0

972-444-8442; *www.SundanceDigital.com*

Provides array of news production tools including camera control, audio and switcher controls, plus a range of video server controls; allows structured newscasts to be built with macros or drag-and-drop control; automation level can be selected on a show-by-show basis.

PRODUCT JACKPOT

VIDEO CAPTURE CARD

AJA Video Systems Kona 2
530-274-2048; *www.aja.com*

Dual-rate HD/SD 133MHz PCI-X capture card supports uncompressed 10-bit SDI, HD-SDI and dual-link 4:4:4 HD at 10 and 12 bits; features eight-channel AES audio, HD/SD component analog video output and broadcast-quality HD/SD hardware up/downconversion.

EDITING CONSOLE

Forecast Consoles
IMAGEMASTER NLE
800-735-2070; *www.forecast-consoles.com*

Pre-engineered editing consoles incorporate benefits of MASTERail console system; expandable and quick to ship; offer deep counters and accessible counter bays for applications including linear, nonlinear, multimedia and graphics.

FOCUS ASSIST SYSTEM

Fujinon Precision Focus Assist
847-945-8923; *www.fujinon.com*

Built-in feature precisely adjusts the lens for optimum focus; can perform on wide shots without initial tight zooming; initially available on the XA101x8.9BESM HD zoom and HA13x4.5BRD-S28K wide-angle lenses.

AUTOMATION INTERFACE

Crispin PSIP updating interface
Crispin: 919-845-7744; *www.crispincorp.com*
Link Electronics: 573-334-4433; *www.linkelectronics.com*

Dynamic PSIP updating interface works with Link Electronics' TVLinx and a station's traffic software for real-time PSIP based on actual on-air events at master control.

NEWSROOM SYSTEM

Dalet DaletPlus News Suite
212-825-3322; www.dalet.com

Newsroom computer system with rundown management and integrated video and text and a prompter interface; provides media asset management and archiving, ingest, desktop editing and playout automation.

New Tools

RF at NAB2004

BY DON MARKLEY

At the last few NAB shows, the most interesting RF products exhibited were all closely grouped around digital broadcasting. Well, they were this year too, but they were more than just small improvements to existing products.

Thales introduced new common-amplification analog VHF transmitters that use liquid cooling. Thales claims this will reduce long-term operational costs.

Thales also introduced its latest IOT DTV transmitters. They liquid-cool the amplifiers and exchange the heat to standard external cooling units. The advantage is that only a small amount of coolant, the oil, needs to be maintained as "pure." Also, a solid-state switch on the AC mains replaces the old, high-maintenance crowbar circuits.

Harris showed a new STL system called Intraplex STL HD Plus. It transports HD audio, LAN/WAN data, telephone, intercom-voice and remote-control signals over a single T1 connection. For UHF, the company showed a new line of high-power ATSC transmitters designed for high efficiency. They replace many of the manual adjustments for IOT phase and gain corrections with advanced digital-adaptive circuitry.

Zenith showed its newest DTV receivers, which can deal with a 0dB echo without losing picture quality. Thus, the prediction that receivers would solve multipath problems appears to have come true.

RFS showed some changes in its antenna line, most notably a new superturnstile UHF antenna. This low-cost antenna for translators, LPTV or low-power DTV covers the entire UHF band without tuning and is available in either an omnidirectional or cardioid pattern. The lowest-power, single-station version of this antenna will cost under $10K. The full-bore, 16-bay version with enough power capability for several stations will cost $20- to $25K.

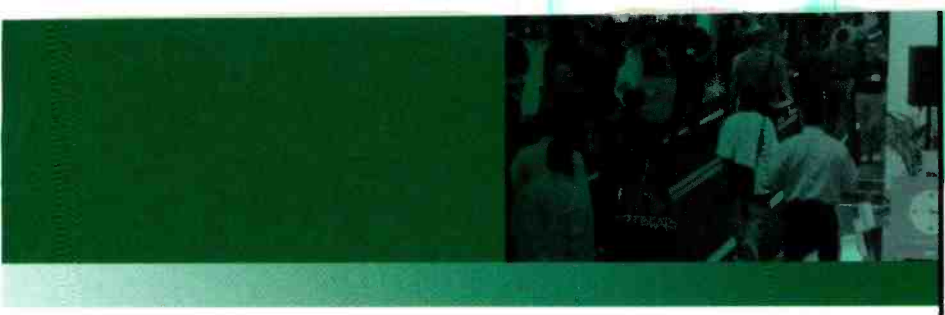
Broadcast Electronics had an interesting item, the Big Pipe STL. This point-to-point wireless link can be scaled up to bidirectional capabilities of 45Mb/s. That means that one system can carry it all, including digital audio, analog audio, AES/EBU uncompressed audio, RDS or HD radio data plus Ethernet and RS-232 communications.

One big push this year seemed to be for large, wide-area control systems to allow one point to monitor/control transmitters over the whole country.

One big push this year seemed to be for large, wide-area control systems to allow one point to monitor/control transmitters over the whole country. Obviously, this is aided by the use of our old friend, the Internet. RFS, Harris, Burke and others showed systems that perform this function.

DRS Technologies showed a beautiful 100kW shortwave transmitter.

Axcera introduced a new line of VHF transmitters. The Innovator HX is available for full-power analog operation with either internal or external diplexing. For stations planning to stay



with their VHF channel, an internally diplexed transmitter needs only a DTV exciter and mask to make the conversion when ready. The transmitter is available with a switching or linear power supply.

Axcera also has a full line of IOT transmitters for UHF and a line of low-power, solid-state transmitters for both VHF and UHF. The company now proposes the use of frequency-agile DTV translator/booster systems with its low-power transmitter line. Papers given at the show and available at the Axcera Web site explain how this will all work. Essentially, it proposes that broadcasters can chain translators together in amazingly long strings without signal degradation. Each site can return the digital signal to baseband, apply error correction, modulate the signal and convert it to the desired channel. The upconverter, which is the agile component, actually picks up the channel.

Axcera is quick to point out that fewer frequencies are needed for cross-country translator systems. The idea is that the same two frequencies can be repeated over and over again. If the system detects any small remnant of the co-channel signal, it simply treats it the same as a multipath signal with no harm to the signal. As pointed out earlier, the newest receivers are solving this multipath problem. Visit the Axcera site to review the papers. The digital translators are poised to make some big changes in that industry.

The big shock in the industry was the news that Andrew was selling its broadcast operation to ERI. This has created some interesting changes. Andrew and ERI shared a booth on the TV side, and former Andrew staff showed up with ERI badges. This will undoubtedly lead to some interesting products. But, right now, the change is still occurring and it is too soon to look for new products. Nonetheless, the change has moved quite a bit of the antenna and hard-line manufacturing capability to the ERI site, and the rest will soon be there. ERI is making a large commitment here, and we all wish them the best of luck.

Finally, Dielectric Communications showed a new line of manifold combiners for analog and digital television systems. The units offer good characteristics; the big advantage is reduced space requirements.

In all, it was a great year for the RF side of the business. It was nice to see some action here that compared to the digital whiz-bangs offered by the studio crowd. Especially since your aging author doesn't understand what those studio folks are doing anymore. BE

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

PRODUCT JACKPOT

SD CAMERA

Hitachi HV-D15AS

800-225-1741; *www.hitachi.com*

Features 65dB SNR, automatic exposure range with 10 F stops and low power consumption; Hitachi processor provides high resolution and color reproduction; features noise reduction to reduce grain and other artifacts.

