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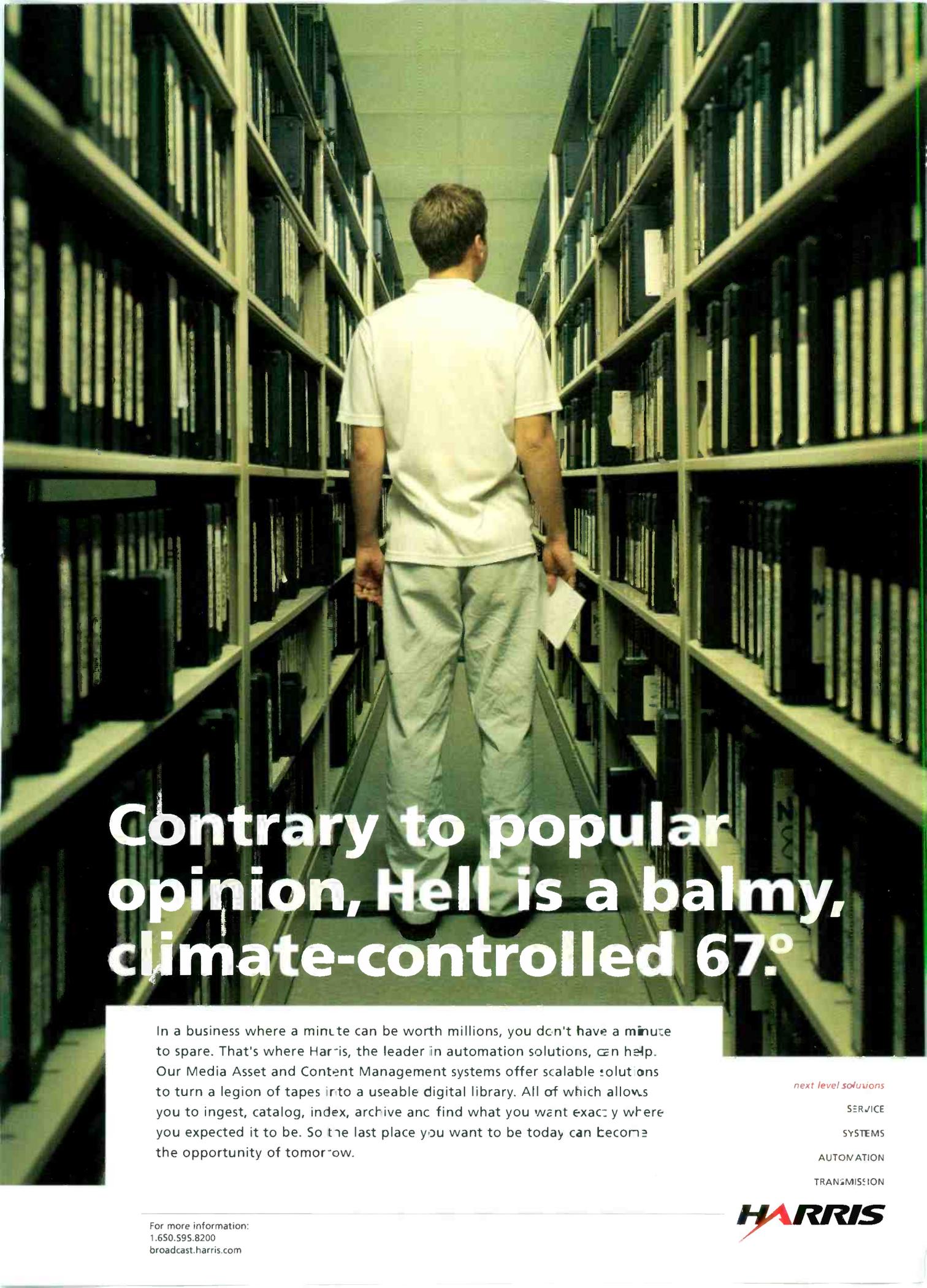
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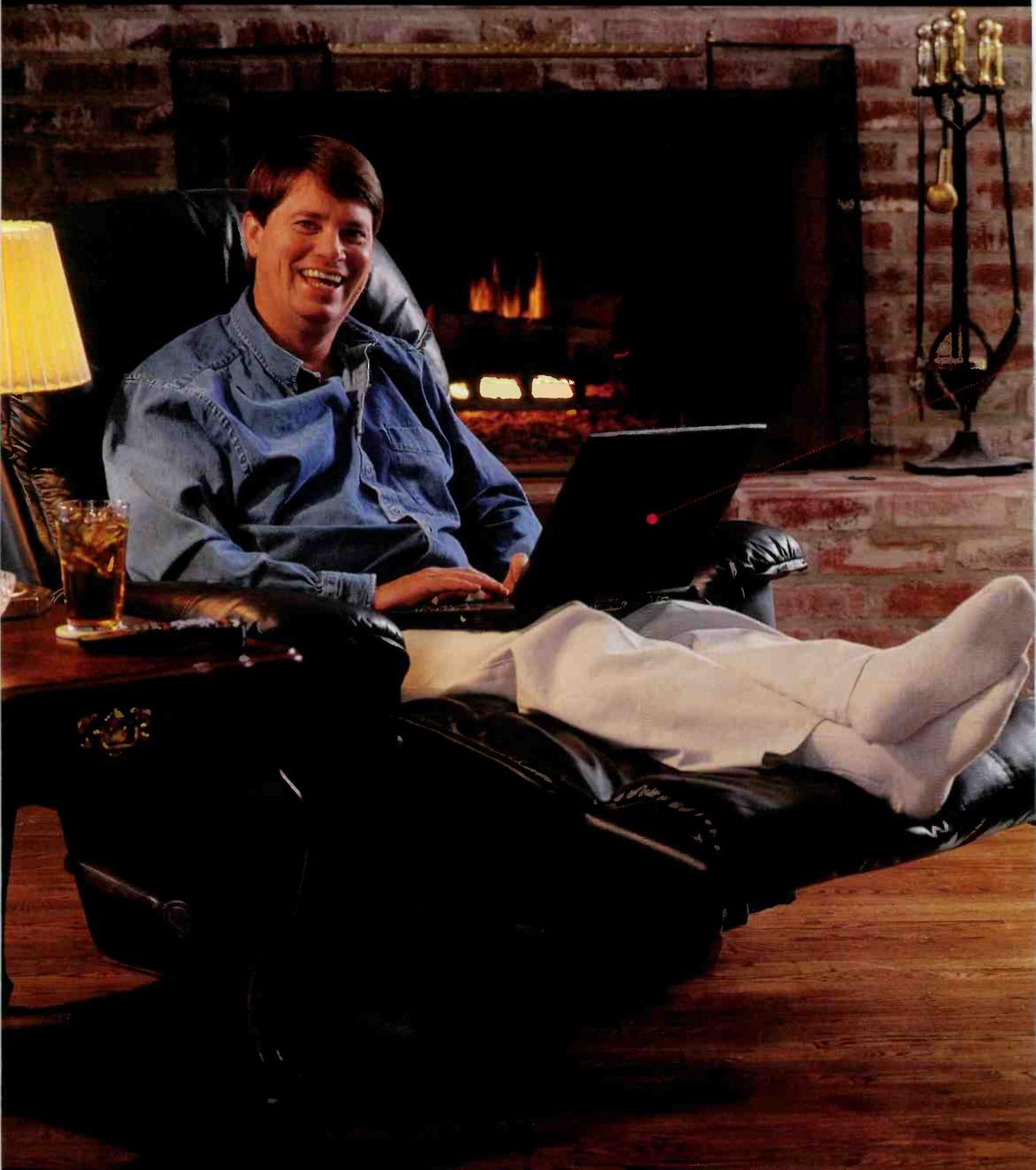
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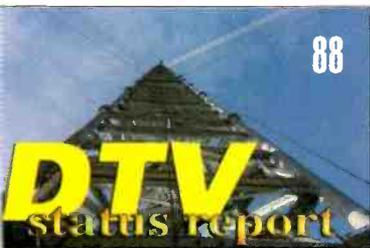
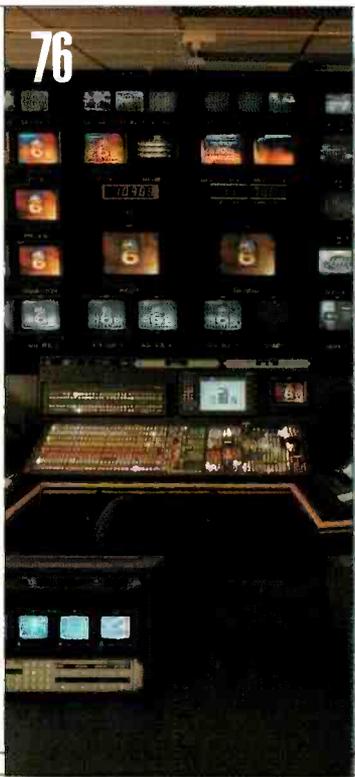
Broadcast Engineering

THE JOURNAL OF DIGITAL TELEVISION

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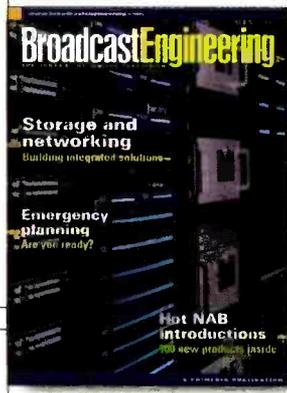


