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FEBRUARY 2006

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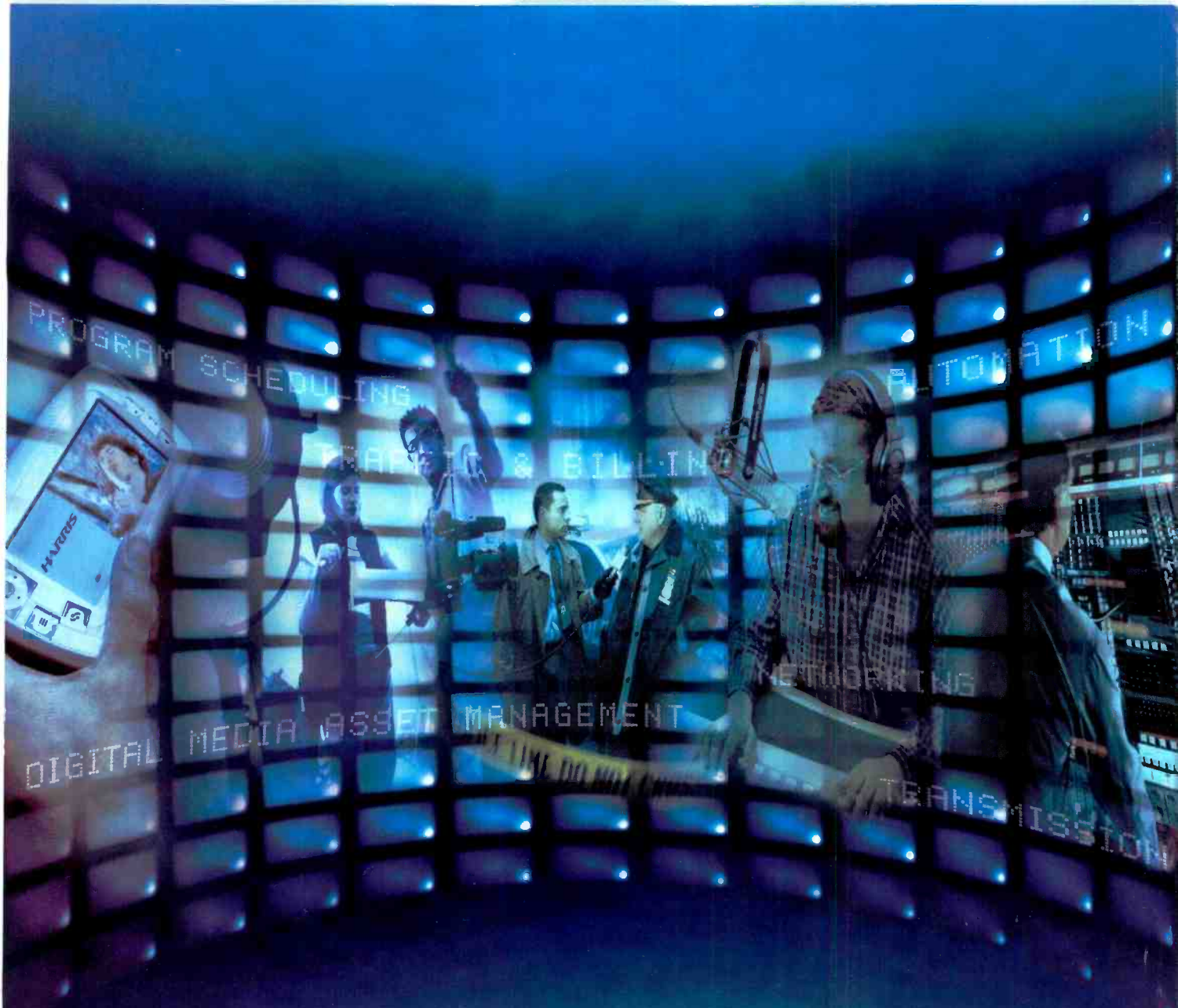

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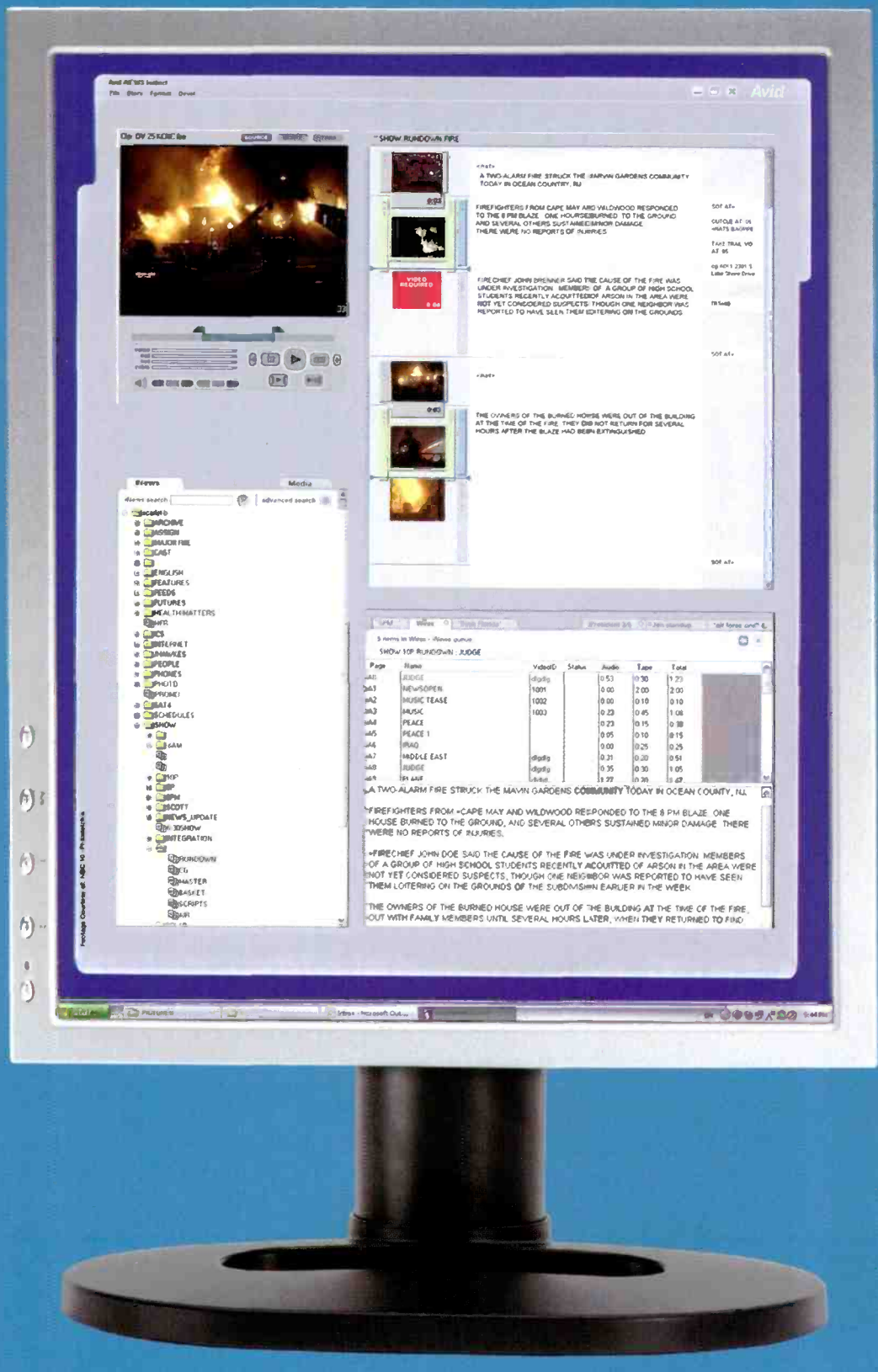
Avid
SHOW RUNDOWN FIRE
A TWO-ALARM FIRE STRUCK THE MARVIN GARDENS COMMUNITY TODAY IN OCEAN COUNTY, NJ.
FIREFIGHTERS FROM CAPE MAY AND WILDWOOD RESPONDED TO THE 8 PM BLAZE. ONE HOUSE BURNED TO THE GROUND, AND SEVERAL OTHERS SUSTAINED MINOR DAMAGE. THERE WERE NO REPORTS OF INJURIES.
FIRE CHIEF JOHN DOE SAID THE CAUSE OF THE FIRE WAS UNDER INVESTIGATION. MEMBERS OF A GROUP OF HIGH SCHOOL STUDENTS RECENTLY ACQUITTED OF ARSON IN THE AREA WERE NOT YET CONSIDERED SUSPECTS, THOUGH ONE NEIGHBOR WAS REPORTED TO HAVE SEEN THEM LOITERING ON THE GROUNDS OF THE SUBDIVISION EARLIER IN THE WEEK.
THE OWNERS OF THE BURNED HOUSE WERE OUT OF THE BUILDING AT THE TIME OF THE FIRE. THEY DID NOT RETURN FOR SEVERAL HOURS AFTER THE BLAZE HAD BEEN EXTINGUISHED.
Rundowns
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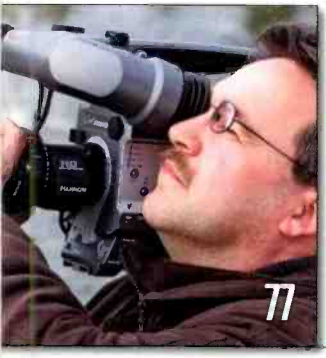

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WFTV, Orlando Eyewitness News 9 Newsroom uses an Avid end-to-end broadcast digital workflow.

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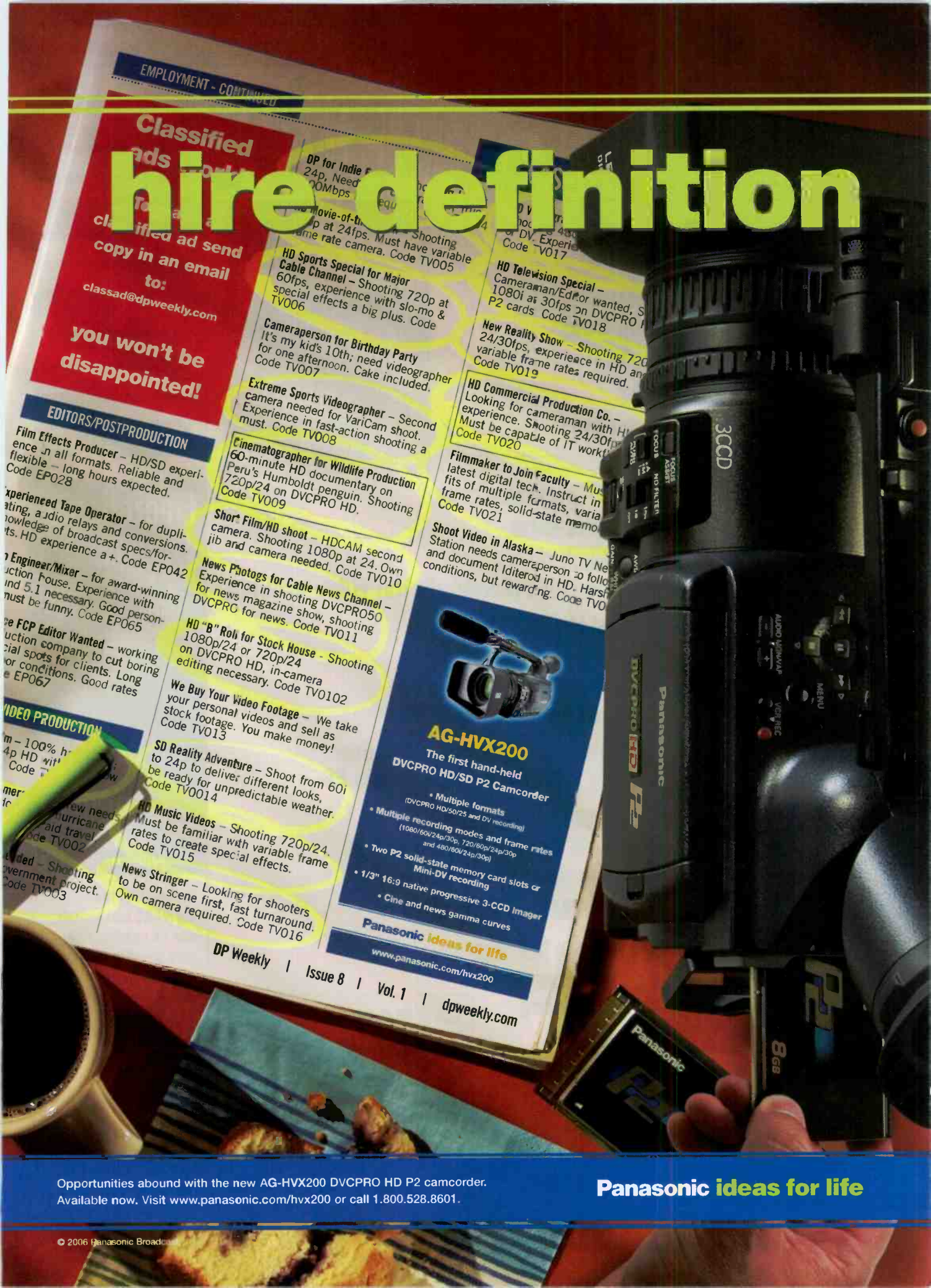
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Cameraperson for Birthday Party It's my kid's 10th; need videographer for one afternoon. Cake included. Code TV007
Extreme Sports Videographer – Second camera needed for VariCam shoot. Experience in fast-action shooting a must. Code TV008
Cinematographer for Wildlife Production 60-minute HD documentary on Peru's Humboldt penguin. Shooting 720p/24 on DVCPRO HD. Code TV009
Short Film/HD shoot – HDCAM second camera. Shooting 1080p at 24. Own jib and camera needed. Code TV010
News Photogs for Cable News Channel – Experience in shooting DVCPRO50 for news magazine show, shooting DVCPRO for news. Code TV011
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We Buy Your Video Footage – We take your personal videos and sell as stock footage. You make money! Code TV013
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P2 cards Code TV018
DV. Experi
Code TV017
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24/30fps, experience in HD an
variable frame rates required.
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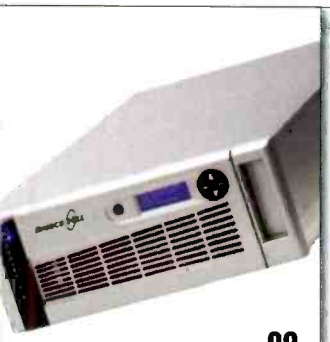

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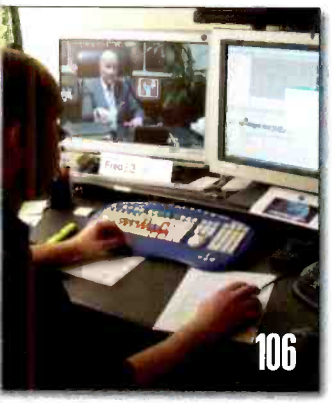

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Freezeframe

The basic MPEG-2 standard defines ____ profiles and ____ levels. The information needed to decode a single picture is contained in the ____ layer.

Readers submitting winning entries will be entered into a drawing for *Broadcast Engineering* T-shirts. Enter by e-mail. Title your entry "Freezeframe-February" in the subject field and send it to: editor@prismb2b.com. Correct answers received by April 1, 2006, are eligible to win.

October Freezeframe

Q. Which of the following NTSC test signals can be used to measure gain/frequency distortion?

-Color Multipluse
-FCC Multiburst
-Multiburst 60 or 100
-Multipulse 70 or 100
-NTSC-7 Combination
$-\frac{\sin X}{X}$

A. All of the above

Winner:

None

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Your viewers are, well, watching you

I've taken to watching most of my local stations via their digital feeds. It's painfully obvious that while they are capable of producing good-looking ENG video, the same can't be said about their studio feeds. When comparing studio images with ENG-generated images, some of the studio content looks like it came from a TK42!

In order to protect the innocent, I'll simply refer to the stations as A, B, C and D. No sense in getting the chiefs riled up. Here is what I saw:

Station A. This station had a consistently soft studio image. Yet, its ENG camera feeds looked sharper (as video, not live).

Station B. The images from the studio and ENG-sourced video were similar, no huge quality difference.

Station C. The third test station's studio feed was — How do I put this nicely? — bad. I've seen sharper video from a $6000 camcorder. Was that fog in the studio or was the gain misadjusted? The ENG video was OK.

Station D. The last signal I examined was worse than all of the above stations. It was unbelievably soft. In fact, the images reminded me of an old Ampex camera I used in 1972 in Wichita, KS. We tried to solve the problem by installing some CBS box that was supposed to sharpen the camera's images.

We did one newscast with the device in the circuit while recording the program to tape. After reviewing the inaugural newscast with the image enhancer in the circuit, both news anchors blew a gasket. Seems the new box was "generating wrinkles" on their faces. So much for engineering's technical solution to the age-old problem of, well, aging.

The bottom line in my test is that the ENG video from the stations looked pretty good. My broadcasters seem quite able to produce good-looking remote video. Why couldn't they do the same in the studio? Does it matter?

Yes, it does, and now to my point: What's going to happen when viewers become familiar with HDTV-quality images from the networks and on comes the local news? All of a sudden, those crisp, focused, well-lit images the viewer has just become used to now remind them of the old 8mm home movies they have in the attic!

Chief engineers and DEs (even of groups) say that news will never go HD. At the last *Broadcast Engineering* News Technology Conference, guys I respect said, "Show me the money." There's no money in doing news in HD, they told me.

My response is that when presented with obvious differences in image quality, viewers will often choose the higher quality ones, especially once they've become familiar with good HD from the networks.

Late last month, CBS announced that two of its O&O stations would begin shooting news in HD with Sony's new XDCAM HD platform in March. Other O&O stations will soon follow. A few stations are already originating their local newscasts in HD, and more follow monthly.

HD news is a whole lot closer than many *Broadcast Engineering* readers may realize. Get your facilities on the HD bandwagon now. Viewers expect it and will tune to those stations that provide it. And once you finally face the HDTV reality, you will find that it is not the million-dollar expense it used to be. BE

Brad Dick

editorial director

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HDTV: MAKING IT HAPPEN

Defining a snipe

Dear editor:

I enjoyed your October 2005 article on snipes. Several years ago, I was working with the promotions manager, and we were talking about putting snipes on the air. He had to explain what he was talking about to me, because I did not know what the word snipe meant.

I found a definition on an Internet dictionary, which I copied and pasted below. I didn't find anything good or pleasing about the definition of a snipe, which is understandable considering that having pieces of information placed all over our programming is not pleasant to watch.

By looking at the third definition below, we can conclude that what we are being bombarded with on the tube are malicious underhand remarks or attacks. Snipes do get very annoying.

snipe, ***intr.v.***, **sniped, snip·ing, snipes**

1. To shoot at individuals from a concealed place.

2. To shoot snipe.

3. To make malicious, underhand remarks or attacks.

MARTY HEFFNER
WICHITA, KS

Attack of the snipes

Editor:

I enjoyed reading your October 2005 article "Lower the visual volume" about snipes. The *Broadcast Engineering* Web site Flash ads drive me nuts. I now resort to deleting most *Broadcast Engineering* e-mails or cutting and pasting the article of interest into a Word document. Graphic artists, directors, producers and Web authors are obsessed with using every tool someone wants to sell them — often without regard to the moment of truth: the reader.

RICHARD DYER
VIRGINIA BEACH, VA

Street cred

Editor:

In response to your October 2005 column, I totally agree with you that there is far too much extraneous information being crammed onto our TV screens. However, if you are after "authority and credibility," I can't help but wonder why you are watching FOX News in the first place!

RON WHITTAKER, PH.D.

14:9 broadcasts

Michael Robin:

I've just finished reading your October 2005 article "The analog-digital hybrid" and was a little surprised that in your discussion of how to cope with mixed 4:3 and 16:9 material and displays, you made no mention of the approach that is used in both the UK and Australia, namely 14:9 letterbox/pillarbox. While the UK is only just about to start HD broadcasting, digital 16:9 SD broadcasts have been the UK norm for many years now, and 14:9 shoot and protect has been the accepted approach by all broadcasters from the outset.

I can't do better than point you to the BBC's own guidelines on the matter, available online at *www.bbc.co.uk/guidelines/delivering_quality/tv.shtml#Widescreen*. I hope this is of some interest.

DAVE HEATH

Plasmas vs. LCDs

Michael Robin:

I read your January 2005 article on gamma correction, which I found interesting. But one question came to me when I finished reading it: Why are you so sure that CRTs will be replaced by plasma screens? Instead, I would expect them to be replaced by LCD monitors.

In my opinion, plasmas might behave more accurately in terms of color reproduction and the overall gamut, which is not very satisfactory with LCDs because they use gas tubes for light source, which feature a discontinuous spectrum and are not consistent over time.

On the other hand, plasmas require a complex method to display different light levels (e.g., midtones) because their pixel light source can either be on or off during certain time intervals. Therefore, the human eye would integrate a certain brightness response. This process is suffering a lot when the whole picture content changes from one frame to the other, such as in a camera pan.

ANKE STEFFENS

Michael Robin responds:

The market will decide which replacement of the CRT — LCD or plasma — will prevail. My main concern is that the television standards were developed with CRTs in mind. CRT replacements, such as LCD or plasma, have a different transfer characteristic than what the standards assume, so the whole concept of gamma correction needs to be addressed and redeveloped. **BE**

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 editor@prismb2b.com

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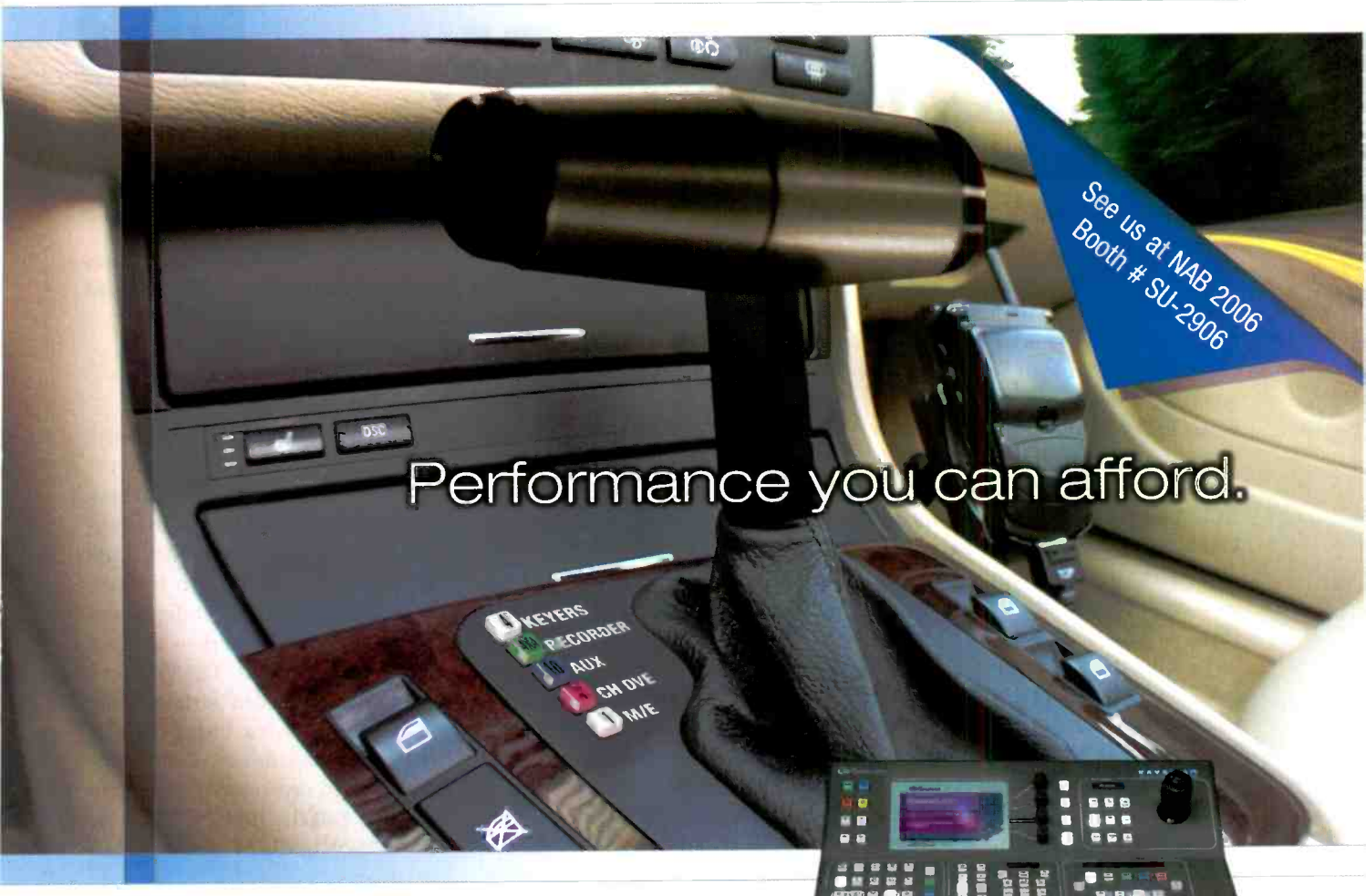

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Don't panic:
The broadcaster's guide to storage

BY CRAIG BIRKMAIER

Some things are better left to the imagination. For example, I first encountered the parallel universe in which Douglas Adams existed in 1981 when I began working at the group now known as Grass Valley. While driving to an off-campus brainstorming session with my boss, we listened to the original BBC radio series "The Hitchhiker's Guide to the Galaxy," recorded on the audio storage technology of the day — a compact cassette. I was hooked. (See "Web links" on page 18.)

The BBC tried to make a TV series from the radio scripts, but the video technology of the day failed to deliver on the incredible imagery that Adams created in our minds. Last year, the story finally made it to the big screen. Thanks to modern computer-generated imaging techniques, massive rendering farms connected to terabytes of hard disk drives and high-res digital compositing techniques, Zaphod Beeblebrox and the rest of Adam's bizarre cast of characters came to life on the big screen — but not in my head.

Adam's words stimulated my imagination in ways where computer-generated pixels failed. To be fair, I'm also a Tolkien junkie, and I thoroughly enjoyed Peter Jackson's interpretation of "Lord of the Rings." Perhaps the difference is as simple as looking back with historical perspective versus forward into an improbable future.

According to "The Hitchhiker's Guide," via Wikipedia, "Though often mistaken for a planet, Earth is in reality the greatest supercomputer of all time, designed by Deep Thought to discover the Great Question of Life, the Universe and Everything." In Adam's universe, everything was part of the fabric of this supercomputer, including the most intelligent creatures on Earth — mice — and the third most intelligent — people.

The infinite improbability drive

If you had asked anyone in the world of broadcasting, circa 1984, what the world of digital television would look like a decade or two later, it is improbable that their imaginations could have come close to modern realities. The audio CD — the first digital audio format for consumers — was just reaching critical mass. The first professional digital video formats were still on the drawing board. Analog component video formats would continue to reign supreme for more than a decade. And the IBM PC XT came with 128KB of RAM and a 10MB hard drive.

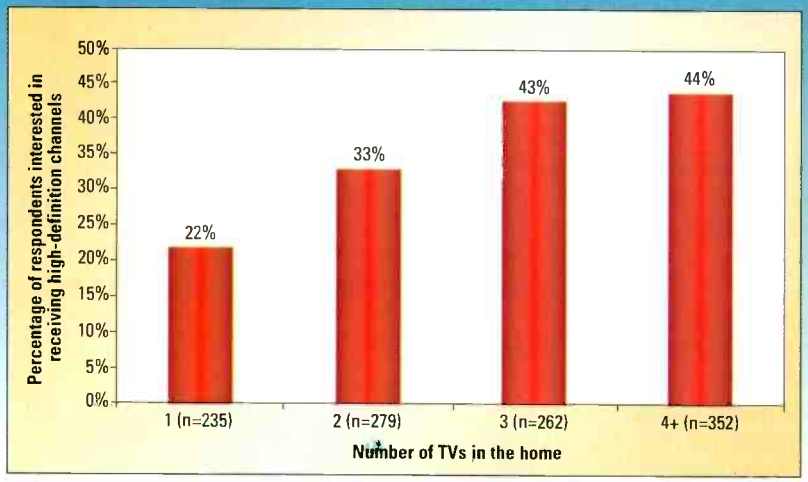
A decade later, digital video compression had burst onto the scene and companies like Avid and Data Translations were making improbable claims that they would soon be able to edit online-quality video on a personal computer with off-the-shelf hard disk drives. At the Winter SMPTE Conference in San Francisco in 1995, I used my first nonlinear editing system to present a paper exploring the convergence of video and computing. The improbable had become reality as I played online-quality video on a 20ft screen from an NLE.

That system, which became the Media 100, used a Mac with off-the-shelf SCSI hard disks and a board that made it possible to input and output composite and component video and stereo audio. The built-in Ethernet network could move bits around at 10Mb/s.

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

Percent of respondents interested in HD

22 percent of people owning one TV are interested in HD channels



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Traditional broadcast equipment suppliers warned that these new computer-based tools were nothing more than toys and that the real-time world of broadcasting required dedicated hardware solutions to satisfy the performance and redundancy requirements faced in television stations and production facilities.

The upstarts responded, telling potential customers to fire the editor. Layers of middlemen and technical complexity were removed from the traditional linear world of television, as new computer-based tools set free the imaginations of a new generation of digital media content producers. These tools set the stage for the digital media workflows that are now beginning to change the way broadcasters create and manage the video and audio content that is their lifeblood.

The scalability of deep thought

For a brief period of time in the late '90s, many broadcasters imagined that the information technology revolution would hit a wall — the high-definition television wall. The sheer volume of bits would overwhelm off-the-shelf technologies.

They did not understand the fundamentals of Moore's Law, which impacts almost every aspect of information technology. Riding the Moore's Law curves for CPU performance, storage densities and network bandwidth, the improbable happened again.

The relentless pace of IT enables the HD revolution. The tools for SD video production have easily scaled up to meet the challenges of HDTV. In fact, an NLE system capable of working with uncompressed HD sources is now cheaper than the first compressed online-quality NLEs delivered in 1995.

Layers of middlemen and technical complexity were removed ... as new computer-based tools set free the imaginations of a new generation.

In the early '90s, I had the opportunity to work with a team of people at Hewlett Packard who were motivated to do something new. Their instrumentation division was being mothballed, and they were given the opportunity to start a new business, if it could leverage other HP technologies. They decided to see what they could do with video.

The first product was a video capture device — a frame grabber front-end for HP printers. The second product, developed by a team led by Al Kovalick, was a video server using MPEG-2 compression. The division was eventually acquired by Pinnacle Systems, which was acquired last year by Avid. Kovalick is now the chief technology officer for Avid's West Coast operations.

Kovalick has been working on the bleeding edge of video server and media networking technologies for more than a decade. He has been involved in product development and broadcast standards development in organizations, including the SMPTE and EBU. You could say he has written the broadcaster's guide to AV and IT convergence.

Well, he kind of did, but he named it "Video systems in an IT environment." To learn more about the issues confronted in the design of media workgroup environments that can stand up to the demands real-time broadcast operations, with full redundancy and monitoring tools, read the book. (See "Web links" on page 18.)

Blackmagicdesign

Now with Multibridge Extreme it's easy to edit in SD, HD and 2K film quality

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The workgroups of doubt

So here we are, two decades into the digital revolution, yet many broadcasters still have largely analog facilities, with a few digital islands, including standalone NLEs and play-out servers for commercials. Few have embraced the technologies that are needed to take full advantage of the new digital workflows. These workflows rely heavily on file-based media ingest and networking to allow workgroup collaboration, be it in the newsroom or the production department.

This may not be such a bad thing. Media workgroup solutions have been available since the late '90s, and the technology has been improving, while the cost has been following the Moore's Law curve. In his book, Kovalick explores the topologies for media workgroups that have been used in recent years and trends for the future.

Web links

About "The Hitchhiker's Guide to the Galaxy"
http://en.wikipedia.org/wiki/The_Hitchhiker's_Guide_to_the_Galaxy

Network attached storage (NAS)
http://en.wikipedia.org/wiki/Network_attached_storage

Storage area networks (SAN)
http://en.wikipedia.org/wiki/SAN

Serial ATA (SATA)
http:en.wikipedia.org/wiki/SATA

"Video systems in an IT environment" by Al Kovalick
www.theavitbook.com

Avid Unity ISIS media network
www.avid.com/products/unityISIS/index.asp

Avid Unity ISIS media network white paper
www.avid.com/resources/whitepapers/Avid_Unity_ISIS_WP.pdf

Most workgroup solutions today are built around a centralized Fibre Channel switch to which arrays of disks are attached. Client machines typically use a Fibre Channel controller that is connected to the switch. A file manager keeps track of all of the files and manages permissions (who can read a file, who can write files, etc.). In many cases, a separate metadata server is also used to manage the metadata files that are now produced by many video acquisition and production systems. The client machines typically use an Ethernet connection to the metadata server.

This type of workgroup topology is know as a storage area network (SAN). In some larger installations, a network attached storage (NAS) controller is attached to the SAN to deliver media files to additional clients using Gigabit Ethernet. (See "Web links.")

Avid recently introduced a new media workgroup solution called the Unity ISIS media network. (See Web links.) The system offers a glimpse into the future of intelligent storage networks, which will offer more capabilities and built-in redundancy, while reducing cost and complexity.

The heart of Avid's system is called a Data Blade. In essence, it is a NAS unit with two Gigabit Ethernet ports. Each Data Blade contains two Serial ATA (SATA) hard disks for 1TB of storage. The Data Blades are attached to Gigabit Ethernet switches, creating two redundant paths from any client to any Data Blade.

A system director keeps track of where all files are located, including metadata files. It also manages system loading and redundancy should a Data Blade or one of the Ethernet paths fail. File redundancy is accomplished using simple file mirroring techniques. Two copies of the file are stored on separate Data Blades, and the files are randomly distributed across all of the storage units. If a drive fails, the system controller can copy files that were on that drive to any available Data Blade. There is no need to rebuild the failed RAID array. This can take place even if the failed disk is not replaced and is typically faster than rebuilding the multiple-drive RAID volumes used in existing SANs.

As the world of digital television evolves, there will be many new opportunities to exploit.

Mostly harmless

Given the incredible pace of change over the past two decades, one might come to the conclusion that off-the-shelf IT solutions will eventually replace such products as Avid's Unity ISIS or that it is improbable that companies developing dedicated solutions for broadcasters will survive. Don't bet on it.

As the world of digital television evolves, there will be many new opportunities to exploit. For example, Avid is now working with Google and Yahoo as these Internet-spawned companies move into the video download business.

The real problem that must be addressed by broadcasters is what will their businesses look like in a decade — in two decades. It's time for those imaginations to start working overtime on the future.

Who knows, the improbable could happen again, and broadcasters could become a critical part of this supercomputer, otherwise known as the Earth. Until next month, so long and thanks for all the fish. BE

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

SEND Send questions and comments to: craig_birkmaier@prismb2b.com

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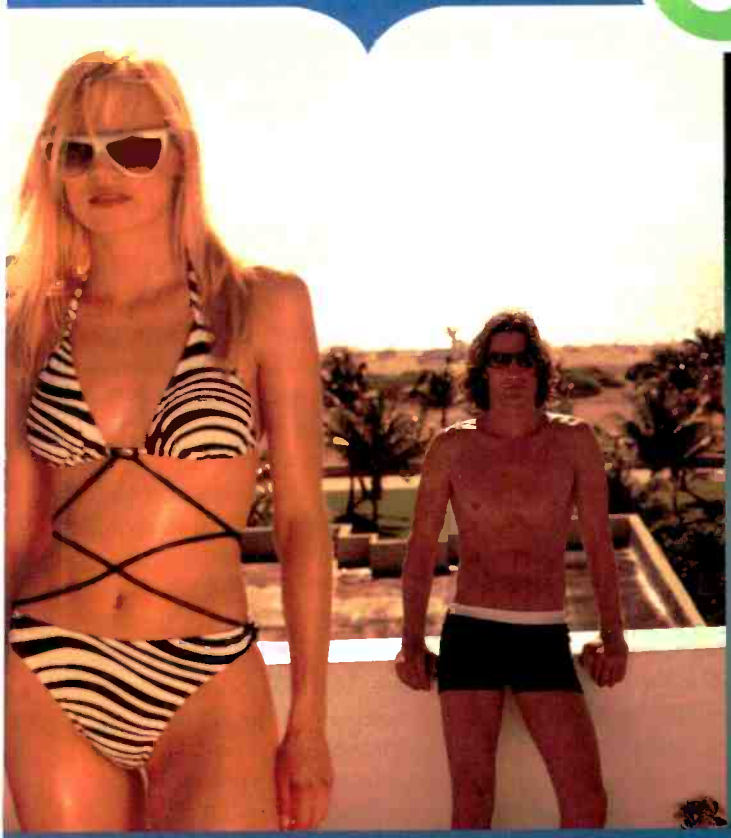

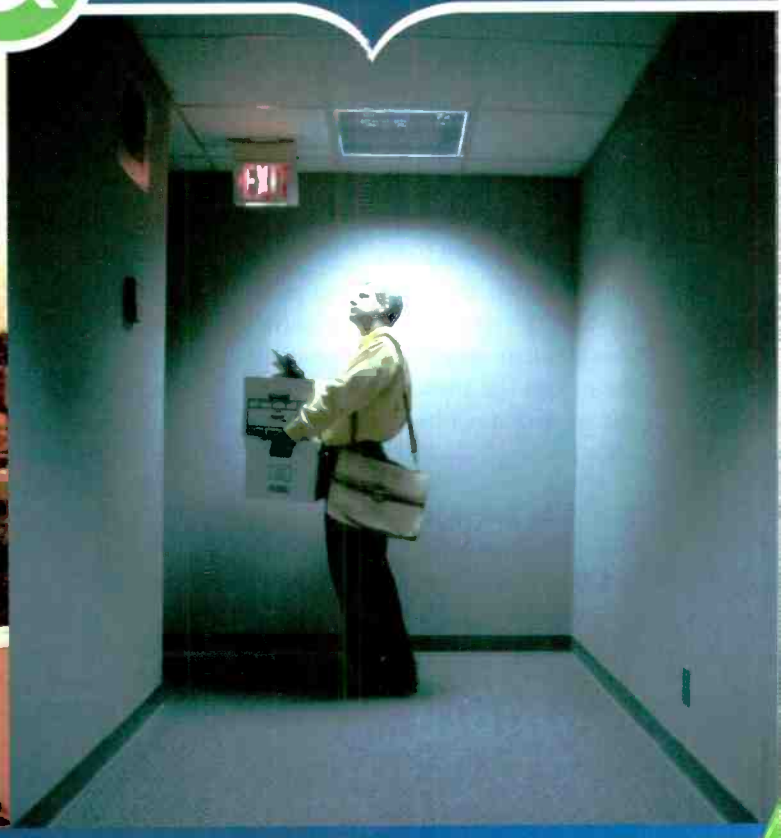

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The Channel to Digital Media

FCC looks at à la carte model for cable

BY HARRY C. MARTIN

In testimony before a Senate forum on indecency issues in November 2005, FCC Chairman Kevin Martin decried the increasing coarseness, violence, profanity and sex on television. He opined that one solution would be for cable operators to offer a family-friendly programming tier. It would allow parents to buy a package that excludes channels with racy programming. Alternatively, the chairman suggested that programming channels should be offered for sale on a channel-by-channel, or à la carte, basis.

The à la carte debate

The chairman's suggestion is completely opposite from an FCC staff report released in 2004, which concluded that à la carte is not economically feasible and could lead to higher prices and fewer programming choices for consumers. In his testimony, Martin disavowed that earlier report and said the FCC's staff would issue a corrected report in support of à la carte.

With his elevation to chairman, Martin is now in a position to direct the staff to take a more thorough look at the issue. The resulting new initiative is being used as a vehicle to promote Martin's long-expressed desire to clean up cable programming through the creation of family-friendly programming tiers.

Cable MSOs, satellite operators and cable programming networks have vehemently opposed à la carte requirements, insisting that an à la carte approach would lead to higher prices as channels raise fees to recoup lost audience reach and reduced ad revenues. The industry also claims that niche and new programming channels would fail en masse because large audiences would refuse to pay for channels that they have never heard of before. Moreover, cable operators and programming providers' agreements with one another often guarantee placement of certain channels on programming tiers that are available to the widest possible number of households.

While the FCC has not yet opened a proceeding to deal with the issue, the mere threat of an à la carte-friendly report has started producing the desired results from the cable operators. According to a cable industry representative, several major cable companies, including Comcast, Time Warner and Insight, plan to start selling family tiers over the next several months. The details of how these tiers will be structured and what channels will be included remain uncertain.

Clearing roadblocks to local cable competition

The commission has initiated a rulemaking to establish standards for preventing local franchising authorities (LFAs) from unreasonably refusing to award cable franchises to competitive entrants. The Notice of Proposed Rule Making (NPRM) seeks to further the FCC's interrelated goals of enhanced cable competition and accelerated broadband deployment and is responsive to recent initiatives by Verizon and AT&T to provide competitive video services.

In the NPRM, the commission tentatively concluded that the underlying section of the Communications Act — Section 621(a)(1) — should be interpreted to prohibit more than just the ultimate refusal by an LFA to award a franchise. The FCC believes that it has authority under the act to ensure that local franchising processes do not present unreasonable barriers to entry for competitive cable operators.

The commission also tentatively concluded that any law or regulation of a state or LFA that causes an unreasonable refusal to award a competitive franchise is deemed pre-empted and superseded by Section 621(a)(1). For instance, local standards requiring build-outs in low-income areas on unreasonably tight schedules would be subject to challenge under the proposed rules. But the commission's rules would not restrict LFAs from requiring new entrants to provide a reasonable complement of public, educational and government access channels. BE

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

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

Dateline

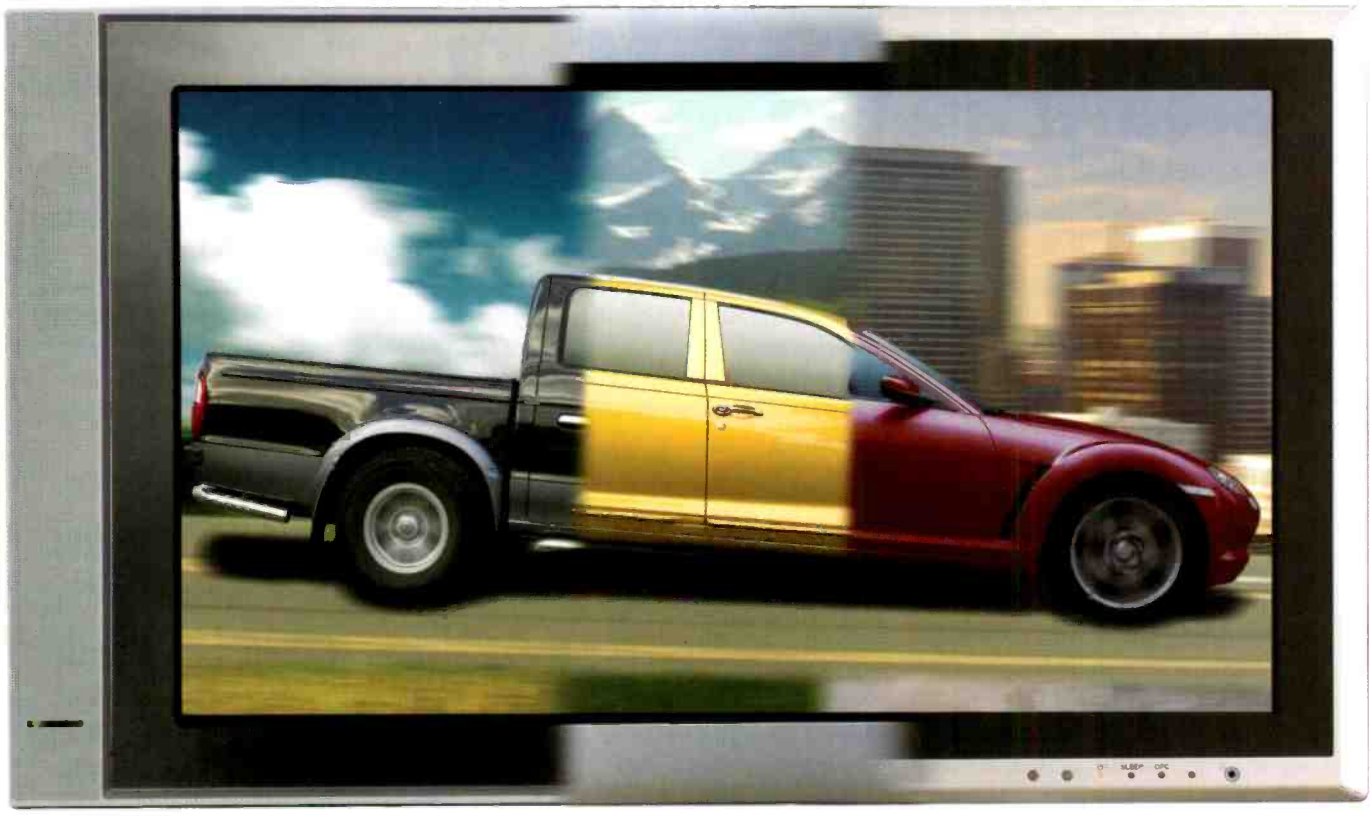
April 1 is the deadline for television, LPTV, Class A and TV translators in Texas to file their 2006 renewal applications.