WAVEFORM MONITOR

Hamlet Flexiscope

+44 1494 729728; 321-939-0457; *www.hamlet.co.uk*

Specifically geared for audio and video test and measurement; combines HD capability and a flexible architecture with low power consumption; palmtop unit provides integral 3.5-inch TFT display.

INTELLIGENT A/B SWITCH

Microfirst MPS-9810

201-651-9300; *www.microfirst.com*

A new redundancy option for the Digital Automation System (D.A.S.); monitors the D.A.S. and switches up to 32 asynchronous serial communications ports over to the backup automation processor (AP); a mirrored database of the primary AP enables seamless switching in case of a failure.

CONDITIONAL-ACCESS SYSTEM

Irdeto Access Irdeto Chip on Board

858-668-4800; www.irdetoaccess.com

Niche content providers can distribute Common Interface Conditional Access Modules (CI-CAMs) with an embedded Irdeto Access smart card; CI-CAMs work in compliant STBs to allow auto-expiring free trials and normal subscriptions.

PRODUCT JACKPOT

RECORDING MEDIA

Fujifilm DP1001 126E XL/DP151 126 XL

914-789-7916; *www.fujifilm.com*

The DP1001 126E XL provides 126 minutes recording capacity in DVCPRO HD mode; the DP151 126 XL provides 126 minutes capacity in DVCPRO50 mode and 252 minutes in DVCPRO25.

ONLINE STORAGE SYSTEM

SeaChange MediaCluster 2G

978-897-0100; *www.schange.com*

Supports serial-ATA or SCSI drives in 6RU, 4RU or 2RU chassis; 1080 disks provide universal, format-independent access to more than 240TB of RAID 2 storage.

BROADCAST CONSOLE

Studer Vista 8

818-920-3212; *www.studer.ch*

Combines the automation capabilities of the Vista 7 and the on-air ergonomics of the Vista 6; redesigned central control bay houses 12 faders and a Vistonics TFT screen, with direct access to up to 52 output signals.

EDIT CONTROLLER

Accom Axial/MX

650-328-3818; *www.accom.com*

Supports uncompressed editing in all SD and HD formats including 24p; offers eight-channel audio edit capability; features include intelligent auto-caching, auto-assembly and optional simultaneous four-stream digitization for streamlined tape room operations.

HD/SD ENCODER

Radyne ComStream HE4000

602-437-9620; *www.radynecomstream.com*

Uses latest Tiernan technology to offer simultaneous HD/SD video encoding; flexible design architecture enables custom configurations to suit any encoding requirement; most advanced features are available as field software upgrades; features include two-pass HD encoding, 4:2:0/4:2:2 encoding and built-in video upconverter.

New Tools

Routing switchers

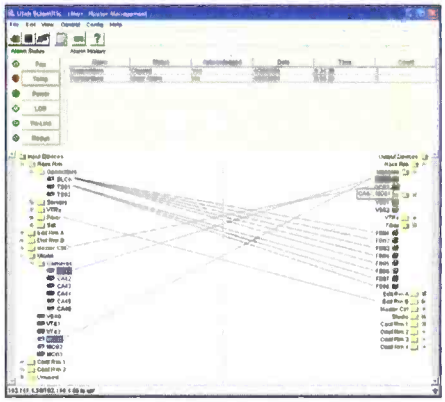
BY JOHN LUFF

One might think that nothing new in routing can be created, but manufacturers have been hard at work creating new and powerful products for infrastructure routing. For instance, Quartz introduced the Xenon routing switcher family. It incorporates submodules that allow users to add functions, such as initial graphics overlay with up to eight keys, internally. You might use this as a minimaster control with no external wiring. The company plans to offer modules that shuffle embedded audio and perform other functions. This approach to building complex systems inside an integrated box may signal new directions for the industry.

Quartz's unique approach for building complex systems inside an integrated box may signal new directions for the industry.

Some routers represent a single point of failure, but Utah Scientific has added redundant automatic failover crosspoint cards to its Utah-400. This unique feature allows users to replace failed cards without disrupting a single signal path. The routers also include signal-presence detection, which can be used to set up signal-restoration paths when an input signal has failed.

Thomson Grass Valley has introduced a new small-scale router family, Acappella, which offers up to two levels of 16x4 routing in a single rack unit. An abridged version of the company's Encore control system, Prelude, is embedded in Acappella, offering sophisticated features in a small router. Prelude can control routers up to 128x128. Acappella marks the company's return to small routers after the demise of the TEN-X series some time back, though Acappella has more power than many small routers. The company continues to provide large routers in the Trinix series (narrow- and wideband video up to 512x512 in one frame) and Apex series (TDM audio router up to 256x256 in one frame), under the control of Jupiter, Encore and Concerto control systems, which all support SNMP monitoring. The Trinix line now includes analog-to-digital converters on input modules as well as digital-to-analog converters on outputs. Thomson Grass Valley also announced optical output modules for Trinix.



Utah Scientific's rMan router management application is software used to graphically show the connections between specific inputs and each output within a routing system.

NVISION introduced its highly

NAB attendees visited booths and saw demonstrations of many new products for infrastructure routing.

expandable NV7512 large-scale TDM audio router, which handles both AES and MADI inputs. The product can be expanded to 4096 by extending the TDM bus between frames. The company also showed an HDTV version of its NV5128 router with integral MCR switcher modules.

PESA introduced Premier, a small-scale router that ranges in size from 8x4 to 16x16. It can accommodate multiple signal formats, including composite, Y/C, RGB, RGBHV and stereo audio. (Future releases will include SDI, HD-SDI and AES/EBU.) The company also showed Clikcontrol, a Web-based routing-switcher control extension, and the UCI-2000 protocol conversion unit, which can interface to other manufacturers' products.

Leitch continued to show its Panacea, Integrator and Integrator Gold routing products in a variety of sizes, but offered no new routing products. Sony showed its established SDI routing switchers, which included the HDSX5800 wideband system.

Pro-Bel showed a new ATM-based audio-routing product, Sirius Fusion, which uses the AES 47 standard and also can route MADI as AES. The product line includes A/D- and D/A-converting I/O interfaces and up to 128x128 in a single 7U frame. Pro-Bel had one of the most entertaining booth presentations, employing a contortionist to symbolize its products' flexibility. BE

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

PRODUCT JACKPOT

HD MONITOR

ERG HDM-EV80D

+81 3376 081 61; *www.erg-ventures.co.jp/e*

Rack-mounted, 8.4-inch HD monitor offers enhanced color and gamma adjustment functions and a memory preset function; HD/SD inputs can be intermingled; four input options and a DC output simplify wiring two monitors consecutively from one DC unit. ■

UPS

MGE UPS EPS8000

714-557-1636; +33 4 76 18 30 00; *www.mgeups.com*

Built-in Web server capability enables detailed UPS monitoring from remote locations; assures true digital power quality for enterprise applications in models from 555kVA to 800kVA.

DIGITAL ASSET MANAGEMENT

ARKEMEDIA Technologies Enterprise Edition

+44 1256 869 200; *www.arkemedia.com*

Compliant with all metadata standards; features hierarchical and extensible metadata tools, thesaurus functions, taxonomy management, media object and asset versioning, extensive folder features and dynamic asset associations.

GLOBAL END-TO-END HD SERVICE

BT Broadcast Services

202-721-8599; *www.bt.com/broadcastamericas*

Fully integrates fiber and satellite; designed to increase revenue opportunities for broadcasters by enabling them to meet the expected surge in demand for HD coverage of major sporting and entertainment events around the world.