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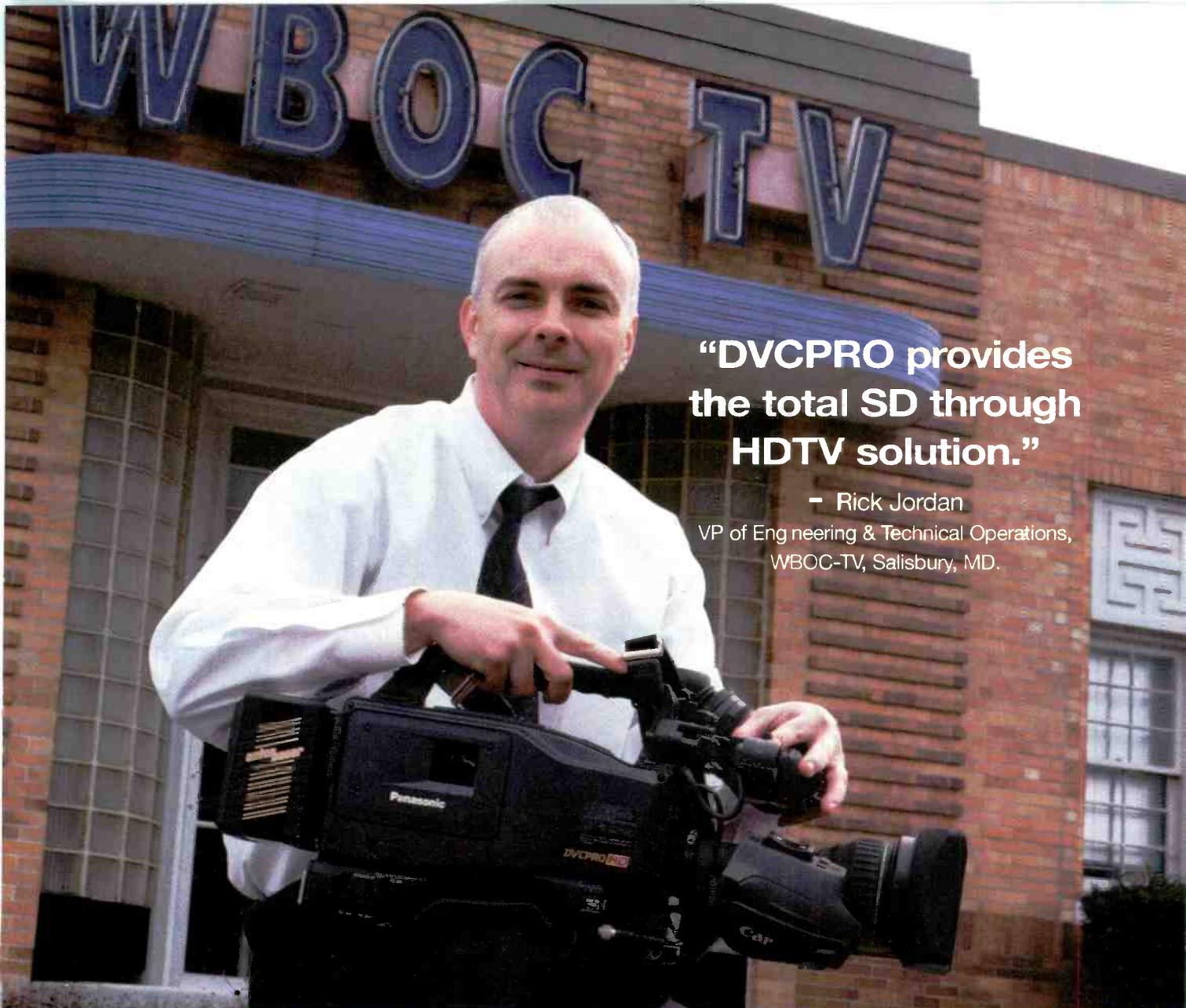
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ON THE COVER:

WWSB Channel 40, an ABC affiliate in Sarasota, FL, uses Omneon's networked content server system with Sundance Digital automation systems and FAST editing for its new digital operations. Photo by Carmen Schettino Photography, Sarasota, FL.

(continued on page 8)



“DVCPRO provides the total SD through HDTV solution.”

– Rick Jordan

VP of Engineering & Technical Operations,
WBOC-TV, Salisbury, MD.

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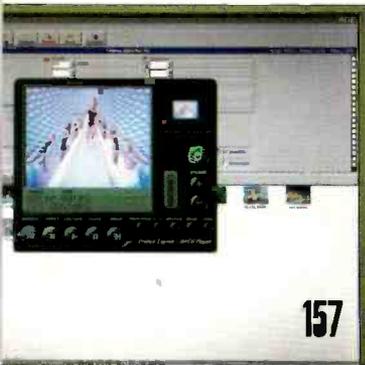
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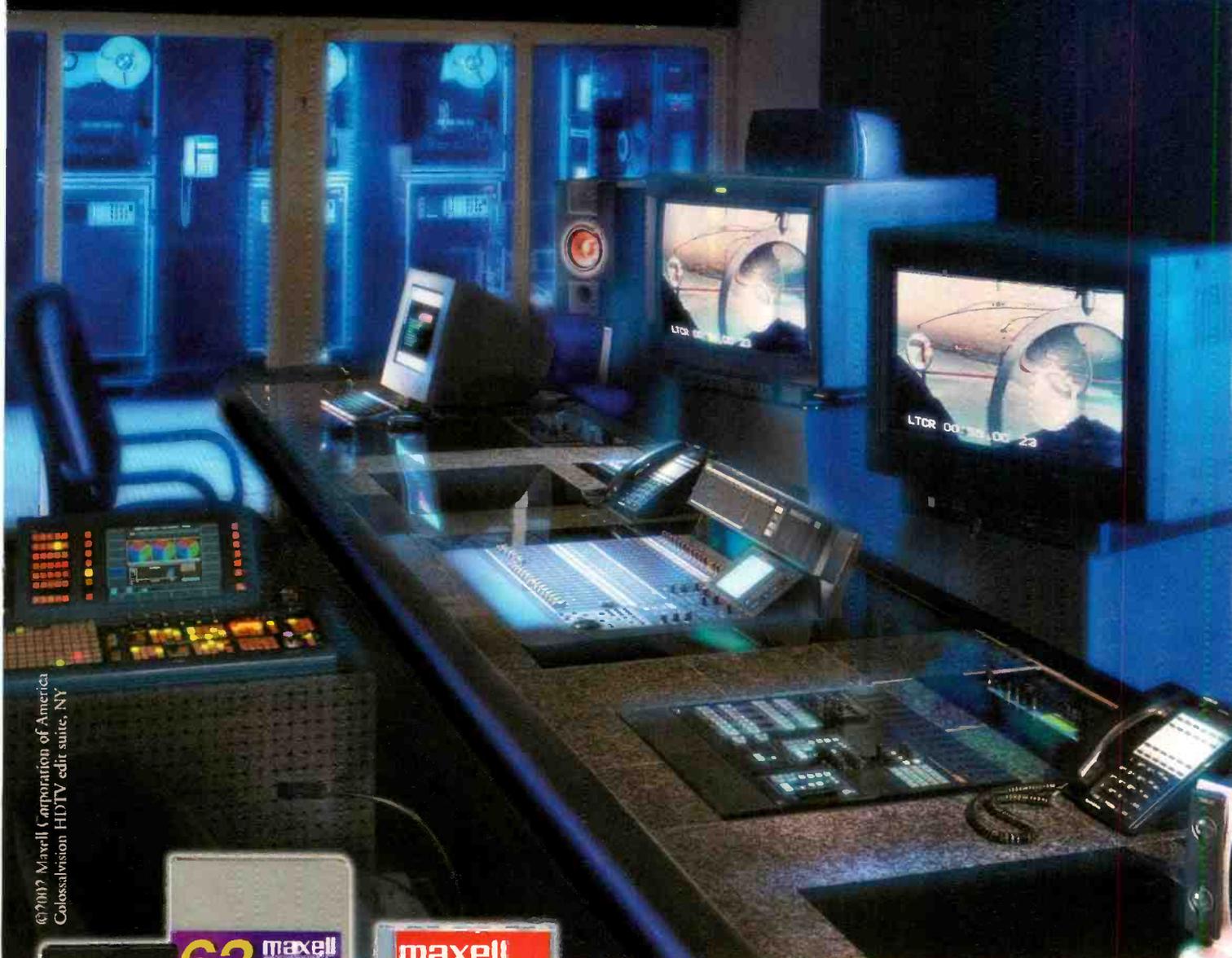
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Name this company



What camera company made the "Polychrome" color camera? What feature made it unique? Correct entries will be eligible for a drawing of the new *Broadcast Engineering* T-shirts. Enter by e-mail. Title your entry "FreezeFrame-April" in the subject field and send it to: bdick@primediabusiness.com. Correct answers received by May 17, 2002, are eligible to win.

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NAB: "A really big shew"

Unless you're over the age of 50, you probably don't remember the phrase, "A really big shew," but it was Ed Sullivan's famous pronunciation used to open his evening TV show. Every one of his shows was "a really big shew." Could this year's NAB be in that same category?