April 1 is the deadline for Texas TV stations to file, along with their renewal applications, their biennial ownership reports and EEO program reports. Class A TV stations in Texas must file EEO program reports with their renewals, but not ownership reports.

April 1 is the deadline for TV stations in Delaware and Pennsylvania to file their 2006 biennial reports.

April 1 is the start date for prefiling renewal announcements for television stations, Class A stations and LPTV stations that originate programming in the states of Arizona, Idaho, Nevada, New Mexico, Utah and Wyoming, in anticipation of a June 1 renewal filing date.

target.



With digital network installations in progress, video service providers are taking aim at new services. But what will set them apart, best the competition and create a great return on network investment?

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The progression toward digital video standards

BY MICHAEL ROBIN

A standard can best be described as an agreement between several parties and, consequently, as a compromise that restrains the freedom of the participants. Agreement to a standard indicates that the parties have certain perceived advantages that offset the limitations of freedom of choice.

Many telecommunications and broadcasting industries operate and prosper thanks to the existence of worldwide (as well as regional) accepted standards. They have a tradition of participating in standards bodies and usually assign their best personnel to help achieve uniform standards. In doing so, they are driven by their assumed role of public service providers.

Invariably, governments play a major role in the development of industry standards for telegraphy, telephone, radio and television. History shows that their involvement has both helped and hampered the creation of international standards.

The history of standards

1865: The first International Telegraph Convention agreement was signed. It harmonized the different systems used.

1885: The Telegraph Union started drawing up international rules for telephony.

1906: The first Radiotelegraph Convention agreement was signed.

1924: The International Telephone Consultative Committee (CCIF) was created.

1925: The International Telegraph Consultative Committee (CCIT) was created.

1927: The International Radio Consultative Committee (CCIR) was created.

(The CCIF, CCIT and CCIR were made responsible for drawing up international standards.)

1927: The Telegraph Union allocated frequency bands to the various radio services existing at the time, such as fixed, maritime and aeronautical, broadcasting, amateur and experimental.

1934: The International Telegraph Convention of 1865 and the International Radiotelegraph Convention of 1906 merged to become the International Telecommunication Union (ITU).

Many telecommunications and broadcasting industries operate and prosper thanks to the existence of worldwide accepted standards.

1941: The United States National Television System Committee (NTSC) developed the 525/60 NTSC television system, embodying such revolutionary concepts as negative video modulation, vestigial sideband transmission, FM sound and a multichannel frequency allocation. The original VHF channel allocation, with the exception of the removal of channel 1, has withstood the test of time, and in the 1950s, UHF channels were added.

1953: The second NTSC committee developed the NTSC-compatible color television system, a revolutionary application of frequency division multiplexing of chrominance and luminance information.

1956: The CCIT and the CCIF were amalgamated to the International Telephone and Telegraph Consultative Committee (CCITT).

Today: The CCITT is called ITU-T and the CCIR is called ITU-R. All

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Digital TV set and display sales

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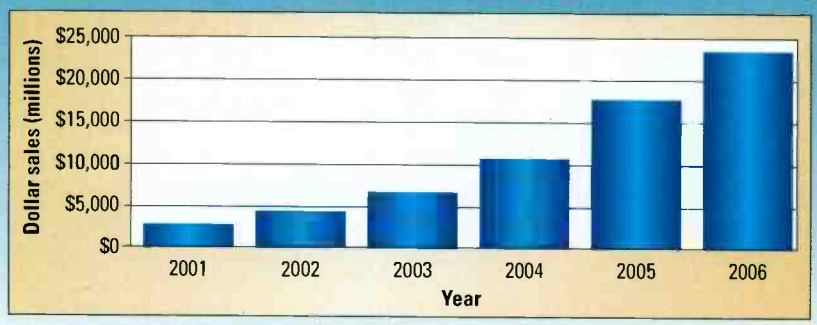

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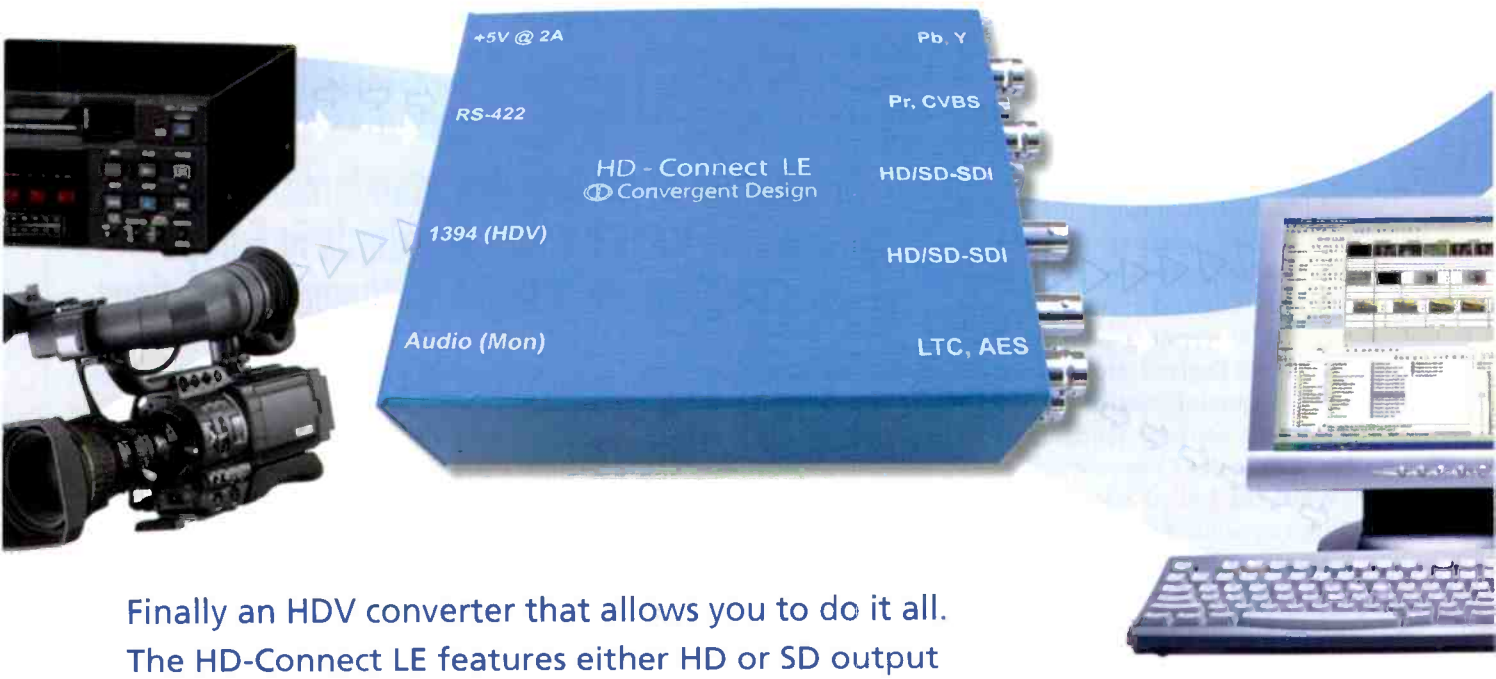

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these bodies are operating under the umbrella of the United Nations. Other internationally recognized regional standards bodies are the European Broadcasting Union (EBU) and the Society of Motion Picture and Television Engineers (SMPTE). In the United States, transmission standards are regulated and enforced by the FCC. In Canada, the Department of Communications (DOC) regulates it. Similar organizations exist in other countries.

The international standards

After World War II, most of Europe adopted the 625/50 scanning standard. France adopted a high-definition 819/50 scanning standard, as did Belgium, Monaco, Algeria and Morocco. England retained the prewar 405/50 scanning standard. Both France and England later adopted the 625/50 scanning standard while retaining the alternate standards for the benefit of older TV set owners.

While the United States and other countries in the Americas recognized the need to have identical transmission standards and VHF/UHF channel allocations, Europe did not feel the need to have either a common scanning standard nor a common transmission standard.

In addition to several line standards, there were quite a few transmission standards in Europe — creating a nightmare of channel allocations. By the early 1960s, there were no less than three scanning standards and seven incompatible transmission standards in Europe.

With the advent of color television, the choices multiplied dramatically, as NTSC was chosen by 525/60 countries with the exception of Brazil; PAL was adopted by the majority of 625/50 countries; and SECAM was chosen by France (as well as former and remaining French territories), most of the East European (communist) countries (with the exception of Romania, the former Yugoslavia and Albania) and some Middle Eastern countries (such as Egypt, Lebanon and Iran).

CCIR Report 624-4 uses 33 pages to describe all these television standards. All these standards had in common was interlaced scanning and film aspect ratio (4:3). By the early 1980s, the French transmissions in 819/50 and the British transmissions in 405/50 were phased out. And currently, Europe shares a single SDTV scanning standard (625/50), two color standards (PAL and SECAM) and four incompatible transmission standards — a marked improvement.

Other industries, particularly the consumer electronics and the computer industries, have in the past taken a different approach. Individual companies — or a group of companies — develop standards and offer them to the marketplace for use.

In addition to several line standards, there were quite a few transmission standards in Europe — creating a nightmare of channel allocations.

Typical examples include the competing Betamax and VHS consumer VCR formats and the non-compatible and non-standard component video signal levels of Betacam and MII as marketed in North America. Occasionally, these non-standards are offered to a standards body for ratification. Among the standards developed by the manufacturers and submitted to standards bodies for ratification was the composite digital ($4f_{SC}$) standard. The short-lived D2 and D3 digital VTR formats are based on this standard.

Standard success

In the early 1980s, an interest evolved in the standardization of studio digital signals. The first successful internationally accepted digital television approach was Recommendation 601 of the then CCIR. This concept consists of using time-division multiplexing of three digital component video signals — Y, C_R, C_B — for parallel or serial distribution. What resulted was a component digital sampling family known as 4:4:4, 4:2:2 and 4:1:1, with common sampling frequencies in the two standard definition scanning standards (625/50 and 525/60).

The dominant format is 4:2:2. The SMPTE 259 standard defines the characteristics of the bit-serial interface for 4:2:2 digital signals with a bit rate of 270Mb/s. A host of SMPTE standards relating to the new component digital technologies were subsequently developed.

The late 1980s witnessed the development of a new concept: the compression of 270Mb/s signals by a factor of 25 to 35 while preserving the original picture quality. What resulted was the MPEG compression.

The majority of the MPEG-2 levels and profiles start with a 4:2:2, 10-bit component digital signal. The bit rate is reduced by using such methods as downsampling to 4:2:0, discrete cosine transform, requantizing, variable length coding, run length coding and buffering to achieve the constant bit rate required in transmission in a given RF bandwidth or variable bit rate, such as used in DVD recordings.

What resulted was the appearance of various digital video and audio compression schemes with application to recording and transmission of digital video. In tandem with the MPEG developments, there evolved a number of advanced digital modulation techniques resulting in superior bandwidth-saving transmission methods of digital audio and video. The result was the ATSC standard, which uses a 6MHz television channel to transmit a single HDTV signal compressed from 1.5Gb/s to a bit rate of 19.38Mb/s or several SDTV signals compressed and multiplexed into a bit rate of 19.38Mb/s.

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So what's next?

The trend towards DTV 16:9 formats produced three line-scanning standards: 525, 750 and 1125 total lines per picture. The 750 line standard specifies progressive scanning. The 525 and 1125 line standards may use progressive or interlaced scanning. The refresh rates are based on film rates (24Hz) or power line frequencies (50Hz or 60Hz) at nominal or NTSC-friendly rates.

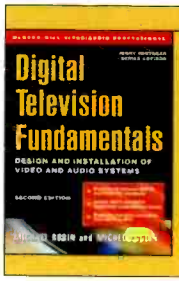
Until recently, the ATSC-compatible 1125 line standard was restricted to interlaced scanning due to the ATSC transmitted bit rate of 19.38Mb/s, which could not accommodate progressive scanning with an uncompressed bit rate of 3Gb/s when using MPEG-2 compression. The appearance on the market of more efficient MPEG-4 technologies allows the compression of a 3Gb/s 1125 line progressive scanning signal into a 19.38Mb/s bit rate with an excellent picture quality. The technology is available at competitive costs as demonstrated by DirecTV, which is in the process of migrating from MPEG-2 to MPEG-4 to carry all the present and future HDTV programs.

More efficient MPEG-4 technologies allows the compression of a 3Gb/s 1125 line progressive scanning signal into a 19.38Mb/s bit rate with an excellent picture quality.

The ATSC would do well to take this new technology into consideration. Interestingly, Europe, which was late in migrating to HDTV, now has the advantage of new and highly efficient MPEG4 technologies. Stay tuned! BE

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

SEND Send questions and comments to: michael_robin@prismb2b.com



The second edition of Michael Robin's book may be ordered directly from the publisher by calling 800-262-4729. The book is available from several booksellers.

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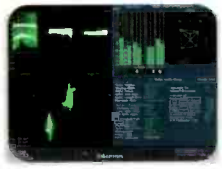

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Networking tutorial: Part II

BY BRAD GILMER

These days, almost all computers are networked in one way or another, whether it be through a conventional wired network, wirelessly or over a dial-up connection. In order for the computer attached to the network to send and receive packets, the computer must have a unique address.

In order for the computer attached to the network to send and receive packets, the computer must have a unique address.

Many years ago, when programmers wanted to write a program that made use of a connection between two computers, the programmers would not only write the application they were concerned with, but also they had to write low-level code to access the networking hardware. I once worked on a project to develop one of the first network-based automation systems. The network drivers were an integral part of the application. If you changed the network card, you had to rewrite the automation system program. This approach worked, but it created a monolithic program that incorporated all of the nuances of a particular networking card into the application itself. Clearly, this was not an optimal situation.

Application programmers needed something that would isolate them from the rapid changes that were occurring in networking technology. The solution came in the form of a layered approach to networking.

Network layering

Figure 1 shows a simplified version of the ISO 7 layer network model. Layer 1 describes the network hardware — the characteristics of the data transmitters and receivers; whether the network is optical, wireless or wired; and so on. Layer 2 describes how to organize bits to be sent over a particular network — Ethernet, ATM or token ring, for example. Layer 3 deals with organizing groups of computers into discreet networks and how computers on those networks are addressed. Layer 4 formats data from an application into datagrams and describes behavior of the network under error conditions.

The layered approach allows engineers to change out hardware at layer 1 and replace the software at layer 2 without having to completely rewrite the application that is using network services.

MAC and IP addressing

Interestingly, in the case of Internet Protocol (IP) over Ethernet, two addresses are required. The first is the layer 2 Ethernet MAC address, and the second is the layer 3 IP address. In Ethernet applications, each card is given its own unique 48-bit MAC address. This address is permanently assigned to the card when it is manufactured. (Security note: In some cases, this address can be changed or spoofed.) The MAC address takes the form nn:nn:nn:nn:nn:nn, where nn can be either a number or letter from a to f. An example of a valid MAC address is 00:09:6b:8d:79:96. Blocks of MAC addresses are assigned to a manufacturer by the Institute of Electrical and Electronic Engineers. Within that block, it is up to the manufacturer to ensure that each address they assign is unique. Therefore, the MAC address above can also be written IBM_8d:79:96 because IBM has been assigned the block of MAC addresses beginning with 00:09:6b.

Layer 2 addresses provide positive identification of a particular computer. But they cannot be changed and provide no way to organize computers into groups or networks. The MAC addresses of computers in an

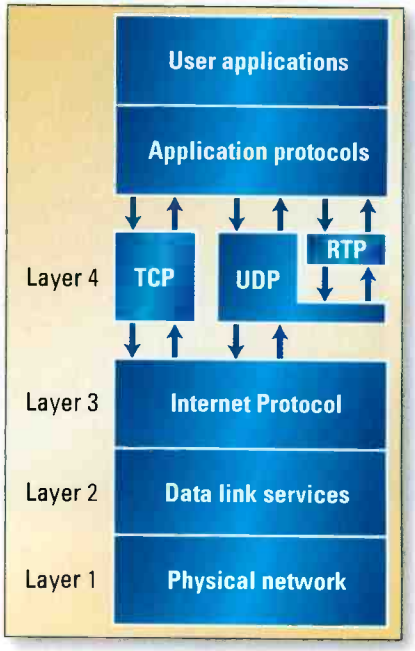
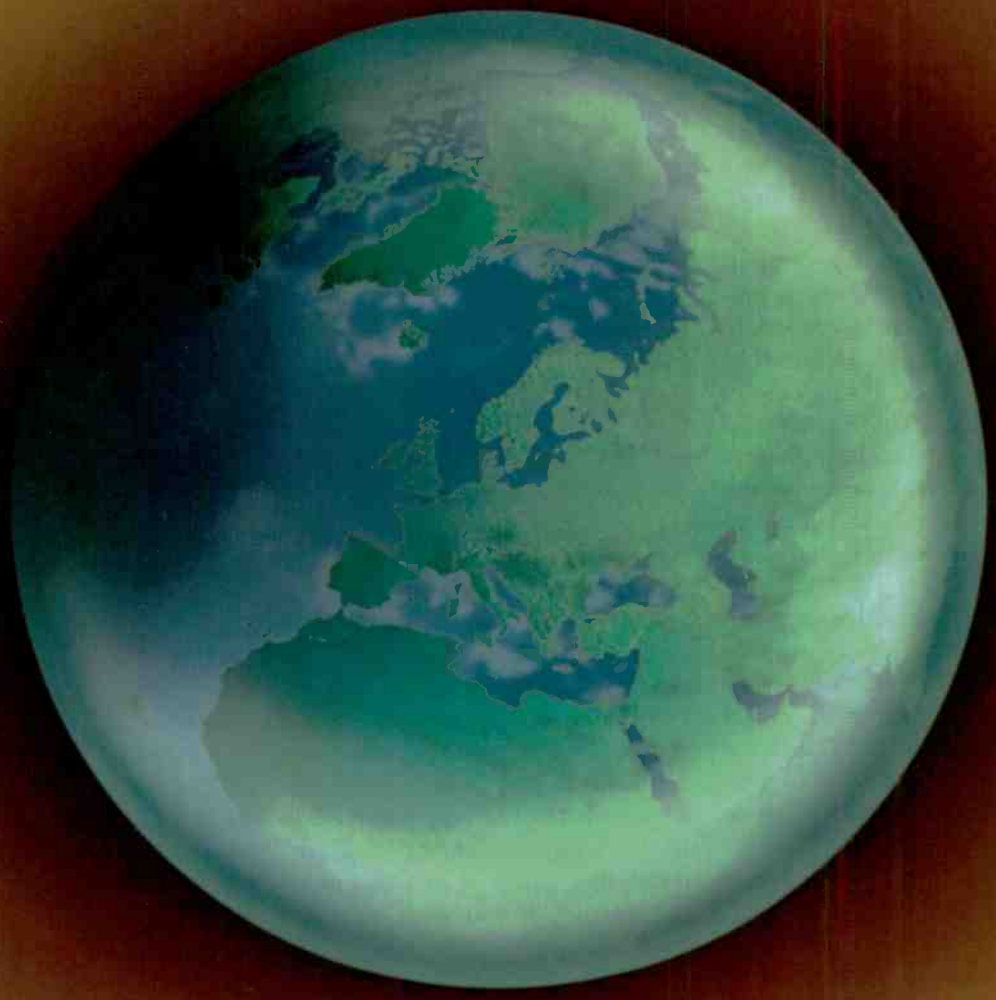


Figure 1. This simplified network layer model illustrates the separation of networking functions from the applications they serve.



Largely covered by water

engineering department will be entirely random. For a router on the network to know whether a particular packet was destined for a local computer or for a computer on the Internet, the router would have to store the MAC address of every computer both locally and on the Internet — an almost impossible task.

The solution to organizing computers into groups or networks is provided by layer 3 of the ISO model. In this layer, machines are identified by network address, and this address can be set by the user. TCP/IP is the most commonly used networking protocol today. IP addresses are written in dot notation, with four numbers between 0 and 255, separated by periods (e.g., 127.0.23.41).

An engineer can assign a group of computers to a logical network, sometimes called a subnet, by assigning them addresses within the subnet range (e.g., 127.0.23.0 to 127.0.23.254 with a subnet of 255.255.255.0). Layer 3 allows the network designer to clearly identify a group of computers that belong together. It also allows routers and switches to forward packets to other switches without having to know the exact location and route to the destination computer.

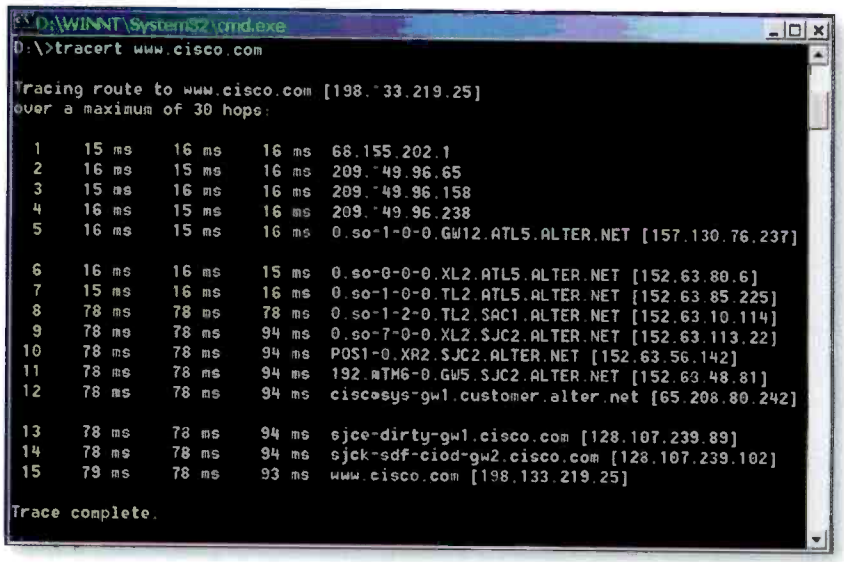


Figure 2. Shows an example of the path across the Internet from a computer in Atlanta to Cisco Systems located in San Jose, CA.

Where do you get IP addresses?

If you are building a network and you are free to assign your own IP addresses, how do you know where to start? Fortunately, some of the decisions have already been made for you.

In the early days of the Internet, developers realized they needed documents to describe how the Internet functions. These documents are known as a Request for Comments (RFC). Currently, there are thousands of RFCs relative to TCP/IP and the Internet.

A good reference concerning RFCs is *www.rfc-editor.org*. One particularly helpful document is RFC 1918, which defines IP addresses for private networks. This document sets aside three blocks of IP addresses solely for private networks — IP addresses set aside for use inside a facility. The IP addresses you use and the subnet you select will depend on the number of PCs and network devices you plan to install. (See last month's article for a discussion of subnetting.)

It is important to note that private IP addresses are unroutable, which means they cannot be projected onto the Internet. If you want computers on the local area network (LAN) side of an Internet gateway router to be able to access the Internet, you will need to use a router that can perform Network Address Translation (NAT). NAT will automatically translate the source address of packets sent from a LAN computer to the WAN address of the Internet gateway. Your Internet service provider normally assigns this public IP address.

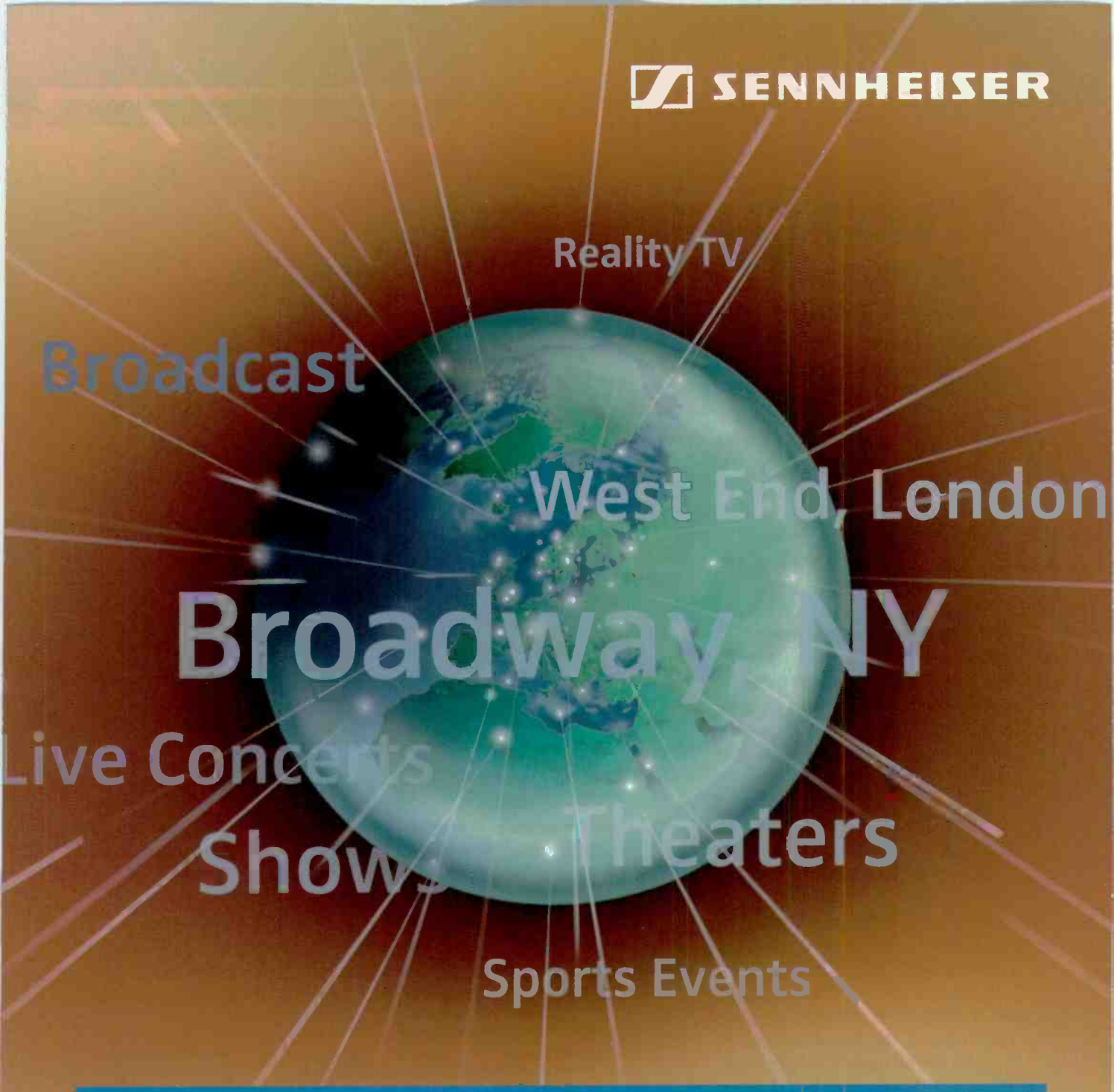
Anyone on the Internet can access the gateway by typing in the IP address. The NAT built into the router allows workstations inside your organization to access the Internet, but the actual IP addresses of the individual workstations are never projected onto the Internet. The LAN network interface on the Internet gateway will be entered as the gateway address for all devices on the LAN. All packets with network addresses that are not part of the LAN will be sent to the gateway address of the Internet router and on to the Internet.

For example, if you are at a workstation on a LAN and attempt to visit *www.cisco.com* (IP address 198.133.219.25), the computer looks at the IP address, sees that it is an address that is not on the local network and forwards it to the gateway. The router then looks at the address and continues to forward it on its way to Cisco. You can actually see this process by entering the traceroute command on a computer. (See Figure 2.) Enter "traceroute www.cisco.com" on Mac OSX and Unix systems or "tracert" on Windows machines. The number of hops will vary depending on the route from your computer to Cisco.

There are many facets to the subject of network addressing. We can only just touch the surface in the space available in this column. If you would like to learn more, go to your favorite Internet search engine and type in "network addressing." You will find a number of excellent articles and tutorials on the subject. BE

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

SEND Send questions and comments to: brad_gilmer@prismb2b.com



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Integrating
HD and SD video and audio

BY JEAN-CLAUDE KRELIC

A critical issue in the successful deployment of HD services is the management of content with different aspect ratios and effective audio processing. Naturally, the complexity of format issues is dependent on the scale of HD operations at a facility, but these signal-processing challenges are typically faced by all HD facilities.

Aspect ratio conversion

Broadcasters working with both HD and SD need to maintain separate HD and SD output paths, while also broadcasting the same content on both channels. While most new material will be acquired natively in HD, broadcasters will continue to receive some SD material in both 16:9 and 4:3 formats. You also need to still work with your 4:3 format-archived material. Efficiently handling all these different aspect ratios has become a major issue for many broadcasters.

Dealing with a mix of aspect ratios on a daily basis involves multiple challenges if the broadcast output is to be of the quality today's viewers expect. In the past, broadcasters would select one aspect ratio conversion (ARC) and use that format at all times. This practice often led to the postage-stamp look or other undesirable effects. To overcome this, broadcasters must use the appropriate ARC for the HD content in order to maintain the shape of an image and avoid cutting out key elements of the picture.

To address this challenge, broadcasters use automation and traffic systems, which allow operators to specify the ARC format for each piece of content. This setting can be recalled by the output conversion card for the HD and SD signal paths.

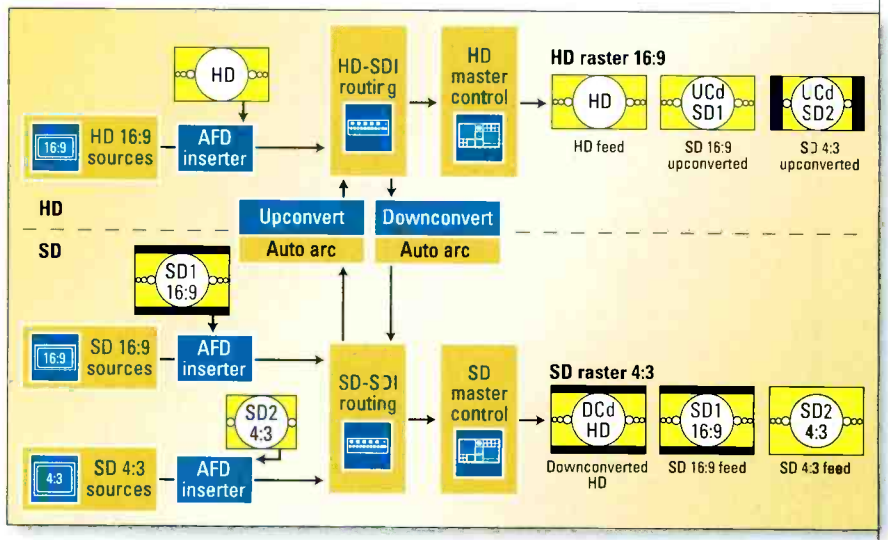

Figure 1. Aspect ratio control with AFD in a hybrid family

While the automation system determines whether the ARC works for the station output, it doesn't apply to other parts of the facility, such as the studio, online editing suite and ingest area. What's more, the addition of all of this information to the automation system brings greater complexity to the playout process. And because it relies on multiple operators to enter the correct ARC information, it opens the door to errors and playout using the wrong ARC format.

To solve this issue, Miranda Technologies developed a new standard, "Image Formatting Information — Active Format Description (AFD),

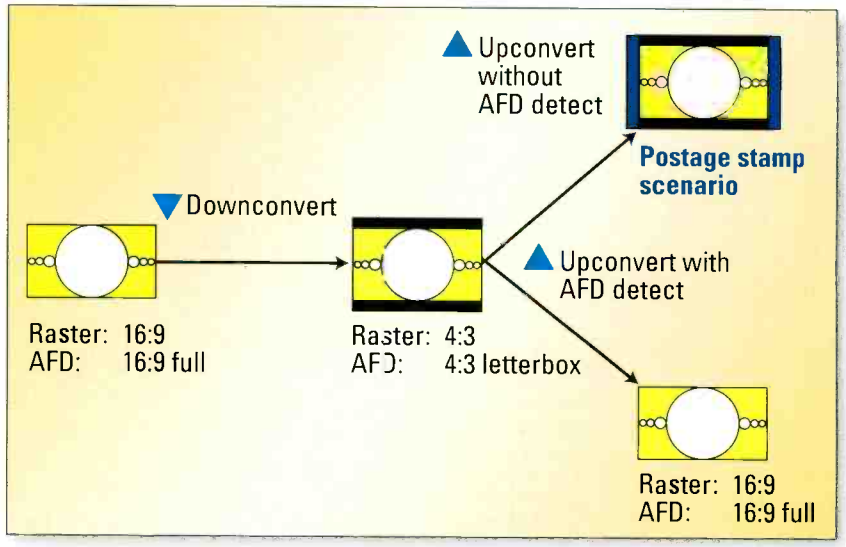

Figure 2. AFD for sequential up- and downconversion

Bar Data, and Pan-Scan," to identify the different source ARC types and automate all these conversions. This standard has been proposed to SMPTE and currently is undergoing evaluation. (See Figures 1 and 2 at left and Figure 3 on page 35.)

In HD and SD signals, the AFD information is inserted into the vertical ancillary data, and it identifies not only the raster (4:3 or 16:9), but also the video signal's ARC type, whether that be 16:9 full screen, 16:9 with black pillarbox, 4:3 full screen, 4:3 with letterbox, etc. In SD, the user can also apply the modified SMPTE RP-186 standard to identify the ARC type of the material. Because this information becomes part of the video signal, it is maintained as material moves throughout the broadcast facility.

AFD information can be inserted by different devices, including the frame sync; incoming-feed cards; up-, down- and crossconverters; or simply by an AFD flag-inserter card. Every signal that comes into a station can be flagged, either automatically or manually. With up-, down- and crossconverters, the flag is inserted automatically during the conversion.

The audio-processing challenge for multiformat, HD/SD installations is significant.

Once this identifying information is included in video content, it can be used by the conversion card to perform the appropriate ARC automatically. The broadcaster need only predetermine the look that is wanted for an up- or downconverted signal, and all converter cards using the AFD information will be able to apply the appropriate conversion without station automation or manual intervention. Another key advantage to this solution is that the up-, down- or crossconverter card will do the ARC change automatically on a frame-by-frame basis, thus ensuring frame-accurate performance.

Preserving audio metadata

The audio-processing challenge for multiformat, HD/SD installations is significant. Broadcasters need to provide a stereo output (LoRo) or a Pro-Logic (LtRt) output for the SD signal, along with a 5.1 or 2.0 signal fed to the AC-3 encoder for HD broadcast as Dolby E, AC-3 or simply as discreet audio as part native HD content. The key challenge here is to maintain and apply audio metadata across the broadcast plant.

Working with 5.1, Dolby E or AC-3 audio always involves handling associated metadata, which includes such information as the type (e.g., 5.1, 2.0, 2+2+2+2), dialnorm values, dynamic range and other details defining the signal. Metadata must accompany the video signal because this information allows the home viewer's

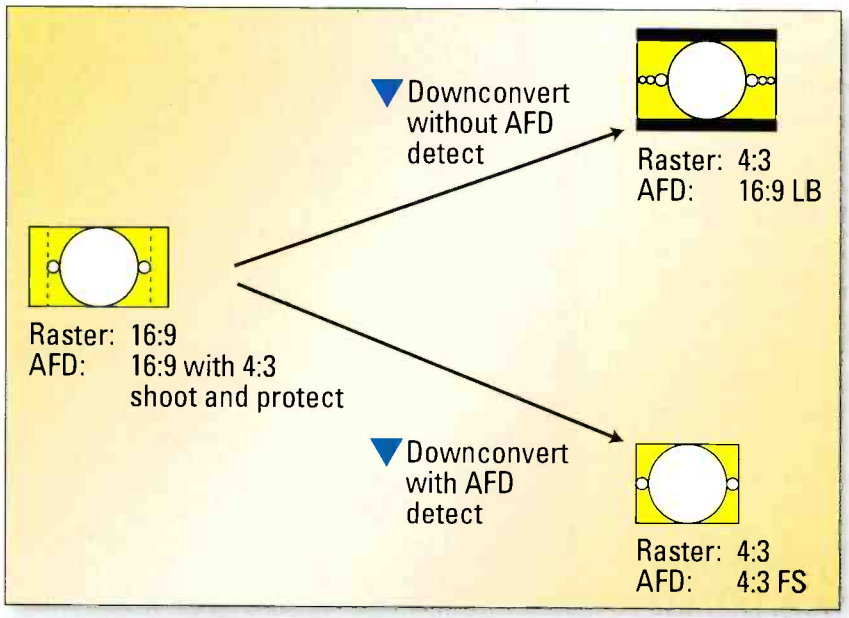

Figure 3. AFD for downconversion

AC-3 decoder to react properly and provide the right sound effect at the right moment.

Until recently there were no effective means of maintaining metadata inside a plant without a Dolby E or RS422 interconnect. Miranda Technologies has worked with customers and other manufacturers to develop a standard that will enable carrying of metadata in the ancillary space of the HD-SDI signal. It was logical to embed the audio into the HD-SDI signal, so why not embed the audio data as well? By allowing broadcasters to carry this metadata throughout their facilities, this solution expands the opportunities for producing material with 5.1 audio.

Downmixing and upmixing audio

The preservation of audio metadata is critical to up- or downmixing audio signals. Although more material is produced with 5.1 audio, broadcasters still need to provide the SD output with a stereo or stereo-coded signal (Dolby Pro Logic I or Pro-Logic II). Some broadcasters can carry both a 5.1 and a stereo signal, but others simply don't have enough channels available — particularly given the need to provide 5.1, SAP and descriptive video. In an eight-channel server system, for example, there is no room for a stereo pair.

To overcome this obstacle, broadcasters can implement a stereo-coded downmix from the 5.1 audio. (See Figure 4.) The stereo-coded output allows home users with a Dolby surround decoder to enjoy sound separation for multiple audio channels. Downmixing is also used throughout a broadcast facility for dubbing purposes and to provide an audio sample similar to the sound experienced by home viewers watching the broadcast in SD.

While a basic stereo downmix is relatively easy, a stereo-coded output gets a little bit complicated. Using only the 5.1 audio with the metadata simplifies the audio scheme. When the audio is still 2.0, the device performing the downmix must auto-detect that the signal is 2.0 and deliver a stereo-encoded signal with the appropriate metadata. When no metadata is available, the device must be able to generate a default value for 2.0 metadata to be sent with the audio.

While a basic stereo downmix is relatively easy, a stereo-coded output gets a little bit complicated.

With the move toward 5.1 audio, some broadcasters would rather not carry 2.0, but they still want to have a 5.1 signal created from the 2.0 (stereo) signals. Transforming a stereo 2.0 signal into a 5.1 audio signal is called an upmix, and this function helps to create the sound effects desired. It simplifies the audio path and functions in a facility and delivers a higher-quality experience to the home viewer. Hence, the ability to create and manage high-quality up- and downmixes is also fundamental to successful HD plant operations. BE

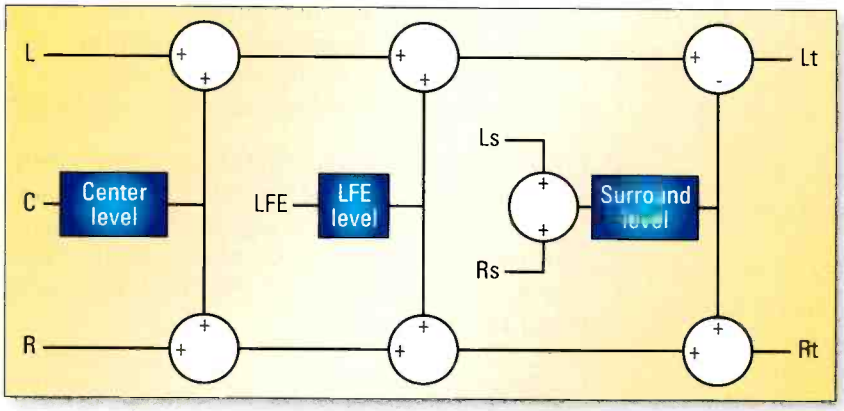

Figure 4. Creating an audio downmix

Jean-Claude Krelic is interfaces project manager for Miranda Technologies.

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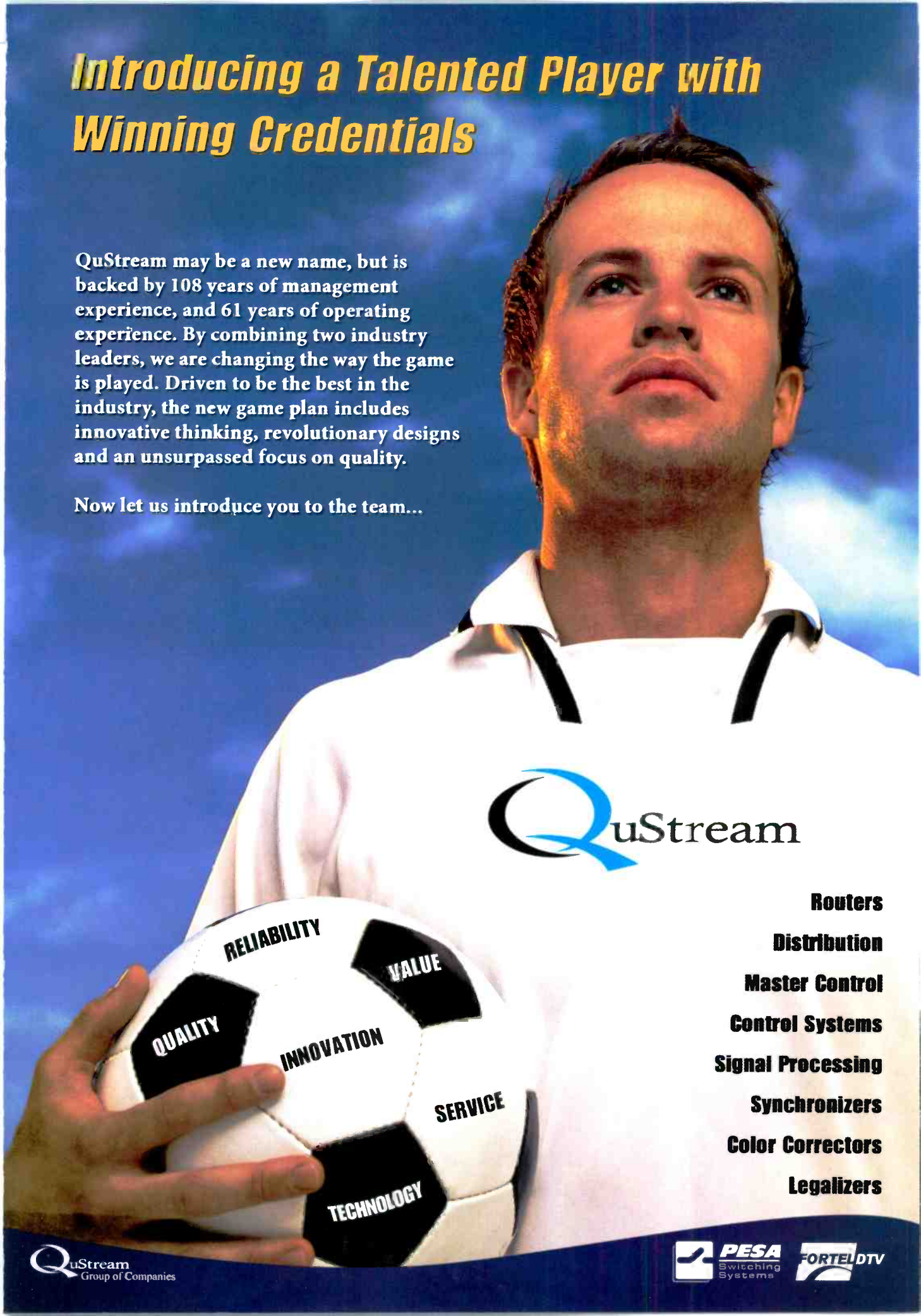

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SYSTEMS DESIGN SHOWCASE

The RAI newsroom in New York is always abuzz with activity. Glass Valley NewsBrowse software provides journalists and producers with unlimited access to clips, both those coming in that day (even before they are finished downloading) and from the archive. Photos by Michael Grotticelli.