AUTOMATION SOLUTION

Digital Transaction Group AIRO

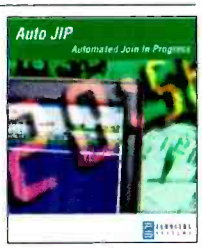
512-837-3737; *www.dtgtv.com*

Designed for master control automation and broadcast transmission control of single- and multichannel broadcasting operations in assisted, unassisted or unattended operations.

AUTOMATED JOIN IN PROGRESS

Florical Systems Auto JIP

352-372-8326; *www.florical.com*



Designed to make it nearly effortless to join a program already in progress, such as when a live sporting event runs longer than expected or when a breaking news event ends; operators simply push a button to signal the end of the live event, and the rest is automatic.

Storage

BY C. JASON MANCEBO

Recent advances in storage technologies provide great advantages to the digital entertainment field. Certainly, as content moves from tape-based storage to hard-disk, optical and solid-state storage media, exploiting these IT technologies can reduce the cost and increase the performance of the final solutions.

Under the hood

Until recently, the hard-disk technologies of choice were SCSI and Fibre Channel. These enterprise-level drive technologies were designed and well suited for the high-duty-cycle, real-time demands of film and video applications.

Because SATA was well received in the marketplace last year, NAB2004 turned away from hardware and focused much more on software storage solutions.

Real-time content collaboration, a.k.a. workflow, is a key concern, and the refinement of shared, clustered file systems is a prime, innovative technology. The Holy Grail of storage is the use of centrally located, shared-storage resources with simultaneous real-time shared content. It's important to note that not all storage-area networks have this important feature.

Apple's Xsan is the new player in this arena. Riding on the success of Final Cut Pro and the newly introduced motion graphics package, Motion, Xsan is a 64-bit cluster file system for the Mac OS X Panther. The platform can share files and volumes up to 16TB in size on a high-speed Fibre Channel network. Additionally, it's designed with bandwidth reservation, a critical feature that ensures that a critical file-system client application gets the performance it requires.

Another SAN player is Bright Systems. Its Linux-based SAN controller provides a similar clustered file system. But, unlike Apple's Xsan, the Bright Systems' controller can support heterogeneous SAN clients, including Linux, Apple, SGI Irix and Windows.

Texas Memory Solutions showed its RamSan-320 solid-state disk, which it claims achieves 1500MB/s random sustained external throughput. This may be an excellent solution for those customers who demand a high-performance disk but have less stringent capacity requirements.

Data Direct Networks presented its S2A8500 silicon storage appliance. The system claims 1.5GB/s of sustained throughput with Fibre Channel or SATA disks.

What format war?

Given the two new storage platforms introduced last year, Sony's XDCAM and Panasonic's P2, you would expect many third-party vendors to announce their system of choice this year. And the winner is — the user!

Third-party vendors eagerly embraced both Sony's and Panasonic's storage solutions, and most vendors declared themselves format-agnostic, willingly supporting both XDCAM and P2.

Sony announced a technology partnership agreement with Avid that enables images acquired with XCDAM to be compatible with Avid's NewsCutter and Media Composer NLE systems.

Also, Quantel announced it would offer interoperability between its generationQ editing and server systems and Panasonic's professional plug-in P2 solid-state-memory-based acquisition system.

Thomson Grass Valley initially will integrate the Panasonic P2 card, into its current-generation digital news production products, NewsEdit and

M-Series iDVR devices. Eventually, it will use the card across the Profile server and LDK camera lines as well.

Pinnacle announced that Time Warner Cable's NY1 was installing its Vortex networked news system and equipping it with support for Panasonic's P2.

Omneon announced that its SPECTRUM media server is compatible with Sony's XDCAM. Ingested content becomes immediately available across an entire facility, thereby providing a significant improvement in the collaborative production process. Omneon also announced enhancements to its SDTI media-interface adapter to support Panasonic's compressed HD format, DVCPRO HD. With this addition, the SPECTRUM is capable of supporting all HD broadcast formats simultaneously, including MPEG, HDCAM and DVCPRO HD. Omneon also announced its support for MXF.

Other storage highlights

Thomson Grass Valley launched Profile in its new, sixth-generation version as the Profile 6G. It uses the same popular user interface, but it now includes the ability to operate in SD/HD modes in a more compact version.

SeaChange introduced its next-generation MediaLibrary 2G online storage system. The storage system supports serial-ATA or SCSI drives in compact 6RU, 4RU or 2RU chassis. A fully configured ML 2G system can support 1080 disks online, providing universal, format-independent access to more than 240TB of RAID 2-protected storage.

360 Systems has added several new features to the Image Server 2000. The video server now handles FTP transfers between Image Servers and supports NAS storage and other MXF-compliant products.

SGI showed its InfiniteStorage solution for broadcast featuring a data-centric broadcast workflow. Based on the Media Server, it provides enhanced MXF capabilities across the SGI InfiniteStorage TP9100 SAN server line. It can also support CXFS, MassTech, MassBrowse, MassProxy and MassStore for low-resolution browse, proxy and archive applications. Third-party support for SGI's CXFS file system comes from several vendors, including Alias, Apple, Discreet and Quantel.

SGI also highlighted its MXF integration by demonstrating working systems with Avid NLEs using multiple SGI Media Servers, all under the control of Harris automation. Atlanta-based Crawford Communications announced that it has purchased fully redundant CXFS servers with 4TB of TP9500 storage. Georgia Public Broadcasting has also invested in SGI technology by operating a complete IT infrastructure that facilitates easy file sharing and complex media management.

Doremi Labs showed its MCS-HD video server with four independent, shared-storage channels, two play channels, two record channels, selectable compression rates and a VTRlike front panel.

Leitch was highlighting its NEXIO modular, scalable server system for transmission and news environments. It serves integrated applications with a reliable platform for editing, browsing and media management across a multitiered storage hierarchy. The server provides fault tolerance and interoperability (including IP), and supports multiple compression formats in both SD and HD.

While there were both innovative and not-so-innovative storage solutions shown on the exhibit floor, at least most were not the smoke-and-mirrors demos of years past. They are real, deliverable products. BE

C. Jason Mancebo is chief technologist at Korsade Technologies, a broadcast and digital media technology consulting firm in Silicon Valley.

PRODUCT JACKPOT

ZOOM LENS

ZEISS/Band Pro Carl Zeiss DigiZoom

Zeiss: *www.zeiss.de*; Band Pro: 818-841-9655; *www.bandpro.com*

Features a 95mm front diameter and 4x zoom; offers industry-standard pitch, zoom, and focus and iris gears; Carl Zeiss back-focus mechanism accurately maintains calibration across the focusing range; focuses to just 22 inches from the image plane – 11 inches from the front of the lens.

GRAPHICS AUTOMATION SYSTEM

Pinnacle Systems DekoCast Traffic Integration

650-526-1600; *www.pinnaclesys.com*

Allows broadcasters to schedule complex graphics playout with a single automation event; introduces a controllable mechanism for quality assurance of scheduled on-air graphics without master control intervention; on-air promotion can be scheduled as needed; can be run within customers' existing automation systems; template based.

WIRELESS HD CAMERA

Ikegami HDL-0101

201-368-9171; *www.ikegami.com*

Developed with NHK; self-contained, one-man unit with RF links and MPEG compression; selectable from 60Mb/s to 24Mb/s; video with embedded audio is transmitted over a 7GHz COFDM channel with an omnidirectional antenna to the receiving site.

LOGO INSERTER

Keywest Technology LogoStar II

913-492-4666; *www.keywesttechnology.com*

Features logo animation capabilities, an enhanced GUI that allows users to make logos move in any direction, and the addition of nonlinear effects, such as bounce and explosion and DVE-like effects; available in analog and SDI version; upgradeable to HDTV.