Despite this industry's quandary about market conditions, budgets and financials, the NAB "shew" actually promises to be quite upbeat. Besides, what better

will even be a tram running between the Central and South halls. Come ride the train!

There are a couple of other improvements worth mentioning in the new spaces. The first is the number of restaurants. Okay, maybe I'm using the term "restaurant" loosely, but at least there are plenty of places to catch a bite to eat and something to drink. Just as important, many of these eateries provide space to sit while visiting with friends or business associates. This is a far cry from the old halls where once you pay \$8 for a hot dog lunch, you end up standing like a stork because there's no place to sit.

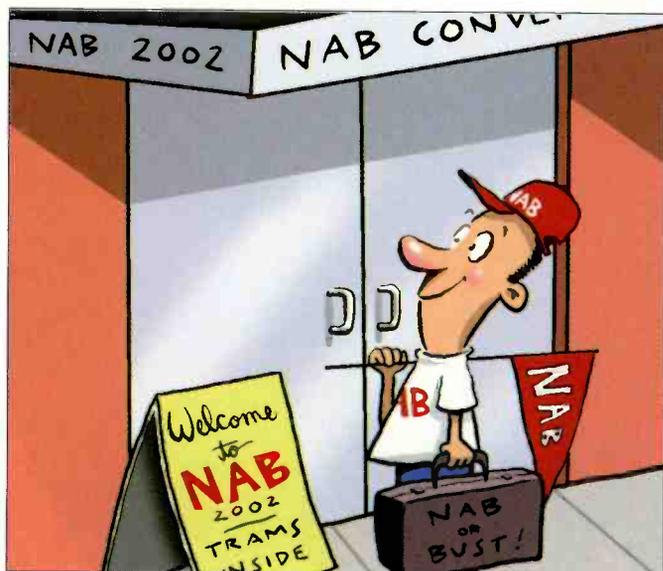
Second, there are lots of restrooms conveniently located around the halls. In the old Central hall, you're either forced to climb stairs to the hidden potties or leave the exhibition area and wait in line near the meeting rooms. It should be easier to find relief in the new halls.

The NAB convention has never been short on sessions, and this year is no exception. With more than 150 conference sessions, seminars and special events you're sure to find something to your liking.

And, in a welcome return to the old days, NAB has arranged a special festive event to launch this year's show. Comedian Jay Leno will perform an opening show Sunday at 9 p.m. The show, to be held at the Bellagio, begins with a reception at 8 p.m. This is an extra cost, advance-ticket-required event, so don't just show up thinking you'll get in. Contact the NAB for ticket information. This should be a lot of fun!

By Tuesday, you'll be ready for some more serious stuff, so you could attend the FCC Chairman's Breakfast where ABC News anchor Sam Donaldson will interview FCC Chairman Michael Powell. The one-on-one setting could prove interesting as this chairman, unlike his two recent predecessors, seems to be focused more on issues than politics.

So, don't let the FUD factor (fear, uncertainty and doubt) get you down. Join me and 100,000 other professionals for "a really big shew."



place to take your mind off business than in "Sin City" with 100,000 people you don't know – who probably want to have just as much fun as you do.

The most visible change in this year's convention is the addition of the two South exhibition halls. Combined, they provide an additional 300,000 square feet of new exhibition space. If your feet got tired last year, just wait!

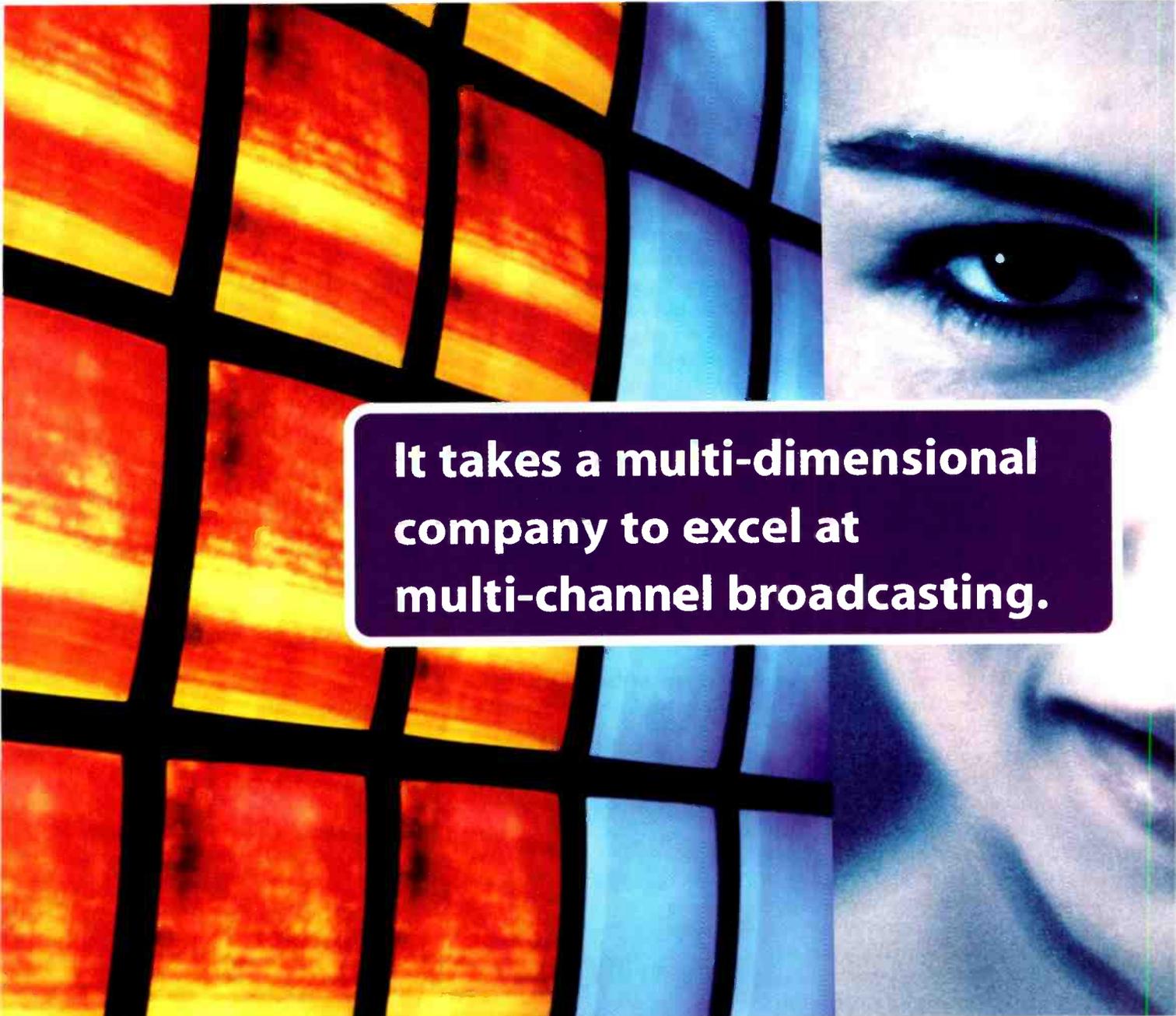
To ensure that the new space isn't missed, several large exhibitors have moved into the new exhibition space. Avid and Apple will anchor the lower level hall. Sony, Leitch and Thomson will anchor the upper level space. The goal, of course, is to draw traffic from the familiar halls into the new spaces. Because the new halls are, shall we say, a bit removed from the main LVCC, there

Broad Dick
editorial director

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

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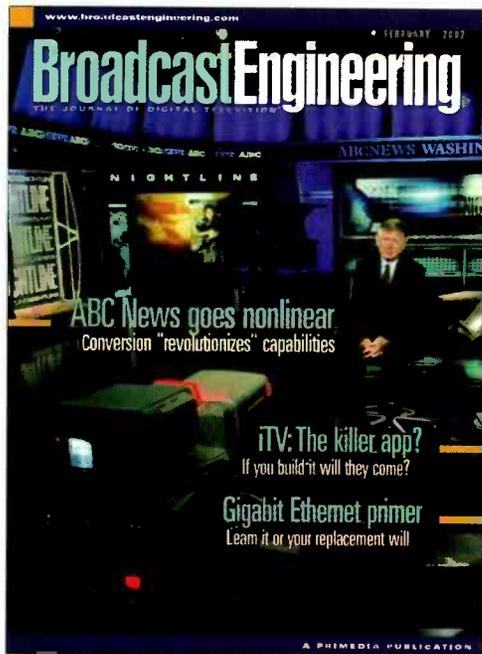
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THINK PURPLE



In the February Feedback column, a reader complained about his lack of success getting the local cable company to provide him with HDTV service. The letter was titled, "Is cable preventing HDTV?" Here is a response from Time Warner Cable.

Dear Editor:

Time Warner Cable has led the industry in carriage of HDTV signals in our markets as those signals became available. Additionally, we have been diligent in carrying satellite-delivered HDTV products. Although we do not believe in digital must-carry, we believe that it is in our best interests and our customers' best interests to carry any available compelling digital content. We currently are carrying available over-the-air HDTV signals in over 30 U.S. markets where we operate cable television systems.