RAI finds new speed FROM A NEW NEWSROOM

BY MICHAEL GROTTICELLI

When the RAI, the American subsidiary of Italian public broadcast provider RAI Radiotelevisione Italiana, had outgrown its old, mostly analog facility, the decision was made to find a new location. For Michael Harabin, head of production, and Sal Paglia, chief engineer, it was a chance to learn from their previous, labor-intensive workflow and get it right this time.

About a year ago, they secured the top floors of a space formerly occupied by AT&T on the Avenue of the Americas in New York. From their location, RAI's signals would always be available to Rome headquarters, no matter what type of catastrophe might befall the area. The NOC is bulletproof. The building has four diverse video paths, including redundant fiber, for incoming and outgoing signals, and 24/7 operation is protected with three massive backup generators.

From this location, RAI's signals would always be available to Rome headquarters, no matter what catastrophe might befall the area.

A need for speed

The company has maintained a North American news bureau in New York for more than 40 years, producing every type of story — from the Gulf Coasts flooding to the New York City Marathon — from an Italian perspective. Recognizing increasing demands, Harabin and Paglia set out

RAI's main production studio features Sony BVW-550 digital studio cameras, while field acquisition is done with Sony XDCAM PDW-510 cameras.

to replace some of their tape-based systems with a shared storage network that would be robust enough to support five Italian networks (RAI 1, 2 and 3; RAI News 24; and RAI International), as well as other RAI subsidiaries.

With help from The Systems Group, RAI moved into a new, all-digital facility in June 2005, while continuing to operate from the old facility in midtown Manhattan. The complete changeover occurred about a month later. The idea was to replace all the sneakernetting and yelling down the hall in search of videotapes with an IT-centric system that would enable editors and producers to be more productive and get stories to Rome faster.

The result: a production workflow design that has fostered a closer synergy among the journalists, producers and production staff. They have more communication and collaboration on stories than ever before. Now when they do live remotes for late-breaking events, getting a journalist on the air takes as little as 10 minutes. In most cases, stories are produced in New York within an hour and sent to Rome for insertion into a larger newscast throughout the day.

The result: a production workflow design that has fostered a closer synergy among the journalists, producers and production staff.

The new newsroom

RAI's legacy facility had a tape room for recording news feeds and four linear A/B suites, two of which were combo control rooms for the two studios. Feeds were recorded in groups of four decks, each to provide copies to those involved in creating the programming, resulting in time-consuming duplication and stacks of tapes everywhere. The new facility reduces RAI's reliance on videotape, though it is not gone from the workflow completely.

The digital newsroom, based on Grass Valley digital news production systems, features the ability to prepare and organize media and materials in a highly efficient manner. The facility includes Grass Valley Kayak DD video

Design team

RAI
- Michael Harabin, head of production
- Sal Paglia, chief engineer

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production switchers, Concerto series routers with an Encore control system, NetCentral monitoring software, and Kameleon and Gecko modular products.

The new space boasts one linear edit room, five NLE suites, two production studios, control rooms (which are often shared via fiber), an announce booth, a radio interview studio, graphics workstations, a master control area and a machine room. There are also three incoming satellite feeds and a CBS NewsPath server with plans to add CNN as a news source in the near future.

Broadcast service panels, with audio and video connections, have been installed at strategic locations throughout the building.

Cat 6 fiber connections allow reporters to review segments from their desks. And broadcast service panels, with audio and video connections, have been installed at strategic locations throughout the building for added flexibility. This includes a panel on the roof to provide a panoramic backdrop for stand up stories. There are also two POV cameras inside the newsroom.

Technology at work

Grass Valley
- Concerto routers with an Encore control system
- Kameleon and Gecko modular products
- Kayak DD video production switchers
- Profile XP Media Platform servers
- M-Series iVDR
- NAS system
- NetCentral monitoring software
- NewsBrowse software
- NewsEdit XT and LT NLEs
- NewsQ Pro news playout

Pinnacle F/X Deko CG

Sony
- Betacam SP VTRs
- BVW-550 Studio cameras
- XDCAM PDW-510 camcorders
- XDCAM PDW-1500 compact decks

Faster field to finish

Footage is shot with Sony XDCAM PDW-510 camcorders, and every producer has an XDCAM PDW-1500 compact deck on his or her desk. The XCDAM systems' use of proxy files speeds up the process of selecting desired shots, creating a rough EDL and getting them into the edit suites for conforming and finishing.

Once footage comes from the field, editors, working on Grass Valley NewsEdit XT NLE systems, have instant access to those materials via NewsBrowse software at 16 seats. This enables editorial decisions to be made quicker and stories to contain more elements, making them more well-rounded than they would have been from RAI's previous location.

The new facility includes five NewsEdit XT systems, two NewsEdit LT field laptop systems, 200 hours of NAS storage, 1000 hours of low-browse storage, four M-Series intelligent digital video recorder (iDVR) servers (supporting eight channels of ingest and eight for playout), an ingest station and a smart bin server.

Using the iVDRs and eight potential channels, the staff can record six simultaneous channels, leaving two for redundancy. The clips are sent to the smart bin server. Within a minute, refresh begins transferring files to the NAS for use by the NLE editor workstations. Finished sequences are pushed to the iDVR or NewsQ Pro for scheduled playouts, or used as roll-ins for live feeds to Rome. For major breaking news, RAI can go live to three networks with three different journalists at the same time.

At RAI, signals are managed with Grass Valley Concerto routers, controlled by Encore software, to get signals to the proper destination at the proper time.

Storage to go

The biggest challenge for RAI is managing storage and moving clips between online and offline storage. For now, this process is carried out manually, but it will become more automated as time goes on. Finished stories, raw footage and B-roll images are archived on the same XDCAM optical discs used in the field.

Ending uncertainty

When RAI set out to build a dream facility that would support its wide-ranging production needs, there were a lot of uncertainties. How would the technology work within an SDI infrastructure that included some tape? How soon would the staff get up to speed on the new technology? And how much would it improve the news creation process?

The RAI staff shouldn't have worried. The end product has delivered on the promise it held during preliminary planning sessions and has made RAI more productive, which is exactly what the team was after. **BE**

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


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Fiber-optic advancements

BY JOE COMMARE

The evolution of fiber optics has made it possible to achieve far greater signal capacity than was ever possible when the technology was first introduced in the late 1970s. But while fiber optics is not fundamentally a complex subject, the rapid, sometimes uncoordinated development of the industry has unnecessarily increased the level of complexity. The existence of some 80 different connectors and all sorts of fiber types speaks to this trend.

In addition, thanks in part to the increasing popularity of bandwidth-heavy HDTV signals and to lack of foresight, early fiber installations are already overwhelmed and being tasked to handle far more signals than they were built for. From this quandary has emerged more cost-effective electrical and optical signal multiplexing techniques that allow us to get more signals onto less cores while facility managers and broadcasters find ways to pull in more glass.

Now that the fiber-optic industry is beginning to mature, there is a greater need for manufacturers to dedicate effort to identifying what methods work best in broadcasting applications and move toward developing techniques that reduce the artificially elevated level of complexity. An industry-wide adoption of the same fiber cabling and connectors will make it easier for mobile broadcasters to have access to compatible equipment, maintain spare parts reserves, find qualified technicians and ultimately keep the equipment clean and working. Paramount to this is settling on cable types, fiber counts and connectors that allow the availability, durability and compatibility that you, as remote broadcast engineers, demand.

With the advent of coarse wavelength division multiplexers, it's now possible to send eight signals down a cable solely within the 1300nm window.

Wavelengths and multiplexing

For many years, data transmissions over fiber networks used the same 1550nm wavelength that telephony companies also use. The 1550nm optical window is attractive in telephony applications because it propagates well over long distances, and cables tend to be permanently installed. However, in the far more demanding operating environment of remote broadcasting, this operating wavelength has been less than ideal when using single-mode fiber cables because it is more susceptible to losses from tight corners and microbending — small bends at the microscopic level that create additive optical losses along a given cable length. But, of course, as soon as we make a sweeping statement like that, new fiber technologies promise to overcome these limitations.

In contrast, 1300nm window wavelengths are more stable, making them better suited for use in mobile broadcast fiber installations. The 1550nm wavelength would not have been used in these applications if not for one reason: the need to optically multiplex multiple signals onto a single strand of fiber. Because the 1550nm and 1310nm wavelengths don't

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A look at the consumer side of DTV

U.S. DTV reception

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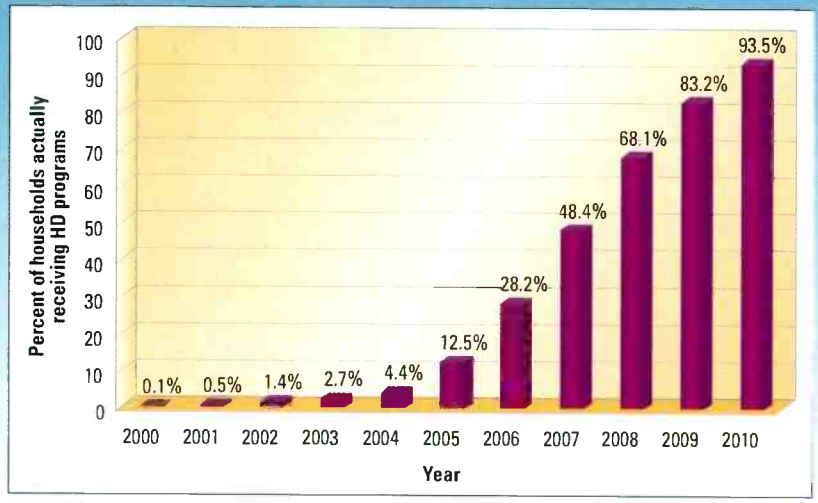

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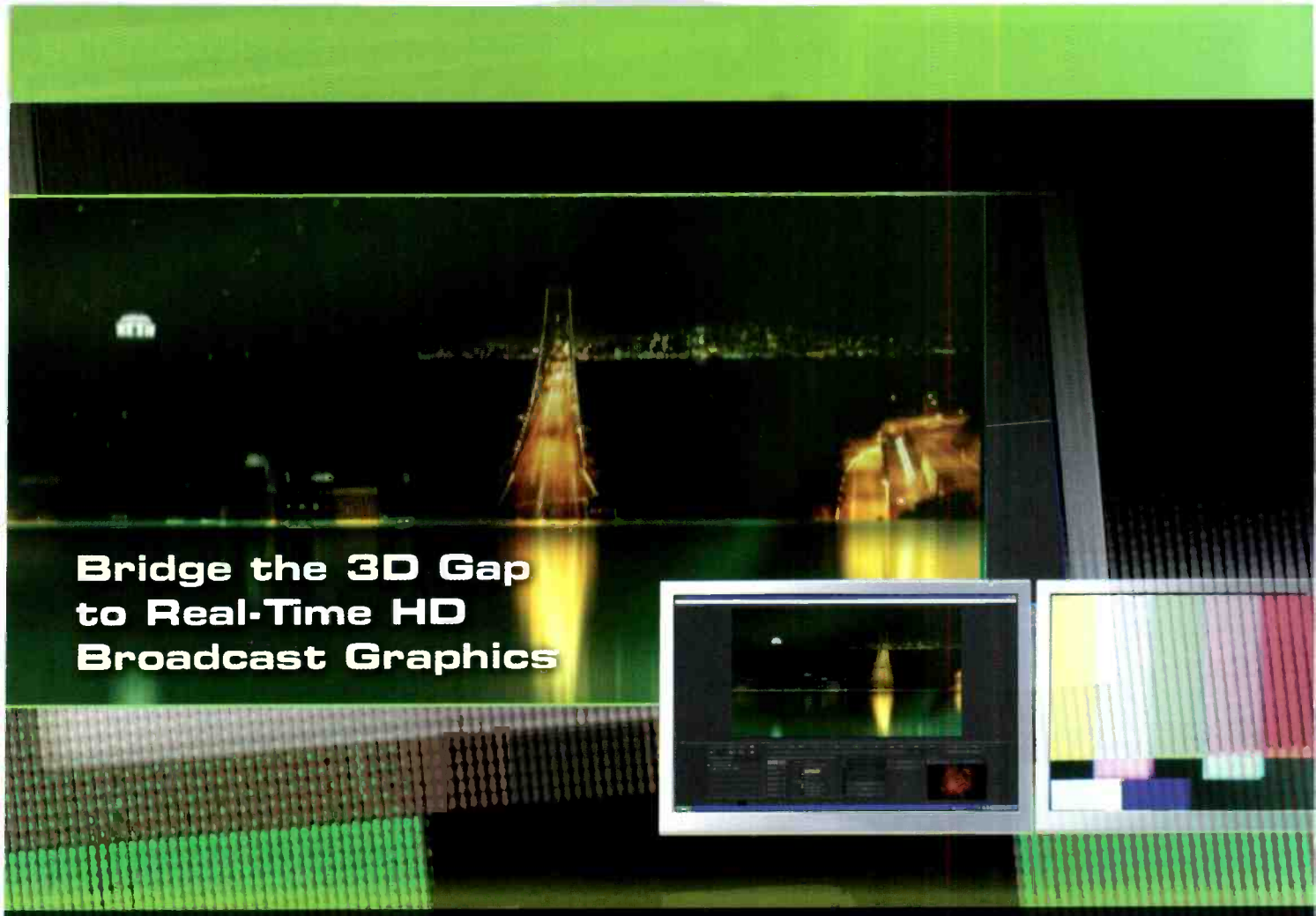

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Telecast Fiber Systems' four-core MX expanded beam plug and receptacle is a standard for harsh environments.

interfere with each other while in the glass, both can occupy the same fiber strand without problem, allowing networks to double up on the number of signals that can be sent down a fiber.

With the advent of coarse wavelength division multiplexers (CWDM), it's possible to send eight signals down a cable within the 1300nm window. If we then add eight more wavelengths ranging up to the 1550nm window, our signal payload increases.

Connector advancements and cable core counts

There are many different connector types available. But just like restaurants in New York City, the good ones flourish and the bad ones don't last long. For single fibers, the ST has offered the best combination of durability and cost for many years. The fact that it looks a lot like a BNC makes it a favorite among broadcasters. But patching lots of STs together in long fiber runs is not efficient, so we set out to find a multi-core connector that was tough and relatively foolproof. The Delphi hermaphroditic connector, in four- and 12-core counts, was an easy choice. The SMPTE committee thought so too, making it a standard for harsh environments.

Now, more than a decade later, the pin and socket design of the Delphi is being supplanted by the even more advanced expanded beam connector technology that uses lenses flush with the mating plane so that there are no longer recesses that can trap dirt and other contaminants. These MX connectors promise even higher performance, tool-less cleaning, easy maintenance, smaller size and, ultimately, lower cost. They will be available in two- and four-fiber configurations.

Fiber core counts are also a critical consideration when building your system. The trick is to design in enough cores to cover your requirement and still have capacity for some spares and/or redundancy while incorporating connectors that are reliable and maintainable. For trunking applications, we created configurations using 12-fiber cables and connectors. But with the emergence of CWDM, we now can easily transport more signals on less cores. So, standardizing on two- and four-core fiber cables with hermaphroditic expanded beam connectors offers a solution that dramatically reduces costs and complexity.

Pulling the pieces together

New fiber technologies combined with new connectors and advanced electronics are making remote broadcasting jobs easier. Further standardization on the use of CWDM with two- and four-core expanded beam connectors for additional redundancy will boost the ability of fiber optics to support a high volume of signals while eliminating the limitations that previously plagued high-bandwidth signal transport over copper. Once these elements are accepted on a wide-scale basis — and incorporated into existing and future systems and rental inventories — we will all benefit with quicker setups and strikes; easier cleaning, maintenance and troubleshooting; more efficient signal transport; and significantly less expensive repairs in the event of unavoidable cable damage. This translates into fiber-optic systems that are better, faster and cheaper. As the fiber-optic industry continues to mature, the push for standardization on best-of-breed solutions will fundamentally benefit all broadcasters. BE

Joe Commare is vice president of sales and marketing for Telecast Fiber Systems.

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FINDING YOUR CUSTOMERS:

The multichannel newsroom

BY DAVID SCHLEIFER

It's mid-afternoon and your viewing audience is at work. They've heard there is a bad storm coming but have no TV access. Will they be able to access your latest report from their work computers? At the same time, a busy executive is in line at the airport and wants to check last night's sports highlights. Can he do this with just a cell phone?

In both of these situations and in many more, viewers are looking for alternative sources for information. They can't wait for the scheduled nightly television broadcast. In most cases, they will look for familiar sources — the sources they trust — if they can find them.

In today's age of digital instant gratification, broadcasters need to have a vehicle to deliver late-breaking stories to their viewers — anywhere and at any time. Broadcasters have an opportunity to make a wider range of content available to a larger audience, provided they have the tools.

Eliminating the barriers between you and your audience

Not so long ago, the only way to get rich media content out to consumers was over the air or via cable. When Internet arrived, dial-up connections made it difficult to deliver compelling and competitive content. This has changed. With more than 60 percent of U.S. homes connected to high-speed Internet connections and even higher numbers in other countries, more people are experiencing the full potential of the Internet, with fast access to text, pictures, sound and video.

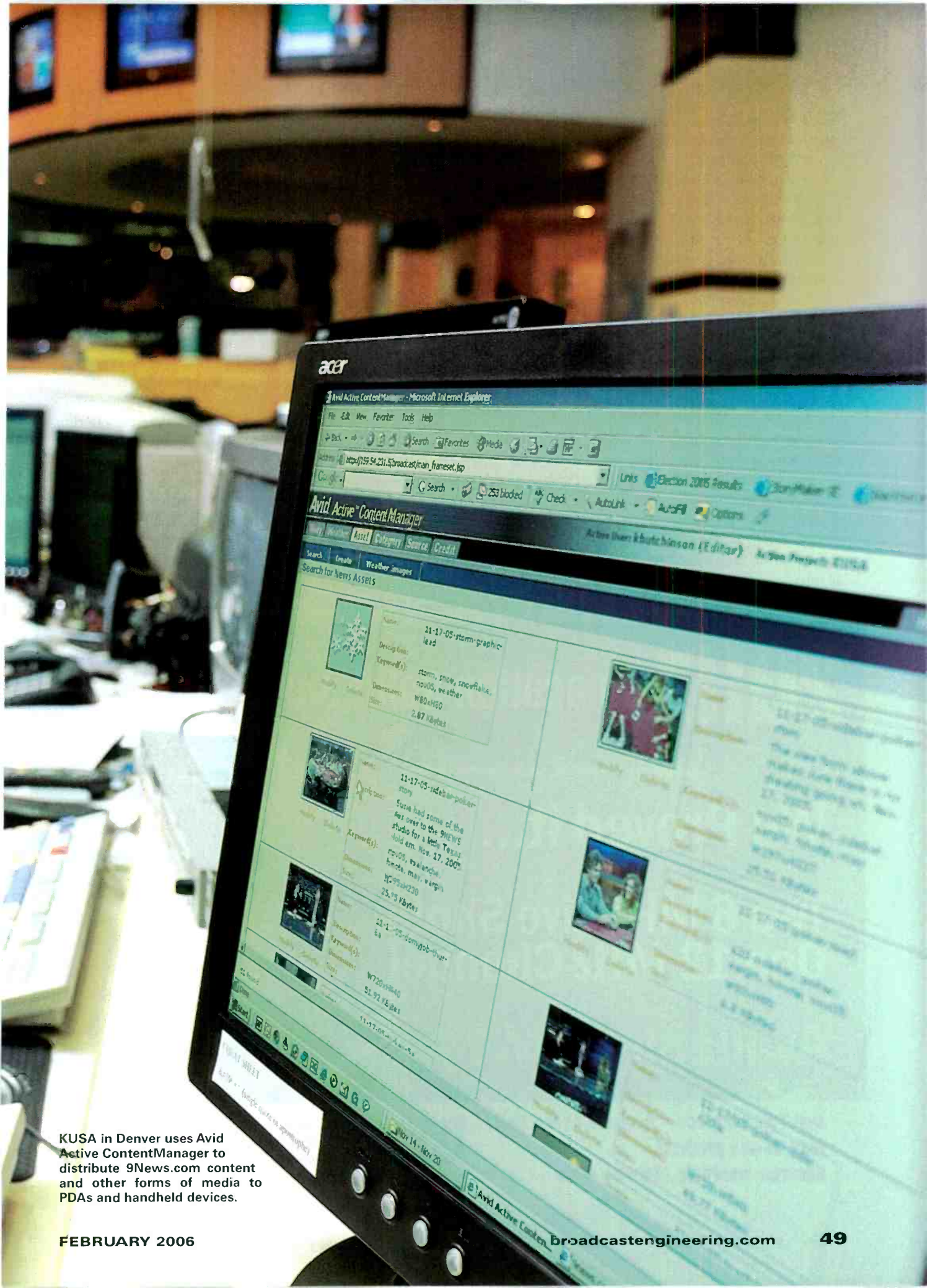
And we now see a push to cell phones and other personal wireless devices. The rollout of 3G phone networks such as EV-DO promises bandwidth that is comparable to what viewers can get at home. The bottlenecks are disappearing rapidly.

Anticipating the technical challenges is critical to implementing and managing multichannel distribution. When broadcasters design a newsroom, there are several factors to consider that can make the process simpler and more cost-effective.

One of the most important issues is workflow. Publishing in a multichannel newsroom requires many things to happen in parallel. As obvious as this seems, broadcasters need to take a hard look at what this means. Systems need to allow for all of the feeds and raw material to come in from the field in high resolution for efficient on-air broadcast management.

Systems also need to allow simultaneous transcoding of media for the Web and other delivery destinations. In fact, systems need to support multi-user access to media so

In today's age of digital instant gratification, broadcasters need to have a vehicle to deliver late-breaking stories to their viewers — anywhere and at any time.



KUSA in Denver uses Avid Active ContentManager to distribute 9News.com content and other forms of media to PDAs and handheld devices.

that a Web producer can choose and edit content at the same time as the 6 p.m. news producer.

The foundation is a real-time shared storage solution and flexible, scalable bandwidth. Starting with an underpowered media network will quickly limit what you can do and potentially cost thousands of dollars to rectify.

Focusing on the Web is a good way to reach your audience. There are several different ways to push content to the Web. One way is to take an on-air broadcast and simply stream it out to the Web simultaneously. All this requires is to feed a copy of your on-air signal to a streaming server. While this is a good way to deal with breaking news, watching TV is a passive process whereas finding information on the Web is a proactive process.

Users on a station's Web site are more likely to look for stories that are of interest to them. If they have logged on to search for a particular piece of information, they will not want to sit around and wait for it in the middle of a half-hour broadcast.

An alternative to streaming continuous content is to chop it up, segment the stories and make all or some of them available as individual packages. This is a better approach, especially when accompanied with text to help users decide on the relevance of the story they are about to view.

The challenges and choices

To decisively win the battle for viewers and get more hits on the Web, broadcasters need to put as much care into what content makes it to the Web as they do in working out their on-air product. The formatting of something shot and edited for SD or HD programming will likely be unusable by the devices consumers may be using in the future. Imagine a gorgeous panoramic vista edited and formatted for a 60in HD screen. Now imagine that same picture on a cell phone display — accompanied by mismatched audio capabilities.

But there is still an opportunity here. That executive in the airport is the perfect target for a preview or version of a story that he or she can watch as soon as they get home. You can lead them to follow the story either on the Web or on that big 60in screen.

The keys to success lie in repurposing the same story in several different ways: delivering short, targeted information to mobile devices; offering in-depth research and background information on the Web; and broadcasting graphically arresting images to the big TV screen.

But how do you do all of this without tripling your staff? The answer is in the centralized bandwidth your infrastructure can provide. At its core,

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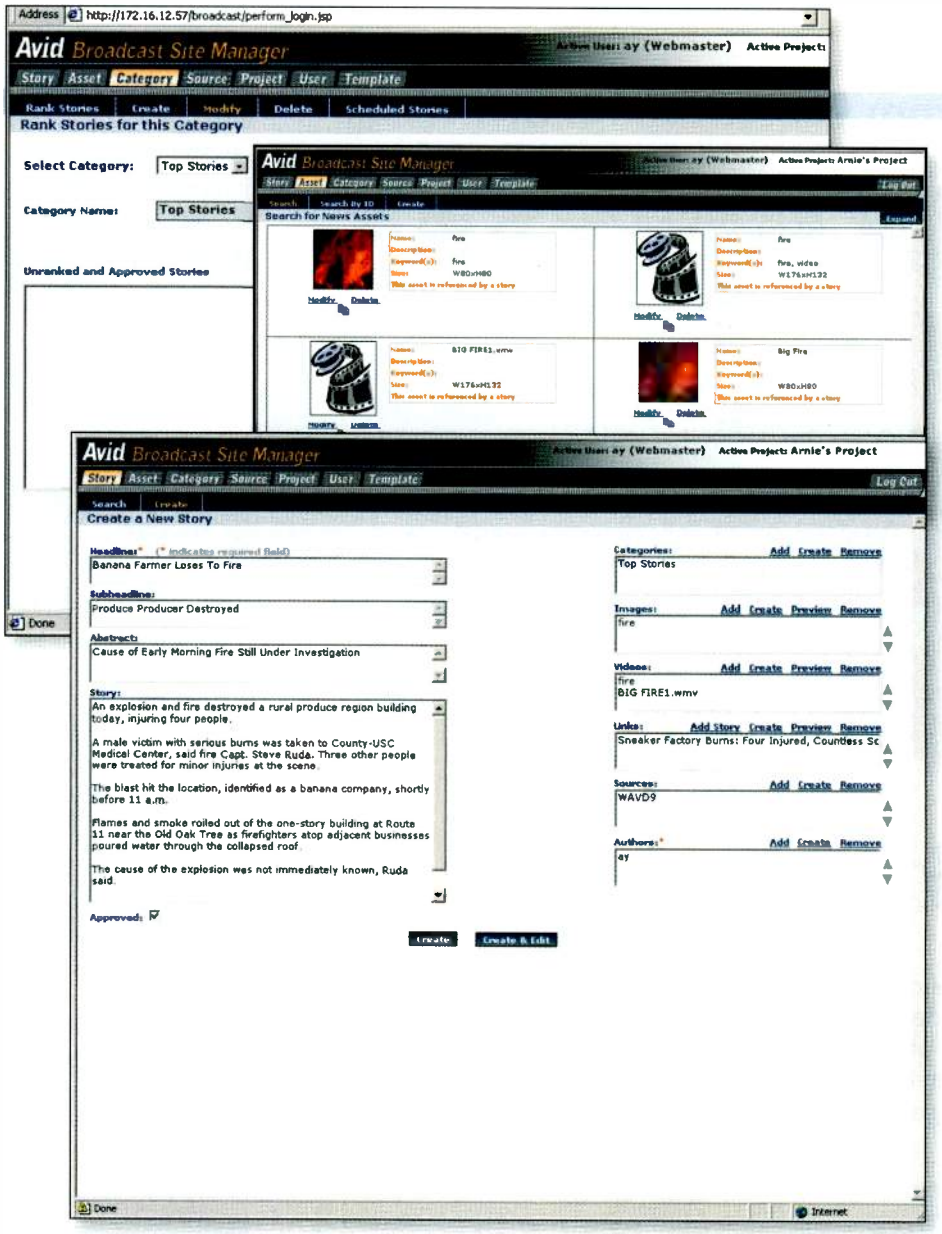

Avid's Active ContentManager lets broadcasters manage and publish video, audio, graphics and text to Web, wireless, ITV and other IP-based distribution points. It collects content from multiple sources to form a consistent online presence.

your system should be designed to support multiple simultaneous workflows in order for you to manage multiple simultaneous channels of output. Today, new tools and technology are emerging that let broadcasters leverage the same content-gathering and content-creation efforts across Internet-based channels.

If you ask your staff to just "get it done" without giving them the right tools to do the job, they will fail. A single Web producer can focus on his or her audience, select appropriate material, reuse what is produced for air, edit out what doesn't fit, send off transcoding jobs to the proper systems, and publish all of this to the Web and other devices extremely efficiently — as long as he or she has access to all of the right media all of the time.

The minute he or she has to wait for tapes, re-digitize them at Web resolutions and wait before being able to view them, there's going to be a problem with getting the news to viewers on time. If the Web producer doesn't have real-time access to the material, you will likely need to hire several more people to manage peripheral tasks. And in the end, you will never get the flexibility to repurpose content to fit alternative channels and deliver added value to consumers. The system you build for your newsroom will determine how effectively you can leverage other methods of distribution.

Everyone can help

Another key to getting the job done well with few people is getting everyone to help — even if they don't know that they are helping. If the copy from the newsroom computer system can make it to the Web seamlessly, then your writers will have helped the process. If the shot selections that your editors, journalists and photographers make as they cull material for your top story are also available to your Web producer, then they have all helped that Web producer focus on the best material. The result: When the Web producer quickly needs alternate shots or more background material to publish, it will be at the ready.

You can also focus on training people to work in ways that allow others to leverage what they are doing. For example, teaching your teams to select and identify additional good shots, alternate sound bites and background information will also help differentiate Web and on-air material.

Additionally, using tools that make sharing and reuse easy will make the process less intimidating. If the tools offer integrated functionality and are easy to use, you can rely on a wider group of people to do the job — as opposed to a workflow that requires your news producer to be an expert in Web publishing tools, sophisticated NLE systems, asset management systems and more.

While we all know the Web is here to stay and we can see the interest in delivering media to cell phones and other devices, we can't predict what the future will bring. We can, however, predict that it will require us to leverage the same core content, brand and effort to every new opportunity.

We need to make sure that our systems are agile, allowing us to change direction in the future. Technologies may come and go, but the cost of

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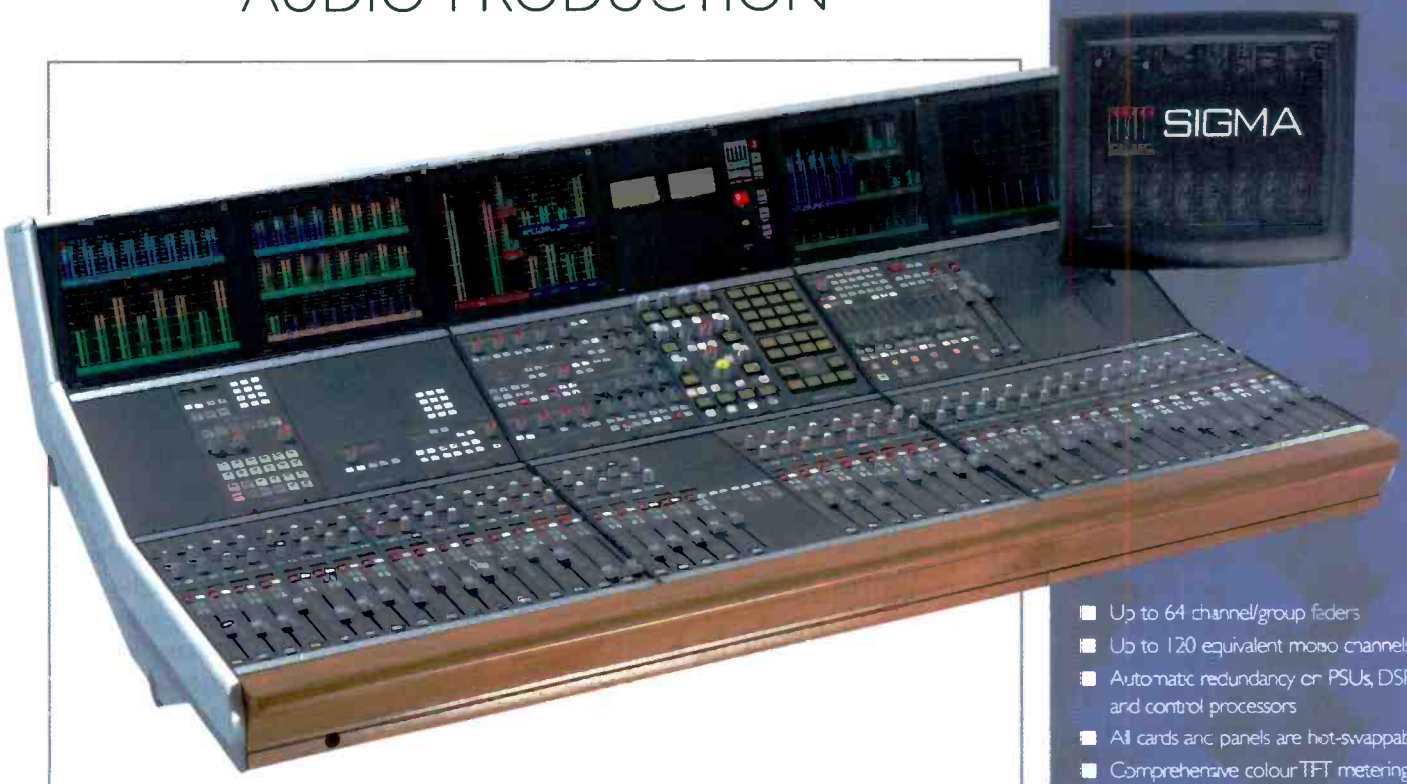

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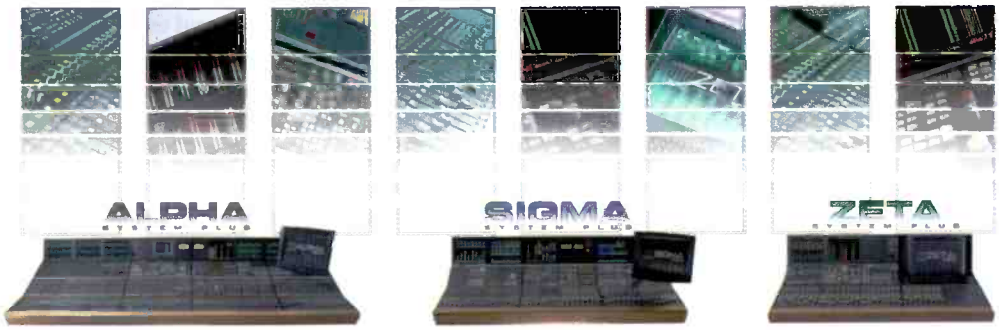

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experimentation should be low. A recent example is podcasting. Will viewers develop regular habits like downloading podcasts of their favorite content? CBS is betting that they will and has started offering podcasts of the evening news.

Bandwidth and business models

No one is better prepared to leverage all of today's available bandwidth than the broadcaster. The real expense is in gathering, sorting and disseminating the news and other content. Once these costs have been assumed, there are cost-effective ways to add new distribution channels.

Broadcasters are in a powerful position because their brand adds tremendous value. Viewers are more likely to trust a familiar station, logo, personality and identity.

Today, the business models are shaping up in two ways. The first is to resell content on other channels. Sprint and other companies are launching pay-to-view services for TV programming on their mobile devices. Many manufacturers are producing handheld video devices. Time will tell whether this is a fad or market-driven trend. It is difficult to see how consumers will shift to paying for content that they are getting for free over the air or as part of their cable package.

The second way to benefit from making your content available in multiple places is not only to sell more advertising based on increased viewers, but to drive those viewers where you want them to increase the value of your brand. If, by delivering content to cell phones, you drive viewers to your newscast, then you will win in both places. But if the content on the phone means that the viewer no longer needs to tune in to the television broadcast, then you will need to extract the same revenue from that viewer on the phone as you do over the air. Broadcasters have to think about how to deliver bandwidth-appropriate content and promotions in order to offer a richer, more complete product.

Desire, demand and delivery

Broadcasters are in a powerful position because their brand adds tremendous value. Viewers are more likely to trust a familiar station, logo, personality and identity. All of these components have value regardless of how the content is delivered.

As the Internet becomes a viable alternative to on-air sources, broadcasters are seeing a growing shift of focus as viewers are moving from the TV set to the computer throughout the day and relying less on scheduled newscasts. Broadcasters need the desire to deliver their content to a broader audience — a desire that is often driven by the need to make up for a loss of viewership.

If broadcasters shy away from new distribution channels, they will find that others will quickly take their place, offering content and eventually building brand identity and awareness with customers. Cable is a good example of this, with new names and entities created to fill a void, mainly because there was a demand for content that was not being filled. CNN and Nickelodeon are examples of programming streams that were created when the traditional networks and Disney were limiting their involvement with cable when it was taking hold. The bottom line: If you don't do it, someone else will! BE

David Schleifer is vice president of broadcast and workgroups for Avid Technology. The views expressed in this article do not necessarily represent the views of Avid Technology.

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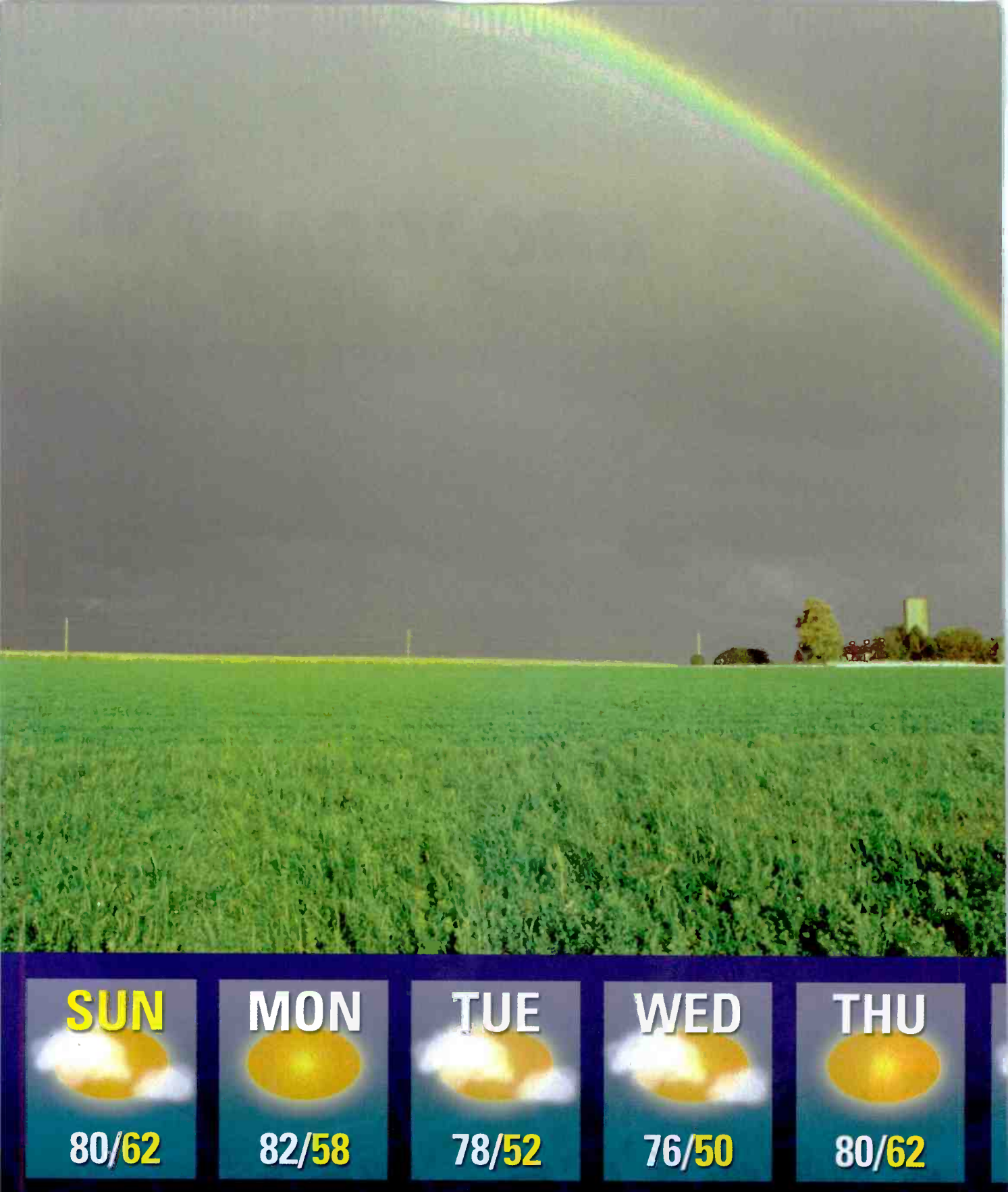

Generating revenue with a

SPECIAL REPORT

DIGITAL WEATHER CHANNELS

BY PETER LEVY

As the quest for additional advertising dollars and the pressure on operating margins continues throughout the broadcast industry, the digital revolution has created new opportunities for generating revenue. The FCC has mandated the move to the digital spectrum, thus enabling broadcast stations the ability to air additional programming channels.

In today's model, stations are typically airing their primary signal on their D-1 (primary digital channel) in HD format. The station's primary signal in HD format uses approximately 14Mb of the available 19Mb of the allocated digital bandwidth. This leaves approximately 5Mb of bandwidth for use by additional digital channels (D-2, D-3, etc.). A standard-definition SDI channel will use approximately 3Mb, uncompressed bandwidth.

Additional channels, at a relatively low cost, were primarily available to cable companies in the past. The broadcast industry now has the opportunity to air additional local programming channels and generate additional revenues using their allocated digital spectrum. One of the best opportunities lies in building a local weather channel. A weather channel requires minimal bandwidth, therefore allowing plenty of opportunity for other new revenue-enhancing channels.

Research has shown that viewers want instant access to live weather information and local forecasts. Stations that provide it first will secure their position as the dominant weather leader in the market. A station's weather presence will be further enhanced through the additional programming channel, increasing the visibility of both its on-air staff and local newscasts.

Most broadcast stations have tens of thousands of dollars of weather computers in their weather centers and a weather team, all generating content 24 hours a day. They spend tremendous amounts of money on their local weather brand and programming, so local weather channels seem a natural programming outlet for a station's digital spectrum. By cross-promoting the station's digital local weather channel, the station can retain viewers to its weather brand 24 hours a day, thus keeping its viewers from turning to other sources for their weather information.

local digital weather channel

DIGITAL WEATHER CHANNELS:
Generating revenue with a local digital weather channel

KTUL Tulsa

KVVU Las Vegas

WPRI Providence

WZZM Grand Rapids

Building a local weather channel can create extra revenue for stations.

Broadcast stations now have the opportunity, on their digital spectrum, to create their own programming without being beholden to their network affiliate, thus retaining 100 percent of the programming control and revenue generated. This may be a little more work initially, in the long-term, however, the return should be optimized, and the programming will always be 100-percent controlled by the local station. By retaining the programming control, the station will benefit by having the ability to modify its programming to meet the changing needs of its viewers while optimizing revenue.

Broadcast stations now have the opportunity to create their own programming without being beholden to their network affiliate.