TRANSMITTER TUBE

L-3 Communications Electron Devices CEA 80

570-326-3561; *www.L-3Com.com/edd*

The tube can be used if the transmitter is upgraded to digital service at a later date; combines IOT and Multistage Depressed Collector technologies for electron collection efficiency; has demonstrated correctable average power output of 30kW.

PRODUCT JACKPOT

AUTOMATION SYSTEM

ON-AIR Systems ON-AIR Central Version 4.0

+44 20 7663 3663; *www.on-air-systems.com*

New version includes multichannel audio and a restyled user interface; provides end-to-end playout, including automated transcoding, ingest and content management of live data feeds with integrated graphics, playout, logging and creation of management reports.

BROADCAST SYSTEM CONTROLLER

Pharos Communications Pilot MCR

+44 118 950 2323; *www.pharos-comms.com*

Enables full desktop management of broadcast systems; integrates with the established Pilot RT networked-based matrix control system; an enhanced version of Pharos Pilot Designer allows users to configure new device control displays.

PAN/TILT HEAD

Telemetrics PT-LP-S3

201-848-9818; *www.telemetricsinc.com*

For camera and teleprompter systems; all connections to the camera and pan/tilt head are made at the fixed base of the unit, eliminating problems associated with multiple cables revolving with the head, including strain relief and interference.

18-INCH FLAT-PANEL LCD TELEPROMPTER

Telescript FPS-180

201-767-6733; *www.telescript.com*

Designed for studio and large venue productions using full-size studio and ENG cameras; incorporates a rod-mount system for large pedestals with studio cameras; easily installs on-site; is lightweight and offers a high-contrast display.

UHF POWER AMPLIFIER

CPI-Eimac K3 MSDC IOT

650-592-1221; www.eimac.com

Simplified to three stages; achieves 58 percent efficiency; low-pressure, low-flow oil cooling eliminates problems associated with water cooling systems.

New Tools

Streaming media

BY TOM PATRICK MCAULIFFE

Many broadcasters have diversified into other media areas. Diversifying makes good business sense. But making it profitable, especially when it comes to streaming content on the Internet, has always been a conundrum for broadcasters.

At NAB2004, there were more than 300 streaming or Internet-related companies ready to help broadcasters find a way to make the Internet pay.

But broadcasters, despite all the optimistic talk, manufacturer stroking and backslapping going on, have three main problems when it comes to profitable streaming. First, they can't sell ads effectively on the Web. Second, the public can't afford broadband or DSL-level Internet access and third, even if it could, the majority of the United States still is not wired for the high-speed broadband needed for video and audio. Add the United States' forced conversion to DTV, and you can see why streaming is at the bottom of some broadcasters' to-do lists.

Despite these problems and challenges, there were some great new products on display this year.

Encoda launched its new product, VeriStream, which quickly pinpoints streaming system errors and failures on a LAN or across a worldwide network. The product is designed for multichannel environments, such as cable television headends or direct-to-home broadcast operations.

ViewCast showed its new Niagara PowerStream encoder, which delivers streaming video to mobile/handheld devices. The new Osprey-300 addresses both streaming and video editing needs. The PCI-X bus interface provides compatibility with the latest PC technologies, delivering high-performance/high-bandwidth streaming with professional editing performance.

BBC Technology came from the UK to NAB2004 sporting a new contract with Discovery Networks International to provide high-bandwidth services. It will stream the network's content to Discovery Channel Web site users via its dedicated broadband service.

The real-time, broadcast-quality MPEG-4 (AVC/H.264) encoding capability of SkyStream Networks' new Mediaplex-20 video delivery platform was also on display.

Lots of great gear in the NAB aisles proved, to me at least, that there are many viable solutions that will help broadcasters provide near-broadcast-quality streaming once the infrastructure hurdles are addressed. Rest assured that eventually — once the transition to digital is complete — broadcasters will somehow find a way to make streaming programming profitable. In the meantime, don't hold your breath. It may be quite a while, and there are more important things to do first! BE

Streaming products on display at NAB proved broadcasters will find viable solutions for profitable streaming when the time comes.

Tom Patrick McAuliffe is a journalist, entertainer and contributing writer with Video Systems magazine.

A PRIMEDIA Publication

Broadcast Engineering

www.broadcastengineering.com

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

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PRODUCT JACKPOT

TELEVISION AUDIO PROCESSOR

Modulation Sciences MSI-3300

732-302-3090; *www.modsci.com*

Multifunction unit combines analog-to-AES3 and AES3 (with automatic speed detection)-to-analog conversion with high-quality gain riding and a transmission audio processor; conditions audio for transmission in a variety of media, including cable modulators, satellite uplinks and fiber modulators.

SCALABLE TDM DIGITAL AUDIO ROUTER

NVISION NV7512

530-265-1000; *www.nvision1.com*

Supports analog as well as digital audio signals; linearly expandable to offer 2048x2048 channels; MADI-format multichannel digital I/O also is featured, as well as high-performance 24-bit converters; enables users to manage large numbers of mixed-format audio signals.

DVD AUTHORING APPLICATION

Microsoft DVD Producer – WMV HD Edition

425-882-8080; *www.microsoft.com*

Special version of Sonic's authoring application supports the production of DVD titles using Microsoft WMV HD; WMV HD is designed to deliver HD video at data rates comparable to SD DVD video.

ROUTER

Pro-Bel Morpheus

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

Manages systems from single channels up to the most complex multichannel environments; features the MediaBall concept, which provides a way to handle secondary events such as interactive TV.

REMOTE/SPORTS LENS

Thales Angenieux 70 HD

973-812-3858; *www.angenieux.com*

Delivers a focal range of 9.5mm to 665mm and an aperture of f/2.2; features dust and condensation-free enclosures; requires low power for operation, allowing direct connection of the lens to the camera.

New Tools

Monitoring, test and measurement

BY PHILIP J. CIANCI

Each generation of equipment shown at NAB integrates more test and measurement features and invariably includes some type of monitoring capability. Therefore, monitoring must now be considered part of the traditional realm of test and measurement.

All broadcasters seek a total end-to-end monitoring, test and measurement system for essence, network and software applications. In this era of convergence of broadcast engineering and IT technologies, it was surprising that traditional IT companies, which offer SNMP-enabled network-monitoring systems, did not demonstrate broadcast-related applications. Nor did I find any PC products that monitored configuration/application health.

Now that nearly all broadcast-equipment vendors have incorporated some kind of SNMP capability, many have gone so far as to develop their own resource-management application. Vistek offers ViewNet capabilities for its newly launched range of HD products. Evertz's VistaLINK offers comparable signal-monitoring capabilities for its fiber-optic transmission products and vast array of baseband processing cards.

Addressing the issue of SNMP implementation vendor compatibility, Snell & Wilcox's RollSNMP extends SNMP monitoring available in its RollMap and RollCall to other vendors' hardware and software products. With a feature set that includes unified alarm reporting for all system elements, mapping of system interconnections and identification of the physical location of resources, this integrated application suite approaches complete infrastructure signal-path monitoring, fault diagnosis and resolution.

Facilities spread across large campuses or numerous locations need verification of incoming and outgoing signal quality. For such facilities, Evertz has expanded its line of interface products to fully support HD. These products include integrated monitoring and measurement of signal parameters. And, of course, the requisite SNMP interface is available.

MPEG transport-stream monitoring systems were a hot item again, but this year with a twist: the capability to assess compressed video quality. K-WILL debuted its Video DNA monitoring line, which decodes an MPEG transport stream and analyzes elementary packet video in real time. Rohde & Schwarz's DVQ performed similar functions. Both systems allow an A/B comparison of SDI video with respect to compressed MPEG-2 elementary stream video. DVQ allows users to set QoS levels and trigger alarms to initiate reconfiguration of encoding parameters or distribution paths. Tektronix upgraded its AD953A and claims to be the first with a transport-stream-analysis system that supports both the H.264 and WM9 compression standards.