We are aggressively pushing for digital carriage agreements with broadcasters to carry their digital programming, once it becomes available, in all of our systems that have been upgraded to the necessary bandwidth capability. At present time, we lead the cable

industry with our upgrades at 98 percent completion. Our ability to complete HDTV agreements with broadcasters demonstrates that the marketplace is working and, therefore, no digital must-carry is needed or warranted.

For over three years we have been providing HDTV set-top boxes, for no incremental charge, to our customers with suitable displays. With the drop in pricing of HD displays, the demand for HD set-top boxes has greatly increased. Due to this increased demand, we are experiencing a delivery problem on HDTV set-top boxes, and we are working with our suppliers to correct the backlog. We have a tremendous incentive to eliminate the backlog as we do not want to "leave money on the table" by failing to deliver services our customers are anxious to buy from us, or to lose customers to our satellite competitors.

We stand by our policy of rapid HDTV content deployment, but

Of the 1.46 million units sold, almost 100,000 were integrated sets. This represents a whopping 1455 percent increase in the integrated set sales over last year. An additional 196,564 stand-alone STBs were sold in 2001, representing a 434 percent increase over 2000."

Are you kidding? The fact that seven percent of the sets sold included an integrated tuner is not a vote of confidence for OTA-DTV.

BARRY BROWN

Recent Freezeframe winners

September Freezeframe:

Name the two companies that in 1982 promoted a hybrid VTR using "attachable VCRs" mounted on standard on-recording ENG cameras.

The only correct answer received was from James Crawford, Frezzolini Elec-

The fact that seven percent of the sets sold included an integrated tuner is not a vote of confidence for OTA-DTV.

apologize to the writer and other customers who have experienced frustration with the delay of delivery of HDTV set-top boxes.

STEVEN C. JOHNSON
DIRECTOR, ENGINEERING AND
TECHNOLOGY
TIME WARNER CABLE
ENGLEWOOD, CO

I want my DTV station

Dear Editor:

Your February editorial on DTV stated: "What surprised me most was the number of 'integrated sets' sold.

tronics. He knew that the companies were Frezzolini with the FREZZI ON-Cam VTR system and PEP.

October Freezeframe:

Name this VTR. The correct answer was "RCA Hawkeye." Many readers answered the question as "M-format VTR." While it is true that the Hawkeye used the Panasonic M format recording technology, readers had to supply the manufacturer and model.

Winners:

Terry Cribbey, Leitch Canada
Brian Rosenau, USAF
George Lynn Franklin, Yahoo!
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set your ideas in motion!

The Multimedia Home Platform

BY CRAIG BIRKMAIER



On Nov. 13, 2001, it was announced that Cable Television Laboratories had adopted the DVB Multimedia Home Platform (MHP) as part of the OpenCable Application Platform (OCAP). The advanced OpenCable set-top boxes will be deployed throughout North America to allow users access to both digital broadcasting and interactive digital applications.

The announcement was interpreted by some industry analysts as a bridge across historic chasms: NTSC vs. PAL; ATSC vs. DVB; cable vs. DTV broadcasting; broadcasting vs. the Internet; proprietary vs. open standards.

Have CableLabs and the Digital Video Broadcasting Project built a bridge across historical rifts as wide as the Atlantic? Or is MHP a showy exercise in futility?

As one might expect, the answer depends on who you talk to. And one cannot discount the possibility that what the industries competing for

control of our digital future *say* may not necessarily be what they *mean*. A case in point: Currently, there are no plans to deploy OpenCable digital set-top boxes by any Cable MSO in the United States, nor any plans to do so by consumer electronics industry

progress is being made, a new issue surfaces delaying implementation of the proposed OpenCable standard.

When this exercise began, the notion of the set-top box providing a bridge between TV and the Internet had yet to be conceived. Vice President

Some of the most compelling examples of interactive television services have been demonstrated in Europe.

vendors who have been seeking to sell cable set-top boxes at retail, as mandated in the 1992 Cable Act.

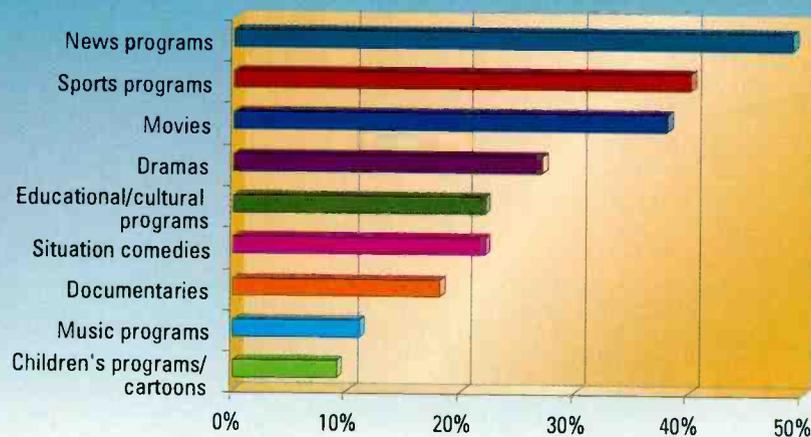
A decade later, the cable industry continues to deploy and lease proprietary set-top boxes. CableLabs has been in the middle of a debate between the cable MSOs, the consumer electronics industry, broadcasters and Hollywood. Each time it appears that

Gore was promoting his vision of the "Information Superhighway." AOL was just beginning to tell consumers "You have mail." The cable industry was promoting its vision of Full-Service Networks. Charlie Ergen was talking about DBS. And the NCSA Mosaic Web browser had just been introduced, along with the concept of the World Wide Web.

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

Viewers plan to watch HDTV for everything

When asked what they'd watch, viewers said news



Open-ended question, multiple response accepted.

Source: StrategyOne/NAB

www.nab.org

Web links

The MHP MarCom Group
www.mhp-forum.de/index_e.htm
 The MHP Basics
www.mhp-forum.de/faq/index.html
 Digital Video Broadcasting Project - MHP Web site
www.mhp.org/flash_index.html
 Cablelabs MHP press announcement
www.cablelabs.com/news_room/PR/01_pr_dvb_111301.html
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Standards for interactive services

IP was still an acronym for *intellectual property* — Internet Protocol was virtually unknown outside of the ARPANET (the forerunner of the Internet). Today, the management of digital media content — specifically the protection of copyrights and patents — is the latest stumbling block to impede the critical path of OpenCable, not to mention DTV and the Internet.

The adoption of the MHP middleware gives OpenCable the appearance of supporting an international standard for the authoring of interactive applications. Yet even in Europe, where the MHP specs were developed, it is difficult to find anyone using them. Some of the most compelling examples of interactive television services have been demonstrated in Europe — BskyB's coverage of soccer, the BBC coverage of Wimbledon and a wide range of new digital services — most notably online gambling and video games — that build upon the legacy of analog Videotext services.

All of these services ride atop proprietary middleware; the result of a hotly contested marketplace with potentially billions at stake for the companies that persevere through the initial commercial shakeout phase. At the moment, the market leader appears to be OpenTV, but CanalPlus Technologies, Liberate, Microsoft, Sun and NDS are all vying for a piece of the action.

MHP provides an *open* application programming interface (API) for manufacturers to develop multimedia applications, without any third-party agreement with a proprietary middleware provider. This offers an alternative to the established way digital set-top boxes are made. Historically, STBs have been custom-built by manufacturers for private (cable or satellite) service providers and network operators. These markets have historically been closed to consumer electronics manufacturers, although

ECB partners with WISC-DT for datacasting

BY VICKI WAY KIPP, CBTE, CBNT

The Wisconsin Educational Communications Board (ECB), which includes the Wisconsin Public Broadcasting network, began a project to datacast rich media content to public school students and teachers in early 2001.

ECB datacast two separate pieces of content. The first was a video called "Investigating Wisconsin History," which had been converted from Betacam tape format to MPEG-2 .m2p file format, and saved on a DVD-ROM. The second piece of content, called "Hand In Hand," was a video with interactive enhancements including another 20 minutes of audio and

The challenge was to get datacast content from the network headend in Madison, WI, to schools in surrounding communities.

video clips, maps, photographs, timelines and historical documents.

"Hand In Hand" was saved as a .vob file on a CD-ROM. During the datacasting demo, ECB realized that the server had a CD drive but not a DVD drive. The DVD was transferred to two CDs for transmission.

Datacasting involves inserting data into the unused portion of a DTV signal for wireless point-to-multipoint transmission of the data to a receive card. Datacasting broadcasts data at rates significantly faster than the speed of a dial-up or cable modem.

While an 8-VSB DTV signal has a data rate of 19.39 Mbits/s, the signal's video and audio often require less than the total data rate. A standard-definition program on a DTV signal only uses 4 Mbits/s to 5 Mbits/s of the 19.4 Mbits/s bit stream. A DTV signal could simultaneously contain four SD programs at 4 Mbits/s each or 16 Mbits/s total, and still have approximately 3.39 Mbits/s left over. Non-payload-carrying bits can be removed from this space and replaced with opportunistic data.

The ECB converted video content and enhancements from Betacam tape to MPEG-2 .m2p digital files. The challenge was to get datacast content from the network headend in Madison, WI, to schools in surrounding communities since ECB lacked a DTV signal. ECB wished to datacast within months, but the expected sign-on date for its Madison PBS DTV station was a year away. ECB sought a solution and decided to partner with CBS affiliate WISC-DT Channel 3-1.