Types of programming

How are stations addressing this new opportunity and what type of programming are they airing? The stations that have taken the plunge into a second digital channel have used a variety of programming. In one model, NBC is offering its affiliates the NBC WeatherPlus programming product, which combines national content generated by NBC with local cut-ins.

Local weather channels have been operating in several markets for more than 10 years. Most of these channels have been analog-based and have been broadcast in conjunction with local cable companies. With the advent of the digital spectrum, local weather channels are a natural progression for a station's digital bandwidth.

Once the station has created its own programming channel, then it must comply with FCC requirements for closed or open captioning, severe weather notification, children's programming, etc. The station must also take into consideration how to incorporate commercial spot insertion and billing when creating a do-it-yourself system.

There are several off-the-shelf digital weather channel products available today from various vendors, including WSI, Weather Metrics, Weather Central and AccuWeather. All of these systems are tied to the weather data feed provided by the vendor, except Weather Metrics, whose system is on an open platform and non-vendor specific for weather data. The systems have, to different degrees, the ability to extend the station's branding through customization of the on-air presentation.

As you consider the off-the-shelf systems, make sure they have the flexibility that your station requires. Flexibility will give your station the longevity and ability to adapt as your market needs change.

As the digital channel matures, you will want to update the programming wheel to reflect more information and different types of information. The Internet is a big resource for content, so you want to make sure your system can take advantage of all of the new Internet protocols and data feeds, such as RSS, XML, CAP, severe weather, etc.

Automation

Automation is the single most important factor at the station level. Engineering and IT resources are being cut, and during severe weather, your weather team does not have the time to change programming of the digital channel.

Some of the systems being aired today require full-time staffs to operate; this will dramatically cut into the station's return and viability of succeeding. Systems that are fully automated and robustly supported by their vendors are required to ensure the highest probability of success in your market.

Integration of your new digital programming channel with other station equipment is a critical factor in determining the automation and flexibility of the systems

you are considering. If the new system can "talk" with the station's existing systems, you expand the capability and flexibility of what you air and how robust your presentation will be.

Vendor considerations

When doing your homework, ask the vendor what additional equipment may be required to create an on-air presentation like the DVD presentation that it showed you. Better yet, ask the vendor to visit your station and do a demonstration of an actual live operating system at the station, like the one you will be purchasing.

By seeing a demonstration, you will see exactly how the equipment works and the complexity of the system. DVD presentations look great, but they will not show you how the system actually operates. With most vendors, your station has the ability to decide what programming airs in a pre-configured, programming wheel.

A few questions you might want to ask your vendor if you are considering a 24-hour local weather channel are:

- Does the system have the capability to record a short weather segment?
- Does the system have a severe weather, Amber Alert, school closing and crawl system built-in?
- Can we cut to our live signal and simulcast during severe weather coverage?
- How do we insert commercial spots?
- Does the system create a billing log for the spots that run?
- Can we put our live, local weather Internet sites in the presentation?
- Can we automatically schedule different programming wheels for different times of the day without shutting down the system?

Summary

By using existing core production and transmission capabilities, stations will generate new revenue through additional digital channels and cable partnerships. By selecting a system that integrates commercial spots, various logo placements and weather network location sponsors, the station can customize the promotional capabilities of the system, thus enhancing revenue.

Investment in an automated weather channel system that capitalizes on your station's current look, staff and branding will create a high-quality local digital programming channel. This will satisfy the FCC's demands for local digital programming, while generating additional revenue at a low cost of production.

If stations find the right combination of products and services, they will be able to optimize their return on investment and generate a profitable, new revenue source with their digital channel programming. BE

Peter Levy is president of Weather Metrics.

SAVING ENERGY
in on-air studios

In many studio designs, you can successfully cut costs by replacing house fluorescent light fixtures with energy-efficient lamps that can be used during tasks that don't require broadcast lighting levels.

BY CHARBEL FARAH

Every building manager, especially in the broadcast industry — and particularly in post-production — is continuously on the lookout for new ways to cut energy costs. With energy prices being what they are right now, assessing the energy efficiency of a facility makes good business sense. Given the fact that utility bills for on-air studios and support facilities can easily reach thousands of dollars per month, saving even a few hours of HVAC and lighting per day translates into substantial annualized savings. These savings can help avoid budget cuts in other more painful areas.

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Utility bills for on-air studios and support facilities can easily reach thousands of dollars per month, so saving as little as a few hours of HVAC and lighting per day can translate into substantial annualized savings.

The process of analyzing potential energy savings can be disarmingly simple, even if the means to realize those savings are not usually as straightforward. Monthly energy costs can be determined by the following formula: (consumption kWh/day) x (hours of operation per day) x (365 days/year) x (1year/12months) x (cost $/kWh).

The most capital-intensive method for HVAC savings is the installation of a cogeneration plant, which involves the simultaneous generation of electricity and use of waste heat to drive a chiller and boiler. Photo courtesy Paul Turang Photography.

Next, determine the energy savings that could be achievable by reducing the use of HVAC and lighting. Based on the above equation, the energy savings can be obtained by replacing the hours of operation by the number of hours that can be saved by turning the HVAC and electrical systems down.

The biggest culprit for high-energy costs in a studio setting will always be the HVAC system.

Cutting down HVAC costs

The biggest culprit for high-energy costs in a studio setting will always be the HVAC system. This holds particularly true for older facilities that do not have energy saving features or means, such as a variable air volume (VAV) system, direct digital

During the last mission by Discovery, audio engineers, Royce Bowie and Greg Wiseman (standing, l-r), with John Stoll, senior audio engineer and audio engineer Beth Weissinger (seated, l-r), in the Johnson Space Center Audio Control Room, handled all the communication and media feeds as well as NASA TV broadcast audio from the System 5-B.

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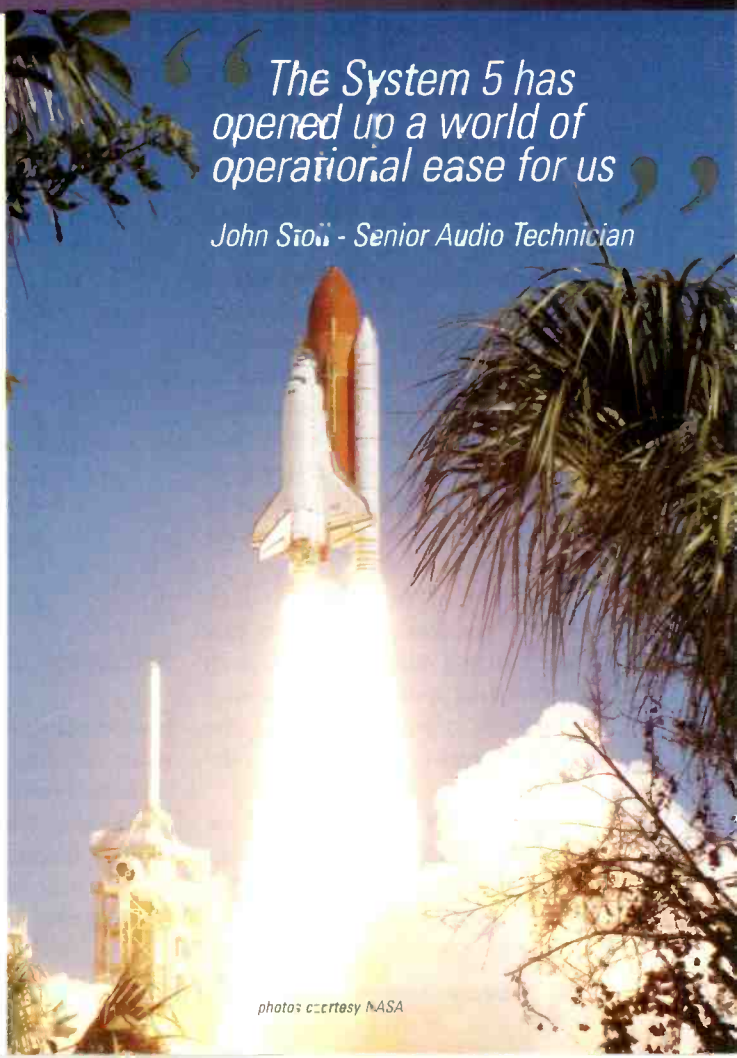

These HVAC systems are installed next to the temporary broadcast facilities at the 2006 Winter Olympics in Torino, Italy.

control (DDC), heat recovery units, etc. Thus, these older facilities have to rely on a constant volume system and manually regulate studio temperature during the various production stages.

Given the fact that the average one-hour live-audience show requires up to four hours of preparation time, it's easy to see how converting a constant volume HVAC system to a VAV system could significantly cut down on energy use, depending on the size of the facility and the capacity of the HVAC system.

Implementing automation, such as DDC, can also play a major role in maximizing energy savings. Such an automated system allows the user to properly plan and control the space temperature in addition to the lighting.

That could be easily achieved via a control integration system. Control integration may include HVAC, lighting, security and other building systems. Overall, studio managers could save between 15 percent and 20 percent on utility costs, depending on usage.

There are three main ways to make a studio more energy efficient. The least expensive way is taking an already existing HVAC system and turning it into a VAV system.

Overall, studio managers could save between 15 percent and 20 percent on utility costs, depending on usage.

The next best option for energy savings involves the installation of heat-recovery units that allow a facility to recover some of the energy that is being released back into the atmosphere in order to comply with code requirements. The air that is being exchanged for outside air is usually low temperature and large quantity air. Putting this air through an air-to-air heat exchanger, heat pipe or enthalpy wheel presents a cost-conscious alternative to using compressors and chillers to bring the hot outside air temperature down to the desired room temperature.

The costs of such a retrofit are low to moderate, depending on the type of facility, age of equipment and space availability. From a logistical point of view, such an undertaking entails converting existing systems and installing variable frequency drives, controls and a heat recovery wheel.

The third, but admittedly most capital-intensive method of saving energy, involves the installation of a cogeneration plant. Cogeneration by definition is the simultaneous

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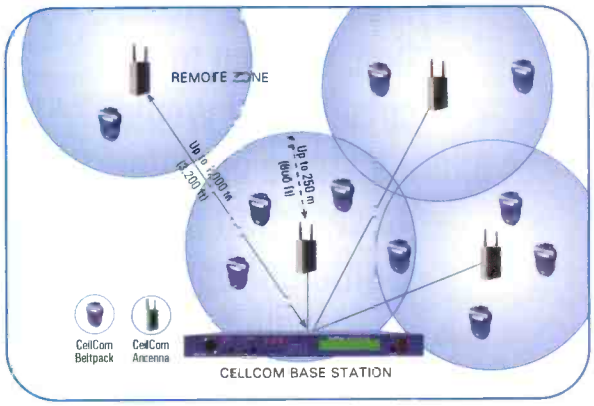

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Studios like KTLA Channel 5 News in Los Angeles typically use up 75W/sq ft for lighting compared to 1.5W/sq ft for the average office building. Photo courtesy Kino Flo.

generation of electricity and use of waste heat to drive a chiller and/or boiler that provides cooling and heating to a building.

Historically, it has been employed to generate energy for large-scale applications, such as industrial complexes, college campuses and hospitals, where there is considerable electricity usage. Today's changing economy and technology advances now make it a viable alternative solution for many other uses. An example of a small-scale cogeneration application is generating electricity on-site in a building to supplement utility-supplied power while also providing chilled water, heating hot water or domestic hot water for the building's domestic use.

Complex dimmer systems are a viable option, with up to 60 circuits that would allow a studio operator to switch to many different lighting configurations.

An added benefit is the fact that several states, including New York and California, and many utility companies nationwide offer some financial incentives to install cogeneration facilities. However, for broadcast facilities, this tends to be the least-favored energy saving approach. The reason may be that studios mostly operate within leased spaces and thus tend to refrain from high-end, long-term investments.

Reducing lighting costs

Studios will typically use up to 75W/sq ft for lighting. Compare that to 1.5W/sq ft for the average office building, and it is clear that cutting down on even two operating hours of full lighting time can have a substantial impact on energy cost.

Automating lighting systems, changing light controls and adding different lighting options are all extremely effective means to significantly cut energy costs. For instance, installing adequate maintenance fluorescent lighting for use during preparation for a show will result in energy reduction by keeping the high-wattage studio lights off until the commencement of the actual show or taping.

In many studio designs, installing house light fluorescent fixtures with energy-efficient lamps help cut energy costs. The fluorescent lighting can be used during tasks that don't require spotlight level, such as pre- and post-work.

In other cases, complex dimmer systems are a viable option, with up to 60 circuits that would allow a studio operator to switch to many different lighting configurations.

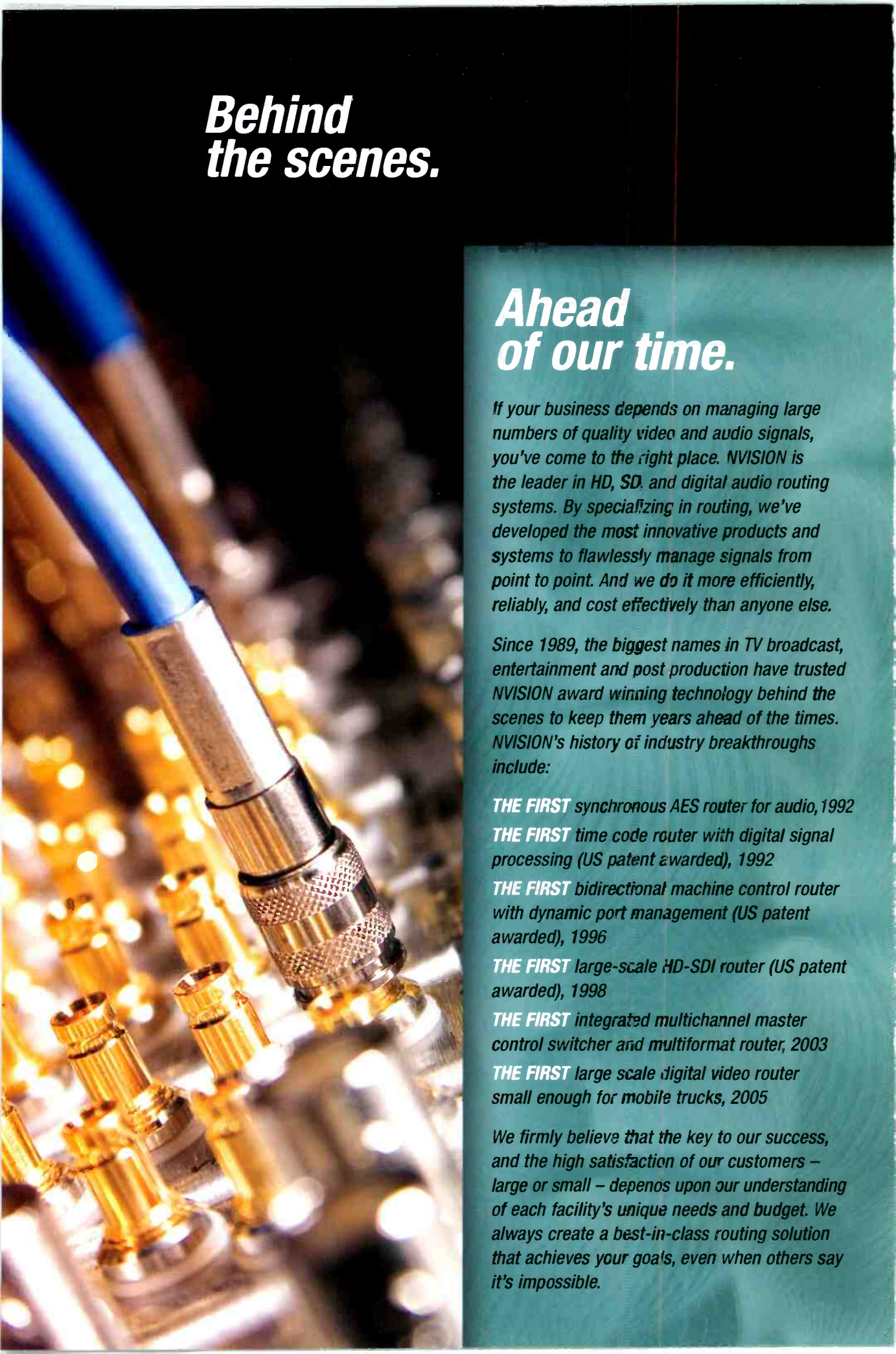
Education is key

Proper use of automated control systems will allow lighting and HVAC use to be carefully scheduled, ensuring the entire studio isn't turned on during pre-production or the space is cooled for full-house use when only a handful of employees are working and that the spotlights are off.

But as is always the case with technological innovations, reaping the full benefits requires that these systems be used properly. All too often, facilities fail to realize the level of savings they expected due to lack of proper training. Staff must be educated on the systems in place and possess the discipline necessary to ensure the system functions at its optimal potential. Not only is initial training required, but also follow-up training sessions are necessary to refresh facility personnel. BE

Automating lighting systems and changing light controls are a couple ways to reduce energy costs. Photo courtesy MBDTV.

Charbel Farah, P.E., is associate partner in the Los Angeles office of Syska Hennessy Group, a consulting, engineering, technology and construction firm that provides technical solutions in such areas as building system design, facilities management, energy management, technology consulting/engineering and turnkey design/build services.



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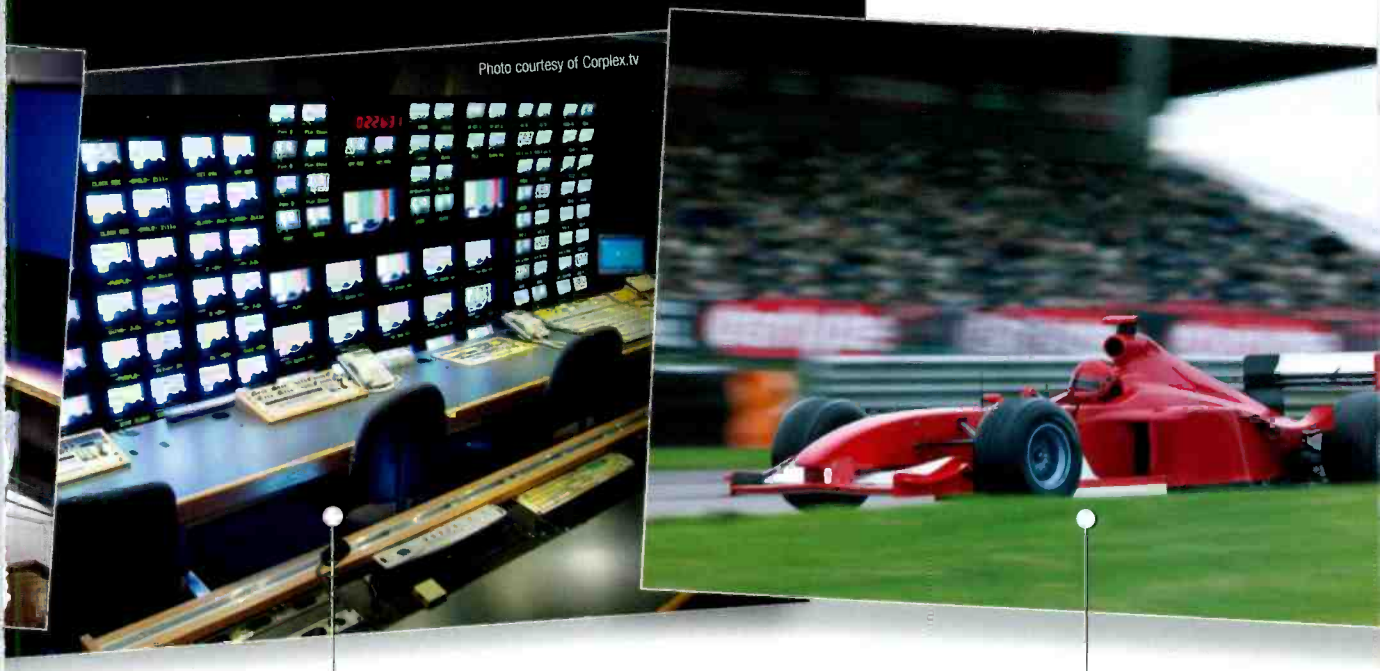

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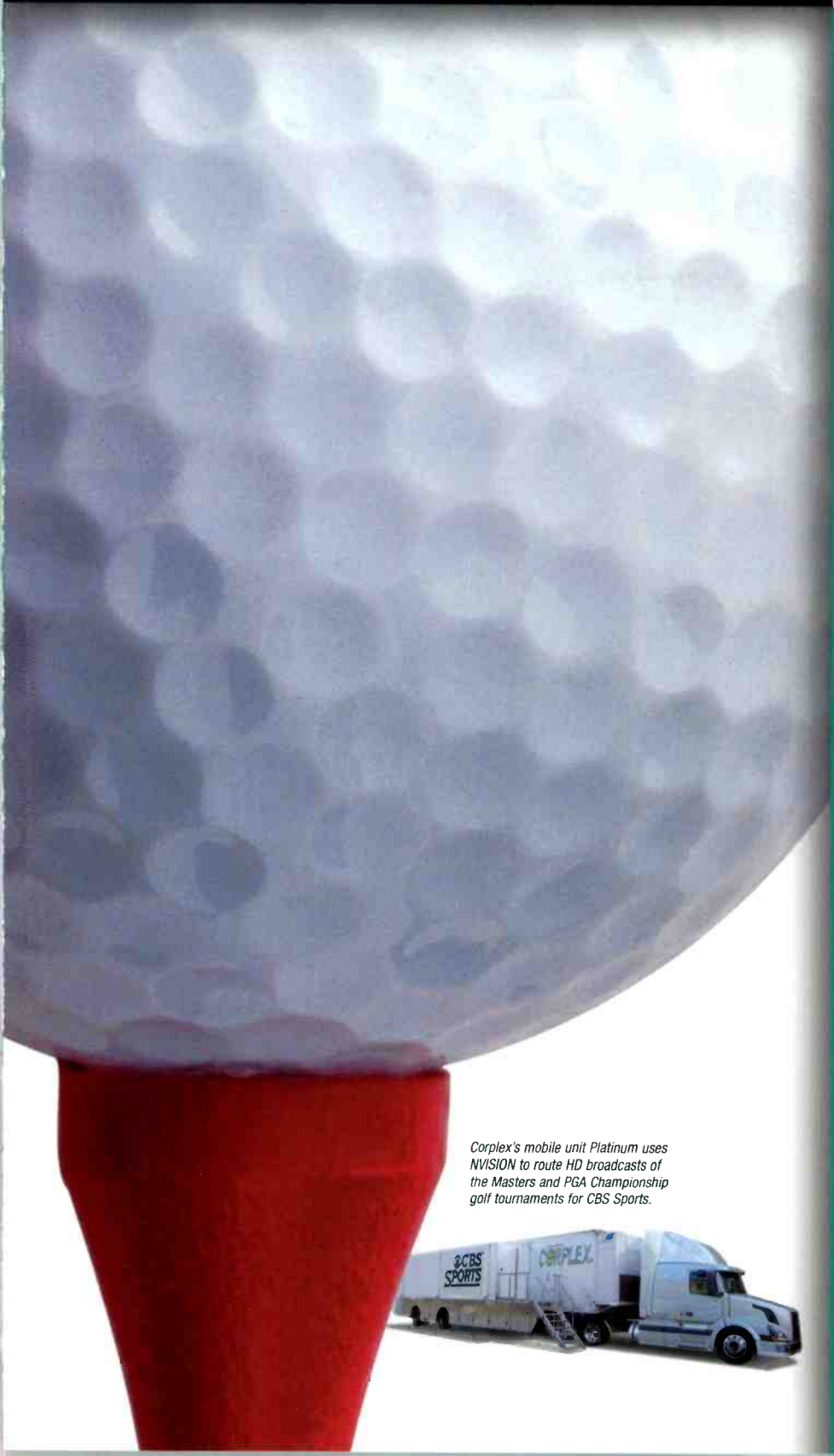

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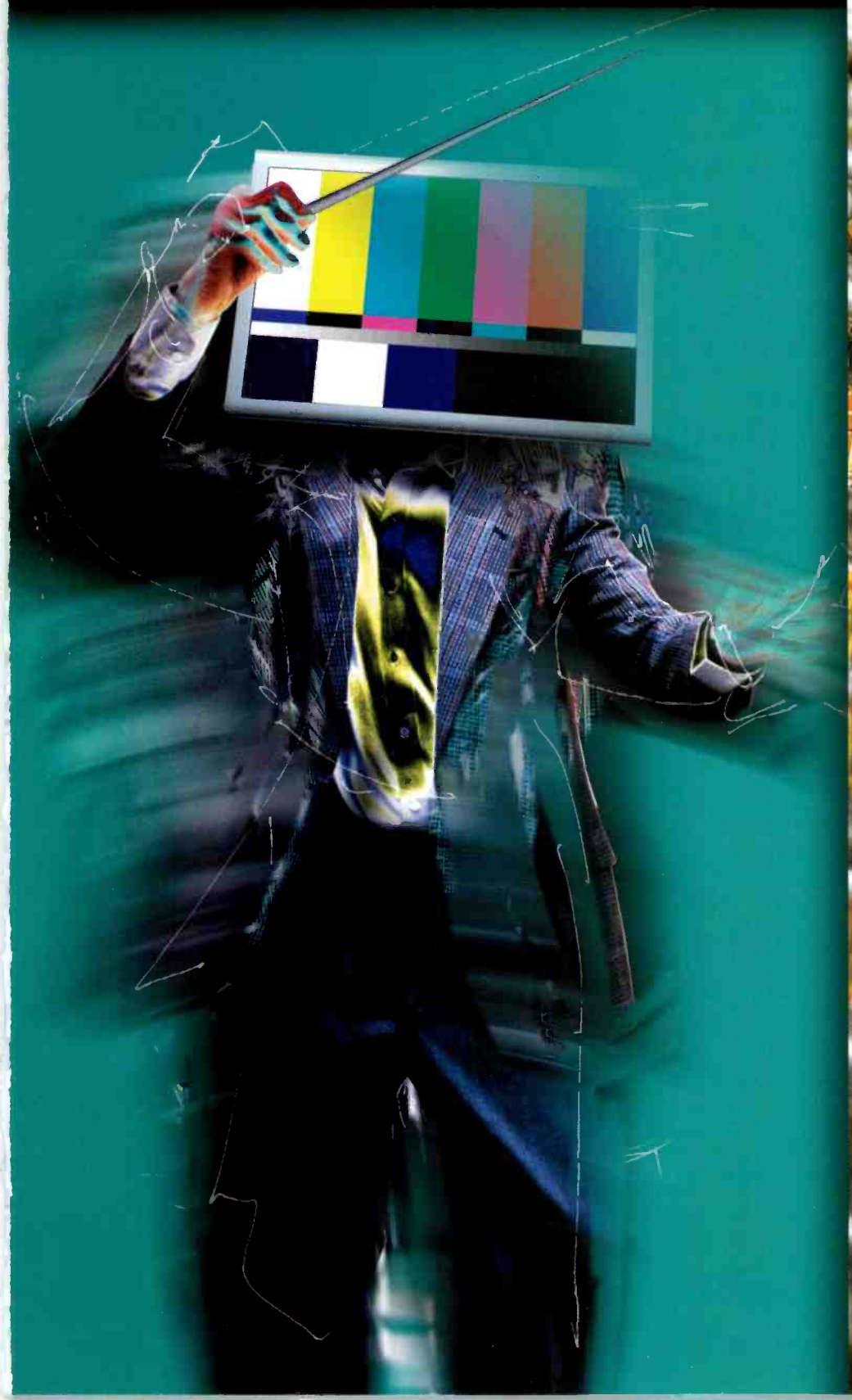
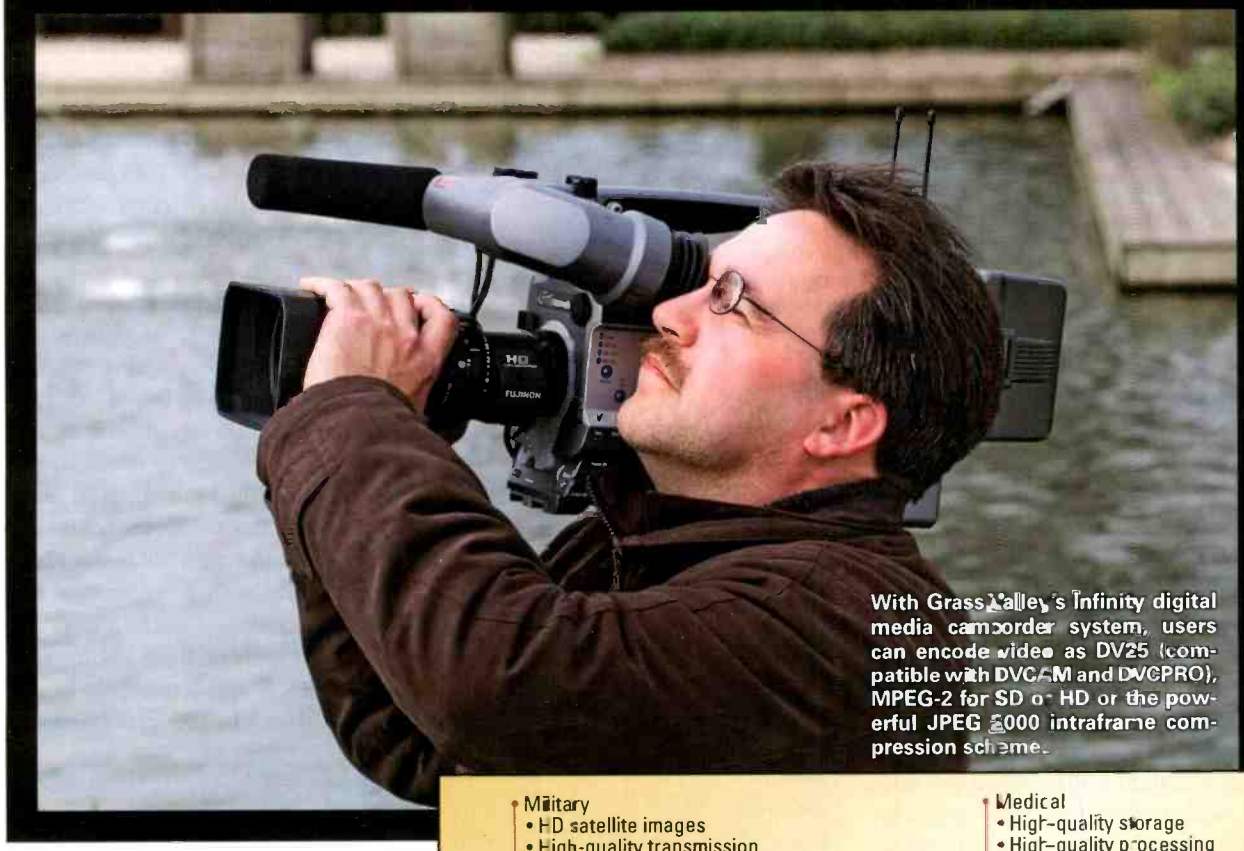


JPEG 2000 image compression

BY CHRISTINE BAKO



With Grass Valley's Infinity digital media camcorder system, users can encode video as DV25 (compatible with DVCAM and DVCPRO), MPEG-2 for SD or HD or the powerful JPEG 2000 intraframe compression scheme.

The JPEG 2000 standard, finalized in 2001, defines a new image-coding scheme using compression techniques based on wavelet technology. Its architecture is useful for many diverse applications, including Internet image distribution, security systems, digital photography and medical imaging.

A lot of confusion exists as to what JPEG 2000 is and how it compares with other compression standards, such as MPEG-2, MPEG-4 and JPEG. With brief comparisons to other compression standards, this article highlights some of the often misunderstood and rarely mentioned potential benefits of JPEG 2000.

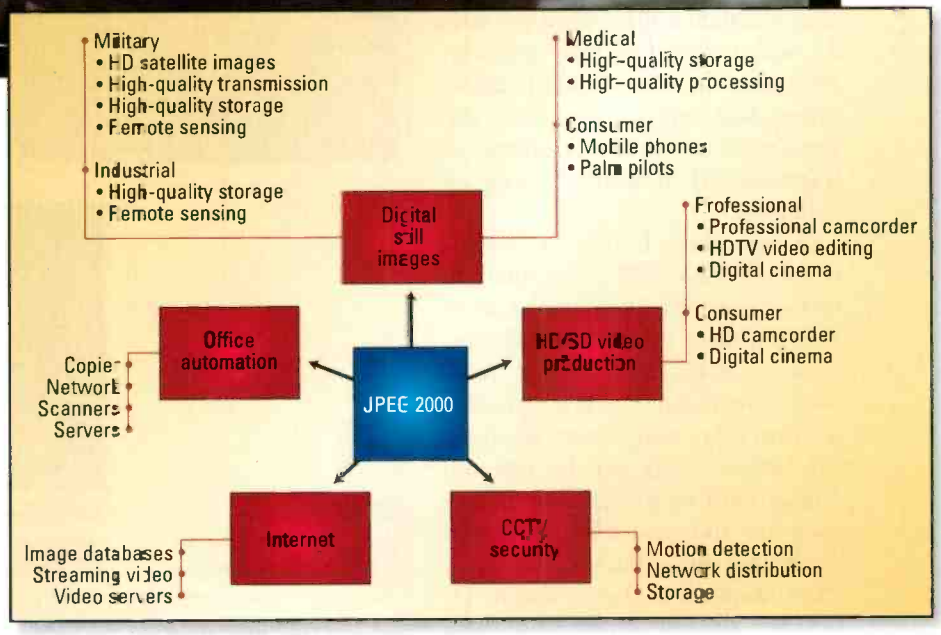


Figure 1. JPEG 2000 applications

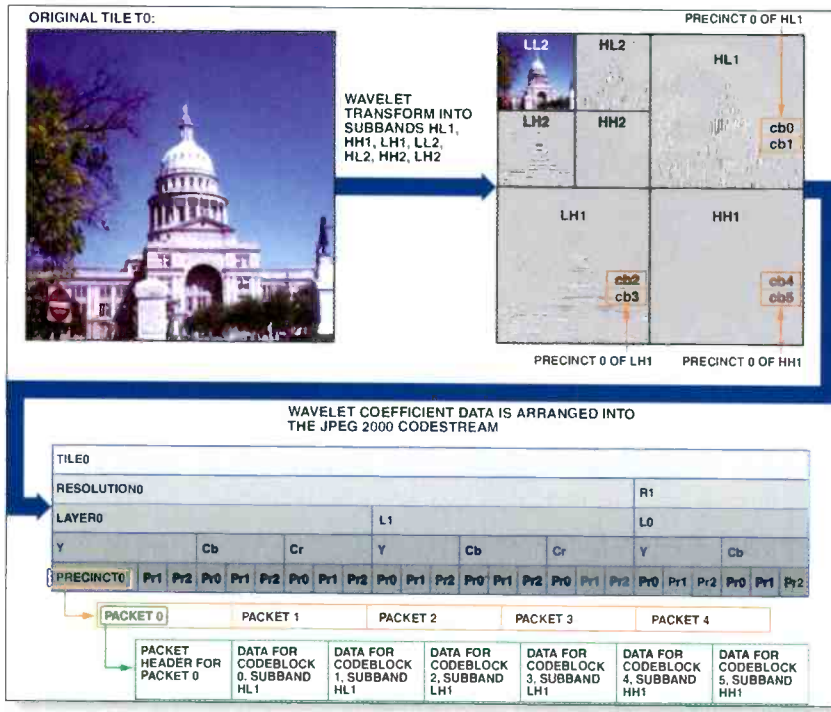


Figure 2. An image encoded with JPEG 2000 uses the wavelet transform to break the image into subbands and offer multiple resolutions.

Limited-bandwidth applications

When transmitting or storing picture information, compression must be employed to maintain picture resolution while making the best use of limited channel bandwidth. Compression is defined as lossless if full recovery of the original is available from the channel without any loss of information; otherwise, it is lossy.

Standards are required to ensure interoperability. JPEG 2000 provides for both lossless and lossy compression. As such, it lends itself to applications that require high-quality images despite limitations on storage or transmission bandwidths. (See Figure 1 on page 77.)

An important feature of systems based on JPEG 2000 is the ability to extract a variety of resolutions, components, areas of interest and compression ratios from a single JPEG 2000 code stream. This is not possible with any other compression standard, because the image size, bit rate and quality must be specified on the encode side and cannot be determined or changed on the decode side.

For example, a closed circuit TV (CCTV) security system can make use of this feature by sending a single JPEG 2000 code stream over a low bandwidth network. High-res images can be stored on a hard disk drive, while several low-res images are displayed on monitors. The operator on the receive side can decide what information to extract from the single code stream that is sent.

JPEG 2000 is frame accurate. Every single frame of the input is contained in the compressed format. MPEG systems, on the other hand, reduce the amount of data through temporal compression. Temporal compression does not encode each frame as a complete image, therefore MPEG compression is not frame accurate. For this reason, legal issues restrict the use of MPEG compression in some security applications. To get around this problem, security system and equipment providers have had to develop their own compression schemes — or use the highly inefficient motion JPEG (M-JPEG) compression standard — in order to provide a compressed stream that contains every single field of the original. They can now use JPEG 2000 for new designs.

Internet applications

Progressive coding, another feature of the JPEG 2000 standard, means that the bit stream can be coded in such a way as to contain less-detailed information at the beginning of the stream and more detailed information as the stream progresses. This makes it ideal for Internet and network applications — especially with large images and low bandwidths — as the image can be seen instantly on the decoding side, even with low-speed networks or image databases. The lower subbands are

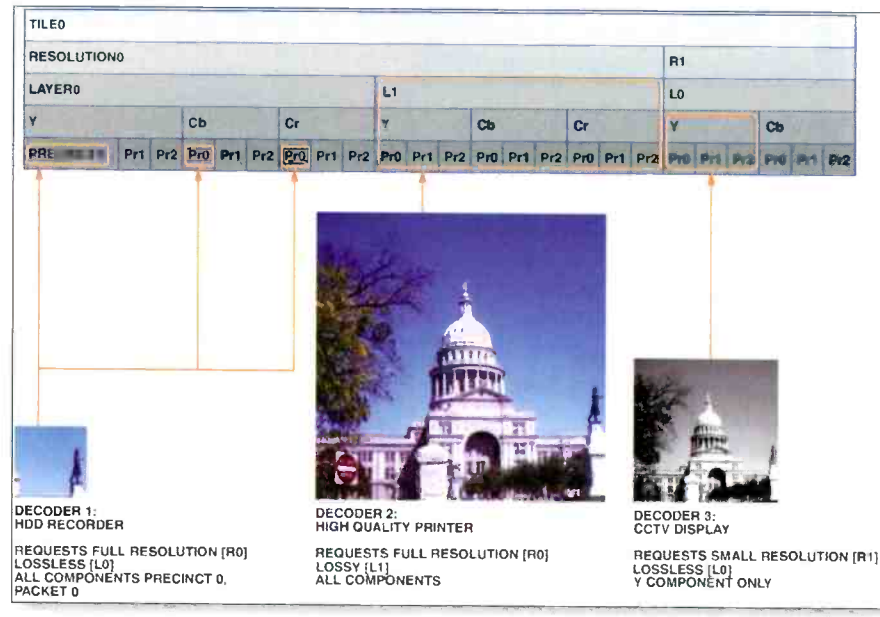
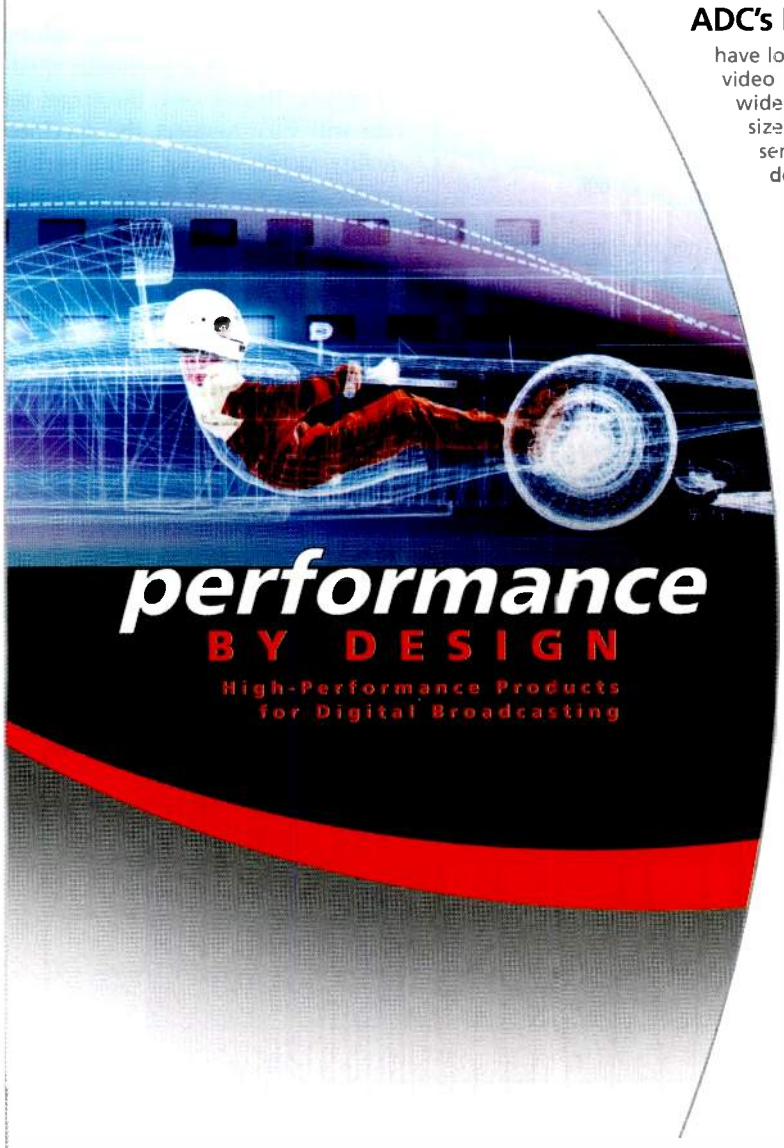


Figure 3. One JPEG 2000 stream can be received by several decoders and extracted at different resolutions.



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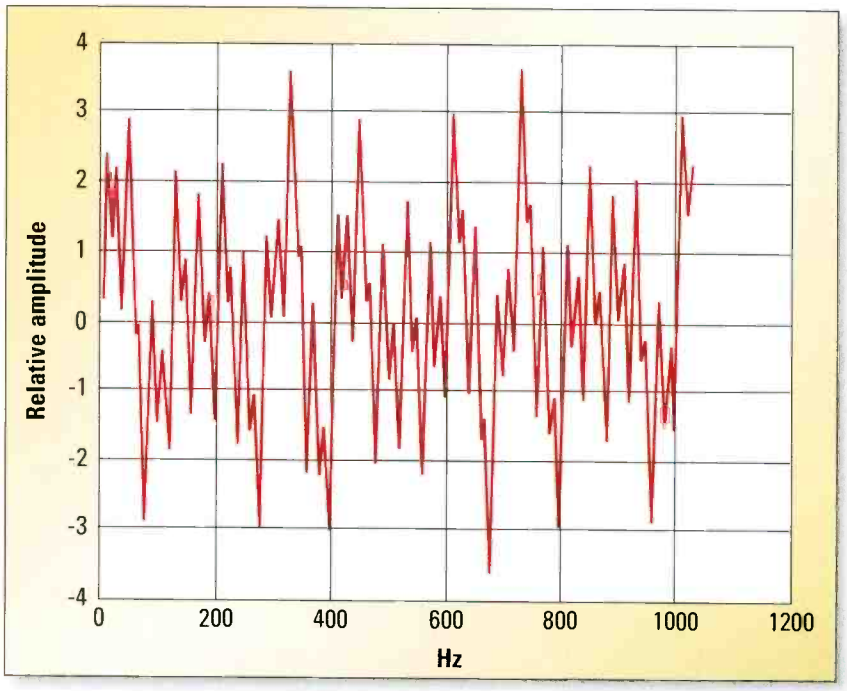

Figure 4. Input signal 1 containing frequencies A, B and C

shown first, and more detail is added as time progresses. Therefore, the picture becomes sharper and more detailed over time, and the entire image does not have to be downloaded before it can be seen.