Digital program insertion is a reality, and verifying that transport streams are compliant with the ANSI/SCTE 35 2001 DPI standard is imperative. Pixelmetrix, known for products such as DVStation-IP (an MPEG-2 transport-stream test-and-monitoring over Ethernet system),

PRODUCT JACKPOT

presented the DPI Auditor, a new DPI software application that features splice information logging and reporting capabilities. This product monitors the compliance of bitstreams for digital program insertion.

Triveni debuted its next-generation DTV transport-stream monitor and analyzer, StreamScope MT-30. It monitors MT-30, DPI SCTE 35 digital cue tones, MPEG-2 PSI and ATSC PSIP. It supports ASI, VSB, SMPTE 310, QAM and Gigabit Ethernet inputs, making this unit extremely versatile.

NAB attendees found that equipment manufacturers are increasingly integrating test and measurement features and including a monitoring capability.

Not to be outdone, Sencore has introduced a DPI monitoring system that logs the start time of the avail, duration and avail count. It can monitor up to eight ASI TS streams simultaneously and log SCTE 35 activity for 25 programs per transport stream.

And, from the other side of the pond, Thales introduced GARNET, a handheld MPEG-2 analyzer, and MPEGScan, a media-file-validation application for TS servers.

Tektronix introduced WFMNLE, which tests and measures graphic effects for compliance with legal color space for Avid tools. Its real-time waveform and vector displays, and its arrowhead and diamond waveform displays, identify component and composite gamut errors. Material can be run through the timeline, errors logged and action taken to correct the violations. WFMNLE is presently available as an Avid plug-in, and there are plans to release versions for other editing systems in the future

For those in the trenches who still need to trace signal paths cable by cable, Wohler will soon offer an HD-SDI signal generator, PenPal HD, which includes 26 video test patterns, 18 serial formats and four stereo pairs of embedded AES audio — and fits in your shirt pocket. It will be an indispensable tool for tracing signal continuity in any size plant.

Leader's LV 5750 portable SDI monitor can help verify HD and SD distribution integrity anywhere in the plant. Full-screen or multiple displays allow viewing of waveform, vector, picture, audio and status. Bar graphs allow you to monitor eight channels of audio. A digital data dump can facilitate TRS, XYZ and VANC analysis.

Last but not least, ENCO's Guardien, a speech-recognition-technology-enabled, automated audio zapper can be trained to recognize the seven (or eight) words that you can't say on the air and will bleep out the offending audio, log the event and save the audio clip. This is certainly a well-timed product introduction. Can a wardrobe-malfunction macroblocking depixelizer be far behind? BE

Philip J. Cianci has been in the TV business for 20 years and done circuit design in the Grand Alliance ATSC prototype system.

BROADCAST DEVICE CONTROL TOOLS

OmniBus Systems G3 Control
303-237-4868; *www.OmniBus.tv*

Provides device access, operation and management over distributed networks; consists of G3 Desktop, G3 Routing and G3 Machine Control; based on standard open-IT protocols.

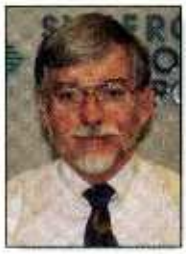
SD MPEG RECORDER

FOCUS Enhancements
FireStore FS-M
408-866-8300; *www.FOCUSinfo.com*

Includes MPEG-2 recording, playout and timeshift recording; timeshift feature enables simultaneous record and playback functions; has a 120GB removable disk drive and is expandable to 200GB; provides more than 72 hours of continuous DVD-quality MPEG-2 recording; user-selectable bit rates of up to 12Mb/s.

Format conversion

BY JOHN LUFF



There was a time when video formats were NTSC, PAL or SECAM. Today, it's not that simple. Not only do broadcasters have to contend with the 50Hz and 60Hz standard-definition systems, but there is also a plethora of HDTV formats in 16:9 aspect ratios, and a few SDTV 16:9 formats as well. To these, add progressive-scan and interlace variants, 24Hz adaptations, and many formats related to the NTSC color subcarrier (60/1.001). It presents an interesting bouquet of possible production and air formats.

As with any conversion between standards, format conversion can be either simple or very complex, depending on which two formats you choose to convert. Converting analog components properly scaled into digital components sampled to meet ITU-R BT601 (SMPTE 259M) is relatively easy. Filter properly, sample, quantize and code the samples for transmission.

But pick a different conversion and the degree of difficulty increases dramatically. Take, for example, a true 60Hz 720p60 HDTV signal and jam it into a 1080i59.94 transmission system. Spatial and temporal samples don't line up nicely for the conversion process. Several things have to happen. First those pesky progressive frames must be sliced and diced into interlace fields. Seven hundred and twenty lines must become 480. Secondly, in the next frame, make sure the vertical samples are interpolated from the correct lines in the 720 frame so they end up a smidge lower to line up with the even 1080i field. After that, begin again. The frame rate doesn't match; so temporally interpolate a few 720 frames to come up with a candidate frame to use for the vertical interpolation to the 1080i (540 line) field. With each successive pair of conversions, the temporally interpolated frame moves a smidge, so its control has to be sophisticated. The line rate is also a tad off frequency as well (1/1.001).

The math involved in the conversion process is complicated. Gennum, a Canadian chip manufacturer, sells a single chip solution to mathematically convert pictures. The GF9320 scaling processor replaces what was once a ½ rack of heat buildup. Arguably, a design using individual components that are optimized for the task might do a better job. But, at first approximation, this is a pretty sophisticated and high-quality solution. Figure 1 shows the chip's capabilities.

Format conversion can be either simple or very complex, depending on which two formats you pick for any particular conversion.

There are several opportunities left to create great conversions, or poor ones. The quality of any A/D and D/A conversion involved in the process is a major factor. Getting the filter mask to match the standard precisely still requires good old-fashioned design talent. Other considerations include integrating a deinterlacing solution and sundry other required components. Clearly, this is no amateur design project for the basement. Many recent, modestly priced conversion boxes offer such integrated solutions, some of which are now confined to a single module in a D/A tray. One manufacturer, Cobalt Digital, sells a box a little larger than my Palm Pilot that does a pretty good job; it is designed using precisely this type of integrated solution.

What sets sophisticated, high-quality solutions

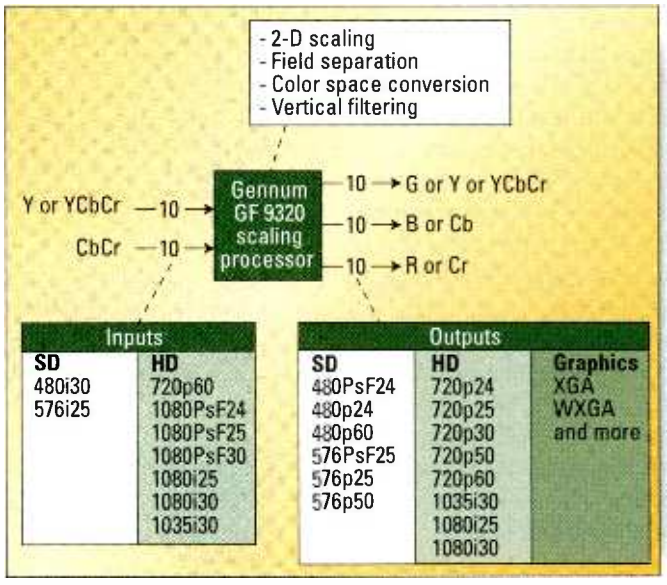


Figure 1. Gennum's GF9320 scaling processor makes converters less costly and complex.