WISC-DT's primary CBS-HD feed has 15 Mbits/s peak rate for a HD signal, while their second feed, the Warner Brothers network, has 4 Mbits/s peak rate for a SD signal, and they still have roughly 0.39 Mbits/s remaining for datacasting. However, the actual bandwidth available for datacasting is higher (up to 4 Mbits/s) dependent on the actual video content and compression from the ATSC encoder.

WISC-TV had a Harris DataPlus that hadn't been connected to their ATSC signal path. The Harris DataPlus was manufactured by Skystream and then repackaged and sold by Harris as part of their ATSC transmission



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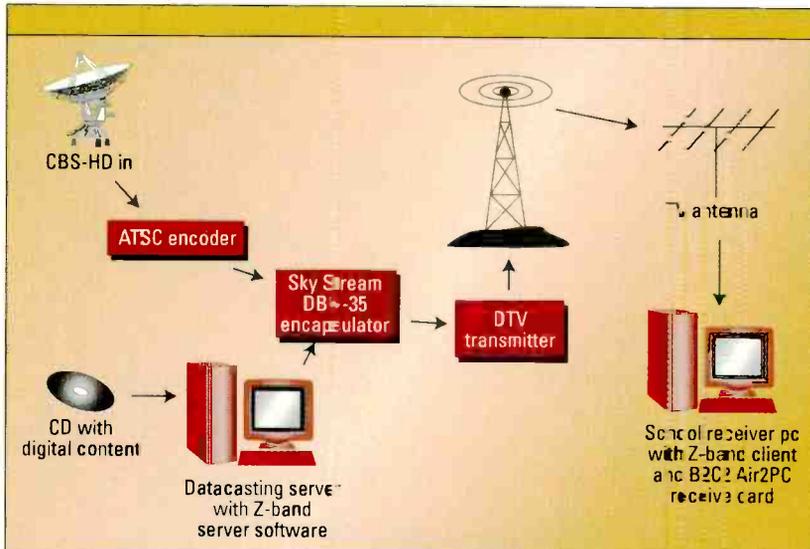


Figure 1. ECB's datacast system is shown above. ECB partnered with CBS affiliate WISC-DT to send rich media content from its headend in Madison, WI, to schools in surrounding communities.

package. But additional software and hardware was required to datacast. To transmit data, ECB needed to acquire a server and Z-Band server software that would format and send the data to the encapsulator. For this experiment, the ECB purchased a 45-day license for the server software.

Datacast content was saved on a CD-ROM and inserted into the server PC, which transmitted the data using the PGM protocol with forward error correction. The server sends the data over an Ethernet link to the encapsulator where it is converted to MPEG-2 format. The encapsulator frees up space in the DTV data stream by PID filtering – dropping certain packet identifiers from the transport stream. Null packets generated by the ATSC encoder are replaced with data packets. After the data is piggybacked onto the DTV signal,

it exits the encapsulator through the SMPTE 310M output and is sent to the modulator. (See Figure 1.)

To receive the datacast, the receive site needs an inexpensive UHF antenna, a receive PC, a PC receive card and software. The ASIC FlexCop digital receive chip provides the functionality of the receive card. To meet minimum requirements, the receive computer should be a Pentium II 300 MHz or Celeron 366 MHz, running Windows 98SE, NT 4.0, 2000 or ME operating system, with at least 64 Mbits of RAM and 10 MBytes of hard disk space, and an open PCI or USB slot for the receive card. The receive card extracts data from the DTV signal. The computer saves the file in whatever format it was transmitted in. Metadata in the datacast will inform the PC receive card

how much hard drive space the corresponding file requires. The receive PC will save the datacast file only if it has enough storage space available for the entire file. An optional telephone back channel allows the receive PC to request content to be sent.

When datacasting with the Z-Band server, the user sets an expiry date for each content file, after which the file is automatically deleted from the receive computer. This is a convenient way to manage timely content that will become outdated or that has a limited time period for playback rights.

Schools could save these datacast files on their network server and then send files on their network (ideally running at 100 Mbits/s or faster) to a computer for display on an LCD projector or an individual's computer.

The ECB has found applications for DTV datacasting technology, including sending teacher guides to accompany educational programs. The board could also send the bulky printed catalog of educational programs in this manner instead of mailing it to each school. A commercial broadcaster might transmit either data that corresponds to their DTV programming, or consumer or business data such as software, Web sites, music, movies, weather, sports statistics or even ISP traffic. **BE**

Vicki Way Zipp, CBTE, CBNT, is a media technician for the Educational Communications Board in Wisconsin.

they have achieved some success through collaboration with DBS service providers.

The rationale behind standards such as OpenCable and the DVB standards suite, both of which now include MHP, is to allow open competition in

the STB markets. In theory, competition would benefit consumers in much the same way that the unbundling of telephones led to a proliferation of products with feature differentiation and robust price competition.

Competing standards

As noted, however, attempts in the United States to unbundle cable STBs have been resisted. Meanwhile, European regulators are allowing operators to continue the current modus operandi indefinitely; proprietary

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MPEG-LA proposes tech tax on content

BY CRAIG BIRKMAIER

It is clear that control over the flow of bits is a critical step in our migration to the new digital media infrastructure. And intellectual property is the main weapon that those who currently control the distribution of high-value content are using to wage war against the consumers of entertainment, news and information.

Every day we hear updates about the legal battles taking place in a futile attempt to control the flow of bits between individuals. Shutting down Napster has had little impact. While it may be possible to shut down companies trying to horn in on the lucrative business of distributing music, nothing short of shutting down the Internet is likely to prevent the use of peer-to-peer file-sharing services like Gnutella.

After the dot.com bust, a highly

Subscription and streaming may soon become synonymous.

relevant question was raised. How can the technology of the Internet be monetized?

One variation of this question is "Will consumers pay a 'fair and reasonable' fee to download music, news, TV shows, movies and other forms of entertainment via the Internet?"

The prospect that subscription and streaming may soon become synonymous has not escaped the attention of a group of stakeholders

middleware vendors are simply bundling MHP solutions with their own, forcing content producers to author for multiple standards.

To further complicate the situation, there are not only rival proprietary approaches, there are competing "open

MHP are European broadcasters and the regulatory bodies that control the broadcast franchises. These groups have been watching as multichannel competitors drive the transition to digital TV, as is the case here in the United States. In June 2001, a group of European

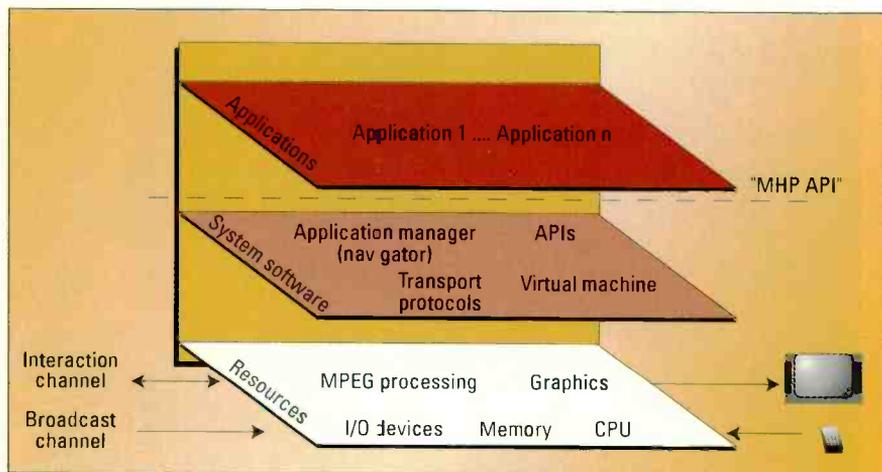


Figure 1 illustrates the three basic layers of the MHP. Resources like MPEG processing, I/O devices, and CPU and graphics processing provide access to the available interfaces. The system software includes an application manager and support for basic transport protocols. It also implements a virtual machine, which decouples the manufacturer-specific hardware and software from the standardized APIs. The applications only access the platform via these APIs. Credit: Carsten Vogt, Alcatel, France.

standards." OpenCable specifies two operating environments for interactivity, declarative (OpenCable presentation engine) and procedural (OpenCable application engine). The presentation engine in OpenCable is similar to specifications developed by the Advanced Television Enhancement Forum (ATVEF), which has a DVB equivalent called DVB-HTML. But the DVB version is not HTML, it is a version of XML developed by DVB. It is also worth noting that the ATSC has

broadcasters and consumer electronics trade groups operating together as the Alliance for MHP, sent a letter to European regulators outlining the current situation with the deployment of digital TV services in Europe and their position on the most desirable solution to the current marketplace chaos. Their comments could easily be applied to the current situation in the United States.

The letter explains that the present market situation for digital television in Europe is characterized by vertically

The most dedicated proponents of MHP are struggling to define their digital future.

been working to develop a middleware platform that shares many of the underpinnings of MHP. The DTV Application Software Environment (DASE) represents yet another spin on the issue of broadcast/Internet convergence.