With the low-quality image instantly available, the user at the receiving end can decide whether to view the picture in its fully decoded version or to pass it by and scan the next picture. Clients can view images at different resolutions or quality levels (compression rates), making them suitable for any transmission bandwidth, connection speed or display device. In addition, JPEG 2000 coding provides the option to zoom in or out on a particular area of the image or to display a particular region of the image at a different resolution or compression rate.

HD applications

At extreme compression levels, JPEG 2000 video starts to blur but is still viewable. MPEG or JPEG artifacts are much more disturbing to the eye, with the picture visibly broken down into small blocks at high compression ratios. The high image quality at medium-to-high bit rates; contents that contain a lot of motion and lack block artifacts; and high efficiency make JPEG 2000 ideal for such HD applications as digital cinema, HD recording systems and HD camera equipment.

Many applications require exact bit-rate control, which only JPEG 2000 can provide. Exact bit-rate control is possible because an entire frame or field is transformed at once. It is then broken down into bit streams or code blocks that can be processed independently. This is in contrast to the alternative of breaking the frame or field into 8 x 8 pixel blocks prior to transform (as is done with DCT systems), thus making exact bit-rate control impossible. The rate-control algorithm used in JPEG 2000 truncates each bit stream to meet a specific target bit rate, adjusting the truncation and requantization of each code block's data as required.

In addition to programming the target bit rate, the standard allows the user to specify a particular quality metric. In this case, the target bit rate will vary to meet the specified quality factor, as long as the performance does not fall below a specific peak signal–to-noise ratio (PSNR). The PSNR is an indication of picture quality comparable to perceived picture quality.

JPEG 2000 code stream

A given input image or part of the image (tile) is sent to a set of wavelet filters that transform the pixel information into wavelet coefficients, which are then grouped into several subbands. (See "Web links" on page 86.) Each subband contains wavelet coefficients that describe a specific

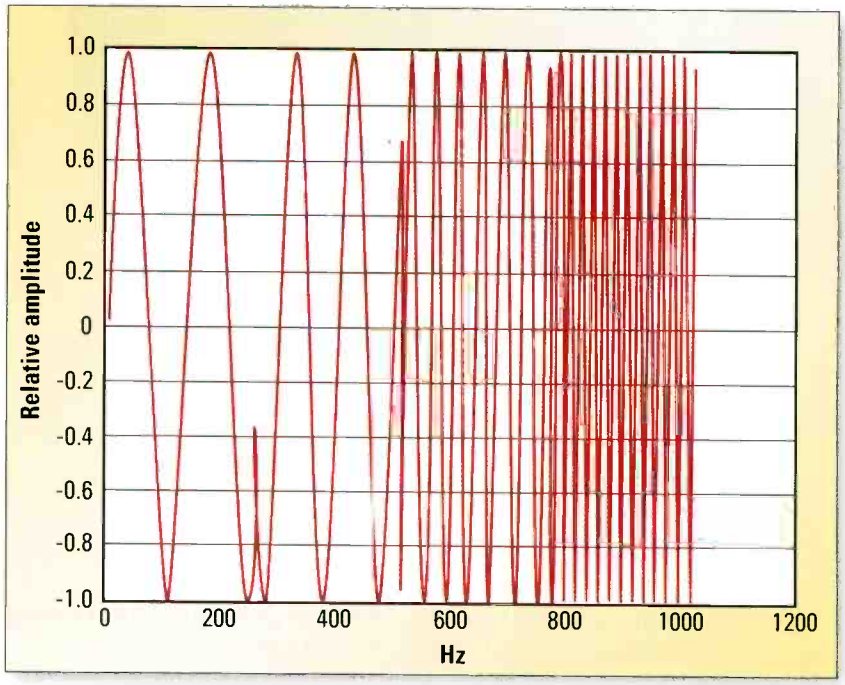

Figure 5. Input signal 2 containing frequencies A, B and C

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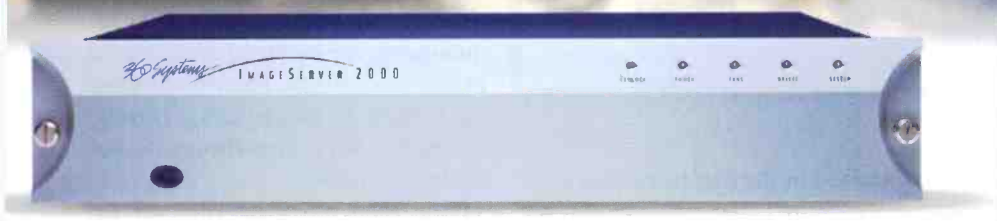

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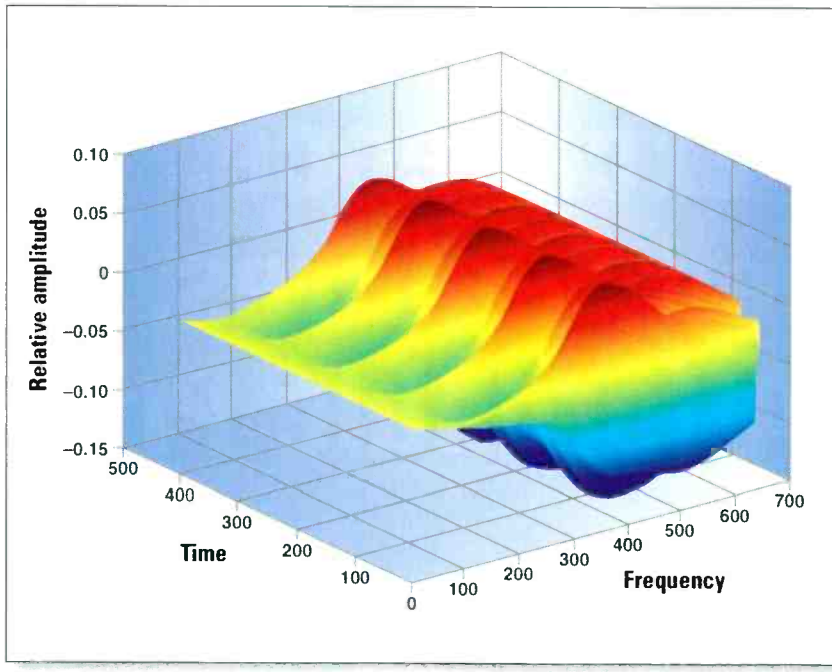

Figure 6. Wavelet transform of signal 1

horizontal and vertical spatial frequency range of the entire original image. This means that lower-frequency, less-detailed information is contained in the first transform level, with more-detailed, higher-frequency information is contained in the higher transform levels.

For simplicity, only two levels of transform will be used for this example. The first transform level results in subbands LH1, HH1, HL1 and LL1. Only subband LL1 is passed on for further filtering, generating the next transform level and creating subbands LH2, HH2, HL2 and LL2.

Equally-sized code blocks, which are essentially bit streams of data, are generated within each subband. This breakdown is necessary for coefficient modeling and coding and is done on a code-block-by-code-block basis. In essence, the actual compression is achieved by truncating or requantizing the bit streams contained in each code block. These bit streams are further decimated using entropy coding known as rate-distortion optimization (RDO).

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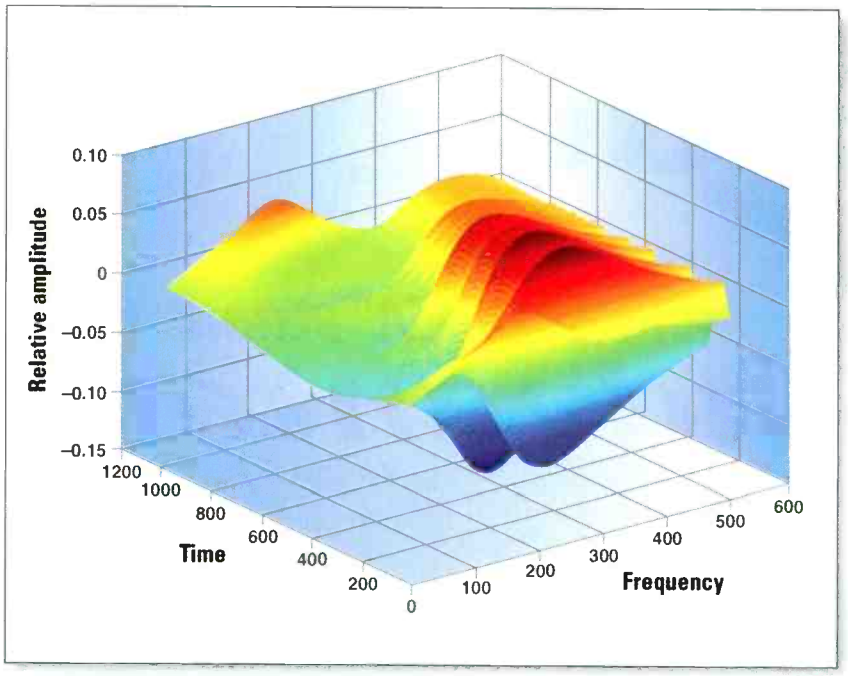

Figure 7. Wavelet transform of signal 2

process, called context modeling, is used to assign information about the importance of each individual coefficient. The code blocks can then be grouped according to their significance. On the decoding side, it is then possible to extract information according to its significance, allowing the most significant information to be seen first.

JPEG 2000 can contain up to 16 layers, which are defined by RDO and context modeling. Each layer stands for a particular compression rate, where the compression rate is achieved from the quantization, rate distortion and context modeling processes.

Layer 0, for example, contains bit streams that were not truncated and contain no coding passes, and thus provide the lowest compression rate and the highest quality. Layer 16 contains bit streams from the lossy wavelet transform (WT), is requantized and ordered according to code-block significance — with the most significant information coming first — and provides the highest compression rate and the lowest quality.

Tiles or images are further partitioned into precincts. Precincts

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contain a number of code blocks and are used to facilitate access to a specific area within an image in order to process this area in a different way or to decode only a specific area of an image. Arranging code blocks or precincts into an array of packets with the lower subbands coming first generates the JPEG 2000 bit stream.

The JPEG 2000 stream starts with a main header containing such information as uncompressed image size, tile size, number of components, bit depth of components, coding style, transform levels, progression order, number of layers, code block size, wavelet filter type and quantization level. The entire image data, grouped in code blocks of LL, HL, LH and HH subbands, follows the header. Data is not contained in the header information. This format, or table of contents, can be stored on the encode side and allows a decoder to call up a certain resolution on demand, without first having to decode or download the entire JPEG 2000 code stream. (See Figures 2 and 3 on page 78.)

Efficiency

One major advantage of JPEG 2000 is that it significantly reduces the processing power and memory required for the compression and decompression processes, thus making it suitable for HD applications. JPEG 2000 uses the WT to reduce the amount of information contained in a picture, while MPEG and JPEG systems use the discrete cosine transform (DCT).

JPEG 2000 ... reduces the processing power and memory required for the compression and decompression processes.

It is true that the WT requires more processing power than the DCT, but MPEG systems require more than just the DCT. The DCT, or any type

Web links

The use of wavelets in encoding was first explained in Analog Dialogue 30-2 (1996); *www.analog.com/library/analogdialogue/archives/30-2/wavelet.html*

The Digital Cinema Initiative will use JPEG 2000 in the delivery of digital motion pictures; *www.itscj.ipsj.or.jp/sc29/29w02901.pdf*

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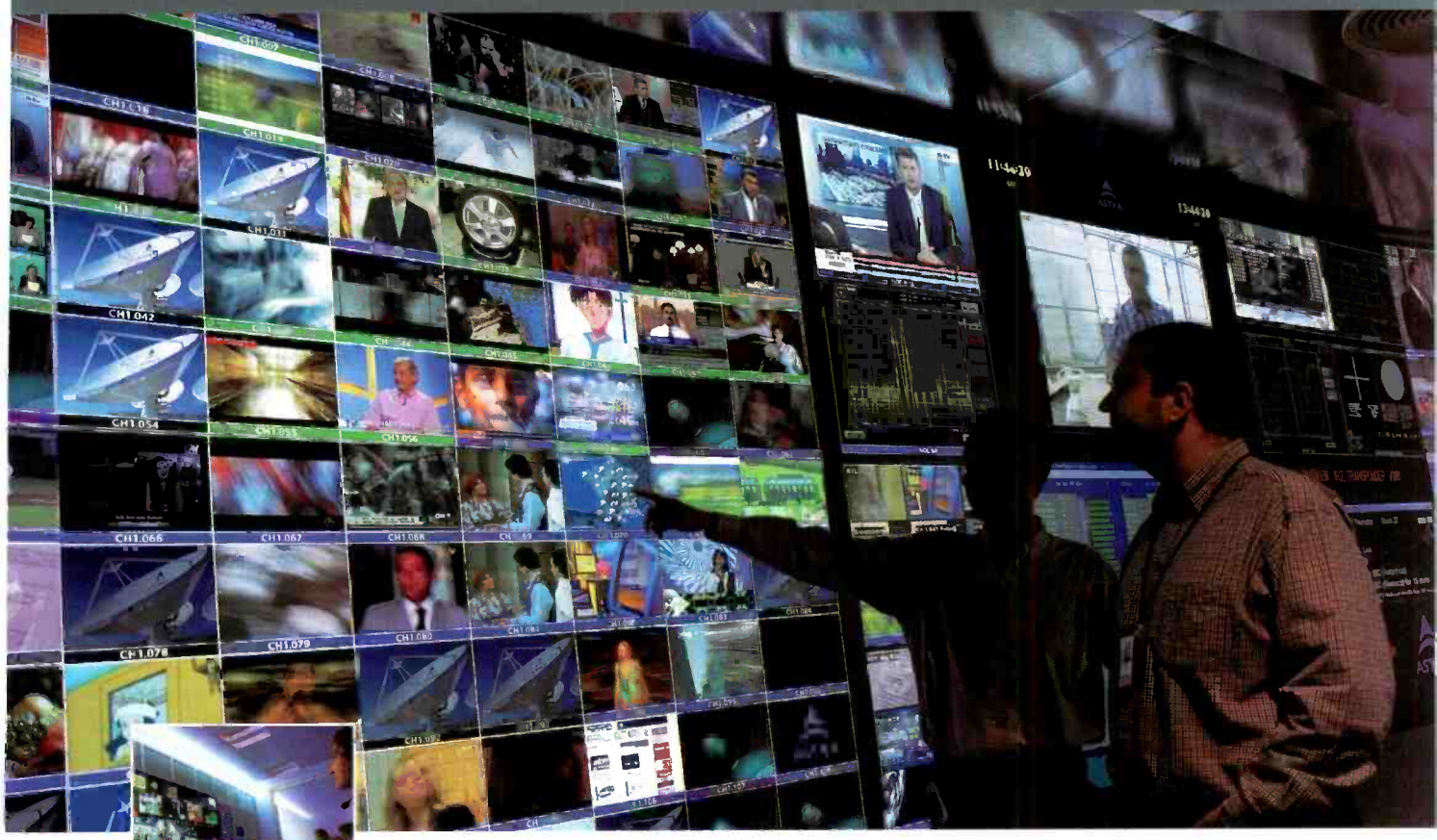

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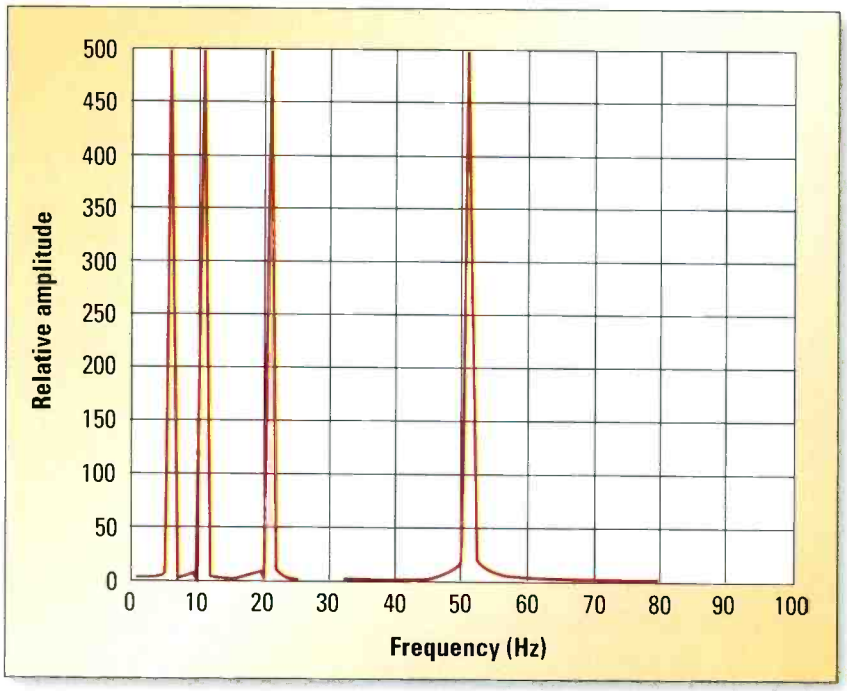

Figure 8. Fourier transform of signal 1 with four frequency components

of Fourier transform, expresses the signal in terms of frequency and amplitude — but only at a single instant in time. The WT transforms a signal into frequency and amplitude over time and is therefore more efficient. Figures 4 through 9 on pages 80 through 88 demonstrate this.

To obtain the same amount of information as with one WT pass, the DCT must be used for every frequency. Each of these frequencies must be transformed at each time instant for each 8 x 8 pixel block. In addition, MPEG systems use interframe compression (motion estimation) in order to reduce the amount of data further for motion estimation. This requires storage of at least two entire fields in external memory. The computation-intensive motion estimation process requires a powerful processor. Temporal compression can be used in JPEG 2000 systems, but it is not inherent in the JPEG 2000 standard.

The advantages

All MPEG standards are complex and computation-intensive. This translates into extensive processing latency and memory requirements in SD applications. These factors become even more of a problem when HD formats are considered — and JPEG 2000 becomes even more desirable.

Another strength of JPEG 2000 is the standard itself, which allows immense flexibility and control in many different applications. There is also much versatility regarding formats: It supports anything from 8 bits per sample to 14 bits per sample, whereas MPEG only supports 8-bit data.

JPEG 2000 continues to gain popularity, even though MPEG-2 is the established standard for DVD and broadcast applications. JPEG 2000 is also popular in HD applications that require high-quality storage or transmission of HD images over wireless or other links.

New silicon

One JPEG chip manufacturer, Analog Devices (ADI) has invested heavily in wavelet-compression R&D. ADI's newest wavelet codec, the ADV202, is thus far the only dedicated JPEG 2000 IC on the market. (See Figure 10 on page 90.) A complete single-chip JPEG 2000 compression/decompression IC, the ADV202 works with both HD and SD video and still images. It supports all features of the ISO/IEC15444-1 (JPEG 2000) image-compression standard except Maxshift ROI. Its patented SURFspatial ultra-efficient recursive filtering technology enables low-power, low-cost, wavelet-based compression.

Containing a dedicated WT engine, three entropy codecs, a RISC processor and on-board memory systems, the ADV202 provides a glueless interface

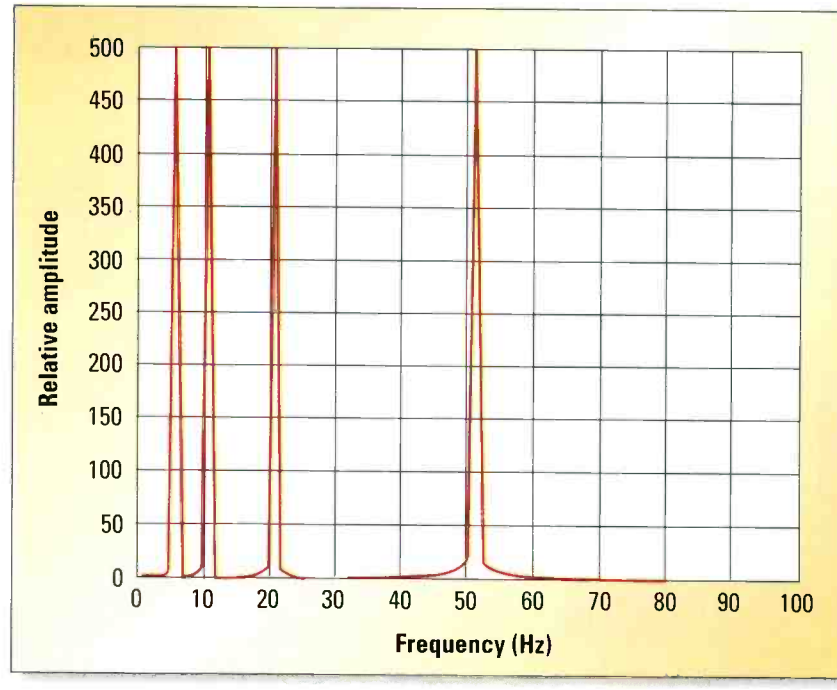

Figure 9. Fourier transform of signal 2 with four frequency components

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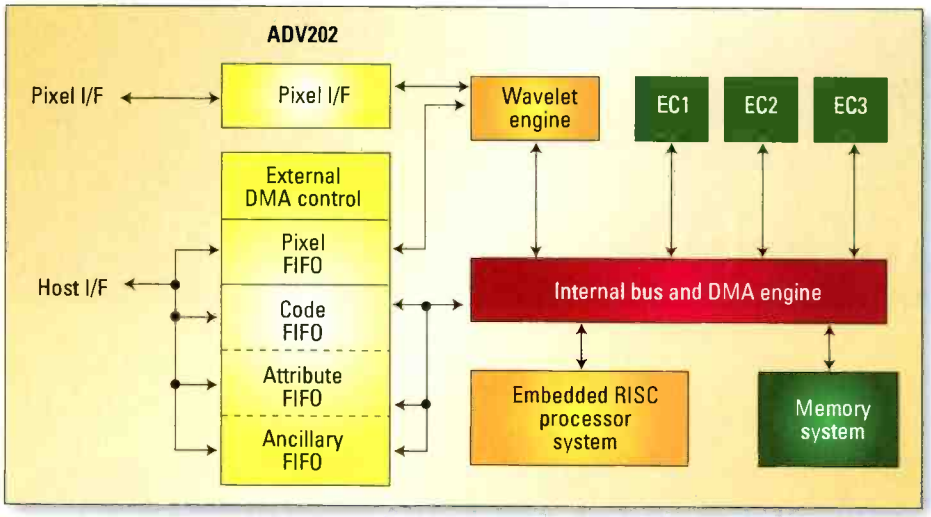

Figure 10. A block diagram of Analog Devices' ADV202, a JPEG 2000 compression/decompression IC

to such common video standards as ITU.R.BT656, SMPTE274M and SMPTE296M. The result is that it can create a fully compliant JPEG 2000 code stream (.j2c, .jp2). It can also provide raw code-block and attribute data, allowing the host processor to have complete control over the generation and compression processes.

Even though digital signal processor (DSP) performance has improved significantly, a DSP would have to perform 20 billion instructions per second to match the performance of the ADV202 in an SD encode application.

JPEG 2000 image compression

The outlook for JPEG 2000

A major advantage of using a JPEG 2000 hardware solution is the low latency as compared with other compression schemes. Several major manufacturers of video and broadcast equipment are now implementing JPEG 2000 into their HD products, including real-time encoding and decoding systems and video servers.

The Digital Cinema Initiative recently announced that it will use JPEG 2000 as the compression method in the delivery of digital motion pictures. (See "Web links" on page 86.) Broadcasters can look for even more JPEG 2000-based equipment to appear. Its combination of low latency, multiple resolution decoding capabilities and high quality make it a good fit for these professional applications. BE

Christine Bako is an applications engineer at Analog Devices in Austin, TX.

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Breece Hill's
iStoRA digital video archive

BY CHRIS STONE

For decades, small and mid-sized newsrooms and broadcast facilities have been accumulating massive local film and video libraries built upon growing shelves of expensive Beta, VHS, reel and DV tapes. These physical video libraries are staggering in size and expense and often render professionals powerless to locate, retrieve and reference specific high-value content in a timely fashion.

Broadcasters know that digital video archiving is the solution. But until recently, this option has been way too costly and technologically complex to implement, especially for smaller broadcasters and production facilities. Breece Hill, XenData and Pictron have collaborated to offer an all-in-one video archive server that allows facilities to transform outdated physical libraries into modern digital video archiving systems at an affordable cost. In addition, this new solution makes it easy for local libraries to be shared among an organization's nationwide and global locations, such as between the growing number of sister stations found in today's broadcasting industry. Legacy tape can now be converted at the local station level and automatically shared by sister stations.

Legacy tape can now be converted at the local station level and automatically shared by sister stations.

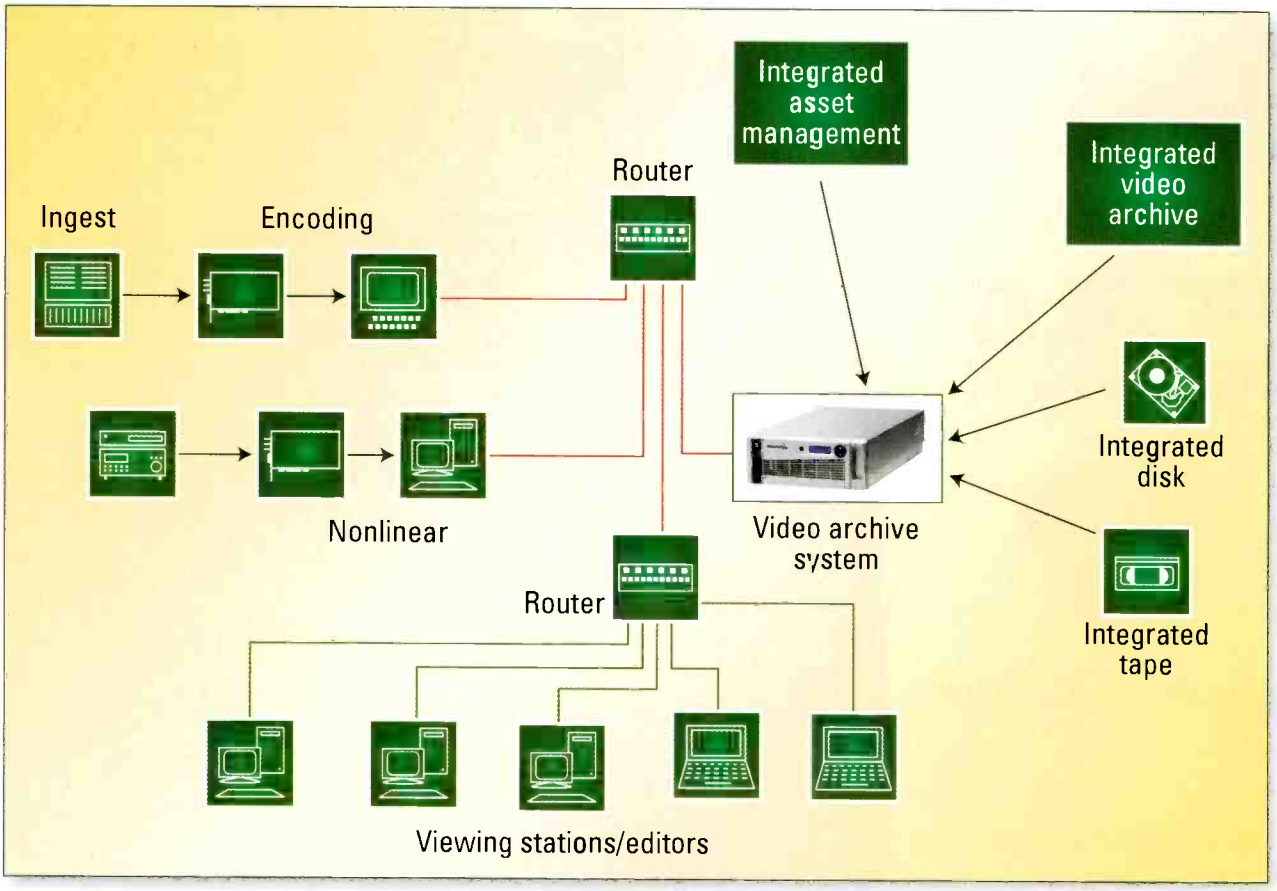

Figure 1. Digital video archive and media asset management system

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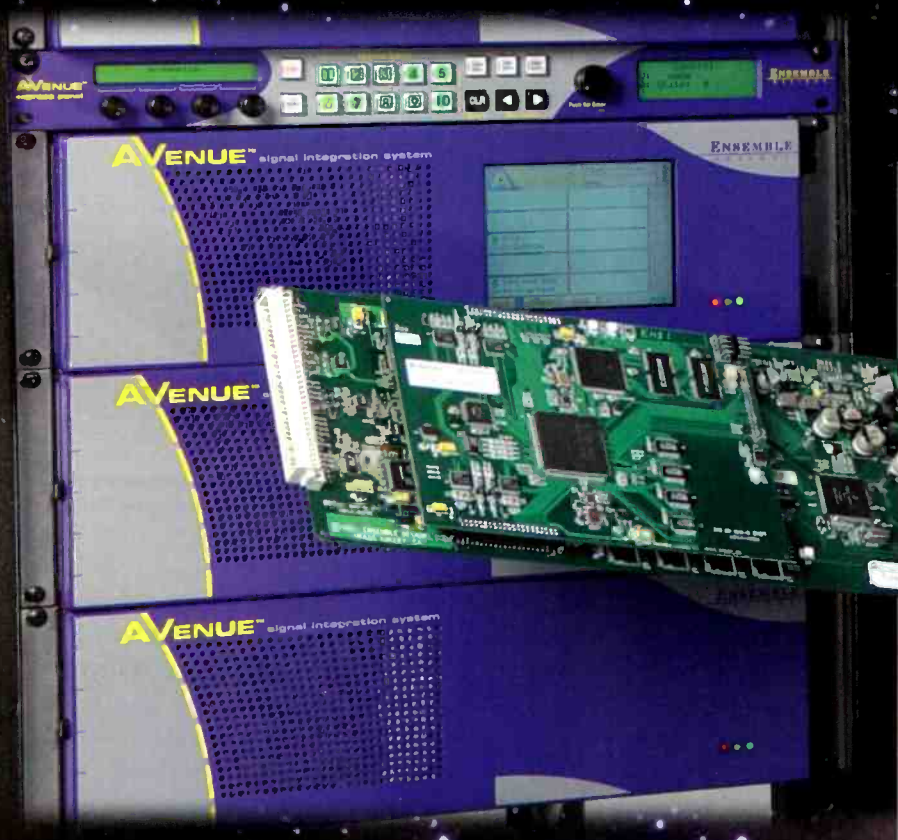

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Digital video archives: The time is now

The powerful yet economical integrated solution for digital video archiving begins with Breece Hill's iStoRA video archive server. It occupies 4RU of space in a control room and can store up to 560 hours of content at 25Mb/s MPEG-2.

The server runs XenData's Archive Series Video Edition software along with Pictron's Media Gateway product suite. The software is provided by a systems integrator and offers powerful media management tools, including automatic scene change detection, customizable metadata entry and remote search by frames, transcripts, storyboards, metadata and keywords. It also offers a similarly robust suite of archive management features.

Bringing this storage approach to the small and mid-sized broadcaster, the tiered system allows video content to be stored on a combination of hard disk and digital data tapes. Tapes are easily exported out of the unit to the shelf and are then managed by the XenData archive software using a standard Windows file system. Exported tapes are controlled by bar code, making retrieval from the shelf fast and easy.

Breece Hill's iStoRA video archive server occupies 4RU of space and can store up to 560 hours of content at 25Mb/s MPEG-2. It runs XenData's Archive Series Video Edition software and Pictron's Media Gateway product suite.

Digital video archives also can be easily shared with other stations,

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allowing each station or facility to archive new content locally and convert older footage on an as-needed basis. This can be done with relatively inexpensive systems because once the video clips have been cataloged and archived, the video can be stored on high-capacity, inexpensive digital media.

Breece Hill uses modern digital data tape that is tested and proven every day for storing data. Each digital data tape can store up to 400GB of data in a cartridge measuring 4 1/4in x 4 1/4in x 3/4in. This results in a much smaller physical library because each tape alone can hold 36 hours of video of MPEG-2 at 25Mb/s — that's enough to store more than 1500 hours of DV on a single 36in bookshelf.

That's enough to store more than 1500 hours of DV on a single 36in bookshelf.

Value of an asset management system

The archive solution enables distributed user access through its bundled Pictron software. During ingest, the software creates a low-res proxy from the high-res video. This proxy is then used as the basis for a searchable database. Metadata can be added to the proxy file by subject matter, cameraman, editor, date and time, catalog categories (e.g., sunset, beach) or any other specific database grouping for the user. The asset management package will also storyboard the clip based on scene changes, extract any line 21 closed captioning and perform audio-to-text conversion.

Media asset management software programs allow users to log in remotely via the Web and search content many different ways. Users can search using the metadata, a key frame, or a key word contained in either the closed-captioned text or the text converted from the audio tracks. They can even use facial recognition to search for a particular person.

All the clips are available to browse and play out remotely (using the low-res copy), allowing editors to select candidate video clips that they wish to repurpose from remote group facilities. The XenData video archive software module then manages the video files archived on the digital data tapes located online or on the shelf.

Once an editor selects the clips he or she needs, it's a simple matter to retrieve the full clip from the archive.

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All the clips are available to browse and play out remotely, allowing editors to select candidate video clips to repurpose. Photo courtesy Pictron.

Even if the video isn't online, the software will identify the bar code of the required tape. The server can support remote handheld bar code readers, allowing librarians to search and locate the correct tape on the shelf quickly and easily. It's then a matter of putting the data cartridge in the import/export slot of the unit and reading the required tape. The archived clip can be placed on the hard disk of the server unit for future use. The archive software built into the machine also allows for multiple tape copies to be made for off-site disaster protection or as a second copy for a centralized storage or group station.

An integrated media asset management and digital archive system can be constructed as a searchable catalog library at shared local group stations and can be accessed easily by each group member station. Users can log in to the various stations, search for content, play it in low-res format in a Web-based viewer (i.e., Windows Media Player, QuickTime, RealPlayer) select the clips they wish to access, create a playlist and export the high-res images from the local system.

The archive software built into the machine also allows for multiple tape copies to be made.

Only one transfer is necessary to move the high-res clip between stations. This can be done via digital FTP transfer or physical delivery on a tape or DVD.

With solutions like these, it's now practical and cost-effective to transform outdated physical tape libraries into a top-notch, well-organized digital video archive that can be shared with other facilities and sister stations. This additional benefit allows each station to manage and retain control

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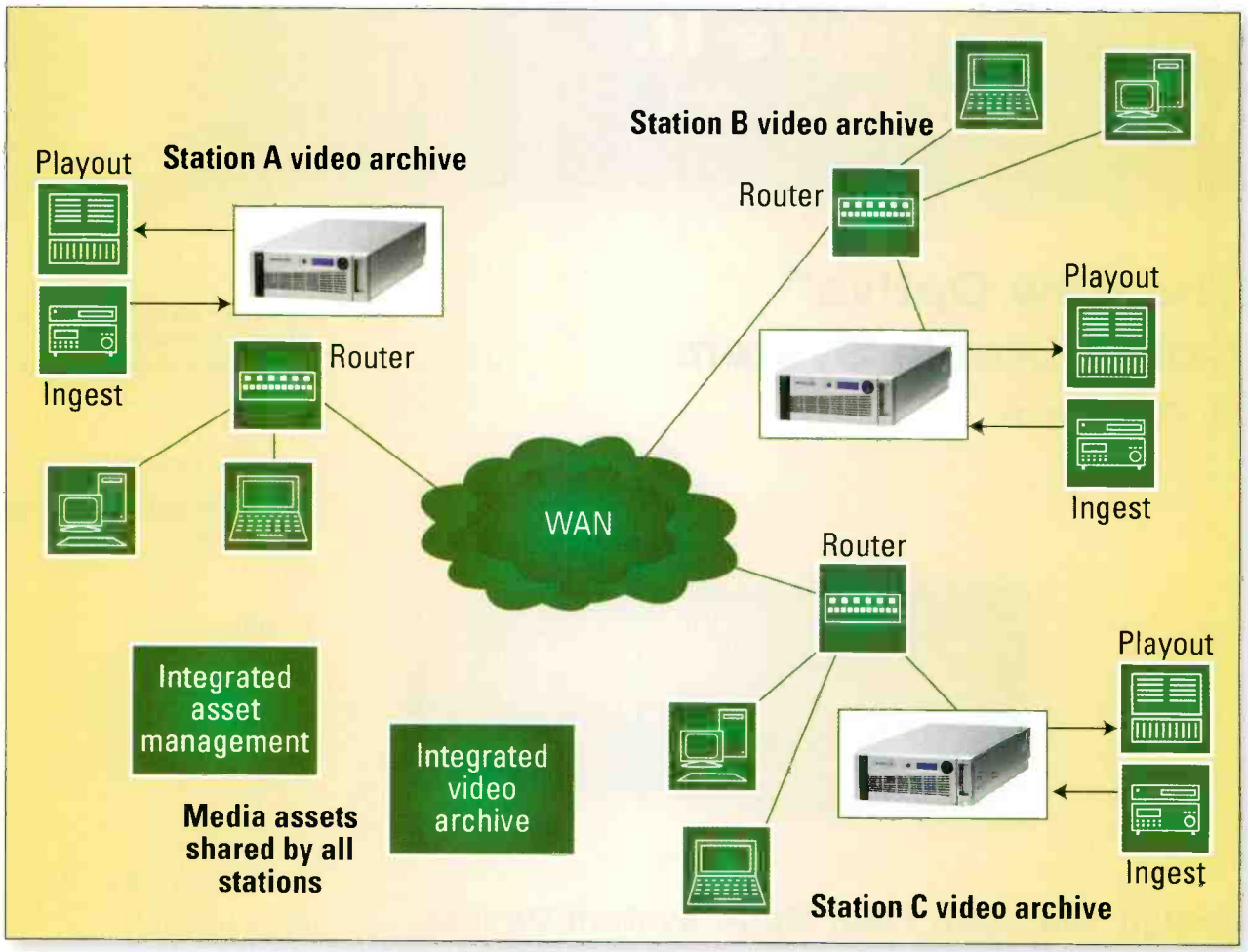

Figure 2. Shared group media asset management system

of content while making it available to other stations for use. In the end, broadcasters save space and are more efficient, and viewers get more diverse, on-target content. BE

Chris Stone is VP of product management for Breece Hill, an information storage and retrieval provider.

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Harris' H-Class Platform for metadata usage

BY TARAS BUGIR

Most discussions on the role of metadata in the management of content have centered around broadcast operations or nonlinear content editing. Missing from these discussions is the larger role of metadata in the content lifecycle. For such discussions to be meaningful, metadata must be considered in a broader context, beyond its physical operational attributes such as titles, SOM, duration and encoding formats. One must consider the wider financial and business usage of the content, such as usage rights, cost and scheduling constraints.

Harris has developed an integrated approach to metadata usage and management that supports increased organizational efficiencies. Such efficiencies lead to increased operational scalability, a more cost-efficient mechanism to repurpose content and an ability to generate new revenue streams.

Beyond operations

Consider Figure 1. In its passage from the creator, content travels a disjointed path through departmental islands in the broadcast operation. While there are two major standards for metadata management — AAF and MXF — their focus is on production and operational efficiency.

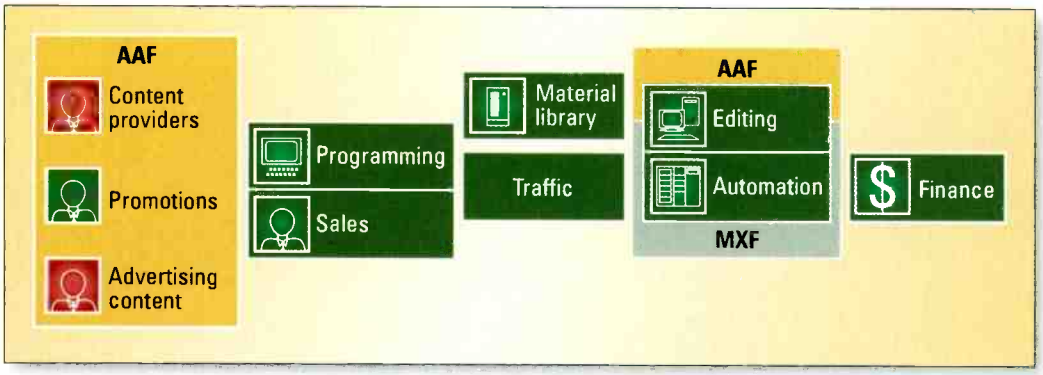

Figure 1. Typical broadcast model with operational focus on content metadata

However, consider the departments of programming, sales, material library, traffic and finance. All touch the content from a business viewpoint, yet each uses software applications that abstract and transact the content from their respective requirements, always distant from the content itself. This is a major cause of discrepancies and inefficiency.

Consider what those isolated software applications have in common. Each has a data structure that describes such things as the state of the content, i.e. has it been acquired, how and when it can be used, how much it costs, where the material is located, on what media, has it been dubbed, has it been paid, was it profitable, were the spots invoiced and many other issues that must be tracked in order for the business to be financially viable.

Consider Figure 2. The Harris H-Class Platform approach to creating an integrated content-model enables metadata usage for both business and operational control.

This approach is to ingest the metadata into the platform to ensure that business applications can access and manipulate metadata as required, all without jeopardizing the integrity of the air-ready content.

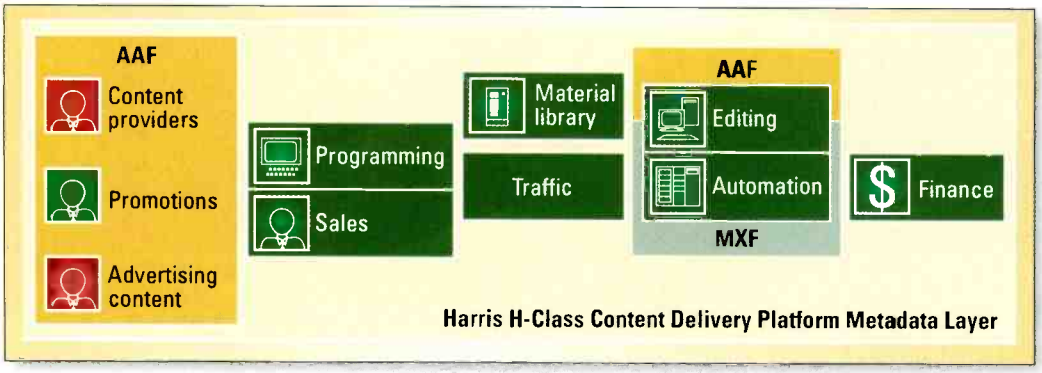

Figure 2. Integration operation with platform-based common content metadata model

Platform technology

Import/export capabilities to all industry standard formats allow for maximum interoperability. However, within the confines of the platform, the content can

be protected and reliably transacted by all departmental applications through the digital asset management system that is inherent in the platform architecture. It is this characteristic of the H-Class Platform that allows applications to transact metadata for multimedia business models. It also provides a business software layer that allows organizations to get the right content, to the right consumer, at the right time on the right device.

Harris developed the H-Class Content Delivery Platform using an n-tiered architecture with well-defined services that provide workflow-focused data to the calling application.

All database calls are handled by the platform, and only the required information is presented. This results in efficient data management and abstraction of the underlying data structures. The result is an environment that supports evolutionary changes to the system without disrupting the applications resident on the platform. Compare this to monolithic applications that must be reinstalled, retested, reintegrated, retrained and reconfigured every time a new version or feature is added to the operation.

New opportunities to leverage content must be managed in a cost-effective manner.

This service-based approach to software is the first of its kind in the media industry for integrated end-to-end workflow management, and it represents a scalable architecture that actively encourages the integration of third-party software. It dramatically reduces the effort of system integration and subsequent maintenance.

Coupled with the inherent integration of business operations, it is not unreasonable to realize efficiency gains of more than 25 percent. This figure is consistent with management studies showing that organizations that are aligned with consistent strategies and support infrastructure realize efficiency gains of the same order.