Sophisticated, high-quality solutions are set apart by the quality of the optimized code that controls them, or, in some cases, by a custom integrated solution. For several years, Teranex has offered some of the best conversion equipment available. Its products come as an outgrowth of a processing engine designed initially for government applications. I don't suppose that was used for converting the images from the Hubble Telescope. But, in any event, they designed a box that used multiple processors on multiple boards with more computing power than any of us would know what to do with. This year, the company introduced a new solution, the XM series modular product, which fits in a D/A tray and produces about the same results.

It's pretty impressive, but it's clear that the science and engineering involved are becoming mature. When that happens, competition pushes prices down rapidly. This is happening now, just in time for the serious implementation of HDTV production and distribution systems.

It is valuable to remember why conversion products exist. They are the bridge between eras of technology or between competing economic interests. The 525 and 625 standards coexisted for many years with little interchange before the first converters were put in service in Europe in the 1960s, when Telstar first beamed live television between continents. Telstar 1 launched in July 1962. It permitted only minutes of live connection, but it required a bridge more immediate than kinescope copies sent by commercial aircraft. Today, we see the overlap of NTSC and PAL with HDTV. At some point, other media will supplant HDTV. In all cases, the bridge period requires a new device to enable both technologies to succeed simultaneously. So long as we don't have one world, standard conversion will remain a fixture in the engineer's toolkit.

It is logical to look to a product range that can be used for coversion in both directions. For instance, today we have converters with single inputs that accept either analog or digital inputs and convert to the opposite without reprogramming. The same is true of standards converters that auto sense 625 or 625, or 1080i and 720p, or combinations thereof, allowing outstanding flexibility. This kind of auto-adapting bridge is being moved into master control and routing switchers and even production switchers. At some point in the not too distant future, you will be able to plumb up a system without being too worried about the boxes talking to each other, leaving you to concentrate on programming them for the functions you want them to perform. System integration will become "function integration"...and then it'll be time for me to retire! BE

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

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

4sight's HRM-1500

BY JIM BOSTON, ANDY HUTTON, LOU JANIS AND ROB MARTIN

The error correction and error masking in modern digital equipment ensures that digital signals do not gradually degrade with increasing attenuation in the signal path as analog signals do. Instead, a digital transmission path continues to work perfectly up to the point where it suddenly does not work at all — the well-known cliff effect. As signals approach the digital cliff, errors go rapidly from nonexistent to severe — swamping recovery efforts and making the path unusable.

Bandwidth and signal requirements

Although the SDI signal is digital in nature, it has many analog qualities that can be used to predict how close to the error cliff a particular digital path is. The SMPTE292 bit-scrambling algorithm essentially produces a square-wavelike signal. The peak-to-peak value of this signal should be 0.8V and the rise time or transition time between the 20 percent and 80 percent amplitude points should be only 270ps. Using the distance of New York to Los Angeles to represent one second in time, the total time taken up by a single bit cell would represent less than half a centimeter travel. The HD bitstream has a fundamental frequency of 750MHz. If the third harmonic is added (3 x 750MHz), the resulting waveform resembles a square wave. If additional odd harmonics were added in the correct amplitude and phase, a nearly perfect waveform would result. In reality, with the extremely high bit rates needed for HD, only the third harmonic makes it more than a few feet down a coax.

Spectral analysis

The physical layer used to transport the data is composed mostly of coax, with some connectors and perhaps a jackfield. But coax provides the greatest exposure to problems for a video datastream. Coax's series inductance and shunt capacitance create a low-pass filter. Because attenuation is greater in the higher frequencies, the upper harmonics of the signal disappear. The square wave data signal starts to look more like a sine wave and may become unrecoverable.

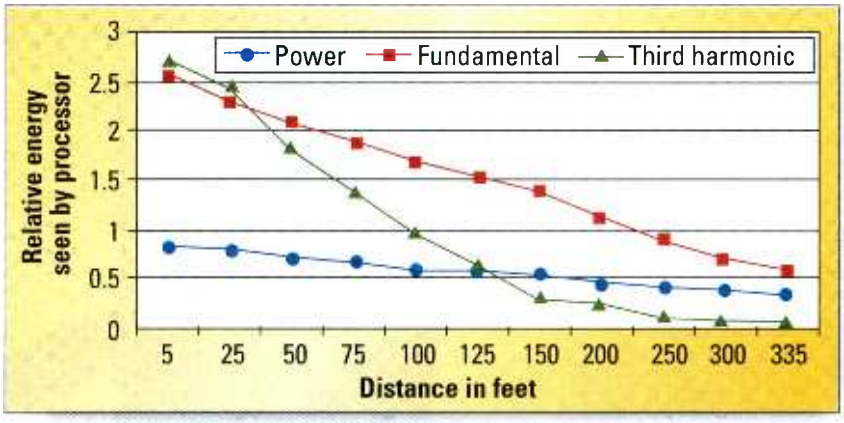


Figure 1. This graph shows the energy loss an HD signal suffers as it travels in a coaxial cable. After traveling about 250 feet, fundamental energy drops to a third of its original value, while the third harmonic drops to the noise floor, making the HD signal unrecoverable.

The bottom line

The weight of the cabling needed in a broadcast facility often equals the weight of the equipment. For this reason, facilities, especially trucks, are built with the lightest cables possible. Many facilities use minicoax, even with HD. Unfortunately, smaller-diameter cable results in increased HF losses. RG-59 type coax might show 5dB loss per 100 feet at 750MHz, whereas minicoax has 9.59dB of loss. At 2250MHz (the center of the HD third harmonic) RG-59 type typically has 9.14dB loss per 100 feet, while minicoax has a loss of 16dB.

Figure 1 graphs energy loss against distance for a coax path. It shows that third harmonic energy drops at a much greater rate than the fundamental energy as distance increases. This is why loss at both levels must be considered.

Usually the error headroom value is checked with expensive test equipment, such as a spectrum analyzer. 4sight's handheld HRM-1500 meter offers broadcasters designing, building and maintaining HD facilities a simple, economical way to check the health of HD signal paths. It determines the amount of energy in the third harmonic, which indicates how close to the error cliff the HD bitstream is. It also provides a simple indication of distance from the error cliff, more detailed information on overall bitstream energy, and a breakdown of fundamental and third-harmonic energy. BE

Jim Boston, Andy Hutton, Lou Janis and Rob Martin are engineers with 4sight. For more information on the HRM-1500, visit www.4sightproducts.com.