Perhaps the strongest supporters of

integrated digital television platforms using different standards for interactive television services. This means that consumers can only access the interactive content offered by one platform operator at a time. As a result, content suppliers who do not



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who control patents related to the video compression technology that makes the delivery of streaming video possible.

For several years there has been growing interest in the next MPEG standard. MPEG-4 was envisioned as a standard for very low bit rate applications including streaming media to appliances connected to the Internet, and to wireless devices like mobile phones. Recently, interest in MPEG-4 has grown because of its improved compression efficiency, enabled by tools that build upon MPEG-2 compression concepts.

This is especially interesting for IP broadcasting applications, as MPEG-4 can improve the quality of digital media delivered at constrained bit rates. But MPEG-4 also includes object-based coding and composition techniques, which will allow content to be localized and personalized. These tools have drawn interest from every industry looking at opportunities to enhance today's current linear TV programming model, including cable, DBS and DTV broadcasters.

Many companies were hoping that MPEG-4 would become the standard for the delivery of streaming media via the Internet, bringing order to the chaos of multiple vendors pushing their own proprietary solutions. A large group of computer industry manufacturers including Apple, IBM and Sun, formed the Internet Streaming Media Alliance, advancing MPEG-4 as the standards-based solution for Internet streaming.

In early February, Apple announced QuickTime 6.0, which adds support for MPEG-2 and MPEG-4. But Apple also announced that it would not release QuickTime 6.0 because of a provision of the recently announced MPEG-LA licensing terms for the essential MPEG-4 visual patents.

The licensing provision in question is a usage fee of two cents per hour for any revenue-producing streaming activity that uses the MPEG-4 video codec. This fee is uncapped and could result in millions of dollars in additional royalty costs for anyone using MPEG-4 to deliver content for profit. MPEG-LA is also working on a MPEG-4 usage fee for broadcast distribution via cable, DBS and DTV.

The notion of a technology tax on content is not unprecedented. MPEG-LA imposed a usage fee on content delivered via DVD, which uses MPEG-2 video compression. The fee is collected by the companies that mass-produce DVD discs. And manufacturers of video game consoles have imposed steep royalties on video game titles. Nearly half of Sony's profits are generated by the royalties on PlayStation games.

There is a growing consensus that the proposed usage fee is unworkable, and that it will kill MPEG-4. Real Networks, Microsoft, ON2 and other codec vendors do not charge a usage fee, and give away their players. But the desire of major corporations that control key technology to generate profits by taxing content distributors is not likely to dissipate. In this war, however, consumers may prevail, as they are the ultimate arbiters of the marketplace. **BE**

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

MPEG-4 can improve the quality of digital media delivered at constrained bit rates.

operate their own technical platform must enter into a contract with a platform operator using a proprietary technology in order to have their interactive services carried. And they may need to author multiple versions of this content for different platforms.

The letter goes on to explain that a fully interoperable digital interactive television system across Europe would mean that a consumer could access any available interactive content service via any digital television-receiving equipment. One device, either a set-top box or an integrated television receiver, would suffice to receive any interactive content available, whether for free, via subscription or a pay-per-use basis.

The European proponents expressed concerns that these vertically integrated and technologically fragmented markets will be perpetuated into the distant future, citing statements from cable operators and other industry players that they will opt for

NBC News' ENG audio

BY DAN DALEY

Ever since Roone Arledge crossed the streams of news and entertainment over a quarter-century ago, new concepts — both technical and in content, in either domain — have tended to come from the top down. However, one organically grown new idea at NBC News points definitively at how ENG audio will be moved around an increasingly time-sensitive news landscape in the future. It also shows how even the layers of corporate bureaucracy that accompany today's highly consolidated broadcast business landscape can't stop a few determined and inspired technicians.

Satellite transmission of on-location report audio has been standard for many years in the

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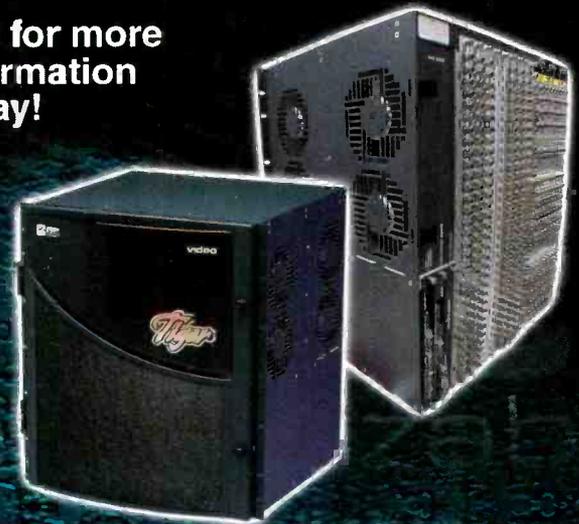
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television news business. However, its novelty has faded while its costs remain constant.

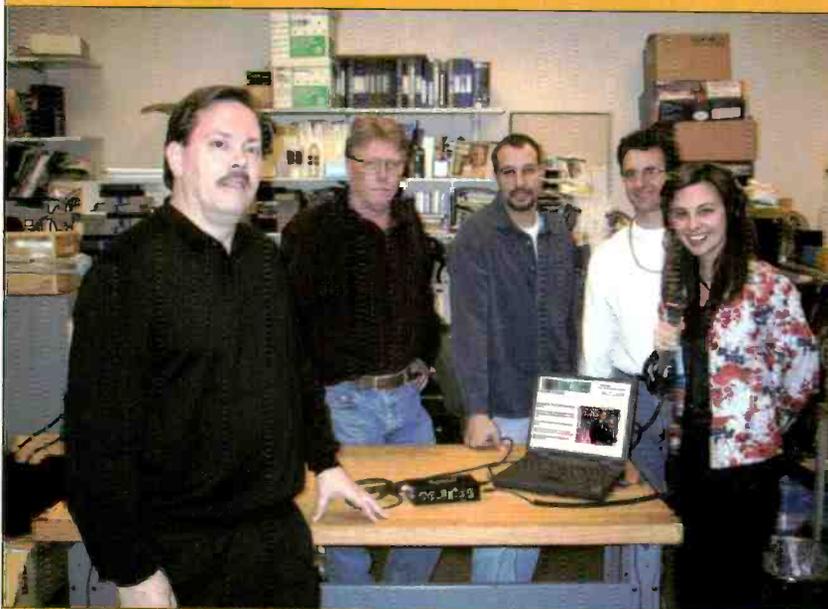
equation germinated among a few audio staff members. It was about finding a way to implement

via the Internet, could easily save millions of dollars a year on satellite and remote recording costs.

In a sense, the pieces of this puzzle were already in place — various sound file formats were becoming commonplace, laptops were ubiquitous in the news business, and the Internet was seemingly accessible from anywhere for the cost of a local phone call. But so far, no one had assembled the correct pieces.

Mike Noseworthy, a senior audio engineer for NBC in Queens; Joe De Pierro, a senior editor for broadcast network operations at 30 Rock; and Jess Bushyhead, an editor at NBC News' Burbank operations center agreed that was just a matter of recognizing the potential of the technology in their operations and figuring out how to implement it.

According to Bushyhead, NBC often used an expensive satellite uplink truck in remote locations to get voice-over for stories. In one instance, Dateline hired a remote truck for \$2500 to get a few lines of voice-over they needed from Maria Shriver while she was at



NBC's E-Tracks uses a laptop computer with a USBPre microphone pre-amp from Sound Devices and a Beyer M59 dynamic microphone. Pictured with the solution (from left to right): Joe Prout, a sales manager at Dale Pro Audio; Mike Noseworthy, a senior audio engineer for NBC; Joe De Pierro, a senior editor for broadcast network operations at 30 Rock; David Ondrick, director of application development, NBC New Media; and Tessa Cappodice, manager, NBC post-production operations. Photo courtesy Dale Pro Audio.

Even the most modest satellite burst transmission costs at least \$500. Availability at critical moments is usually a matter of timing and luck if the reporter isn't near a bureau location.

About three years ago, simultaneously at NBC News' Dateline operations, in Long Island City (an industrial area of Queens just across the East River from NBC's 30 Rock headquarters), and at the technical operations center at the network's Burbank, CA, bureau, an idea that would change that

Internet and sound file technologies in ENG operations. The economic benefits were undeniable. Converting field audio into a

The notion of combining a high-end pre-amp with a laptop computer simply hadn't gained any traction yet.

sound file on a reporter's laptop computer, then sending it to the program producers and editors

her vacation home in Idaho. He said he knew then that they had to make a change.

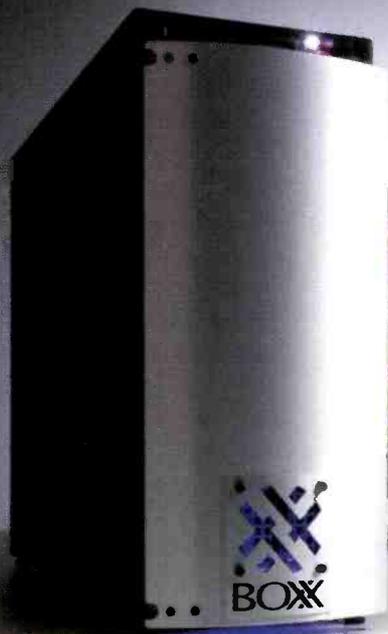
proprietary, non-interoperable and closed technologies when they upgrade their networks to accommodate interactive digital television services: "The individual business incentives to opt for proprietary technologies that allow these stakeholders

fully to control the access of their competitors to their respective platforms is much more powerful than the willingness to shape these markets in the best interest of consumers."