Future opportunities

As broadcaster bandwidths increase, new opportunities to leverage content must be managed in a cost-effective manner. The economics do not allow for increased personnel to staff the increased management requirements of new channels and services.

Through the use of a content-focused platform, knowledgeable of business metadata, content-aware applications can allow organizations to scale for the increased volumes of content that will necessarily follow. This not only will present up-sell opportunities for subscription-based content, but also it will drive the advertising content pushed to them. BE

Taras Bugir is chief strategy officer of the Software Systems business unit within the Broadcast Communications Divison of Harris.

FOR-A's VPS-700
video production system

BY KEN TRUONG

FOR-A's VPS-700 switcher began with one developer's simple question: "Couldn't we create fantastic images if independent DVEs are used for each input?" This became the key point and the initial concept for this digital video switcher.

Because the demand for SD-SDI switchers has not diminished in many regions, FOR-A began using a product concept based on SD-SDI input/output for a 1M/E, compact (2RU) chassis. A wide range of functions were incorporated in the standard configuration, such as six keyers, six chromakeyers, six powerful mask generators, six-channel DVEs, six trail stores and six border generators. The development also included adding multilayer support for optional configurations, which otherwise would only be available in large-size switchers, as well as capability for representing multilayer transitions.

Multilayer and multi-DVE

Despite being a 1M/E compact switcher, with the proper configuration, the VPS-700 can create multilayer, multi-DVE images that would normally only be possible with a large-size switcher. Multi-DVE capability means that up to a 38-DVE engine can be used when optional boards are installed. Also, with multilayer capability, there are 17 layers in each pre-combiner unit (DVE assignment and background matte to 16 channels) and eight layers in the M/E unit (PGM, PVW, four keyers and two DSKs) for a total of 25 layers (up to 40 pictures can be displayed simultaneously).

If a large-size switcher is used, complex images can be made by making a cascade connection of the M/E composition results. However, to clarify the concept of adding DVEs to each input, consider each input as a single layer, making this a layer-type switcher because of its capability to compose multilayering image with a combiner.

The layer system is based on keyers. Video and keys are sent to the combiner by each layer, and the background and priorities for each layer are determined and composed by the combiner. (See Figure 1.) An optional VPS-70DS (input DVE/pre-combiner) board can

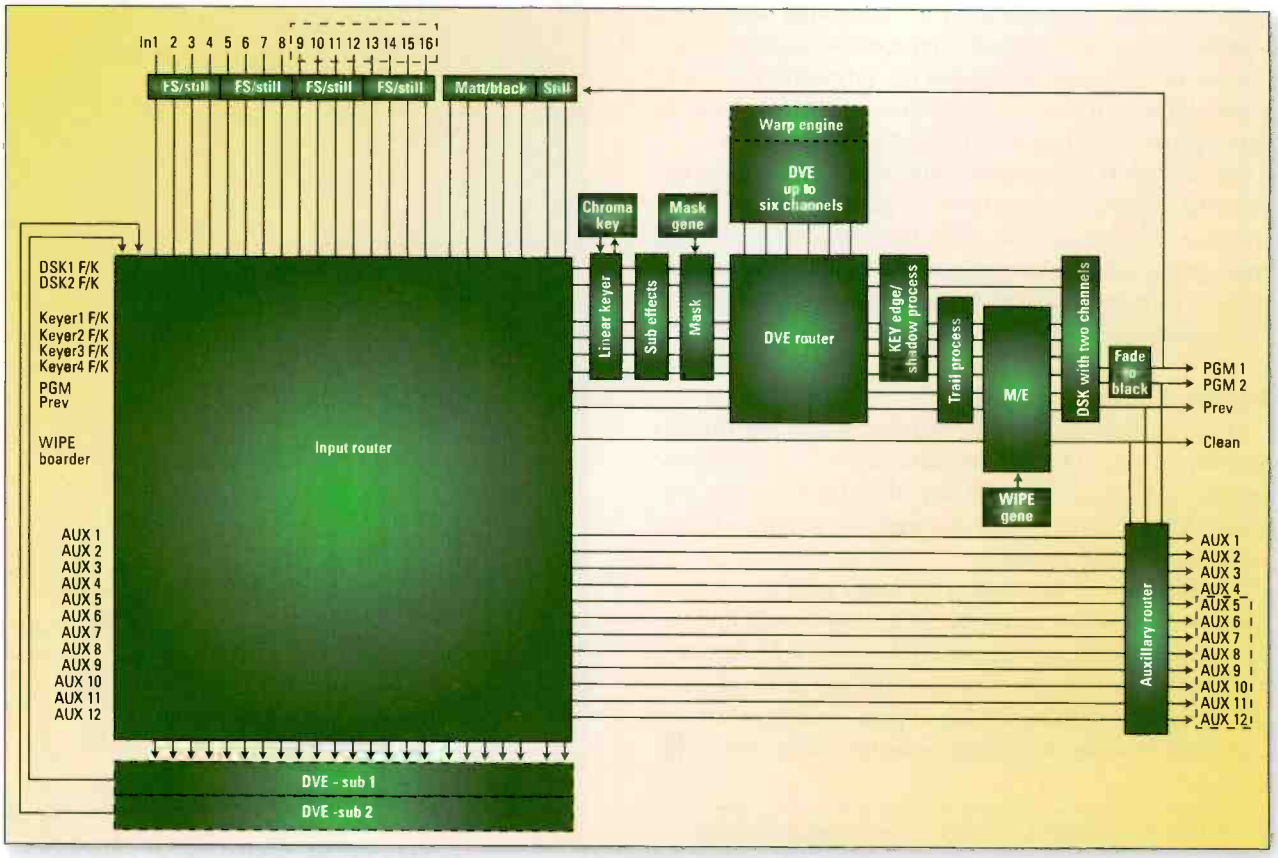

Figure 1. A block diagram depicting the workflow of the FOR-A VPS-700 digital switcher

be added to the standard 1M/E configuration switcher functions for realizing the layer system functions.

The digital video switcher is capable of assigning DVEs to each input (up to 16 inputs), generating video and key signals, composition by setting the priority and transparency with a pre-combiner and returning these signals to the M/E. The returned signals are handled as cross point and keyer elements. Despite being a 1M/E switcher, the input DVE and pre-combiner functions enable the realizing of composition effects equivalent to multi-level M/E.

This switcher can accommodate up to two input DVE/pre-combiner VPS-70DS boards for enabling creation of complex images. However, it can also be used as a basic 1M/E compact switcher, when needed, without installing the boards. Then, when the user wants more advanced image creation, a VPS-70DS board can be added for realizing operation as a layer-type switcher with composite effects equivalent to a multilevel M/E switcher.

System configurations

In the standard system configuration, eight inputs and eight outputs (PGM1-2, PVW, Clean and four AUXs) are provided, and four keyers, two DSKs (with six CKs), six DVEs (2.5D), edge/shadow generator and other features are available. In its standard configuration, the system can be introduced into such production environments as cable TV stations, production creation and editing, live event recording and studio switchers. It can also be used as a base unit (L-shaped composite) that combines a broadcast with different types of information screens, such as regional information, emergency bulletins and weather forecasts.

Adding the optional VPS-70WARP, VPS-70DS, VPS-70SDI and VPS-70SDO boards enables the system to be used as a pre-combiner, to wipe effects as line DVEs and to create complex images for high-level presentations. For example, the VPS-700 combined with a switcher can be used as an external DVE capable of warp effects. Or the pre-combiner function can be used to realize multiple picture-in-picture effects without using a keyer for making more complex compositions of key composition base video.

Future development will focus on the tally unit and AUX control panel developed in the HANABI series and development of analog I/O board products that can be incorporated in the main unit. Because expansion slots are limited, it will be difficult to make a fully analog design for input/output, but an effort is underway to provide a method to enable effective use of existing equipment. BE

Ken Truong is technical manager for FOR-A.

HDNews accelerates HD video editing with Sanbolic's Melio FS

BY MOMCHIL MICHAILOV

VOOM HD Networks provides HD entertainment programming to the United States, including 10 original HD channels, which are created by Rainbow Media and currently available to Dish Network subscribers.

When VOOM embarked on the creation of a new HD 24-hour news channel, HDNews, the company determined it needed an advanced video editing and storage solution that would support uncompressed 1080i video content. The solution needed to have the bandwidth and performance to allow multiple editors to access and share the same video content at the same time. This capability would simplify workflows and accelerate the production of news clips and promotional content.

After evaluating the features, functionality, costs and availability of the market's off-the-shelf solutions, HDNews decided to build its own editing and storage solution out of industry standard component products. It turned to Sanbolic, a StorageTek and Cisco Systems partner, to provide software tools and services to enable high bandwidth-shared access to data. Sanbolic designed and implemented a high-performance Fibre Channel storage area network (SAN) to support the company's digital editing and storage needs. The components of the solution include:

- Melio FS, an advanced symmetrical cluster file system, from Sanbolic
- LaScala, a symmetrical cluster volume manager, from Sanbolic
- D-Series disk storage systems (now called FlexLine) from StorageTek, a division of SUN
- MDS 9216 storage switches from Cisco Systems
- video editing workstations with Adobe Premier Pro editing software and Bluefish HD capture cards.

The resulting shared SAN storage system delivers the high throughput performance required for work with large uncompressed 1080i HD video files.

The resulting shared SAN storage system delivers the high throughput performance required for work with large uncompressed 1080i HD video files. The Melio FS clustered file system and LaScala volume manager allow multiple edit stations to have concurrent read and write access with guaranteed bandwidth of more than 165MB/s, which is required

HDNews' post-production editing system is connected to the SAN, which includes a dual Xeon-based PC running a Melio file system, LaScala volume manager and Adobe Premiere Pro with a Bluefish HD I/O.

A computer feeds video from an editing system on the SAN to a Grass Valley broadcast system.

to avoid video stutter or dropped frames. In aggregate, the solution, built on high performance disk arrays, provides more than 1GB/s of bandwidth to the network from the shared storage pool.

On the SAN's back end, the D-Series disk systems deliver the high reliability that's needed for HDNews' around-the-clock operations. The system is robust and has been in almost constant use over the past year and a half.

The use of the new shared SAN-based storage allows the operations team to manage a single pool of data and a single disk system, rather than multiple smaller storage pools. LaScala volume manager enables centralized creation, management and assignment of storage volumes, improving workflow management.

The shared SAN storage solution has increased staff workflow editing efficiency, simplified storage management, enhanced data consolidation and reduced overall storage costs.

The shared SAN-based storage allows the operations team to manage a single pool of data and a single disk system.

Staff members can work in any editing room, have access to the same pool of data and make edited program material available in any other room. For instance, while editors work on news clips, promotions personnel can put together promos for the same stories and help keep pace with the tight deadlines of news programs.

The solution offers built-in redundancy. If any edit room goes down, staff can move to another editing room and continue working with the same content, available via the SAN.

HDNews Studio allows users to record and edit onto shared storage.

Looking ahead, HDNews has the option of directly integrating near-line archiving into the SAN so its employees can more easily repurpose existing content and archive. BE

Momchil Michailov is the CEO of Sanbolic.

Canare's Cable Checker at New Century Productions

BY DAVID W. CHASE

It's an all too common occurrence: You're on location, preparing to broadcast, and you have a camera go down. Is there a problem with the camera system? Is the cable failing? Accurate trouble-shooting is an essential skill for remote broadcasting and is even more critical for live shows. Choosing the wrong path will cost you valuable time, and the on-site team may have only moments to trace the trouble and correct it. New Century Productions (NCP) faces these challenges daily.

As a full-service remote video production company, NCP employs many hybrid fiber-optic cameras and cable assemblies for our high-definition systems. In our many travels from job to job, equipment is frequently set up, taken down, moved, jostled and otherwise stressed. Although hybrid-fiber-optic (HFO) technology is excellent for even long-distance transmission under ideal circumstances, the downside is that small amounts of dust in a connector can deteriorate a signal. Errors also can be caused by cable kinking or pinching. Our greatest challenge has been identifying when failures are due to camera equipment or cables.

Lacking the time to use the complicated SMPTE fiber test equipment historically available, we often found ourselves employing several different camera and cable configurations until we found the right combination. We also were frequently repairing or replacing fiber cables that may or may not have been faulty. We needed an easy-to-use cable tester that any crew member could implement without special training. That's when we found Canare's Cable Checker.

David W. Chase, New Century Productions' field shop/maintenance supervisor, uses Canare's Cable Checker to assess HFO camera cable integrity.

When I got my first look at the specifications, I knew the FCT-FCKIT was our answer. It is well laid-out and usable by anyone. The tester consists of a hand-held unit that transmits and receives an optical signal and a loopback unit. The main unit is connected to one end of a cable and the loopback to the other. Both use Canare's SMPTE 304M-compatible HFO connectors for fast, easy connection. The technician need only to press the measure button and, in seconds, the checker displays optic loss and electrical line continuity information. Almost instantly, the crew knows if a cable needs cleaning, is functioning within specifications or should be swapped out for another cable.

Additionally, the construction of the checker is exceptionally functional. The large, backlit LCD read-out makes the test results easy to see in any lighting. The durable metal body and included carrying cases (when purchased as a kit) are essential for field use, and the auto-off feature saves batteries. It's obvious that the designers had mobile broadcasters in mind during every step of development.

Using this tool, our staff can easily test a cable and quickly get on with the business of television. The unit is small and portable, taking up virtually no space. We also keep one at our field shop to test incoming cables after each assignment. The shop staff then knows if a cable needs cleaning or other maintenance so that it will be ready for immediate deployment the next time it is required.

The Cable Checker saves so much time and effort that ENG and mobile broadcasters will find it to be a must-have tool. Nothing else available offers HFO assembly integrity information so quickly and easily. In addition, the incredibly low price makes the unit affordable to broadcasters of any size. The savings in time and unnecessary repairs more than covers the cost of the unit. BE

David W. Chase is the field shop/maintenance supervisor for New Century Productions.

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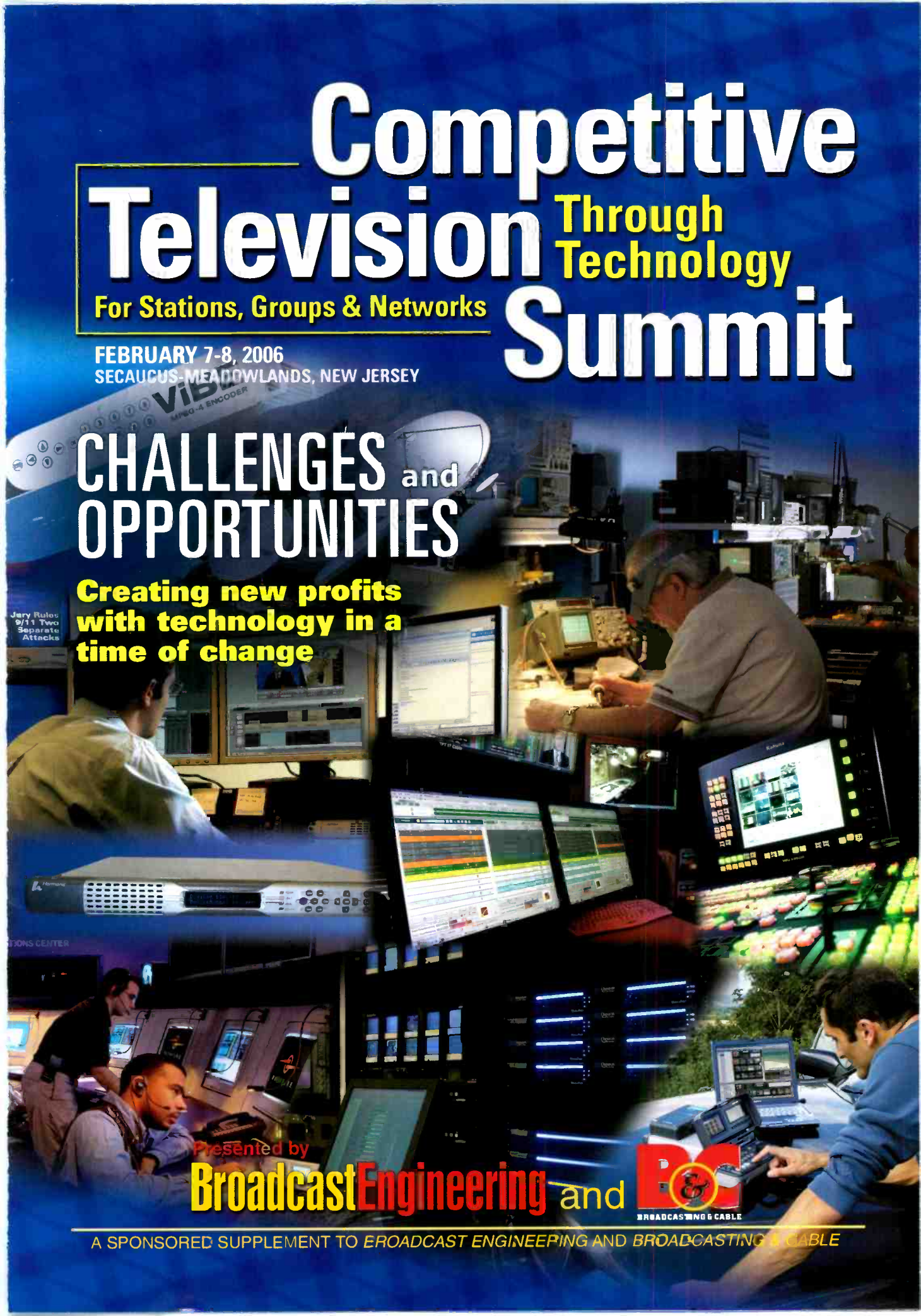

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A LETTER

from the publishers

The television industry is experiencing a period of rapid change in technology and the business strategies needed to succeed. However, one factor remains constant: the need to serve the entertainment and information needs of the local audience. Whether it is programming for the widescreen HDTV in the living room or the small LCD screen on a mobile phone, stations can leverage their special connection with their communities to provide content that will build their brand and capture new revenue.

B&C and *Broadcast Engineering* magazines have developed a series of exclusive seminars to help television executives cut through the clutter of noise and hype that so often surrounds new developments. The goal is to help these executives focus on identifying the unique solutions that may benefit their stations while at the same time reducing the risk of making incorrect technology choices.

This year's Competitive Television Summit is supported by leading equipment providers and attended by more than 100 television executives from leading facilities across the county. Attendees encounter a series of fast-paced and intensive sessions covering a variety of topics from IT conversion to strategies for implementing HD. Between the sessions, they have an ample opportunity to meet fellow executives so they can share ideas and thoughts on how our industry will meet the challenges that face us.

We hope this glimpse of the technology issues provides the information and encouragement you need to help make your enterprise more competitive.

Regards,

Jonathan Chalon
Group Publisher
Broadcast Engineering

Chuck Bolkcom
Group Publisher
B&C

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AUTOMATION:

In the drive for efficiency, lower operating costs and greater ROI, television automation is shifting into high gear.

Fifteen years ago, the term "television automation" conjured images of robots grabbing cassettes from a central repository and neatly inserting them into tape decks to be aired according to the traffic schedule. Once played, the cassette would be whizzed away to storage until it reappeared in the play schedule.

Fast forward to today. The tools have changed, but the mission is the same: improve return on investment (ROI), make better use of station personnel and reduce or eliminate mistakes and the associated, costly make good. With such a calling, it's no wonder TV automation continues to advance and grow.

"The trend towards automation has been ongoing for decades now," said Sundance Digital president, Robert Johnson. "Of course, the definition of automation continues to change and grow. For example, a Betacart could certainly have been considered automation in 1990 but isn't today. And the systems have become more sophisticated.

"In our opinion, automation, at some level, is no longer a luxury for larger stations. We see stations from all market sizes embracing automation as a way to make their stations operate more effectively."

The latest wave in station automation can be tied to the proliferation of video playout servers, according to Pathfire stations and groups product manager, Jamie Meyer. "The introduction of automation typically goes hand in hand with the introduction of video servers for play to air," he explained. "At this point, we believe that about 50 percent of stations have play-to-air automation. The use of automation is not limited to market size."

However, the scope of what an automation system handles is often tied to market size, according to Larry Stephens, systems sales engineer and account manager for Professional Communications Systems. "Automation systems are being implemented across the board depending on needs and budget," he said.

Pathfire's Meyer agreed. "The problems that can be addressed do vary by market. For example, the amount of syndication content is inversely related to market size. Automation can be a significant cost savings in playing out this syndication content. In the large markets, the core driver was ad content, taking the problems of tape away from the cash register," he said.

THE GROWING GOAL

Historically, automation systems have dealt primarily with master control and managing a station's playout. However, the quest to seek greater ROI and improved efficiencies is expanding that role.

The work of the SMPTE S22-10 Data Exchange Working Group is intended to streamline communication between traffic and master control.

"Small and medium-sized markets are confined to spot playback and basic automation requirements. This is due primarily to available budgets and actual ROI. Larger markets have implemented more sophisticated automation systems because they can clearly see a lower cost of ownership and, therefore, higher ROI."

"As broadcasting in general becomes more complex the leading automation providers have to expand their presence in the station. Automation needs to expand beyond master control and facilitate

the integration of master control into the rest of the station," said Sundance Digital's Johnson. "Master control has always been an island inside a broadcast facility with large barriers preventing effective communication with the rest of the station. Automation must play a key role in breaking down these barriers and integrating with the rest of the station," he said.

A major step in that direction is the work of the SMPTE S22-10 Data Exchange Working Group. Composed of a variety of automation, traffic, storage and content delivery system vendors, the group will soon submit a proposed standard to SMPTE for a messaging system that moves critical data back and forth between traffic, server, asset management, content delivery and master control systems.

"The role of the traffic department has always been to direct what is supposed to play on-air, but because the interface between traffic and automation has been rudimentary at best, master control personnel had to modify the list extensively," explained Sundance Digital's Johnson. "Sundance is a charter member of the SMPTE S22 committee, which is developing a sophisticated XML protocol for automation and traffic to communicate with each other. The end result will be tighter communication between the two systems, and this will potentially allow traffic to drive the master control automation. Ingesting and program timing will continue in the domain of master control, but the management of the list will migrate to traffic."

S22 also encompasses content delivery systems, furthering their integration into station operations.

"The SMPTE working group is designing a protocol that will facilitate real-time communications between these systems, as well as the content delivery systems."
—Jamie Meyer, Pathfire

A standardized interface and communications protocol makes both manufacturer and clients happier by reducing hardware and software conflicts.

That means many things from a practical point of view, but perhaps the most important is the proposed S22 standard, which will allow incompatible traffic and master control systems to communicate with each other.

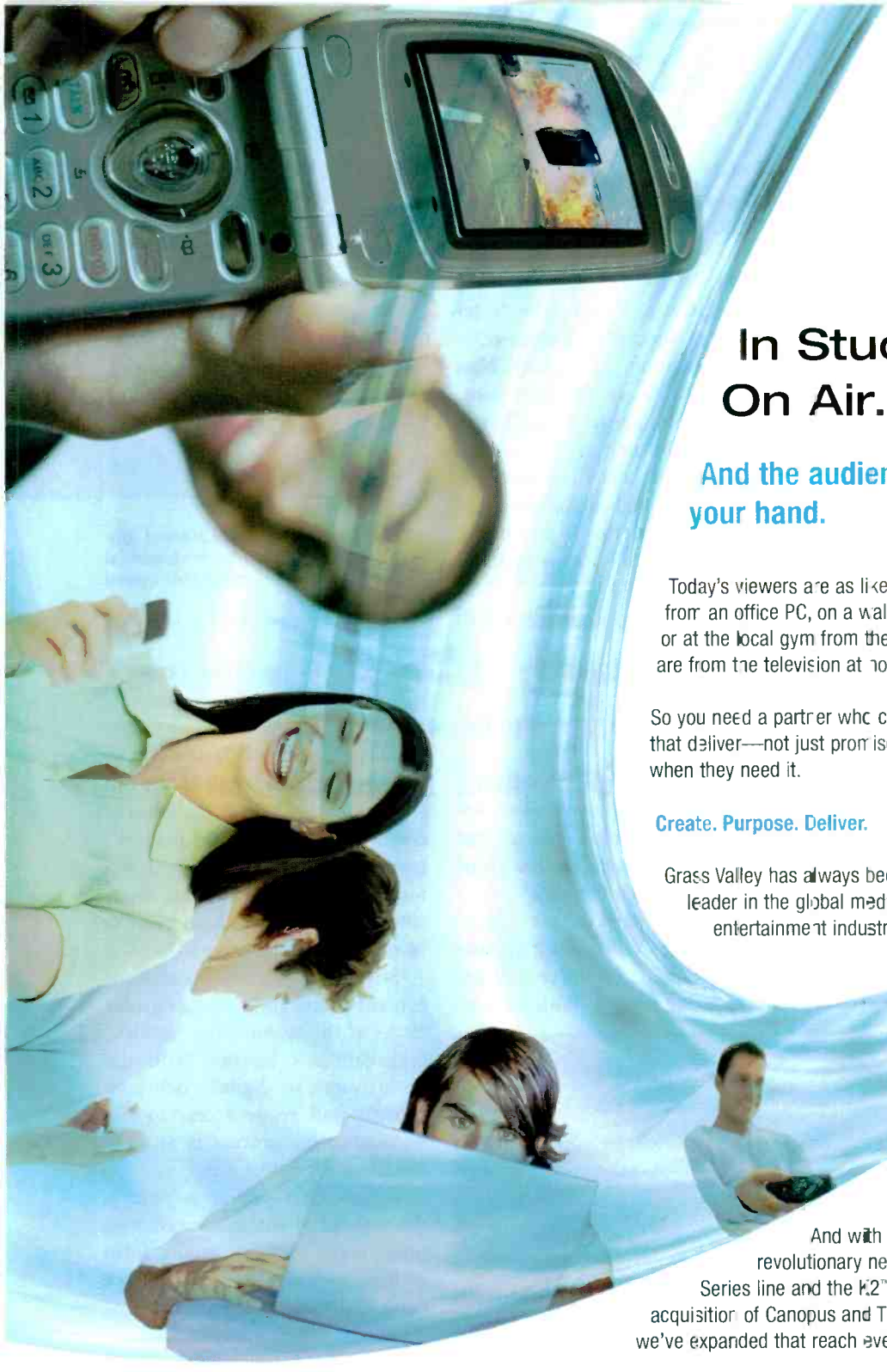
S22, or a standard like it, is necessary because traffic and automation systems have different origins with different development histories. "Historically, the proprietary operations of the disparate systems resulted in highly complex file translation schemes that were often unique to this process," explained Pathfire's Meyer. "Couple that with batch-oriented processing of the traffic information, and this makes for a complex task of getting the schedule into master control.

"The SMPTE working group is designing a protocol that will facilitate real-time communications between these systems, as well as the content delivery systems. This level of communications will significantly change the nature of the operations and can extend the master control console directly to the desks of the traffic personnel. Managing scheduling of last minute ad sales, routine schedule changes and media management tasks can immediately benefit from these communications."

The upside of this approach is clear to Paul Turner, vice president of product market for Omneon Video Networks. "You certainly can see in this scenario the advantages. Rather than filling out a paper request and going to the master control operator, you actually can do this from traffic. Now you can start to see the value of this and deal with the business realities of TV."

MULTICASTING AND BEYOND

Better communication between traffic and master control couldn't



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come at a better time. When fully implemented, S22 should dramatically improve station efficiency — a critical factor as stations go forward and look for ways to program, schedule and control multicast channels.

"The profit margins on multicasts are simply not the same as on the broadcaster's main channel," explained Sundance Digital's Johnson. "For this reason alone, automation is a requirement to keep costs down."

Stephens of Professional Communications Systems concurred. "The use of automation in single and multichannel operations has proven to improve a station's performance, reduce overhead and increase profits," he said.

"Master control requires fewer operators, thus lowering overhead. Scheduling and play-to-air responsibilities are being streamlined to the traffic department, eliminating the need to pass daily logs through more than one set of hands, thus reducing the possibility of errors. Fewer mistakes means a lower rate of make goods to customers, thus increasing profits," he added.

"Automation can assist in the task of multicasting," explained Pathfire's Meyer. "Formats used in multicasting can be the larger driver to successful implementation of the multiple channels. New content outlets, such as podcasting, provide a unique set of challenges to the station that an automation system cannot solve. However, automating a high-definition feed and downconverting to the analog feed can be easily accommodated with the automation system, just as multiple channels are broadcast from a single facility today."

"The use of automation in single and multichannel operations has proven to improve a station's performance, reduce overhead and increase profits."
—Larry Stephens, Professional Communications Systems

Ed Casaccia, news workflow manager for Grass Valley, put it another way: "Automation is the crux of any multicasting strategy. Without it, all you've done is moved your personnel cost from one point to another."

KTCA in Minneapolis-St. Paul, MN, relies on station automation from Sundance Digital.

Beyond multicasting, the reach of automation may encompass content production and asset management, explained Sundance Digital's Johnson. "Leading automation providers will be integrating sophisticated asset and workflow management engines into their products so that the management of media can start much farther up the content creation chain. The asset management system's integration with automation will also facilitate alternate means of distribution by links to various VOD providers," he said.

WMFE-TV runs a multichannel operation with the aid of a Professional Communications Systems-designed workflow.

"Streamlining the process of content preparation is the current target of the automation vendors," said Pathfire's Meyer. "With the proliferation of digitally delivered content and ready access to the metadata, this process is an easy candidate for automating."

Already Grass Valley is putting the concept of automating content preparation to work in the form of Ignite, which lets users produce news and entertainment programming with one or two people.

"With systems like Ignite," said Grass Valley's Casaccia, "we are taking the automation philosophy of being able to continue a high level of performance with a low level of cost beyond transmission and into creation of content. Ignite uses some of the same technology as station automation, delivering the ability to do more with less as well as with creation." ■

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MANAGING ASSETS:

With today's move to file-based workflows, asset management has never been more important.

Asset management systems, which have become a reality of life for broadcasters existing in a file-based world, come in all shapes and sizes. On their most basic level, content management tools are used to schedule simple playback functions from a playout server. On the other end of the continuum are massive repositories of online, near-line and offline storage for a combination of high-resolution and proxy material on everything from television playout servers to DVDs.

But for broadcasters looking to put their hands on a news clip that aired last week, a promo from last month or a segment from last Sunday's local roundtable show, the need is pretty clear, even if the terminology might not be. Broadcasters want to search their archive, retrieve the right item and get on with their business.

Unfortunately, according to Sundance Digital president, Robert Johnson, that's not always what they've gotten. "Traditionally, the asset management systems sold to broadcasters have been developed for another business — such as pre-press — and have also been extremely expensive. This has been attributed to a low adoption rate of asset management systems at broadcast facilities and also — not surprisingly — a high failure rate for the companies who have been selling these products!" he said.

"What does make sense for broadcast facilities of almost any size is a purpose-built, cost-effective asset management system," Johnson said. "The new breed of systems ties in tightly with automation and with other broadcast-specific pieces of hardware, such as graphics CGs and editors."

Tight integration with automation systems addresses one level of asset management, said Grass Valley chief technology officer, Ray Baldock. "You already have a content and asset management system as a fundamental part of every automation system. If it can ingest material, it has to be able to manage and provide searchable access for users. But admittedly, this is rudimentary and is often only implemented on a local scale," he said.

"The next step up is a newsroom system. The newsroom's asset management is a little more complex because there are far more users. It needs to support various resolutions and include the notion of lifecycle management. Content may often be identified as raw footage, edited content, approved for air or aired, and content in the archive may also be archived," Baldock said.

Where things get a little dicey is asset management on a grand scale, he said. "Where I believe there is a struggle in embracing asset management is the notion of establishing it at a higher level to facilitate the exchange of assets between stations or between companies distributed geographically. This is where the advantages have rarely been able to justify the costs, especially if a return is expected in the short term," he said. However, for most stations such sweeping systems and the concerns over return

Content and asset management is part of every automation system and can scale from there in complexity and expense.

on investment associated with acquiring them are not a factor.

For small stations, the thought of adding another system can be daunting, but it shouldn't be, said Omneon Video Networks vice president of marketing, Geoff Stedman. "Sometimes small stations get scared off. That's yet another system that has to get put in, and it will be costly and disruptive," he explained. "As automation systems integrate more content management functionality, stations evaluating how to manage their content will be able to find systems that offer the level of content management they need. Systems that make it much easier and offer serving functions at the same time are important. There are content management systems that are appropriate for smaller stations," Stedman said.

Pathfire's direct encode side provides content providers complete control.

> **"Even though the hardware might be the same, there are crucial differences to make this equipment appropriate for the area it will work in."**
> **– Ed Casaccia, Grass Valley**

Transmission and reception of files via satellite rather than video add efficiency and savings.

OFF THE SHELF

One of the most attractive promises of IT is leveraging the economies of scale of the immense computer market to keep costs under tight control. And while that applies to aspects of asset management, stations that rely on off-the-shelf disks, RAIDs and network switches for online storage do so at their own peril, said Grass Valley news workflow manager, Ed Casaccia. "Whenever you build a technological device — particularly a computer IT-based device — there are biases built into it in terms of what size files will be stored and how the firmware will deal with large files and small files," Casaccia explained.

"Even though the hardware might be the same, there are crucial differences to make this equipment appropriate for the area it will work in," he said. "The thought that you can buy a bunch of RAIDs and a switch and have a multiple-stream, high-bandwidth system that's stable is wildly optimistic. It's in the software, the firmware, where the hardware is optimized for a given application."

Avid Technology vice president of broadcast and workgroups, David Schleifer, concurred, "Most generic content management systems are not optimized for the type of files, volume, size and lifecycle of files that broadcasters use and as a result can slow the process of broadcast down."

However, such systems may have an important role to play in near-line or offline storage where demands on hardware performance are far less. "The off-the-shelf systems simply lack throughput for playout. In almost all cases, that is what renders off-the-shelf storage inappropriate," said Omneon Video Networks vice president of product marketing, Paul Turner.

"A more generic approach can be appropriate as long as the systems controlling that storage are tuned for media in offline applications," he explained. "A lot of off-the-shelf systems are good with small files, but when asking for very large files — gigabytes in size — those systems are not tuned for that."

What will be stored offline, online or near-line is a function of the importance of the media in question. "Where do you store media?" Turner asked rhetorically. "It depends on the value of material at the time. News material is extremely valuable while it's current. The whole point is to get it on-air. Store it directly on the

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In addition, every MediaStream system features built-in up-conversion and down-conversion so that broadcasters can take programming in any format and move from SD to HD or HD to SD instantly—and back out to air. There's no need for separate SD or HD systems or even separate SD and HD playlists. One server system, one playlist, and one consistent video format ensure interoperation with third-party broadcast solutions and seamless play-to-air operations, regardless of format.

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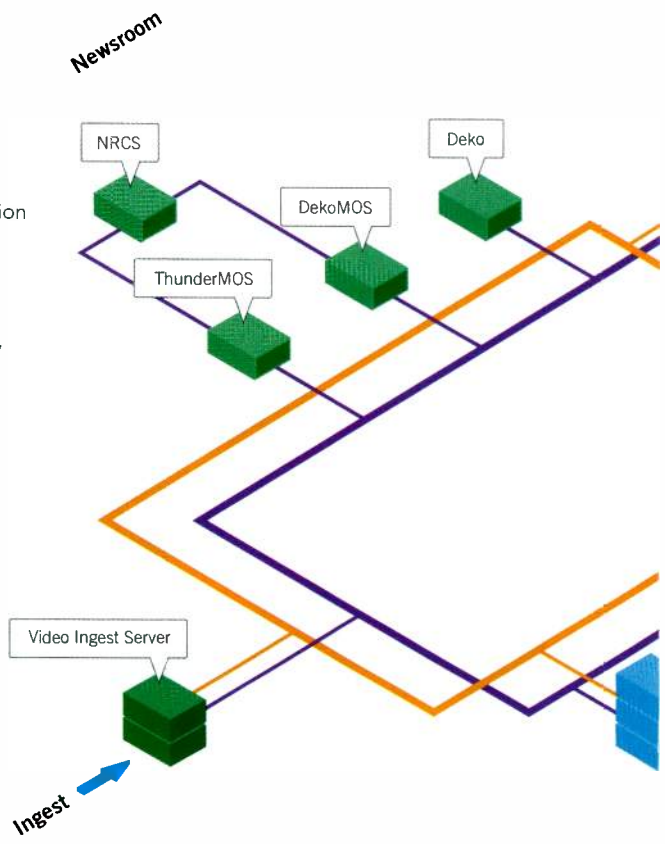
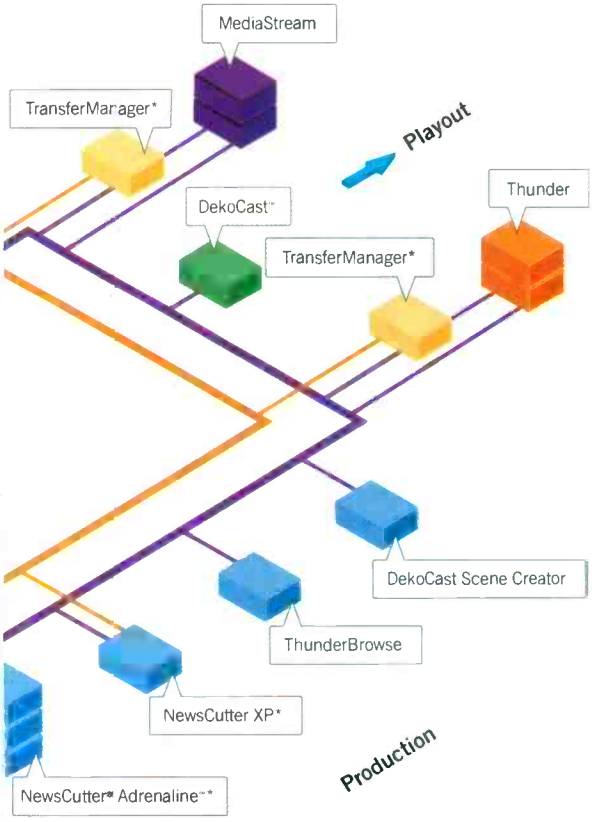
MediaStream servers can be configured from just a few channels using a standalone server to up to 100 simultaneous channels with completely redundant networked storage. All chassis-level components are the same, so a small server configuration can be easily upgraded to a larger server configuration.



* Support expected in the first half of 2006



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A strategic approach to media storage will assign the appropriate level of storage performance to the demands of the task at hand.

playout server, and when you're done with it, move it to a storage server. Playout severs have specific technology taken into account to meet playout requirements."

Media should be moved from one storage device to another as its value changes, and that movement isn't one-way, Turner explained. "News is very valuable when you first get it. That's when you put it on a relatively quick access storage media, then move it off to another storage media as its timeliness wanes," he said.

Pointing to the July 2000 crash of the Concord outside Paris, Turner illustrated how the value of an asset can change and in the process change where it should be stored. "When the Concord went down in Paris, the material was of massive importance for the first week. It waned a week out from that. Then it dropped in value until modifications were made to the Concord. On the one-year anniversary, the value of that material rose. There are spikes," he said.

"In the second stage, you move it to some spinning disk that is less expensive than playback storage but still gives you nonlinear access," Turner explained. As it continues to wane, move it to a DVD library or some StorageTek device. Then as it peaks again, you bring it back to the mid-point. You have to be able to search it, store it and find it and tell it to easily move from Point A to Point B."

In other words, whatever layer of storage is used in television needs to be matched to the requirements of the workflow. "Think of a broadcast operation as a manufacturing factory for media," Omneon's Stedman said. "It is a workflow, and to the extent storage can be an active part of workflow, it will make that process more productive. Generic, passive, off-the-shelf storage is available, but it really isn't as useful to broadcasters."

As Avid Technology's Schleifer put it, "Broadcasters — like many others — are driven to want everything everywhere all of the time. Technology and price still get in the way of achieving this goal.

"Today, it makes a lot of sense to maintain a large pool of online storage to enable the workflow benefits that it supports. Behind the online storage, you can then position an archive system or a near-line and an archive system," he said.

FADE TO BLACK

Part of the reason asset management means different things to different people is because most systems are as unique as the needs of their users. Taking a strategic approach to media storage management is a necessity, according to Sundance Digital's Johnson. "The 'correct' answer for which type of storage to use varies greatly depending on several factors, including budget," he explained.

> "You have to be able to easily search it, store it, find it and tell it to move from Point A to Point B."
> —Robert Johnson, Sundance Digital

For example, Johnson says, "The cost of spinning disk storage continues to drop dramatically. And this is certainly a good place to park media.

"However, removable storage, be it tape or DVD, is still cheaper on a per terabyte level. And it also has the added benefit that it can be removed and stored off-site," Johnson said.

"Given the budget," he said, "most broadcast facilities are opting for a combination of a spinning disk cache combined with a larger robotic storage system for longer term storage." ■

Most stations choose a combination of storage platforms for digital assets. For online storage, systems optimized specifically for broadcast are needed.

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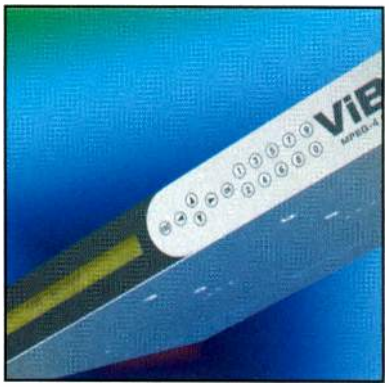


DISTRIBUTION AVENUES:

The Web, cell phones and other channels allow local TV stations to serve viewers on the go.

Not too long ago, the competitive landscape of television was clearly understood. But today, several factors are converging to change the lay of the land.

New, more affordable means of production are broadening the accessibility of video creation to a growing circle of people. Broadband Internet coupled with efficient video codecs is making the Web a practical avenue for content distribution on a mass scale. With an estimated 47 million broadband customers in the United States and 215 million worldwide in 2005, the ability to reach a sizeable audience via nontraditional means has never been greater.

Already, specialty Internet television channels devoted to niche topics, such as yacht racing, extreme sports and home movie clips, abound. Brightcove, a startup company developing a self-described open Internet TV service, says that there will be as many video channels as there are Web sites at some point in the future.

Add to that the growth of video-enabled cell phones, 14 million iPods sold over the Christmas holiday (many of which were video iPods), 8 million video downloads from iTunes since its introduction and the burgeoning interest in IPTV among telecommunications companies, and it's clear that video distribution is changing radically.

While it's unclear exactly how these alternate distribution avenues will take hold, which will succeed and which will fail, one fact remains certain: These new distribution avenues are a double-edged sword for broadcasters. On the one hand, they increase competition for viewership from never-before-contemplated competitors. On the other, they offer networks and local broadcasters a new way to serve their established audience how and when that audience wants to be served. In doing so, they reveal a potentially important opportunity.

KEEP IT LOCAL

The dramatic use of webcasting helped New Orleans broadcasters serve viewers after their transmitter sites were destroyed by Hurricane Katrina. The everyday use of the Web allows TV stations to stream news stories to their audience. These distribution channels share an important element: localism. That's the special magic of hometown television stations.

"The concept of local, video-based (as opposed to print) news is one that will stay with us for a long time," said Sundance Digital president, Robert Johnson. "While the method of distribution may change over time, there is no doubt that there is a market for local newscasts. Many local stations currently put news clips on their Web sites. And the transition from Web-based video to iPod, cell phones or video on demand is fairly simple."

Grass Valley news workflow manager, Ed Casaccia, agreed. "Local broadcasters have spent almost 60 years developing the tools and operational infrastructure to do a thorough and economical job of capturing local audio/video actuality," he said. "The appeal of it is

Broadcasters looking to generate revenue from emerging distribution avenues must find ways to repurpose what happens on the set for new aspect ratios, bit rates and resolutions.

More efficient codecs enable alternate distribution channels, transforming satellite backhaul at this PanAmSat Ellenwood facility.

something that can't be matched by satellite service or any other national service.

"The same thing that makes the local news appealing — the 'let's all get together at 6 p.m. and find out about our community' — works in the mobile environment. And it is the same sort of appeal that is found in radio."