Professional Services

Employment

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System Integration

MOBILE UNIT ENGINEER IN CHARGE (EIC) - MIRA Mobile Television, a five truck mobile facilities company located in the Pacific Northwest, is seeking an experienced mobile unit EIC. Minimum of 3-5 years mobile production experience with extensive digital TV systems knowledge and troubleshooting ability. Knowledge of HD systems a plus. Strong client relationship skills mandatory. Extensive travel in western U.S. and western Canada. No Phone calls. Send or e-mail resumes to: R. Kirk, MIRA Mobile Television, 5775 SW Jean Rd., Suite 103, Lake Oswego, OR. 97035, rkirk@miramobile.com, Equal Opportunity Employer

DIRECTOR OF ENGINEERING - WPXI(TV) the Cox-owned NBC affiliate in Pittsburgh is looking for a Director of Engineering. If you're an operations-oriented, experienced engineering manager with strong technical skills, a track record of organizing and managing television operations, and want to be a key leader at a station with a heavy emphasis on local news, programming, and production, read on. Candidates should have a minimum 5-years experience in Television engineering management, a BSEE and a FCC General Radio Telephone License. SBE certification a plus. Must demonstrate success in managing capital and operating budgets, managing computer integration and networking , value effective maintenance practices and cross training. Must have enthusiasm for goal-oriented customer-focused service. We want someone with the management background to oversee our current television facility and help us design our brand new "digital from the ground up" building. Yes, we are breaking ground on a new facility. If this sounds like a perfect fit, you should apply, but only if you're committed to working with and developing a terrific group of people. Want to be part of the team? Send a cover letter and resume to Ray Carter, VP & GM, WPXI, 11 Television Hill, Pittsburgh, PA 15214 Email **rcarter@wpxi.com or fax 412-237-1286. EOE**

WSBC BROADCASTING is looking for a Manager of Engineering. We will soon own five AM stations and one FM station in the Chicago area. We need an experienced person, familiar with AM directional patterns and multi-tower arrays. In addition, the person will be involved in all engineering and technology aspects for this growing company. Resume, job and salary history to: Harvey Wells • WSBC Broadcasting • 1645 West Fullerton Ave. • Chicago, IL 60614. WSBC Broadcasting is an Equal Opportunity Employer.

BERMUDA CABLEVISION - is seeking applications for the post of; General Manager for Cable Television...General Responsibilities: To provide management direction for the activities and operations of the Cable Television systems throughout Bermuda. Core Duties and Responsibilities: Preparation of budgets and forecasts and direction of operations to meet defined objectives for growth and profitability. Management and monitoring of staff to maximise productivity and to improve the quality of customer service. Interpretation and implementation of corporate policies and procedures. Building and maintaining relationships with community, country residents and public officials for the benefit of the organisation. Reporting to corporate office, providing a continuing evaluation of operating results and working with all departments to maintain the highest level of customer service. Also includes interviewing, hiring, and training employees; planning, assigning, and directing work; appraising performance; rewarding and disciplining employees; addressing complaints and resolving problems. Education and Experience: Bachelor's degree (B. A.) with a minimum of 5 years experience in the Cable Television industry covering operations and maintenance of systems including knowledge of digital television roll-out. Experience in government relations required. A formal financial qualification would be of distinct advantage to applicants. Other Requirements: PC skills including presentation and accountancy programmes. Strong organisational skills. Excellent overall communication skills. Must be committed to providing exceptional service at all times. Salary and benefits will be commensurate with experience. Applications in writing only are invited and should be addressed to; Personnel Director, WestStar TV Ltd., Box 30563 SMB, Grand Cayman, Cayman Islands, British West Indies, e-mail: weststartv@weststartv.com

BROADCAST ENGINEER (STUDIO) - KNME-TV (PBS) at the University of New Mexico, seeks an experienced studio engineer to work in a dynamic environment. KNME, New Mexico's oldest public television station, was first in NM to begin broadcasting digital in 2001. The studio digital conversion project is well under-way and fully funded. KNME serves 1.6 million+ viewers in central and northern New Mexico. It operates a complete digital production facility with SD and HD capability, and a full-service teleport with Vyvx network connectivity. We are seeking a career-oriented professional who wishes to grow with us. The position offers an excellent benefits package, including university tuition for the entire family, and 4 weeks vacation. The Albuquerque/Santa Fe area offers great quality of life with many cultural and recreational opportunities. For complete vacancy announcement and application, please check www.unm.edu under "jobs". Refer to requisition #M38888. Resumes must be accompanied with a "Supplement to Resume" form, in web page. ALL APPLICATIONS FOR THIS POSITION MUST BE SUBMITTED VIA eJOBS, UNM's ONLINE APPLICATION/RESUME SYSTEM. Go to the eJOBS website, http://ejobs.unm.edu, to apply. This posting opens on May 17, 2004 and will remain open until July 10, 2004.

WDSI FOX61TV - seeks Maintenance Engineer with good computer skills, experience with UHF Transmitter A MUST, studio equipment, analog and digital tape recorders required, and excellent communication skills. Will maintain company vehicles and DVC Pro equipment. Send resume and cover letter to: WDSI FOX61 Attention Christene Ramsey, 1101 East Main Street, Chattanooga, TN 37408, email to wdsijobs@pgtv.com or fax to 423-265-3636. NO PHONE CALLS PLEASE. Deadline for resumes is June 30, 2004. WDSI FOX61 is an equal opportunity employer and a drug free workplace.

The Walt Disney Company

Broadcast Engineer

The Situation
The Broadcast Engineer position is located in Kent, Washington and resides within the Buena Vista Datacasting business unit; part of The Walt Disney Company. Buena Vista Datacasting has just launched MovieBeam™, a video-on-demand movie rental service transmitted via digital wireless signal to an electronic receiver.

The Position
Reporting to the Manager of Network Deployment, this position will be primarily responsible for installing the MovieBeam™ technology into Broadcast Towers, performing installation analysis and generating/coordinating drawings and integration points to interface the MovieBeam™ technology into the Broadcast Stations Analog transmission system, and executing installation, integration and activation activities in the deployment of the MovieBeam™ technology into Broadcast Stations. Other responsibilities include: the operation and maintenance of deployed MovieBeam™ technology; preparation of failure analysis and recovery procedures for the MovieBeam™ technology, as deployed in individual/unique Broadcast Stations; monitoring the performance of the operational systems and analysis of system logs; and supporting the development of tools to automate the monitoring and performance of the MovieBeam™ technology.

The Company
Walt Disney Company is a diversified, international family entertainment and media company with 2003 annual revenues of $27 billion. Its operations include theme parks and resorts, filmed entertainment, including motion pictures and television shows, home video and DVD products, records, broadcast and cable networks, internet and direct marketing, consumer products, radio and television stations, theatrical productions, publishing activities and professional sports enterprises.

The Ideal Candidate
Qualified candidates will be BS Graduates with an RF or Electrical Engineering degree, have over 5 years experience in television broadcast engineering, comprehensive knowledge of FCC rules & regulations for all phases of broadcast television, and thorough understanding of NTSC television transmitter installation & maintenance. Other required skills include: comprehensive knowledge of video test signals & measurements; working knowledge of high power RF systems; "hands-on" experience with and understanding of television station operations; understanding of Linux and Microsoft computer systems and general office software applications such as word processing, spreadsheet, e-mail and internet browsers programs.

The Opportunity
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Help Wanted

A TV CHIEF ENGINEER is needed at LeSea Broadcasting's WHNO-TV 20 in New Orleans, Louisiana. Candidates must have high technical skills in Master Control, Studio, Remote Venue and Transmitter operations and maintenance (IOT desired), including non-linear video editing, satellite receiving, tape & DVD record and play, video server, camera, remote truck and high-power transmitter equipment troubleshooting. Strong computer skills are a plus. SBE Certification desirable. At least 3 years as a chief or assistant chief is required. Exceptional interpersonal, written and verbal communication skills a plus. Send your resume and cover letter to: WHNO TV 20, Chief Engineer, 1100 S. Jefferson Davis Parkway, New Orleans, LA 70125 or email it to pjbeene@lesea.com. No phone calls will be accepted. EOE

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BROADCAST ENGINEERING June 2004, Vol. 46, No. 6 (ISSN 0007-1994) is published monthly and mailed free to qualified persons by Primedia Business, 9800 Metcalf Ave., Overland Park, KS 66212-2216. Periodicals postage paid at Shawnee Mission, KS, and additional mailing offices. Canadian Post Publications Mail Agreement No. 40597023. Canada return address: DP Global Mail, 4960-2 Walker Road, Windsor, ON N9A 6J3. POSTMASTER: Send address changes to *Broadcast Engineering*, P.O. Box 2100, Skokie, IL 60076-7800 USA. CORRESPONDENCE: Editorial and Advertising: 9800 Metcalf, Overland Park, KS 66212-2216 Phone: 913-341-1300; Edit. fax: 913-967-1905. Advert. fax: 913-967-1904.