Given marketplace realities, this is all an academic exercise. In the

United States the cable industry has not been deploying set-top boxes capable of supporting advanced services such as those defined by MHP. For now, the industry seems content to offer digital TV tiers that keep them competitive with the premium

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content packages and NVOD movies offered by their DBS competitors. Likewise, set-top boxes supporting interactive DBS services have been offered only as a premium option. DirecTV and DISH have taken a somewhat agnostic position about interactive services, allowing multiple competitors to offer set-top boxes and enhanced services via their networks.

This could change if the proposed merger of EchoStar and DirecTV is approved, as there would be a strong incentive for the combined entities to migrate all existing customers to a next-generation platform that would incorporate improved video compression technology, local cache storage and the resources needed to support advanced interactive services.

How does the Multimedia Home Platform enable the desired shift from proprietary vertically integrated

Over the next two years, the three audio technicians tossed around ideas not only about what to do but how to do it. With the tacit approval of their immediate managers, Bushyhead appropriated 18 IBM Thinkpad laptops, which had by then become standard issue at NBC News. He found that Music Match's MP3 software was truly freeware, without need of a license, as well as simple and reliable to operate in the field to convert audio to MP3 files, and loaded it on the computers.

The next step was to test the concept of sending voice-overs from one location to another on the Internet. The first time the system was tested was in Tel Aviv, using an AOL account. Any problems with sound quality had

more to do with the microphone pre-amps than with MP3. The first broadcast story covered using the system was Mother Teresa's funeral, with no problems reported.

The system was still not completely standardized: Laptops had varying sound file formats on them, mostly in the form of PCMCIA sound card plug-ins creating .wav files, and there was little in the way of high-end transducers and microphone pre-amps available to get the audio quality close to broadcast standards at the time.

New interface solution

Two years ago, Noseworthy went to the NAB show in Las Vegas in search of microphones and laptop interface. He wasn't impressed with

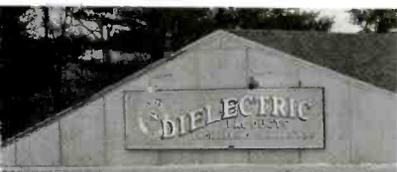
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1950s First stacked antenna system built

1970s Multi-station antennas installed on Mt. Sutro and John Hancock building.

1986 Acquired RCA's TV Antenna operations



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Rigging of an early Dielectric antenna in York, PA in 1947.



Charles "Doc" Brown (3rd from left) working with fellow engineers.



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what he found. The notion of combining a high-end pre-amp with a laptop computer simply hadn't gained any traction yet. It was a classic instance of how many technology-based industries, including broadcasting, look to the computer industry for tools but must make their needs known to find ways to get computers to adapt to them.

That happened about six months later, when Noseworthy met with Joe Prout and Jim Koomar. Noseworthy explained how he was trying to increase the quality of audio into laptops but not increase either the weight or the complexity

of the process for field correspondents. A month later, the company delivered the Sound Devices' new USBPre, a microphone pre-amp with XLR, 1/4-inch and RCA inputs accepting either mic or line level,

and a USB computer interface, as well as outputs for stereo headphones, LED gain meters and its own software driver. Just as important, the USBPre draws its power from the computer, making

it completely portable. In addition, it can accommodate condenser microphones, which require 48 volts phantom power.

The package also included a Beyer M59 dynamic microphone, Sony MDR-7506 stereo headphones and appropriate cabling.

The Web site

The next step was to set up a more permanent Web site to



A dedicated Web site, segmented into 10 bins, one for each NBC News location, was created to facilitate the transmission of voice-overs from remote locations. Image courtesy NBC News.

still proudly supporting the needs of broadcasters worldwide.

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1999 Introduced high power transmission line — **EHline™**

2000 Built first triple stacked antenna for Sears Tower
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2001 Acquired Central Tower and TCI Inc.
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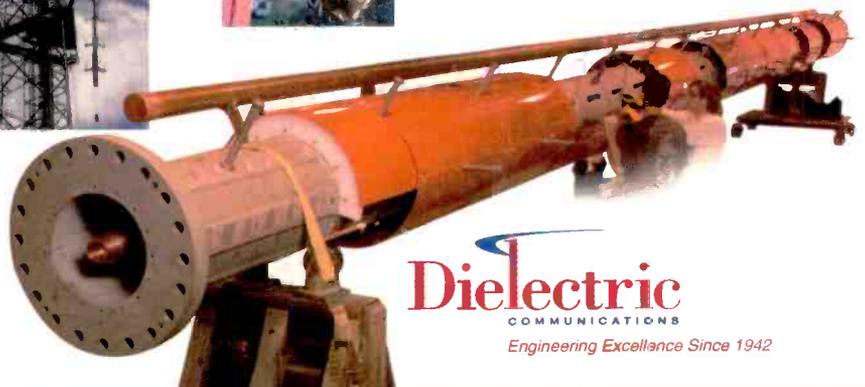
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Stacked antenna in Washington, D.C.



Rigging of FM antenna

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transition from the AOL e-mail-only test bed. This originated on the East Coast side. The original AOL account is still up and running as a backup in case NBC's server ever goes down.

De Piero and his colleagues Tessa Capodice and David Ondrick at 30 Rock conceived the concept of a dedicated Web site as opposed to the e-mail-only AOL address. De Piero had the idea to segment the Web site into what are now 10 bins, one for each NBC News location, such as New York, Los Angeles, London, Chicago, Moscow, Atlanta and so on. After a correspondent records a sound bite onto the laptop, they log on to the dedicated and password-secured Web site using any available ISP access provider and fill out a form with the name of the story, the correspondent's name, the producer and editor's names, and the approximate length of the sound clip. The MP3 sound file is then uploaded into the appropriate bureau bin. That action generates automatic e-mail to the key personnel such as the producer and editors waiting for the sound bite at that bureau.

Once the MP3 files reach their bureau destination they go to editing where they can stay in the digital domain through processing on Avid Media Composer digital workstations right up until they go out over the air. The only time it leaves the digital domain is if it needs to go to one of the Grass Valley Group tape-to-tape editing systems.

During this period, NBC became aware that something was going on. But by the time it began to reach the executive suites, the system — now officially dubbed E-Tracks — was already proving itself. Noseworthy had used it to send audio voice-overs from Afghanistan. The system fit the economic model: the microphone, USBPre, cabling, the software and the IBM Thinkpad laptops brought the whole pack in at about \$2000, less than the cost of booking a remote truck. Bushyhead estimates that by eliminating the satellite uplink component alone, savings in the range of millions of dollars could occur annually. And while E-Tracks also offers qualitative benefits, such as faster and presumably more timely and accurate reporting capabilities, and sets a course that could eventually lead to integrated audio and video reports filed via the Internet, its economic advantage is much more immediately apparent. To date, approximately 1500 sound clips have been processed. **BE**

Dan Daley covers the pro audio industry and writes for Broadcast Engineering's sister magazine, Mix.

platforms to an open horizontal integration approach? Is it even possible to create an open platform with which multiple vendors in competing industries can build set-top boxes and integrated receivers that will interoperate with content from anyone? The experience of the Internet suggests that this is indeed possible; thus it is not surprising that many of the concepts and technologies upon which MHP has been built

have their roots in the open systems world of PCs and the Internet.

What is MHP?

Detailed information about the MHP standard can be accessed via the Web links provided with this story. The MHP MarCom group — a trade association promoting the standard — provides a quick overview of the MHP specification and how it works. In a nutshell, this is where MHP fits

into digital TV platforms.

MHP is an open, common software platform that provides a standardized basis for free-TV, pay-TV, multimedia programming and interactive services.

MHP will be installed in set-top boxes, IDTVs (Integrated Digital Television) or on multimedia PCs. There it supports media convergence — television with the Internet, for example — and the networking of digital components such as televisions, set-top boxes, PCs, telecommunications equipment or DVD players.

By means of the common API and together with the Java programming language, manufacturer-independent applications can be designed for the MHP system. The common interface provides a standard hardware interface so that MHP-capable systems can be extended by means of modules. (See Figure 1.)

A bridge too far?

The goals of the Multimedia Home Platform are clearly admirable. The list of companies that have signed up in support of this platform is extensive; the consumer electronics industry, long shut out of the markets for cable set-top boxes is prominent.

But MHP may have overreached the window of opportunity, as its most dedicated proponents are struggling to define their digital future, even as they continue to hold onto what is still a very lucrative analog television franchise. Ultimately, the marketplace may migrate to open standards for multimedia. This is inevitable, if one believes that broadcasting and the Internet will converge, and that the Internet will remain open.

The questions that remain unanswered are "How long will this take?" and "What will the marketplace look like when we get there?" **BE**

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

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Channel 52-69 stations may have to "rent" their channels



BY HARRY C. MARTIN

TV broadcasters still operating analog facilities on channels 52-69 after 2006 may become subject to heavy spectrum fees.

By now all broadcasters are familiar with the notion of spectrum auctions and the sizeable dollars that such auctions are able to generate for the federal government through the sale of spectrum. But the proposed federal budget for FY2003 provides for \$500 million in spectrum leasing fees projected to be collected starting in 2007.