Vigorously pursuing these new distribution channels with coverage of news, weather, sports scores and other items of local interest is likely to benefit stations in a couple of ways. "There are two reasons to deliver content through nontraditional methods," explained Avid Technology vice president of broadcast and workgroups, David Schleifer.

"The first is to derive specific revenue from them, and that comes down to subscription services or advertising. The second is to increase the value of the brand and to control your user's experience by reaching viewers when it is appropriate and moving them to your revenue-generating outlets. For example, increase your ratings (and revenue) by giving your phone viewers a compelling reason to tune in," he said.

However, there is no automatic success in these uncharted waters. Generating revenue and increasing brand awareness demands proper planning in the view of Larry Stephens, system sales engineer and account manager at Professional Communications Systems.

"In order to compete effectively in the marketplace, broadcasters must be able to define and fully understand their business goals and objectives," he said. "Each department plays an important role in making a station's plan ultimately successful. Similarly, having buy-in from each department and its personnel will make achievement of the goal that much more viable. My recommendation is that stations take the time, effort and money to put together a comprehensive, firm plan," Stephens added.

"There are two reasons to deliver content through nontraditional methods: ... derive specific revenue (and) increase the value of the brand."
—David Schleifer, Avid Technology

A LEG UP

Today's broadcasters exist in a world of mixed resolutions and aspect ratios and may have an advantage when it comes to capitalizing on the opportunities these new distribution avenues present. After all, for the past several years, many stations have been putting the technology and workflow in place to serve up a combination of SD and HD channels once the DTV transition is complete. Such flexibility gives them a leg up in serving up content for multiple distribution formats.

"The key issue is how to create a flexible environment that can switch seamlessly to the requirements of whatever job is thrown at it — an environment that works in SD/HD or a combination of the two (and does so in a way that the operator may not even notice because the equipment takes care of the conversion). This means one set of equipment, one set of operators, one set of training and so on," said Snell & Wilcox vice president of strategic marketing, Joe Zaller. "At Snell & Wilcox, we have made it our mission to eliminate incompatible standards and formats, making technology an enabler, not a limitation for our customers," he said.

Local broadcasters can always attract an audience, regardless of how that news is distributed, because of viewers' interest about what's happening in their communities.

"A file-based approach certainly

THE WEB IS GOLDEN FOR LOCAL STATIONS, SAYS TVB-SPONSORED SURVEY

Local TV online advertising grew at an exponential rate last year and is expected to grow by 39 percent across all markets this year, according to a new Television Bureau (TVB) survey.

The survey, "Benchmarking the local Web site marketplace," was commissioned by TVB and conducted by Borrell Associates. It found that during 2005, local TV stations increased their online ad share an average of two percentage points over the 12-month period. The survey revealed that several stations captured more than 15 percent of all locally spent online advertising dollars in 2005 and that some station groups are now generating millions of dollars from Internet operations.

Among other findings, the survey reveals:

- By 2005's end, local broadcast stations had generated an estimated $283 million, twice as much as they did in 2004.
- Many TV Web operations stepped up sales efforts last year, growing their online ad revenues an average of 46 percent.
- More than 100 stations — many of them UPN, WB and Fox affiliates — started generating money from their Web sites for the first time in 2005.
- In 2005, TV local Web revenues accounted for a 6 percent share of all locally spent online advertising, a gain of two percentage points from 2004. The gain, though on a relatively small portion of $3.9 billion, is still impressive.
- The survey further projects local online advertising will grow 28 percent in 2006 across all local markets. Adding local paid search advertising to the equation, the growth climbs to 39 percent.

The survey revealed that smaller markets did a better job capturing online share than those in big markets — on average three times more ad share. It also found that last year, more than 20 percent of broadcasters reported that online sales grew more than 100 percent from the previous year. Most stations generated hundreds of thousands of dollars from online sales in 2005.

While cars and health care were the most popular ad sales categories, nontraditional ad revenue, particularly from real estate and financial services, showed growth in 2005. ■

helps with multiple resolutions and aspect ratios," said Grass Valley's Casaccia. "We are having to do that for the broadcast infrastructure, combining 16:9 and 4:3. So we need the tools to deal with different resolutions, file types and bit rates on the same timeline. That allows you to determine which set of output options you want when you publish content.

"These options will allow users to compose the content for a medium other than the usual TV experience — for the lean-forward computer experience and hold-it-out-at-arm's length experience as opposed to a lean-back TV experience."

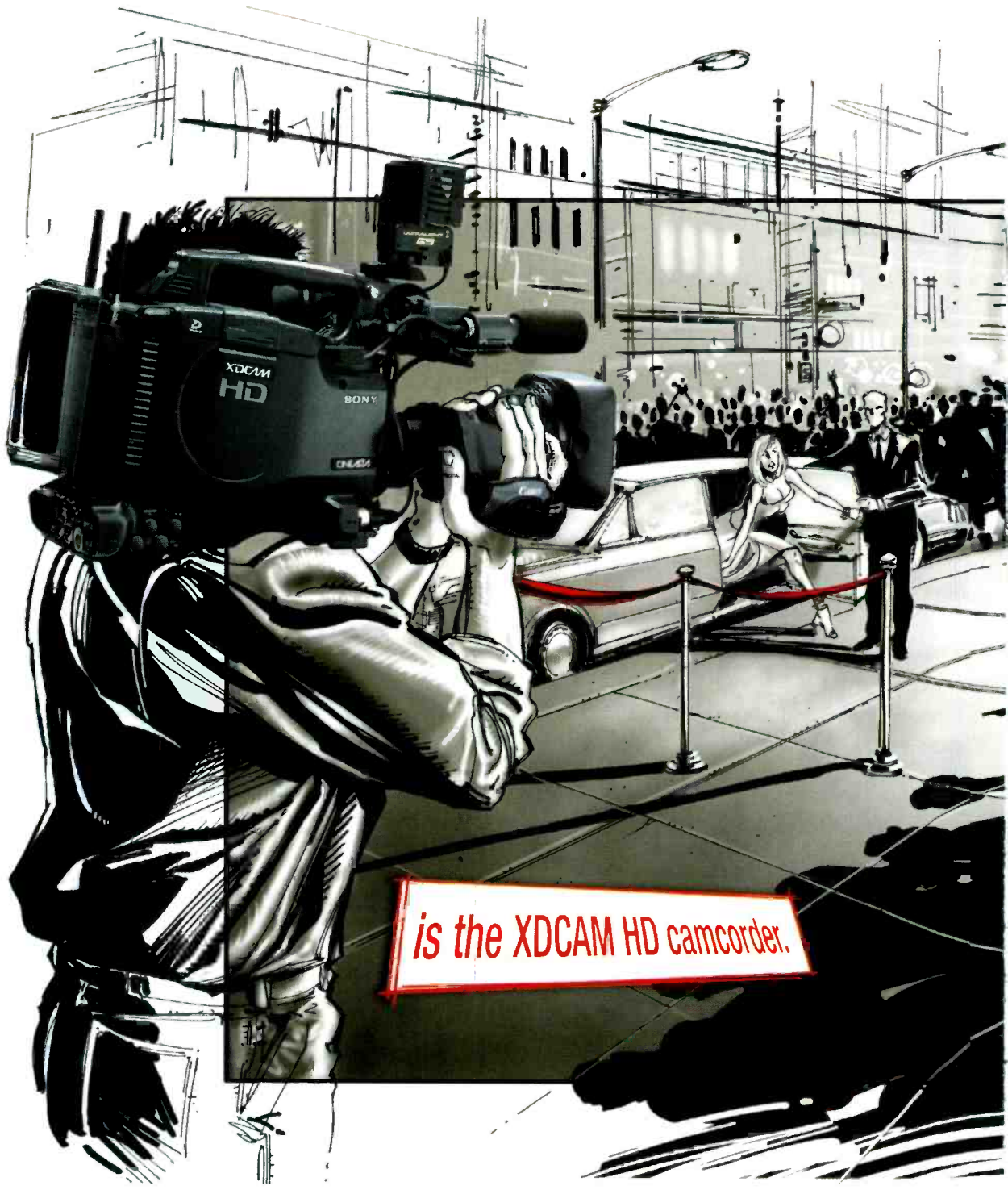
In terms of technology, the fundamental enabler that will support broadcasters as they repurpose the same basic content for various distribution channels is the storage, according to Avid Technology's Schleifer. "It may seem odd to say this, but shared storage is the key," he explained. "In reality, parallel workflows — that allow all of these deliverables to be processed at the same time and support reuse of materials — are the keys to success, and they depend on simultaneous access to the media and information throughout the process."

With the prospect of delivering viewer access to content via multiple platforms on the horizon, broadcasters will have to find economic models that make sense.

Omneon Video Networks vice president of marketing, Geoff Stedman, concurs. "You are basically talking about files to start with and making different versions for different distribution venues — being able to implement a shared storage environment to support file-based workflows."

However, unbridled access to these assets across a group of editors and producers isn't the answer, Schleifer warned. "Managing all of these assets is critical. You need to know that all of these are tied back to the same story," he explained.

"You need to take advantage of everything possible that is common across the distribution vehicles, and you have to allow each deliverable to be worked on without disturbing any of the others.



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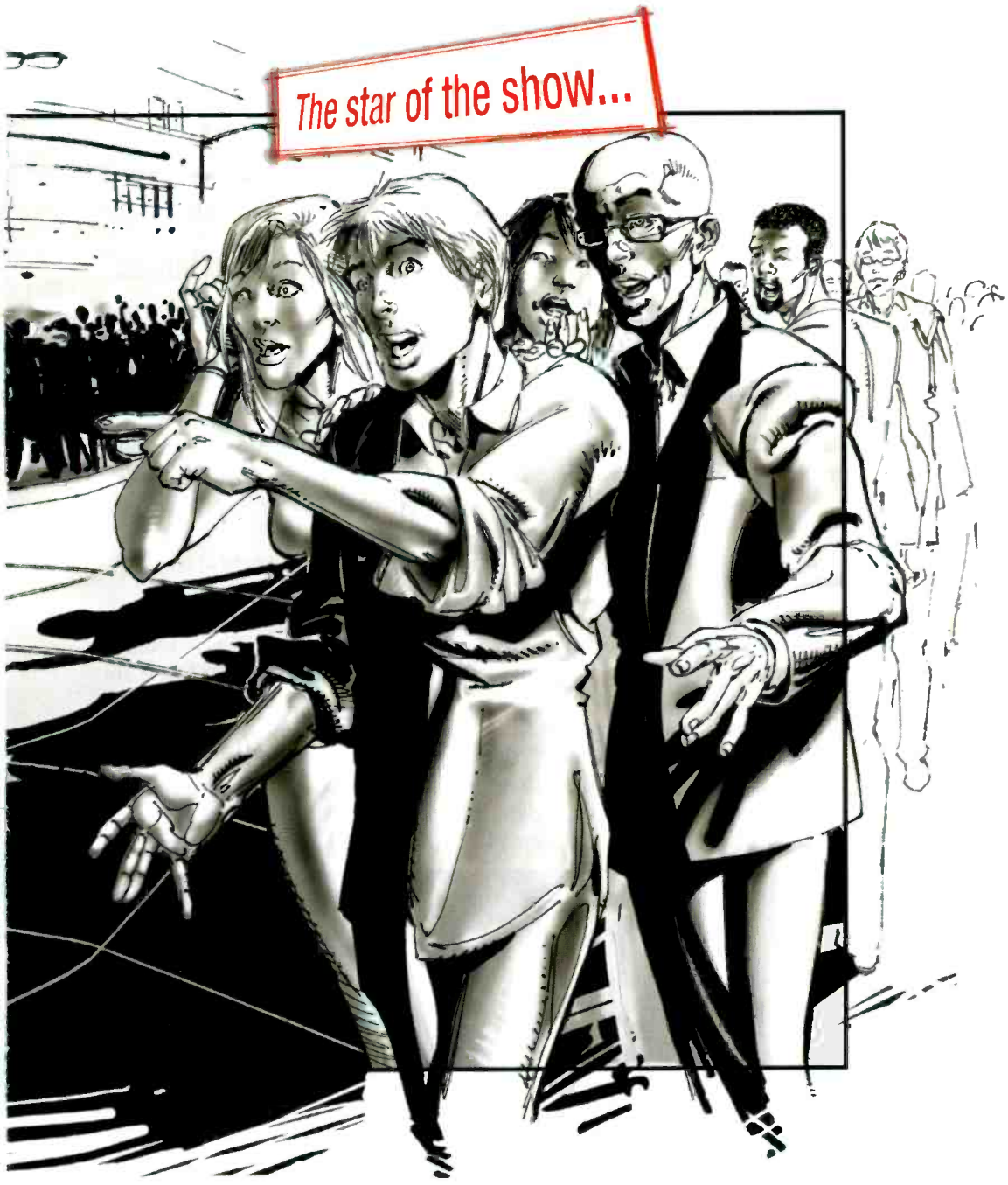

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For example, someone building a story for a cell phone can't interrupt or add burden to the people putting your product on the air," he said. That, according to Johnson of Sundance Digital, is the province of a "sophisticated automation system and asset management software so that broadcasters can leverage the material."

Fundamental to serving content to such diverse distribution avenues is deciding what format and bit rates will be supported out of the playout server and whether or not content must be real time before you begin. "At some point in time, you need to transcode from the input format to the final output format, and that transcoding can be real time using hardware, which has its limits, or a non-real-time multi-pass process using VC1 or MPEG-4 AVC," explained Omneon Video Networks vice president of product marketing, Paul Turner.

"That's good for when you wish to allow the software to chew on the material for enough time to get the desired bit rate. If you are delivering something at a relatively high bit rate, such as MPEG-1, MPEG-2 and even MPEG-4 at the moment, streamed in real time to your audience, you'll do that with a real-time piece of hardware. This approach is appropriate for companies providing news and sports," he said.

About 18 months ago, Harmonic saw that broadcasters, cable operators and others would soon want to serve content through these yet-to-emerge distribution avenues without having to change direction. To do so would require significant investment in capital and operational resources, said Harmonic director of satellite and broadcast marketing, Shahar Bar.

"The market has a need to distribute to multiple vehicles. Broadcasts and other content providers ask, 'How do I build for these different distribution platforms without duplicating infrastructure?'" he explained.

"Two years ago, they would have had to build a platform for ATSC, a second for IPTV, a third for the Web and a fourth for another platform. Technically, that approach is possible, but it is very expensive from a capital perspective and an operational cost perspective," Bar said.

"Instead of having multiple platforms, why not build a single platform that serves multiple distribution avenues? That's important for our service providers and broadcasters to have, and hence we developed that into a product, the Electra 5000," he said.

At IBC2005 in Amsterdam, Harmonic unveiled the Electra 5000, an encoder with a single input that outputs via multiple codecs at different target resolutions at the same time. "It can feed an ATSC signal, an IPTV signal and a cell phone or mobile device simultaneously," Bar said.

The intention, according to Bar, was to remove the financial burden of building and operating redundant infrastructure. "Hypothetically, let's say I was to build distribution for three vehicles with a $100,000 capital expenditure per vehicle. That's an expenditure of $300,000. I would wind up paying half of that if I were to use the Electra 5000. On capital expenditures, it will save you 50 percent, and the more distribution you have, the more it saves you. The operational savings will depend on the size of the facility, but it will require fewer people to operate."

"At some point in time, you need to transcode from the input format to the final output format."
—Paul Turner, Omneon Video Networks

DILUTING THE AUDIENCE

While the allure of new revenue streams and building the brand are tempting, is there a possible downside to pursuing new distribution avenues? For instance, could putting the newscast on the Web for viewers stuck in traffic also erode the existing audience as they learn that they can time shift via the Web? How would advertisers respond to station sales people explaining that although the ratings have slipped, the audience is really migrating to the Web?

Efficiencies resulting from a file-based workflow from master control to the newsroom may free up resources that broadcasters will need to feed the new demand for content via alternate means.

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MOBILE ESPN KICKOFF

Television continues its march to the small screen with this month's nationwide release of Mobile ESPN, a cell phone service giving die-hard sports fans access to sports news, scores, statistics and about 40 video clip highlights per day.

The Feb. 5 national kickoff of Mobile ESPN coincides with Super Bowl XL when the ESPN-branded Sanyo phones go on sale for $199 at 600 Best Buy retailers. The Mobile ESPN service plan will cost subscribers between $35 and $225, depending on usage.

ESPN may have built its business on 24-hour cable sports, but to remain a leader in sports, it must be there whenever fans turn to a new platform, even if that means being in the palm of the viewer's hand, George Bodenheimer, co-chairman of Disney Media Networks and president of ESPN and ABC Sports, told a recent financial gathering. ■

ESPN hopes that die-hard sports fans will appreciate the network's repurposed video game highlights, sports news and scores for cell phones with its Feb. 5 national rollout of Mobile ESPN. Photo by Plamen Petkov.

"This could happen," said Avid Technology's Schleifer, "but each medium is different and offers different benefits. The Web offers the opportunity for depth on a subject, the phone offers immediacy and the HD screen offers unmatched picture quality and the opportunity to tell the story with impact. If broadcasters leverage the benefits of each, they should bolster viewership, not dilute it."

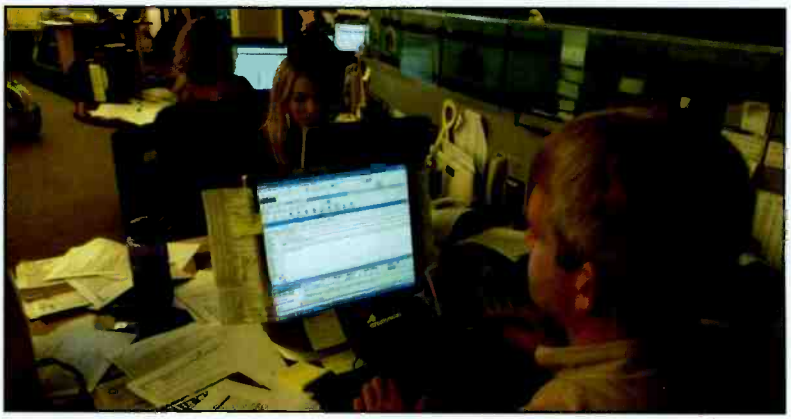
In the view of Sundance Digital's Johnson, keeping or bolstering viewership doesn't just happen. Ensuring there's no audience dilution will be a proactive responsibility of every station pursuing these new distribution channels.

"I believe it is incumbent on the stations to package their alternately distributed news content in such a way as to encourage the viewers to seek the main broadcasts for current, timely news," he said. "Likewise, the live broadcasts can drive viewers to the other distribution channels. It is common now for stations to offer extended information about stories on their Web sites. That current model should prove effective for other distribution means as well," he continued.

Grass Valley chief technology officer, Ray Baldock, sees little danger from audience dilution. The real threat, in his opinion, is failing to act on the opportunity these new distribution avenues present. "Think about the your news content and about an audience sitting in a bus or at a park. If you can reach that audience with some news or game highlights, you've gained audience, not lost audience — unless you choose to not participate," he said.

"Ad revenue is still a challenge," he continued. "The networks have been bringing these questions to Nielsen and Arbitron and asking when they are going to measure the real audience, including time shifting. As these new channels emerge, it will be important that there is a measure of that audience." ■

"It is incumbent on the stations to package their alternately distributed mews content ... to encourage the viewers to seek the main broadcasts."
—Robert Johnson, Sundance Digital



Simultaneous access to content as files on video servers allow a news producer to put together a version for broadcast, while an editor accesses the source content to assemble a version for cell phone subscribers.

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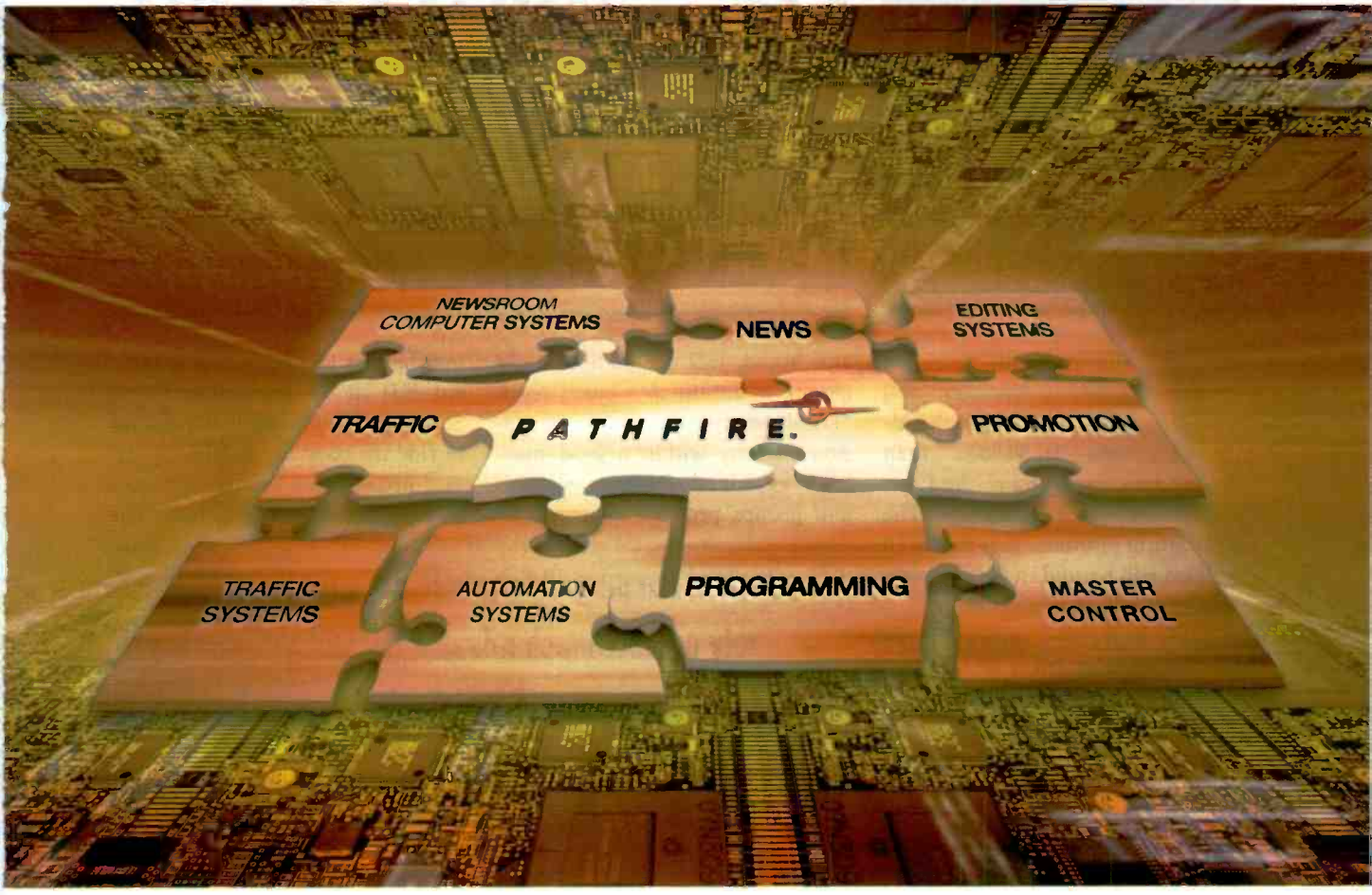

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ORIGINATION:

The switch from SD to HD local news origination can be made gradually, if broadcasters plan ahead.

This year, for the first time, consumers will buy more high-definition televisions than analog sets, according to the Consumer Electronics Association. The association estimates that nearly 16 million will be sold in 2006, generating $23 billion in revenue.

These impressive numbers come on the heels of 2005, which produced a few noteworthy milestones, including:

- the production and presentation of 24 of 25 college football bowl games in HD
- the addition of "Good Morning America" to the increasing list of network HD offerings
- growing local commitment to HD for news origination
- an estimated 16 million U.S. homes with HD sets by year's end.

It's safe to say that the HD train is leaving the station, which raises the question about when the vast number of local stations will jump aboard with the origination of local news and programming. As Avid Technology vice president of broadcast and workgroups, David Schleifer, put it, "The move to HD is inevitable at this point. Generating new revenue will come from the facility's willingness to get out and establish their brand in the HD space. In part, the task of keeping the eyeballs on your HD output will rely on how much relevant content you put there."

Given the importance news has when building a station's identity and brand, HD origination could elevate a station in viewers' eyes. "Local news is the source of station identity within a local market," explained Pathfire stations and groups product manager, Jamie Meyer. "We anticipate local HD news origination to become more and more prevalent on a market-by-market basis. A local market will remain SD-only until one station in the market takes the leap forward into full HD production, and then the competitors will follow."

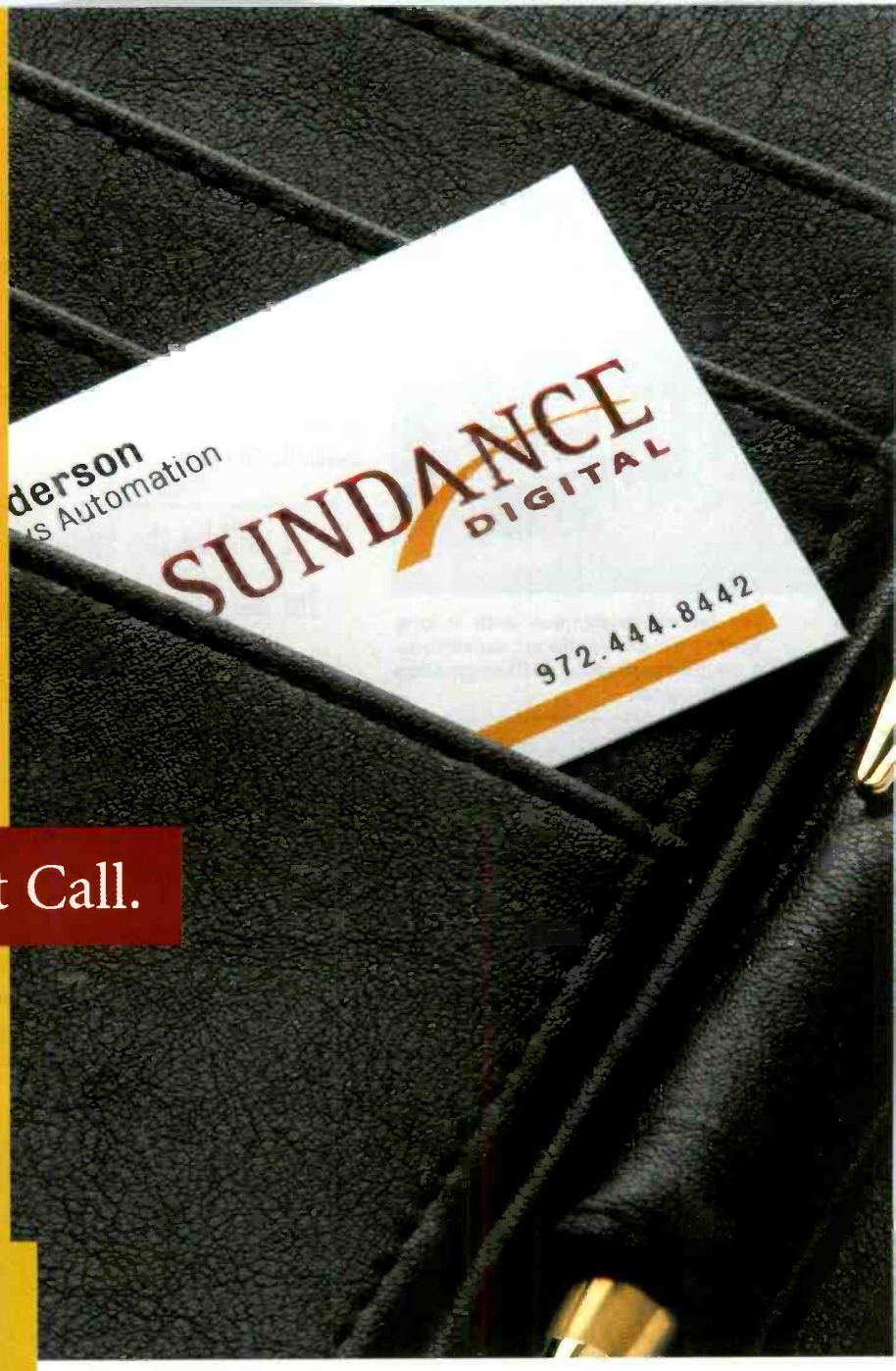
"The task of keeping the eyeballs on your HD output will rely on how much relevant content you put there."
—David Schleifer, Avid Technology

But what will tip a station over the edge and make it commit to being the first in the market to present HD news? For KSDK-TV in St. Louis, the answer is the chance to ride the coattails of NBC Sports as it presents the Winter Olympics in HDTV from Turino, Italy. The Gannett-owned station will join sister stations KUSA-TV in Denver and WUSA-TV in Washington, D.C., in offering local HD news beginning on Feb. 6.

Other news stations will be motivated by news competitiveness.

ESPN created resilient, physically dispersed HD-SDI and AES paths to support its HD-originated programming.

"If I were making the decision for a local TV news operation, the first time I saw research that said one person watched my competitor



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For television stations with a long history of conventional operations, a gradual approach to HD origination makes sense.

and not me because of HD would be the trigger," said Ed Casaccia, a former news director and now news workflow manager at Grass Valley.

Perhaps Bob Ott, Sony vice president of optical and network products marketing, put it best, "I think it will be the same as saying, 'Should we go to color for our news or stay in black and white?' If your competition goes color, you will go color."

Ott continued, "The level of content available in HD is just going to continue to grow." Within the past few weeks, CBS announced that its owned-and-operated local affiliates will begin HD news operations with assistance from Sony XDCAM HD. The first CBS stations to begin using the optical disc recording technology for news will be WBZ-TV in Boston and WBBM-TV in Chicago.

A growing amount of HD content is spurring demand, and that becomes apparent when the United States is compared with the rest of the world, according to Shahar Bar, director of satellite and broadcast marketing for Harmonic. "I think the interest in HD in the United States is somewhat different than what is happening in the rest of the world," he said. "The United States is moving toward HD much faster. The volume market will adopt HD quickly, and the transition from standard definition to high definition will be fast. Once they are used to high definition, many consumers are not likely to choose SD programming when an HD version is available," he said.

> **"It will be the same as saying, 'Should we go to color for our news story or stay in black and white?' If your competition goes color, you will go color."**
>
> **—Bob Ott, Sony**

HD TRANSITION

Next to a lack of audience, which is changing dramatically, the next most common objection to HD local program origination — especially news — is the lack of a sound business model. But that point of view assumes that the switch to HD would require a new set of everything.

Even if broadcasters choose not to air HD at this time, they may still want to begin building an HD news archive by capturing in HD now.

Fortunately, stations have an alternative. Rather than creating HD from nothing, stations now have the option of easing in to HD.

"Moving to HD has not been about throwing the switch over a weekend and making an exclusive transition," said Avid's Schleifer. "In most cases, it has been about building out the infrastructure over time — first the transmitter and routing, then the playout servers and editing.

"It is possible to produce standalone, less time-intensive programs like magazine shows with a few cameras and one or two standalone editing systems. News is an area where there is some complexity. While we could deliver an end-to-end HD solution to the market today, most facilities will still be getting their feeds in SD, so inevitably stations will still be in a mixed mode for a while."

Snell & Wilcox vice president of marketing, Joe Zaller, agreed, "Most stations plan for a gradual transition of their operations to HD," he said. "At Snell & Wilcox, we've taken the decision to, whenever possible, make all our products both SD- and HD-capable. This means that a broadcaster can buy a piece of equipment that's fit for purpose

today and have the peace of mind that the same equipment will work equally well in the future when the station moves to HD operations," he said.

The company's SD-HD production switcher is an example of this philosophy in practice, he said. "Kahuna's powerful functionality has many practical benefits beyond the elimination of external upconverters and downconverters. The problems associated with the size, positioning and resolutions of graphics becomes a thing of the past. And Kahuna does all this as part of an integrated system that incorporates minimum delay," Zaller said.

Snell & Wilcox is not alone in its desire to design equipment that smooths the transition from SD to HD in the future. Sony's new XDCAM HD was designed to protect stations today and let them plan for tomorrow, said the company's Ott.

"Sony has made the decision to protect legacy formats as much as possible. We use the same media in XDCAM HD as in XDCAM SD. And if you look, you see the same capability in analog with Betacam and Betacam SP; Betacam SP playing back in Digital Betacam and IMX decks," he said.

"If your station is not going to HD today, you can use the DVCAM recording capability of XDCAM HD, or you can — with the built-in downconverter — play out SD in anamorphic, 4:3 centerpunched or letterbox. This approach allows you to archive all of your news in HD and deliver with your existing SD system until you're ready for HD," he said.

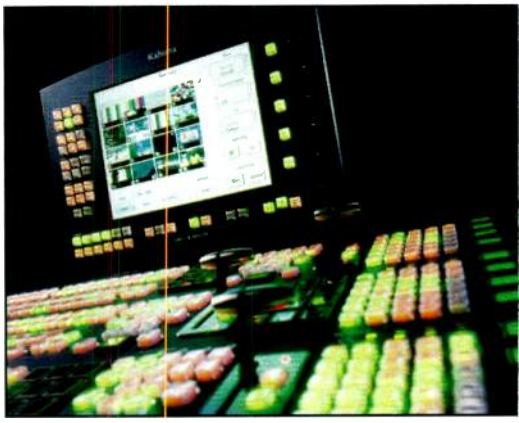
"The second aspect of our system is we originate at 25Mb," he explained. "We have a variable bit rate, 35Mb and 18Mb. But 25Mb was the standard established with DVCAM, and that is available on XDCAM HD," he said.

"If I have an editing system set up with 25Mb capability, I wouldn't have to increase storage. If you were able to pass a DV signal though your plant, you can pass XDCAM HD with certain modifications based on the infrastructure. And we have an HD-SDI connection for interface to switchers with that input," Ott said.

Grass Valley, too, has designed its Infinity newsgathering and production system around the concept of allowing customers to make an easy SD-to-HD transition. "Let's talk about the barriers to making the shift to HD," said company chief technology officer, Ray Baldock. "People previously had only one option: buy an HD camcorder and throw away their SD camcorder. That's a barrier — a big one for many local stations.

"So part of the approach we are taking with Infinity is to provide both HD and SD in a camcorder and field editing equipment. Then as people invest in field equipment, they can have confidence that they can continue shooting in SD, and they can make the switch to HD by simply flipping the switch," he said.

"And we have tried to lower the cost by providing comprehensive connectivity from all of our new products to the IT world, including the laptops many news crews are carrying. We use a standard Iomega rigid removable hard disk format called REV. Customers can buy a portable 3.5in REV drive, plug it



One design goal of the Snell & Wilcox Kahuna production switcher was to help stations ease into HD production when they are ready.

> **"People previously had only one option: buy an HD camcorder and throw away their SD camcorder."**
> **—Ray Baldock, Grass Valley**

Like its SD predecessor, Sony's XDCAM HD offers flexibility in the field for local stations seeking an evolutionary way to ease into HD news acquisition.

MPEG 4 AVC and DVB S2 are adding new efficiency to satellite transmission of HD programming.

into the USB 2 port of their laptop, take the disk out of their camcorder and have an HD viewing station. That's another way we are trying to ease the transition.

"We are also affecting the cost of transition from the point of view of the lens. With the Infinity camcorder, stations can use their old SD lens. While I'm not advocating this for optimal HD performance, it can be done. For many stations, the cost of upgrading the glass is a substantial barrier. It can almost double the cost of moving field equipment to HD."

The bottom line for broadcasters is that the huge gap in pricing between SD and HD equipment is closing. The key task for local stations is careful planning of the transition to HD operations. As Snell & Wilcox's Zaller put it, "Broadcasters need to create an infrastructure and environment that can operate in a flexible, hybrid way for as long as needed."

Zaller, who pointed to his company's IQ Modular Infrastructure products and Kahuna production switchers as two examples of products designed for an industry in transition, said dual support also has benefits when it comes to training. This means that you train your operators on one set of equipment, and that these operators work in whatever resolution the job requires," he said. "This flexible hybrid environment leads to workflow efficiencies and greater utilization of existing and new hardware. Keep in mind that to move to HD, you don't need to throw away everything you own and start over."

MIXED WORLD

While the trend on the news and production side of television stations is to ease into HD consists of dual standard-compatible products, that's not the only place broadcasters can expect to see the gradual progression toward better service take hold.

On the transmission side of the station, work is underway to help stations transition into getting more out of their 6MHz channels. MPEG-2 isn't going away as part of ATSC-compliant transmission, but efforts are underway to improve its efficiency.

"There's room to grow in terms of compression efficiency in SD and HD — but especially in HD," said Harmonic's Bar. "If you look at the market for MPEG-2 HD encoders, it's not small, but it has not reached the size of the SD market. So a lot of attention was focused on SD, and it was taken to new heights. In MPEG-2 for HD, there is a lot more room to grow in compression efficiency."

Greater compression efficiency means the possibility for broadcasters to offer a greater number of multicast channels. "Most stations currently offer one HD and one or two SD channels," said Bar.

"There's room to grow to three SD and possibly a fourth SD with an accompanying HD channel," he said. Improvements in MPEG-2 compression efficiency coincide with ratcheting up the performance of statistical multiplexing, Bar said. "Together, the two will allow that growth in efficiency." ■

"Broadcasters need to create an infrastructure and environment that can operate in a flexible, hybrid way for as long as needed."
—Joe Zaller, Snell & Wilcox

TBS relies on an HD file-based production workflow with a range of modular products from Snell & Wilcox.

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WORKFLOW:

File-based workflows are transforming TV, improving efficiencies and making people more productive.

Storing video files on servers and making them widely available to news, promotions, traffic and even sales departments is transforming TV one station, group and network at a time. It's easy to understand why. File-based workflows increase productivity and reduce costs compared to working with tape.

The typical station in the 1980s dubbed spots to a cart machine, recorded most of its programming via satellite, shuffled tapes around the station and used paper logs and adhesive-backed cassette labels to track which program was on which cassette. Compare that with a file-based approach.

"A file-based workflow creates a centralized access to content and offers an increased number of people access to the content," explained Grass Valley chief technology officer, Ray Baldock. "A file-based approach changes it from a linear to a parallel process."

According to Grass Valley news workflow manager, Ed Casaccia, the accessibility of content means that everyone in the station can grab portions of a video file — even as it's being recorded. Greater access equals improved efficiency.

"A linear-based workflow is a waste of time," he said. "With a linear approach, people are waiting for the relay baton — the videotape — so they can start what they must do."

RETURN ON INVESTMENT

Beyond efficiency, a file-based workflow offers a business advantage. "The well-known improvements from switching to a file-based system are better video quality, more flexible playback options and reductions in media and maintenance expenses," said Sundance Digital director of broadcast operations, Rick Stora.

"But, simply replacing tape with a video server in the on-air operations area does not relieve most of the workflow issues as long as the content is still being manipulated in the video domain," he said. "When a broadcaster adopts the IT methodologies of file transfer and metadata tracking for their content, huge improvements are exposed. Video can be delivered in faster-than-real-time and stored in a format that is ready to air at will. The details stored in databases can be shared with other departments and business processes.

"The cost savings reveal themselves in the obvious ways of reduced media costs and videotape machine maintenance. But, really significant savings are only realized when broadcasters attempt to expand their activities and enjoy the lack of coincident cost increases that would have formerly accompanied such expansion. Since the returns on expanded activities are typically lower than a main channel operation, the expansions may only be profitable — hence viable — because of the new workflow efficiencies."

File-based workflows position stations to provide simultaneous access of content to a variety of personnel, such as news editors, producers, craft editors and promo producers.

MULTIPLE VENDORS

The challenge in implementing these systems is file exchange between IT solutions from different vendors, according to Larry

Stephens, system sales engineer and account manager at Professional Communications Systems. "The concept of a file-based workflow infrastructure is the ultimate destination. The missing element that makes it such a challenge is the lack of a universal standard that all manufacturers can and will agree on. Without it, stations face difficult decisions regarding infrastructure and technology," he said.

"Currently, there are manufacturers that offer turnkey system solutions for specific station applications, i.e., news systems, playback systems, production systems and editing," said Stephens. "What happens, however, if a customer likes one manufacturer's editor but not its server? They can look at conversion equipment but that is expensive and complicates the overall system architecture. In addition, if there is a problem, the question always arises as to whom is at fault."

"The concept of a file-based workflow infrastructure is the ultimate destination."
—Larry Stephens, Professional Communications Systems

If the broadcast production system and the station's general computer network must be connected, building firewalls and blocking ports not needed for the specific application will help protect the system.

Such industry efforts as Material Exchange Format (MXF) are an important start. MXF is basically a file wrapper that describes what's in a file (e.g., whether it's a video, audio or data file, what kind of codec was used to compress it, the file's duration). The metadata embedded in the MXF wrapper is intended to provide enough information between two applications so they can seamlessly exchange the file.

Industry-wide implementation of MXF is well underway, but not all implementations are identical — in part because of the flexibility of the MXF format. Being a broad standard, MXF gives vendors a chance to optimize their implementation for their specific needs, such as capture, storage, archiving and interchange. That means MXF is continually improving and evolving. Efforts are underway with SMPTE to harmonize aspects of MXF, such as ongoing work to standardize XML tags.

Snell & Wilcox has taken a leadership role in advancing the MXF standard with SMPTE. And the company offers a free MXF toolkit to the industry. Since its first offering in 2004, more than 2000 companies have downloaded the toolkit, said company vice president of marketing, Joe Zaller. "Whether a company uses Snell & Wilcox MXF tools or not, the evidence suggests that they probably test their implementation against our tools."

File-based systems reduce maintenance expenses and offer more flexible playback.

Even if file exchange between IT-based systems from various vendors isn't an issue at a particular station, maximizing the benefits of a file-based workflow just doesn't happen without forethought and effort, according to David Schleifer, Avid Technology vice president of broadcast and workgroups. "Measuring ROI is always difficult, more so in this case because some file-based systems deliver the potential to be more efficient, but they do not dictate what you do with that efficiency. It is worth pointing out that you can work in a file-based workflow where the file replaces tape, and is moved around in a similar fashion, and in fact does not deliver much new efficiency."

SAFETY FIRST

While greater efficiency and the likelihood of a good return on investment is enough to put stars in the eyes of a station manager contemplating a file-based workflow, a nagging concern remains. Is putting all of the station's assets in the digital basket risky? Will much of the evening news mysteriously vanish compliments of a virus or worm du jour?

The Pathfire DMG server enables digital file transfer rather than distribution of video via satellite.

"Stations face the same vulnerabilities as any group that exposes its system to the outside world," said Omneon Video Networks vice president of marketing, Geoff Stedman. "Those situations can be avoided and prevented. You don't often hear about the New York Stock Exchange or a foreign exchange getting hit. That's because there is a lot of technology to insulate these systems from the outside world."

Pathfire stations and groups product manager, Jamie Meyer agreed. "These types of issues (vulnerability to viruses, etc.) exist in any environment. The extent to which transitioning from a tape-based to a file-based workflow increases these vulnerabilities really depends on the architecture of the network infrastructure within the station. There are two facets to this: how the systems associated with the file-based workflow could be impacted by threats from elsewhere in the station and whether the introduction of file-based systems brings with it any additional vulnerabilities," he said.

"We hear many people say that they are nervous about file-based systems being vulnerable to attacks, or that they may introduce worms when these systems use the Internet for any part of the file delivery process," Meyer said. "This is a valid concern, but in many instances the biggest threat comes from the possibility that a virus or worm could be introduced by somebody in the newsroom or other part of the station opening an e-mail or visiting a Web site and downloading malware, which might then propagate into the file-based delivery systems."

There are steps stations can take to protect themselves. According to Meyer, the risk is best mitigated by building separate networks for broadcast production systems and for general users. He advises keeping them isolated or establishing connections between the two networks using firewalls and restricting the traffic between the two networks to only trusted devices that are absolutely necessary.