Multicasting:
Doom and gloom on the airwaves

BY PAUL MCGOLDRICK

Ever since talk about offering broadcasters additional RF channels began, people have used the word multicast to describe a potential revenue model for digital broadcasting. The term was ill-defined, and remained so for many years. But, finally, people are making proposals, both formally and informally, about directions that this model could take.

Modest proposals

These proposals are a world apart from the four traffic-camera images that KRON TV's digital channel has multicast, or the view of Detroit from the Canadian side of the Detroit River that WDIV TV has multicast. In conversations at NAB2004, it was clear that people are treating some of the ideas quite seriously. But are they practical?

Just before NAB, NBC announced that it was going to start a national digital network called "The Weather and Alert Channel," which it expects its O&Os and 92 percent of its 215 affiliates to carry as a multicast channel. A definite first in this program is that NBC proposes to split the costs of setup and operations 50/50 between itself and the stations that adopt the programming. Networks will find this to be a useful weapon in their effort to pressure the cable industry and the FCC to ensure that must-carry rules apply to multicast channels. The rest of the multicast offerings out there today are rather tepid material compared to the seemingly daily appearance of new channels that are vying for space in cable systems' limited bandwidths.

Multicast numbers are already rather impressive. According to Decisionmark, which tracks the DTV roll out, 213 stations were multicasting in January 2004. Of those, about half were public TV stations multicasting mostly adult and children's educational material. The commercial stations are offering news/weather type options, which would obviously be a threat to cable's Weather Channel if must-carry applied.

Bold proposals

But the big plans are much more extensive. One proposal I've heard, going beyond the limited offerings that USDTV has made in its start-up cities, is to compete directly with cable and satellite by banding digital RF channels together, with four to six SD programs on each channel. The broadcasters in the group would carry their own feeds, as usual, plus cable-type offerings. If everybody cooperated, and presumably PBS stations could not play at this party, the higher-DMA cities might be able to offer a dozen RF channels to give a maximum of, say, 72 program choices.

The viewers would then have to obtain, by buying, renting or as a giveaway, a set-top box that could sort out all these terrestrial channels and their content. And, to be able to pay for all these services, the stations would charge participating viewers the standard $19.95 a month. USDTV has a Chinese minority partner to supply the STBs.

The degree of cooperation by all these stations would have to be incredible and the viewing public would have to accept a major change in its life: the idea that over-the-air broadcasting would no longer be free. This contradicts a concept that has almost become a fundamental right for many of us. A separate entity would have to form to handle the distribution of the STBs and billing/collections. And, of course, once this model was in place in a city that has killed HDTV, unless you accept a reduction from, say, six SD programs to only two when HD content is being transmitted. Viewers' reaction would not be pleasant. A short while ago, my state's daily newspaper eliminated the overnight grids from its TV listings because most of the programming consisted of paid advertorials and to save ink. Those grids have since been restored because of the howls from the many late-night viewing owls out there.

Doom and gloom

No, I just don't see this model as feasible. And, looking at the other models centered around news, broadcasting news has never been a smart way of making money in television (not that you would think that when you look at the more than 40 companies that offered news/weather products at NAB). But, if there is no revenue stream from multicasting, what will happen to terrestrial TV broadcasting?

I have to say that I see nothing but doom in the future unless the broadcasters supplement an HD offering with novel content in one or two channels of multicast SD signals. Even then, the must-carry of that content on cable will be critical. If broadcasters don't take that direction, I can see them handing back a large number of digital channel licenses to the FCC at about the same time that the analog licenses go away. Those additional licenses may turn out to be the kiss of death for the industry as we know it. BE

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

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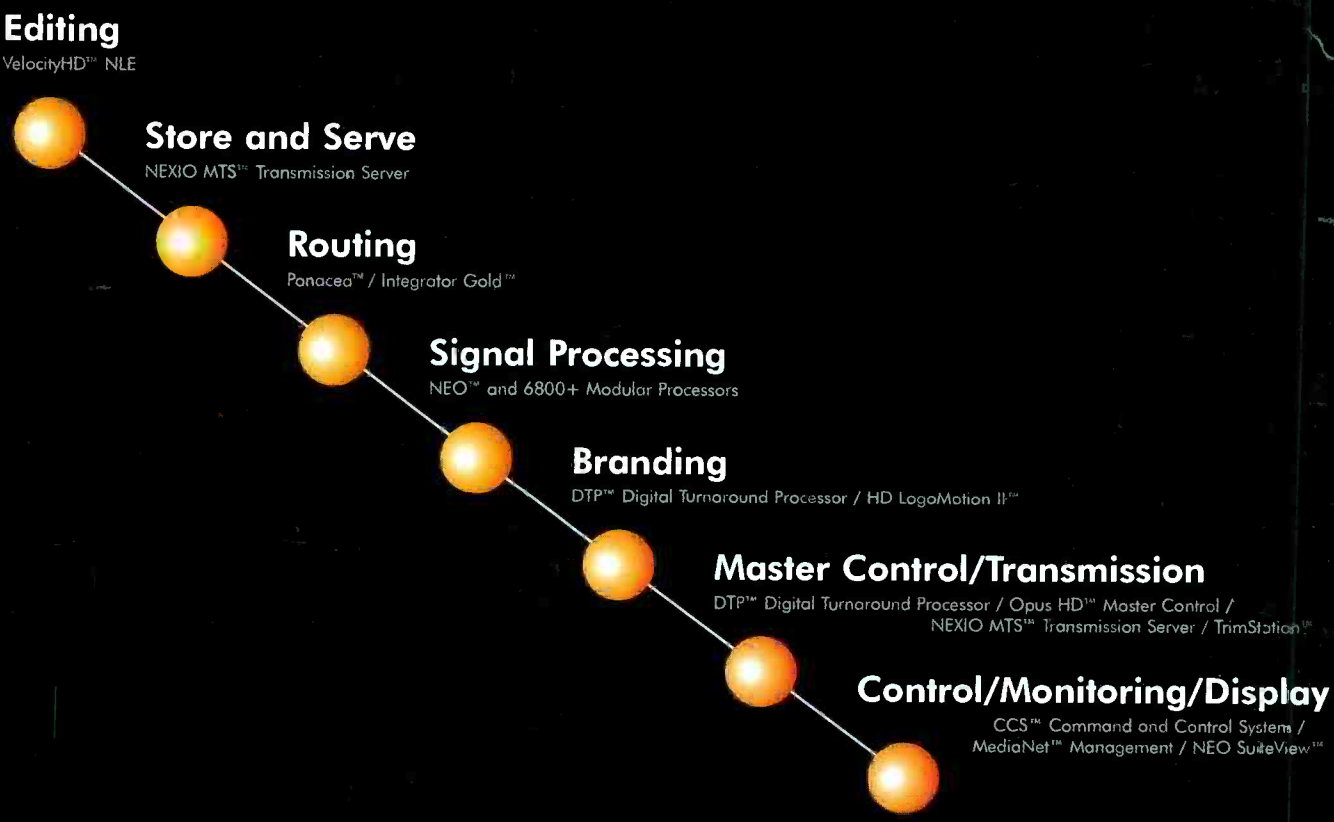

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