"In addition, it is prudent to block all ports other than those required for the specific applications," he said. "This security can be further enhanced by using an inline intrusion protection system, which provides alerts when any suspicious traffic is detected and, in many cases, can also actively suppress this traffic and act as a virtual patch."

DISTRIBUTION

Besides the advantages a file-based workflow offers individual stations internally, moving files rather than video can make program and commercial distribution extremely economical and reliable. The PBS Media Operations Center's deployment of a file-based program distribution system to hundreds of local public broadcasters is a prime example.

"Although, PBS currently transmits its schedule of programing hours to member stations, it eats up much more time than that for the satellite to deliver it," said Omneon Video Networks vice president of product marketing, Paul Turner. Omneon supplied server technology as part of the massive project.

"The reality of transmitting via satellite is rain fade on the way up and down. Workflow is based on

"The extent to which transitioning from a tape-based to a file-based workflow increases these vulnerabilities really depends on the architecture of the network."
—Jamie Meyer, Pathfire

Once a file-based workflow is established, disaster recovery systems and procedures can be put in place for automatic safeguarding of assets.

Kahuna - the production switcher that defies definition

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Kahuna - The world's first multi-format SD/HD production switcher

Standard definition? High definition? With Kahuna you don't have to worry. It can handle both of them, either separately or at the same time. Even more remarkably, thanks to a new technology called FormatFusion, it can integrate any SD material, such as camera feeds or archives into HD productions, seamlessly, without the need for upconversion.

Kahuna is the most versatile switcher on the market and the most economical. It enables you to manage the transition to HD without having to re-equip with all-HD sources and without having to put an upconverter on every SD input.

If you have no plans to go HD just yet, you can install in SD only. Then when you are ready, switch to full multi-format mode using software only, with no operational disruption.

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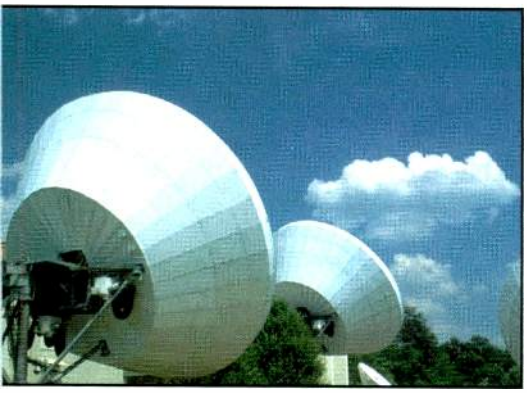

Broadcasters can use satellite links as an effective way to move video and data between primary and back-up sites.

people in Alexandria, VA, hitting play on the playout server and a whole bunch of people hitting the record button to get it in. If someone fails to press the record button in time, Alexandria has to resend the material," he said.

But that approach has been transformed into transmitting files — not video — and doing it via an FTP approach with forward error correction. In the event of rain fade, member stations can request packets. "If a couple of packets are lost, they resend those packets over a wire network, or if it's a large number of packets, they retransmit over satellite," said Turner.

As senior vice president of North American sales for PanAmSat, Kurt Riegelman has seen the transformation of video to file distribution firsthand. "Three years ago, 90 percent of syndication was delivered on an analog basis. That means that Warner Bros. rolled a tape in Los Angeles and every station had a person to flip on a recorder and record it. If it took an hour, it took an hour. That whole business has gone to a file delivery approach due to BitCentral and Pathfire," he said.

"The studios are delivering to the server, and it is easily manipulated. Packages are now real time. They show up on the server and get confirmation. The people getting them don't have to convert them. They go right into the server. That reduces labor and cycle time and increases quality," Riegelman said.

"This one-to-many distribution model also works with news clips, making it valuable for network news," explained Riegelman. "ABC, alternatively, uses one-way distribution. It puts news on a server that local stations can access and pull material from. NPR has taken this a step further, creating a two-way distribution system called ContentDepot. It's a giant catalog that member stations can look at and order from on demand as well as offer their own inventory for fellow member stations to pull from. Creating systems that local stations can access content from is a cost-efficient and fast way to disseminate files."

DISASTER RECOVERY

If FTP has found a prominent role in the distribution of commercials and programming, couldn't the same technology be used to inoculate the content of a local station, group or network from the effects of a natural or man-made disaster?

"Many facilities that exist in potentially risky environments make provisions to keep backup copies of important materials off-site," said Sundance Digital's Stora. "These systems range in complexity from simple off-site archives to full-blown redundant systems that operate in sync with the main system, but potentially never make it to air."

Omneon Video Network's Turner agreed, "The beauty of a file-based approach is you can set up an FTP site to upload files automatically, provisioning for disaster recovery through this connectivity."

This approach to disaster recovery works because copies of content can be created automatically and moved virtually anywhere over ubiquitous networks. "File-based systems have an inherent advantage when it comes to restoring lost files. Digital assets can be backed up on a regular basis or mirrored so an emergency repository is constantly maintained," said Pathfire's Meyer.

"While a backup archive can have significant results restoring content for catastrophic failures, we shouldn't overlook the benefits an archive brings to daily operations," he said. "Everyday cost-incurring inconveniences that require requests for re-feeds or a resend of a dub tape can be handled by restoring a file from an off-site or centralized archive. As metadata standards are solidified, retrieving missing content from central archive will be seamless and automated. Central archiving is a significant focus in our product planning." ■

Sony's XDCAM and HD XDCAM record files to optical media and easily integrate into a file-based production workflow.

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AKG's WMS 40 PRO Series

BY TOM PATRICK MCAULIFFE

From cell phones and computer Internet access to low-cost microwave transmitters for ENG teams, everything is going wireless these days. Audio microphones in particular have excelled from wireless technology.

Over the years, wireless mic systems have gotten better in quality and less expensive. The new WMS 40 PRO Series wireless mic system from AKG is typical of this new breed of product.

It includes a handheld or lavalier mic, which is the transmitter, and a single or dual antenna stationary base station. For our tests and when using it for video/ENG applications, the PR 40 Miniature Portable Diversity Receiver, part of the Microtools series of add-ons to the system, helped us use it with a camera.

Working in a high RF environment

More ENG and TV documentary makers are using smaller DV and DVC/DVCPRO cameras. And as most folks who have used them know, the onboard mics leave much to be desired.

Shooting a behind-the-scenes documentary at the recent PGA Sony Open, we needed to do one-on-one interviews with a handheld wireless mic that didn't cost an arm and a leg and would work in the high RF environment with tons of other wireless systems around it. There's no faster way to end a small, independent shoot than to have your gear step on the audio of a national or local TV crew. The WMS 40 PRO fit the bill with its High Definition Audio Performance technology, which offers a high degree of noise rejection.

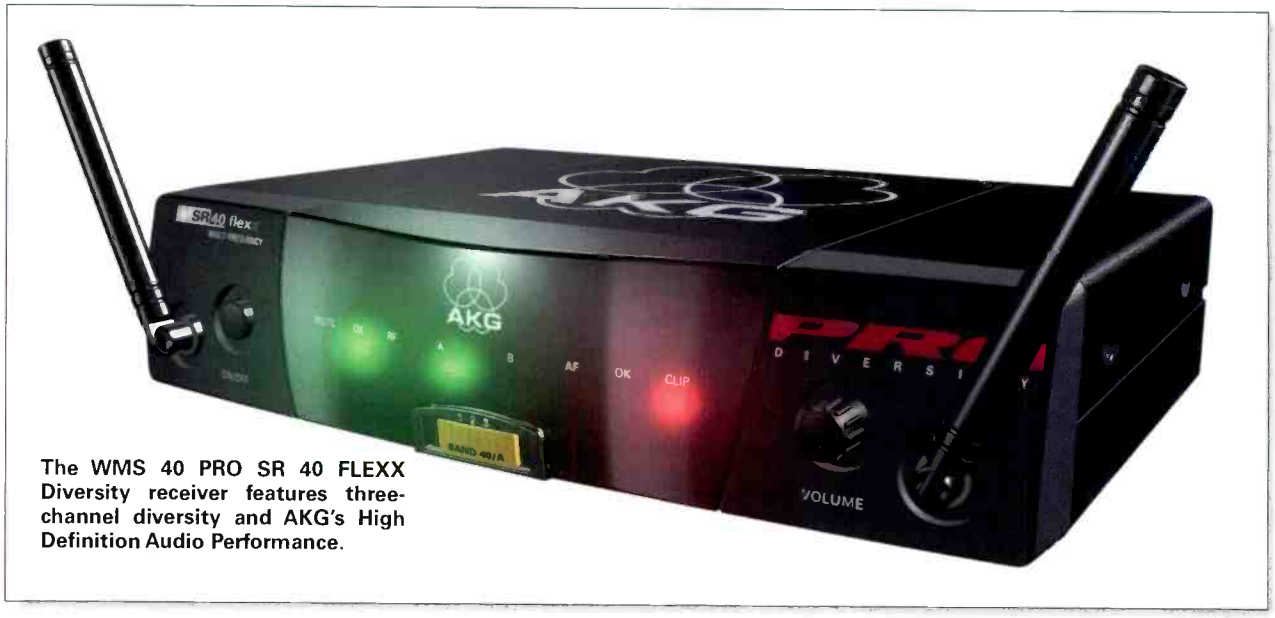
There's no faster way to end a small, independent shoot than to have your gear step on the audio of a national or local TV crew.

At the Sony PGA Open, there wasn't much time to change batteries or adjust frequencies. Luckily, the transmitter and receiver operated for more than 24 hours on a single AA size battery.

With AKG's FLEXX Diversity system technology, each unit has three frequencies for each channel in addition to its fixed frequency. This enables you to zero in on a good frequency that won't bother other shooters and will still deliver good audio to your camera. This allows you to use your system in conjunction with other systems and add additional mics (up to nine for each base unit).

The included HT 40 Pro Cardioid handheld mic/transmitter is both handsome and rugged while being

AKG's new WMS 40 PRO Series of wireless mic solutions includes the Microtools PR 40 mini receiver, which can easily attach to any video camera.



The WMS 40 PRO SR 40 FLEXX Diversity receiver features three-channel diversity and AKG's High Definition Audio Performance.

lightweight. It weighs less than 6oz. The mic is also color coded with a small tag so it can easily be matched with its base unit or portable receiver, which makes it user-friendly.

Add-on options galore

The WMS series offers multiple options. You can have a lavalier or a handheld, multiple receivers feeding multiple recorders or audio systems, and wireless transmitters, which are useful for musicians. All of these options are called Microtools.

The WMS Microtools PR 40 UHF portable diversity receiver is of special

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SESSION 1 – BUILDING VIDEO NETWORKS

Wednesday, February 22nd
2 p.m. Eastern Standard Time

This section takes you through the process of designing a network for video and audio applications.

- Understand user requirements for video networks
- Find out how to implement video networks with IT components
- Learn best practices for building fault-tolerant networks

SESSION 2 – VIDEO AND AUDIO APPLICATIONS IN AN IT ENVIRONMENT

Wednesday, March 15th
2 p.m. Eastern Standard Time

This session builds on the first, addressing the key differences between AV transport and non-time-based applications.

- Learn the three models for moving AV digital assets across IT networks
- QOS basics for AV/IT networks – eliminate the glitches
- Understand and improve TCP performance in LANs and WANs
- Find out how to create efficient workflows – appreciating the tapeless advantages

SESSION 3 – NETWORK & MEDIA CONTENT SECURITY

Wednesday, April 12th
2 p.m. Eastern Standard Time

Network security

This section describes best practices for building efficient networks while maintaining a high level of security from network-based threats.

- Find out the types of network threats – both internal and external
- Learn about firewalls and other security technology
- Detection and response – discovering a breach and repairing it

Digital media content security, planning and putting it all together

This section describes best practices to address security from the desktop and application level.

- What are the threats, how do they propagate, what steps can you take to protect from and limit threats?
- Access vs. protection: Learn the best practices to avoid problems while meeting users' needs
- Putting it all together: the successful digital media network

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interest to video camera operators. The small receiver, about the size of a box of Tic Tacs, attaches to your camera and feeds the audio from the mic to the camera. This feature includes two cables, both of which have an 1/8in I/O for connection to the micro receiver. One cable has a 1/4in male plug for connection to a high-impedance input. The other has a Y connector with a 1/8in female output for headphones and a 1/8in male output for connection to the cameras or the VTR's audio input. Operating on a fixed-quartz stabilized frequency in the UHF frequency range, the PR 40 uses two swiveling antennas and two AAA batteries.

We were able to run from one interview to another with no set up time, and the audio sounded great.

One of the nice features of the WMS 40 series is that we were able to run from one interview to another with no set up time, and the audio sounded great. And the mic and rig look professional, which is beneficial when you are not with a major news or sports organization.

We tried the unit with two different cameras: a Sony VX-1000 DV camera and a JVC KY-27 with a BetacamSP back. We also used the WMS 40 PRO

with a K-Tek boom pole. In all cases, it performed flawlessly.

The only feature I would want to add to it is a three-prong Canon balanced output on the base unit to go along with the 1/4in high-impedance balanced out. This would allow an even better integration with mixers and audio processors. Adding a digital I/O wouldn't be a bad idea either.

Balance and value

Having the ability to custom-configure a wireless mic system and mix a handheld with a lavalier are benefits that can't be overstated. I've used many different wireless mic systems, both as a professional videographer and as a musician. The WMS 40 PRO and PR 40 micro receiver offer a perfect solution for today's videographer with a balance of value and features at a cost that's less than other pro systems with similar features.

Once you've gone wireless, you'll never go back now that the audio quality of these systems rival that of corded microphones. With costs of equipment rising across the board, videographers and ENG crews looking for a professional and cost-effective wireless mic solution should consider the WMS 40 PRO series. BE

The abilities to custom-configure a wireless mic system and mix a handheld with a lavalier are two benefits that can't be overstated.

Tom Patrick McAuliffe is a journalist, video creator and former member of the U.S. Navy's Combat Camera Group.

Asset management and archiving

BY JOHN LUFF

The first asset management system I remember was a small desktop file cabinet at Ohio University Television (affectionately called the OUT House). That simple cabinet held 3in x 5in cards with a record of the entire permanent tape and film library. Archiving happened when we moved tapes out of the way to a storage room somewhere else on campus. Simplicity.

Today, there are archives that hold tens of thousands of tapes in nearby storage and many more tapes in off-site storage. Managing that many physical assets requires more sophistication than what a 3in x 5in card index could supply. Of course, the 3in x 5in card approach seemed a good deal more sensible in an era when all libraries kept a card catalog.

As low-cost computers came to the broadcast business and database programs moved from the exclusive province of mainframes to much smaller machines using off-the-shelf shrink-wrapped packages, it became practical to computerize media library records. At first, this still required a huge amount of discipline because the value of the records is entirely in knowing what you have, what it contains and where it is. The best tape librarian, computerized or not, can tell you things you could not even guess at knowing.

Digitizing the content

Archiving has been dramatically affected by computerization as well as by the infusion of video servers into our industry. Once content has been stored to a server, the bits that comprise it are no different than any other digital content. This means that complex organizations with data-intensive processes, such as is required for bank records and academic records at large universities, produce content that need not be kept beside your desk. However, it must be accessible in the event it is needed in the future.

Servers digitize analog content. The process of recording to a server makes digits out of analog content. Once there, that data can be treated in exactly the same way as bank records. There is, however, an important proviso: Content records in our industry can be many gigabytes in size and have enormous value as intrinsic assets. The most valuable diamond in the world is not likely to be as important to protect as the original footage from a motion picture by George Lucas or the assets that record the Super Bowl this month. This incredible rich trove of content we create in the tens of thousands of hours per day worldwide has become a staggering problem to manage and keep track of. It would not be enough to say I know we have the original footage of the final minutes of the Super Bowl, but not to know where it is.

Clearly, the need is real for a digitized asset management system, and the computerization of our industry has made the technology approachable. However, media asset management software must store a lot more than an index number and the title of the program. The number of fields in this database can be literally dozens.

The rights information, links to the original source material, date of recording, date of last archive clone, who is in a program, episode numbers and metadata from the original shoot — including GPS and camera pointing data — are all potential elements of metadata that must be stored with, or linked inexorably to, the original content. When it is moved somewhere, the database must be updated with the location of the real asset. It might have been moved to a tape in a robotic data library, put in a box and sent off to a limestone mine, or sent to a commercial off-site data warehouse where it can be called back on a moment's notice.

The most valuable diamond in the world is not likely to be as important to protect as the ... assets that record the Super Bowl this month.

The search is on

Today, many asset management systems provide rich search engines allowing content to be selected using the stored data, including visual information and caption data. Often, a link is provided that ties the original content and a proxy copy together

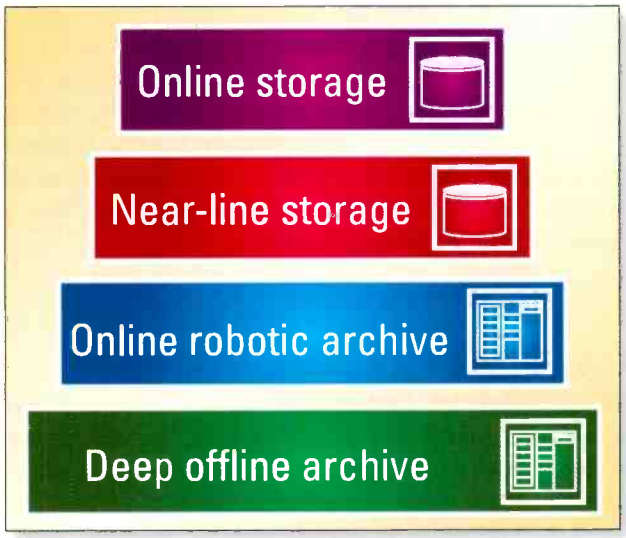


Figure 1. The four layers of archival storage. A near-line storage system acts as the first low-cost step in archiving.

so that desktop searches can be performed and the results viewed immediately, even when the original content has been moved to an off-site location.

It is not unreasonable to think of the proxy in a parent-child relationship to the high-res media. Proxies created for the purpose of a searchable archive of content can be quite "skinny" by using WM9, H.264 or other high-compression systems, unlike proxies made for editing, which must be editable frame by frame. The key is the link between the media, which must be absolute.

Layers

Archiving is certainly linked to asset management. However, it is important to look at archiving as more than a binary selection of locations. Today, layered storage systems are increasingly prevalent. In such a system, in addition to the online full-res media and proxies, a near-line storage system acts as the first low-cost step in the archiving process. (See Figure 1.) A near-line archive is usually built of arrays of inexpensive disks with high reliability, but lower performance than the storage for the online media content. It is often between 10 percent and 50 percent of the cost of implementing the online system.

Backing up the near-line archive is a deep archive. It may be a robotic DVD library or data tape archive with huge capacity. The cost per byte of storage is lower, and the quantity of storage available can be much larger than the combined near-line and online storage systems. The access time is much slower, with both the latency of the robotic search as well as the linear nature of the media slowing down retrieval and storage.

A fourth level of archive can be added with mirroring of the deep archive and even off-site storage of the physical media. This can further reduce the cost because the mechanical robot is not expanded linearly with increased total archive contents. The media asset management system must keep track of where all the assets are and contain expert rules to make decisions about where content should be stored. The decisions are made on expected or predicted needs or simple rules that take content older than a trigger value and move them to the next lower tier of the archive system.

Implementing a new system

Understanding the purpose is a good starting point when making decisions about implementation of asset management and archive. It is even better to thoroughly look at workflow and how such new systems can improve total operating efficiency. You might be surprised how much can be achieved without going to the most expensive system. Check into near-line storage as a transitional approach to a full implementation of asset management. You will find specialized vendors and automation companies that sell this kind of product at effective prices. BE

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

Send questions and comments to: john_luff@prismb2b.com

CAMERA

FOR-A VFC-1000: A high-speed variable frame rate camera; full frame features 250fps; split frame features a maximum of 8000fps; black and white and color models are available; electronic shutter function enables speeds of up to 1/100,000 second for capturing sharp, high-speed images; standard recording time of four seconds, with an optional expandable recording time of 16 seconds.

714-894-3311; *www.for-a.com*

HD OPTICAL MEDIA CAMERAS

Sony XDCAM HD: Includes the PDW-F330 and PDW-F350 camcorders and the PDW-F70 and PDW-F30 decks; can record up to two hours of HD content; cameras offer 24p recording in SD or HD, interval recording and slow shutter; decks can upconvert XDCAM SD content recorded in the DVCAM format to 1080i HD at output.

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

MULTICHANNEL DIGITAL MOSAIC SYSTEM

Harmonic IP-based ProStream 8000: Decodes and resizes embedded videos to produce video tiles or thumbnails; can integrate with existing digital television infrastructures; each multichannel mosaic is transmitted as another channel in the lineup to ensure compatibility with existing STBs and TVs; features an intuitive point-and-click user interface.

800-788-1330; *www.harmonicinc.com*

MEMORY BLADE

SeaChange Memory Streaming Blade: Blade adds streams, storage and ingest to independent files; features SeaChange's Axiom video operation system software, which manages the lifespan of content and offers real-time capture of content from broadcast and other sources; 1000 streams per blade can be served without impacting a server's disk performance; has four GigE ports and 3.7Gb/s throughput.

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

3-D DVE SUITE

Snell & Wilcox Kahuna IMPAKT: Switcher option offers up to four twin-channel 3-D DVEs that can apply in SD, HD or both; works in source-based or bus-based modes; effects include spheres, slabs, zooms and warps; requires no additional connections or extra rack space; controls effects from the main Kahuna control surface or from a separate 1M/E Kahuna control panel.

212-481-2416; *www.snellwilcox.com*

TRIPODS

Gitzo Carbon 6X: Carbon fiber tripods; feature a six-crossed multilayer tube measuring 1mm; have an anti-leg rotation system that allows for a fast and smooth setup; are 30 percent lighter than previous versions; top castings feature high-quality corrosion-resistant, polished, stainless top casting bolts.

201-818-9500; *www.bogenimaging.us*

PRODUCTION SOFTWARE

Blackmagic Design DeckLink Series: The editing and composition products feature 4:4:4 10-bit RGB video capabilities; support real-time effects in HD resolutions and a full 10-bit workflow within Adobe Production Studio applications, enabling seamless transitions between video and graphic applications, including Adobe Premiere Pro 2.0, Adobe After Effects 7.0 and Adobe Photoshop CS2.

702-257-2371; *www.blackmagic-design.com*

TRANSPORT SYSTEM

Multidyne RGB-5000: Single-fiber, single-wavelength, digital, RGB and UXGA fiber-optic system; features Coarse Wave Division Multiplexer (CWDM) laser; transports up to 18 high-res RGB/UXGA signals on one fiber; has 10-BaseT Ethernet and bidirectional data; includes daisy-chain and star capability for point-to-multipoint monitor configurations; has total analog bandwidth of up to 500MHz supporting loop-through HD15 XVGA inputs.

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

CONTROL SURFACE UPGRADE

Wheatstone Generation: Features MXM assignment flexibility software; MXM bus assignments save sources at setup time that can be recalled later when the source is called up on any control surface channel; assignment functions follow the source through any routing path.

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

STUDIO MONITORS

JBL Professional LSR4300 Series: Monitors include the LSR4326P-powered 6in two-way system and the LSR4328P-powered 8in two-way system; feature network intelligence and a new automated version of JBL Professional's Room Mode Correction system; included in both is the Harman HiQnet network protocol that enables system-wide intelligence and allows all speakers to be centrally controlled from the mix position.

818-894-8850; *www.jblpro.com*

WIRELESS MONITOR TRANSMITTERS AND RECEIVER

Sennheiser SR3254-U, SR3256-U and EK3253-U: Single-channel transmitter, dual-channel transmitter and body-pack receiver are compatible with Sennheiser Evolution Series wireless G2 monitor products; offers extended tuning flexibility and 100mW output; features a 36MHz switching bandwidth; are tunable in 5kHz steps across the frequency range, offering a total of 7200 frequencies; products ship with 16 pre-coordinated preset frequencies and 16 user-assignable presets.

860-434-9190; *www.sennheiserusa.com*

COMMERCIAL INSERTION AND PROFANITY CLEANER

Doremi Labs LiveEditPro: Is designed for profanity delay and commercial insertion systems; works with Doremi's MCS broadcast video servers and controls servers via Ethernet; delays incoming video feeds for up to several hours; to replace profanity, a pre-recorded segment, video pattern or black video can be inserted; automatically increases or decreases the delay time.

818-562-1101; *www.doremilabs.com*

GRAPHICS MANAGEMENT SYSTEM

Chyron MOS version 2.0: Manages graphics and creates content using any version of Chyron's Lyric CG software, online or offline; administration control is available from anywhere on the network; features a new, one-step search and fulfill menu; immediate updates of rundown changes are reflected in playlists on playout devices.

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

COLOR CORRECTOR

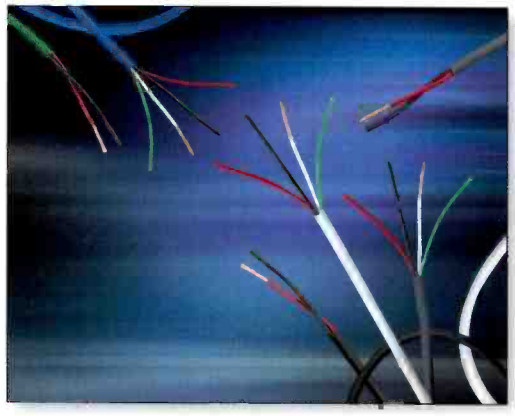
Edifis Finaliser SD: Color corrector system features six hours of internal SD storage and eight hours of audio; is fully automated; includes a still store for reference frames and a wipe pattern generator; has motion tracking and flare and starbust effects; features real-time signal processing and restoration tools; can be field-upgraded.

530-839-2104; *www.edifis.us*

HDD RECORDER

Specialized Communications CinePorter CP-2: Mounts to various Panasonic P2 cameras; works like a large P2 card while writing to a shock-mounted on-board hard drive; capacity ranges from 100GB to 240GB; is hot-swappable; supports DV, DVCPRO, DVCPRO50 and DVCPROHD formats.

800-359-1858; *www.spec-comm.com*



AUDIO CABLES

Belden Brilliance Low Cap Speaker cables: Cables' performance gains are achieved through high-conductivity, oxygen-free, copper conductors; use a low-capacitance polyolefin dielectric; are available with 10-, 12-, 14- or 16-AWG bare copper conductors; feature round, brightly colored and satin-finished PVC jackets.

800-235-3361; *www.belden.com*

NEWS GRAPHICS PRODUCTION SYSTEM

Avid Technology DekoMOS 3.0: Newsroom system lets users quickly insert up-to-the-minute Deko news and information graphics into stories; features a new playback controller; graphics can be activated with production switcher or other control system; playback controller supports up to nine channels of Deko; each channel is under automatic or manual control.

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

PORTABLE WIRELESS RECEIVER

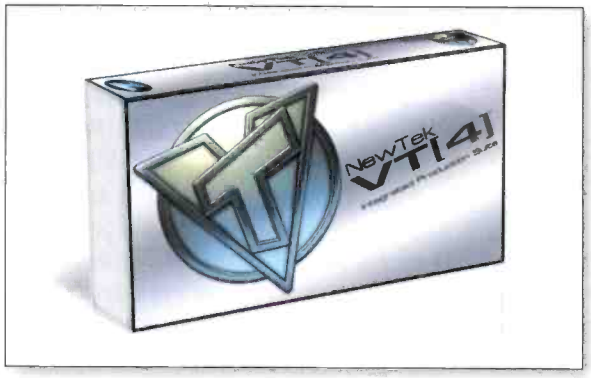
Lectrosonics UCR401: UHF receiver has a Digital Hybrid Wireless design that overcomes channel noise by combining digital audio with an analog FM wireless link; features SmartSquelch technology that adjusts squelching behavior; a DSP-generated ultrasonic pilot tone from the transmitter controls the receiver audio muting and eliminates thumps, pops and other transients.

800-821-1121; *www.lectrosonics.com*

DVI SWITCHER

Oxygen DCT Switcher 4:4: Is a four-input, four-output dual-layer data router for DVI and RGBHV signals; switches any input to any output independently on both the DVI layer and the analog RGBHV layer; has signal optimization facilities on each input and output; is controlled via push buttons, Ethernet or RS-232 port for integration into third-party control systems.

+44 8707 4 62062; *www.oxygendct.com*



INTEGRATED PRODUCTION SUITE

NewTek VT[4] version 4.6: Graphics suite includes improved 3-D animation and motion graphics tools, enhanced support for multiple monitors and improvements to the NewTek codec; features FX Monkey motion graphics and animation wizard; supports systems with three or more monitors; has new audio mixer skins; title templates now support low-res background images.

210-370-8000; *www.newtek.com*

GRAPHICS PLUG-IN

Inscriber TitleMotion Pro HD: Plug-in for Inscriber TitleMotion lets users strike 3-D text, effects and multilayered compositing; can add animated textures and animated kerning; 3-D effects can be applied to text and graphic objects; improves efficiency by providing offline creation capability that exports into editing studio applications.

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

REMOTE CONTROL SUPPORT

Euphonix EuCon, Digital Audio Denmark (DAD) AX24: AX24 converter supports Euphonix's EuCon remote control protocol; can control the AX24 directly from the Euphonix System 5-MC and MC digital audio workstation controllers via EuCon; control of the AX24 is achieved via DAD's DADman remote control software; by running DADman software, a MADI-equipped AX24 converter can transmit eight audio channels over a single coax cable to a Euphonix console.

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

HD/SD VIDEO CAPTURE CARD

AJA Video KONA 3: Capture card features a four-lane PCI-Express bus interface with integrated AJA QuickTime drivers; works with the Apple PowerMac G5s and Final Cut Pro; supports any uncompressed SD or HD format; features DVCPROHD hardware acceleration and HDV hardware acceleration; has Dynamic RT Extreme hardware acceleration; includes broadcast-quality hardware 10-bit up- and downconversions.

530-274-2048; *www.aja.com*

CONVERTER

Teranex Mini: DTV format converter can be used as a stand-alone portable DTV format converter, or three can be rack-mounted on a 1RU shelf; includes NLE ingest/play-out conversions, SD camera upconversion and HD VTR downconversion; SD/HD SDI I/O with embedded audio is standard, with an option for DVI, HDMI and analog component out.

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

MID-FRAME MATRIX

Clear-Com Eclipse Median: Frame incorporates eight interface slots and provides 112 ports in 6RU; each of the 16-port matrix cards provides full duplex connections with panels and external lines, plus intelligent interfacing to other matrices; supports E-Que card for T1, ISDN, IP and FreeSpeak/CellCom.

+44 20 8939 4650; *www.vitecgroup.com*

CABLES

Gefen DVI and HDMI: Supplies all-fiber components bundled in a durable cable that protects data while it travels from the source to HD display; available in varying pre-cut lengths with either DVI or HDMI connectors on both ends.

818-884-6294; *www.gefen.com*

MOBILE ROUTER

NVISION NV8288: Digital video router can be configured for asymmetric configurations up to 288 x 576; can be expanded without distribution amplifiers to create routers up to 576 x 576; card cage is 10 x 12; features one-on-one redundant power supplies and one-on-one redundant control modules.

800-719-1900; *www.nvision.com*

TRIPODS

Gitzo Carbon 6X: Carbon fiber tripods; feature a six-crossed multilayer tube measuring 1mm; have an anti-leg rotation system that allows for a fast and smooth setup; are 30 percent lighter than previous versions; top castings feature high-quality corrosion-resistant, polished, stainless top casting bolts.

201-818-9500; *www.bogenimaging.us*

Help Wanted

Univision 19 in Sacramento Seeking MAINTENANCE ENGINEER

Demanding environment requires an experienced Maintenance Engineer for multi channel station. Must be quality driven and be a self-starter bilingual is a plus (Spanish/English). Must be familiar with DVC PRO tape machines, Cameras, Switchers, Routers, ENG Trucks, News Gathering equipment, Microwave and UHF transmitters. Must have knowledge of all FCC rules and regulations as well as test equipment operation for diagnostics of all digital and analog signals.

Flexibility required to work all shifts and overtime when required. Excellent verbal and writing skills required i.e. Outlook, Word, Excel and Access. Good driving record is required with dependable vehicle. Other duties will not be limited to list above and will be assigned by Chief Engineer as needed.

Fax resume to (916) 614-1907
Engineering Department

TECHNICAL FACILITIES MANAGER

KGO TV is looking for a technical Facilities Manager to work in the TV engineering department. Must be able to Install, test and maintain the station's technical facilities and supervise the maintenance staff. Excellent troubleshooting skills required.

ASSISTANT MANAGER BROADCAST MEDIA INFORMATION SYSTEMS

KGO TV is looking for a Assistant Manager of Broadcast Media Information Systems. Must be able to Install, support, and maintain all I.S. related aspects of the On-Air broadcast television environment.

If interested, mail your resume and cover letter to:
KGO-TV/ABC 7
900 Front Street, San Francisco CA 94111
Attn: Human Resources Department

Or e-mail your resume and cover letter to kgo-tv.hr@abc.com. Please include the position you're applying for in the subject line.

Information Line (415) 954-7958
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856-767-8884 ext. 204

Help Wanted

MATC
Milwaukee Area Technical College
Milwaukee Public Television

MANAGER, MPTV TECHNICAL FACILITIES

Direct and supervise engineers, technicians and other staff to accomplish supportive maintenance and installation of public television station's equipment and systems. Work requires use of independent judgment working from broad institutional policies, general objectives and specific project goals at Milwaukee Public Television stations WMVS-TV/DT & WMVT-TV/DT.

Requires a Bachelor's degree in broadcast engineering or related field; a Master's degree in Facilities Management is desirable; ten (10) years of progressively responsible professional experience in television engineering; four (4) years of supervisory experience; or other equivalent combination of experience and training.

TV ENGINEER (ASSET ENGINEER)

Responsible for operation and maintenance of television broadcast and production equipment, maintaining and enhancing storage procedures for a physical media library, setting archival standards for the storage, cataloguing and retrieval of digital content files. Also, organizing and maintaining a functional media library at Milwaukee Public Television stations WMVS-TV/DT & WMVT-TV/DT. Maintain the flow of production, broadcast and related media. Participate in planning for new media asset management systems.

Requires a Bachelors Degree in Library Science, MLS or MIS preferred. Certificate or other training in video preservation desirable. Four (4) years work experience working in archives containing television, film or digital video media; or other equivalent combination of experience and training

To apply, please visit our website at www.matc.edu or call **(414) 297-7770** for an application and job description. Resumes and letters of application will not be accepted in lieu of a MATC application.

MATC is an Affirmative Action/Equal Opportunity Institution and complies with all requirements of the Americans with Disabilities Act.

DIRECTOR BROADCAST ENGINEERING

Director of Broadcast Engineering for Boston based eastern TV Production/Transmission Company. Responsibilities include developing, designing, implementing and maintaining systems and equipment for broadcast facilities. Actively seek out new technical solutions to improve, expand business and improve efficiency. Provide guidance, training and management of the department staff. Based in Boston the position requires periodic travel to facilities in Philadelphia, Baltimore and remote production locations. 7+ years of experience in Engineering Management in a broadcast or production environment, with full range of skills in all broadcast technologies including AutoCAD and IT. Must have effective verbal and written communications skills. Please e-mail resume to **HR@videolink.tv**.

For Lease

Maryland Public Television, having broadcast towers at various locations throughout the state of Maryland, has tower space available for lease. For additional information interested parties may contact Miriam DePalmer at 410-581-4033.

Help Wanted

EXPLORE OUR WORLD!

The Randstad Group, one of the largest temporary and contract staffing organizations in the world, in partnership with Discovery Television Center-Miami, is seeking the following professionals to join our Engineering department. Contact us today about these exciting opportunities in the Human Resource Department in Miami, FL.

- **Assistant Manager – Systems**

This position requires hands-on maintenance, as well as employee supervision and training. The Systems Engineering Staff is responsible for the maintenance and support of all master control and post-production suites as well as core equipment. We are looking for a self-motivated team player with a minimum of 7 years television/broadcasting systems experience, including significant experience in a digital environment. Ability to diagnose to the component level and familiarity with test signals and equipment. This is not an IS position. Minimum 3 years supervisory and management experience required. Excellent communication skills, both written and oral, a must, plus strong interpersonal skills. SBE certification, FCC general class license and knowledge of Spanish and/or Portuguese are pluses.

- **Television Systems Engineer**

Be a part of a team of engineers responsible for, but not limited to, the preventative and corrective maintenance of all television equipment within the Television Center. Requires a minimum of 3 years maintenance experience in a broadcast or post-production facility. Significant experience with digital audio and video signals. Minimum AS degree in electronics or computer science. Experience with Avid Media Composer/Avid DS, Sony Digibetas Odetics, Louth, HP or Omneon servers, and Phillips/B"S switching systems a plus. SBE certification, FCC general class license a plus. Multilingual capabilities in Spanish or Portuguese would be beneficial, but not necessary. Please note: This is not an IT/ISS position.

- **RF Engineer**

Team players with a minimum 3 years RF experience, including significant experience in a digital environment. This position requires hands-on equipment maintenance and support of all broadcast television equipment, including Master Control and Satellite Up-Link systems. You will be required to diagnose to the component level and must possess thorough knowledge of test signals and equipment. SBE certification and CAD experience are pluses. Experience with the following equipment is preferred: Phillips Saturn and Venus, MCL HPA's and Scientific Atlanta Power VU Plus. Electronics degree or equivalent work and/or military experience is required. Excellent communications skills, both written and verbal, are imperative.

This is a 24/7 facility; therefore, weekend and/or shift work may be required. Please direct all inquiries and communication to: **Discovery TV Center/Randstad Human Resource, 6505 Blue Lagoon Drive, Miami, FL 33126; fax: 786-273-4883; e-mail: jeanette_cooper-cw@discovery.com.** EOE

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Network fretworking

BY PAUL MCGOLDRICK

When you think about it sensibly, the major networks in the United States are anachronisms in the business of television. They were created for purely commercial reasons, with the affiliate distribution system designed to cheaply get advertising (in the guise of programming) into the most number of houses in the country.

The model closely resembles that of the travel industry, in which travel agents enabled airlines, hotels and car rental companies to reach the maximum audience. And look at that business now.

In the same way that the travel industry has bypassed those agents — driving its clients to the Web for a much easier booking experience — the networks can also squeeze out broadcast affiliates at their whim and fancy. But are the networks going to be squeezed out first?

If you think that is a bizarre question, think about how our viewing *habits* (isn't that a dreadful word to describe a supposedly entertaining event in our lives?) have changed over the last 50 years. The networks held a solid footing with the public until the grown-up versions of cable TV came along, replacing the terrible systems of the 1970s, which were examples of engineering at its worst. The creation of so many new channels, all being fed with programming material, changed our industry in the way that productions were made, which is still something that many equipment vendors in the broadcast business have not woken up to. The spread of advertising revenues creates different financial models in the industry. Satellite TV, with more channels, has diluted those revenues even more.

Somehow, network television has come through it all, still paying premium prices for productions, whether they are from a studio, inside a penthouse at Trump Tower or from a sporting event. As the only place for viewers to catch a Super Bowl or a Rose Parade, network television has continued taking the top advertising dollars in the industry.

People don't sit down with their TV dinners to watch three hours of carefully lined up network television, with productions vying for the best time slots. They watch on their own time.

The networks have been hit with new technology: first VCRs, then TiVo and now recordable DVDs, all of which have been a disaster for advertisers' confidence in the broadcast product. The fact is, the old concept of prime-time television is a thing of the past. People don't sit down with their TV dinners to watch three hours of carefully lined up network television, with productions vying for the best time slots. They watch on their own time. They record programs they want to watch on their own time. They buy DVDs of the series to watch on their own time. They download programming to watch on their own time.

Those facts are not lost on at least some of the network executives who see revenue in those new viewing options. But it is a changed form of revenue. Payment for a product must be made available in a different format and come directly from the viewer instead of an advertiser.

This is causing the networks to stray from their core product, which is not making programming — it is to sell advertising. If you think this is a callous approach, you must not have met the same people in the industry that I have. I have seen major companies collapse because they have deviated from their core product. The USPS, Amtrak and Greyhound are prime examples.

Technology is not going to stop developing. As the information pipe to our homes and offices gets larger and larger, there are people who see the chance to beat the networks at their own distribution game. The industry has been hijacked with live productions being carried out on the Internet, and it won't be long — if it hasn't happened already — before pay-per-view materials are also hijacked — much like the pirated movies that are available before their theatrical releases.

As much as I love transmission equipment, I would hate to be personally responsible for paying the utility bill to broadcast 24/7 to an audience that is going in other directions for their visual entertainment. BE

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

SEND Send questions and comments to:
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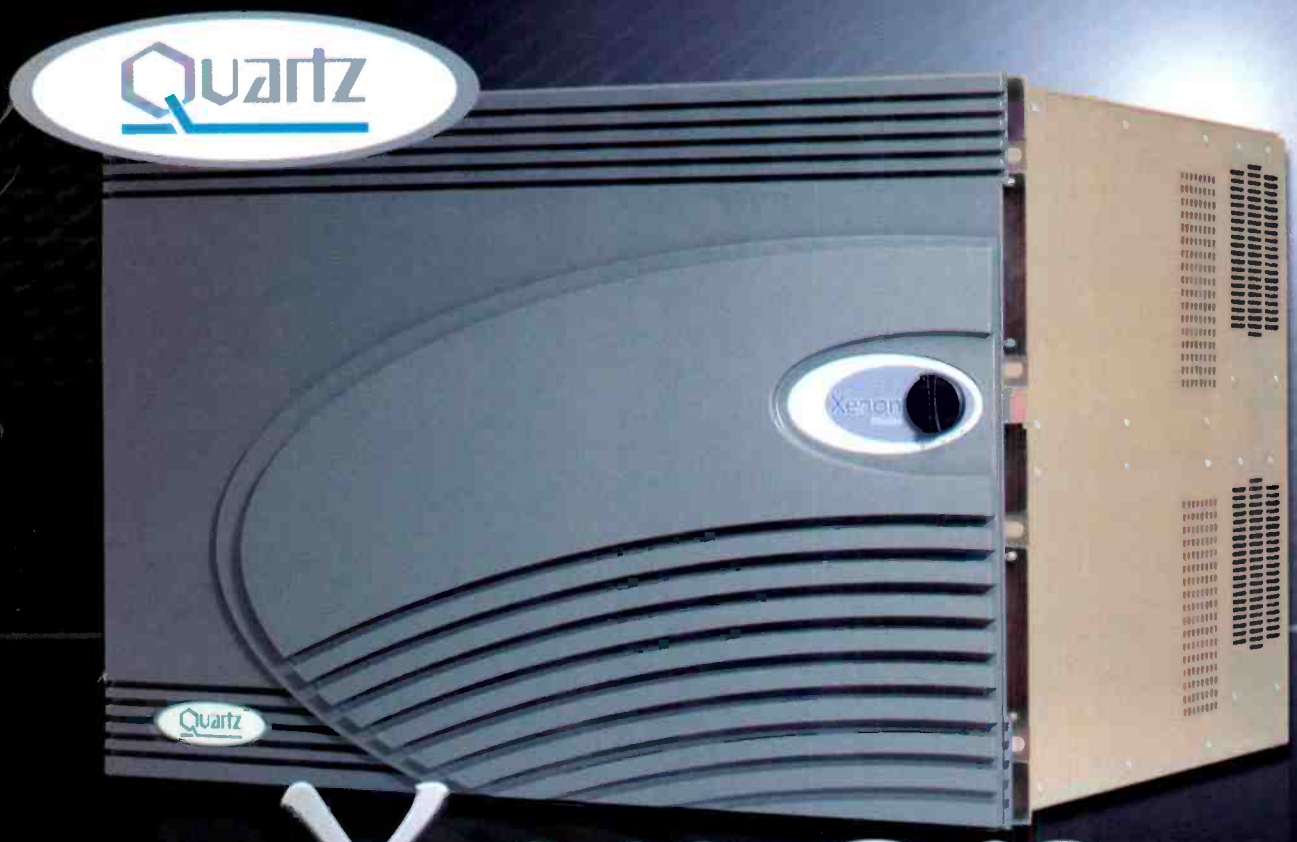

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