There is no real mystery about why the government might want to become a rent-charging landlord. For years the government has assumed, rightly or wrongly, that it would be able to auction off channels 52-69 once the conversion to DTV and the resulting clearing out of that portion of the current TV band were completed. The projected completion date for that process is 2006. Meanwhile, the auction of spectrum, including television channels 52-69, is predicted to raise more than \$25 billion for taxpayers during the next five years.

However, the government's ability to effectively auction off the 52-69 spectrum hinges on its ability to clear that spectrum of its current users. And what better way to encourage the current

tenants to vacate than by upping what it will cost them to stay put? Hence, the plan to start collecting rent from hold-over analog broadcasters on channels 52-69 starting in 2007.

Keep in mind that the federal budget

competition and diversity. The 35 percent cap will remain in effect until these deliberations are concluded.

Band-clearing update

As of the end of February, a total of

The government's ability to auction off the 52-69 spectrum hinges on its ability to clear that spectrum of its current users.

is merely a proposal and almost certainly will be significantly amended before passage by the Congress. Nevertheless, the president's proposal affords some insight into what eventually may occur as the contest for the 700 MHz spectrum heats up.

Ownership rules bashed by Court of Appeals

In a decision handed down in February, the U.S. Court of Appeals for the D.C. Circuit ordered the FCC to repeal its cable/broadcast cross-ownership rules and to reconsider its rule capping a single company's nationwide audience reach to 35 percent of TV households.

The court held that the FCC had failed to support its conclusion that the cable/broadcast cross-ownership ban was necessary to promote diversity and competition. A follow-up order implementing the court's order is expected, unless the FCC decides to appeal the decision to the Supreme Court. That is unlikely.

Similarly, the court ruled that the FCC had not adequately explained why the 35 percent national cap was necessary and in the public interest. Again, the court ruled the FCC had not given sound reasons for its conclusion that the cap was necessary to preserve

12 applications had been filed with the FCC by channel 60-69 television stations proposing analog operations on their digital allotments as a means of clearing the upper-700 MHz band for auction to wireless and public safety users. All of these applications request waivers of the traditional separation rules for analog assignments.

These applications will be considered by the full Commission because they raise important public interest trade-off issues. On the one hand, channel 60-69 broadcasters are not likely to vacate their analog channels and make the upper-700 MHz band available for wireless operators unless they have an alternate analog channel to use until the DTV transition. On the other hand, the Mass Media Bureau is reluctant to waive interference protections needed to accommodate the analog proposals. This is the case even though some of the applications propose less interference than they already have been authorized to cause if they were operating on the same channel in the DTV mode.

BE

Dateline

April 10 – Deadline for electronic filing of Forms 398 (children's programming)

April 15 – New deadline for filing comments on the FCC's proposed EEO rules

May 1 – Deadline for commercial stations in markets below the top-30 to construct their DTV facilities

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



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Streaming for profits

BY STEVEN M. BLUMENFELD

Come one, come all. Step right up and hear about a technology that costs an arm and a leg, has an increasing variable cost for every new user, and doesn't generate any profits. And, oh yeah, you also need to hire PhDs to run the system. That is the state of streaming media today — not pretty.

Yet, in spite of the fact that a number of very large failures in this area have literally pockmarked the fiber pathways with darkened strands, we're still attracted to digital distribution. Streaming, with all its faults, still commands a lot of attention across the network landscape. As more and more

bandwidth and the people required to run streaming services place a heavy toll on the cost structures of today's streaming operations. And once we start talking about scaling these operations, the issues become quite acute.

Streaming, with all its faults, still commands a lot of attention across the network landscape.

Here's the way most media-streaming servers work in today's unicast environment: Upon request from a client's software, a port is requisitioned, the server allocates it, and the

server's bandwidth-limited backbone. This leads to a limit on the number of ports a single server can support — usually in the low 1000s. While this is acceptable on the small scale, it creates nightmares when tens of thousands or more streams are

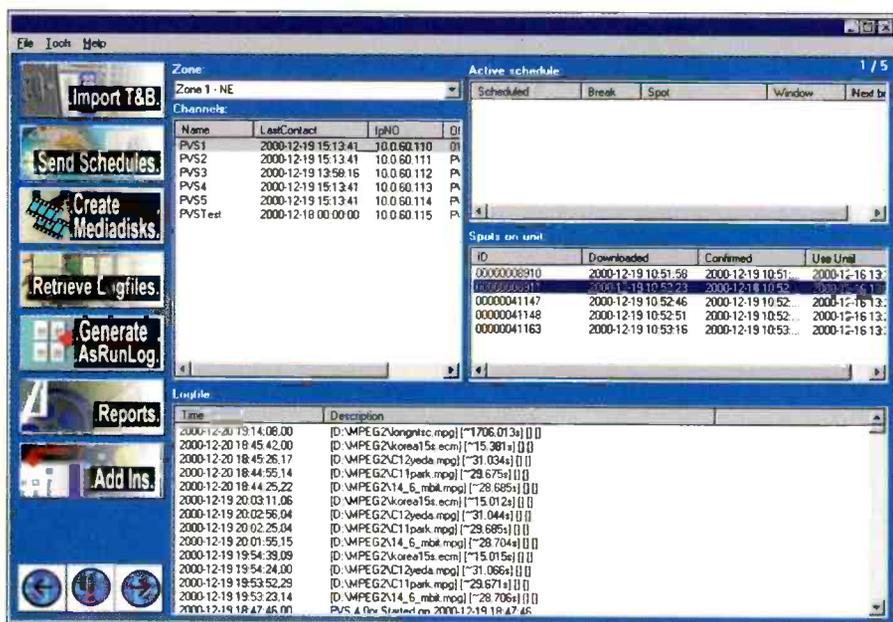
being accessed. For every additional media transaction, bandwidth requirements increase. Some large-scale streaming operations push in excess of 2 GBytes/s. That's a lot of data, and the cost of the bandwidth is staggering.

Many people were expecting MPEG-4 to be streaming's savior. But they were disappointed recently when MPEG LA, the group that controls licensing and the pricing of the patents, released the costs. At approximately two cents per hour per stream with no cap on the amount, streaming seems to be the hardest hit of all the uses. The problem with this is that if a user has access to a stream for a month, as in a subscription service, the service provider owes a two-cent fee each time the user views the stream. This is not the case with download material and it may make the distribution of media in MPEG-4 less advantageous for streaming.

Add to that the administrative task of managing multiple server clusters, probably in multiple locations, and you can see that streaming in a big way is not for the faint of heart.

Is streaming worth it? Should we invest in the future of streaming? Is there any money to be made?

Well, bluntly, the answer is yes to all the above. Streaming has an immediacy



Centralized management systems like Nucleus Systems' VBase can interface with existing automation and traffic systems to assist broadcasters in generating profits from streaming services.

services look for a place to distinguish and disseminate their ideas to a global audience, streaming seems to fit the bill.

But the economics of streaming leave a lot to be desired. Servers,

stream begins to flow from the server to the user. Certain small amounts of user and technical information flow back to the server.

These "media transactions" create an enormous amount of traffic along



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that downloaded content just cannot duplicate. It's just like broadcast, only it's available when you want it or need it. Sure, we love our VCRs and our TiVos, but watching a football game that has been recorded just doesn't have the same impact. Immediacy ranks high on the list of reasons for streaming.

In addition, streaming, unlike broadcast, can have global reach. We are all becoming extremely aware that the market for our content needs to reach beyond the traditional borders of our geographic market. Even more importantly, our streams need to reach beyond the devices our clients typically use — the PC and the TV. It is now possible to stream content directly to new devices. In the near future, CD/radios with Ethernet ports, 802.11a wireless display devices, cell phones, and untethered gaming consoles and

other devices will demand the attention of our streaming servers.

New services being developed for portable, connected and reconfigurable devices will begin to drive the use of

server architectures, the port densities are increasing by a factor of two to three, and possibly will be much greater in the future. Increasing port density brings a number of cost savings.

Streaming has an immediacy that downloaded content just cannot duplicate.

streaming media, something that could not be accomplished with traditional broadcasting.

Bandwidth issues continue to compress as new and better codecs are introduced. Lately, we have seen video in the under-1 MByte range that is dazzling. There is even some at bandwidths as low as modem speeds that would make you believe you were watching cable TV. It just keeps getting better; it's truly amazing.

Server densities are also increasing. As engineers develop more specialized

Greater density means less co-location real estate, less power, less air conditioning, fewer pieces of hardware and, most importantly, lower administrative costs.

Streaming is here and it's making a big push forward. Now is the time to invest or reinvigorate investment in the marketplace and prepare yourself for greater revenues coming from unsuspected places.

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Steven M. Blumenfeld is vice president of technology, AOL Time Warner CTO's office.

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Audio signal distribution and level measurements

BY MICHAEL ROBIN

The unbridled development of radio broadcasting in the 1920s and 1930s demonstrated the need to standardize audio equipment, studio-to-transmitter links, and methods for measuring static and dynamic audio signal levels. Unrelated concepts and solutions developed on both sides of the Atlantic during that time, and today we still bear the consequences of these developments.

Typical signal levels and impedances

A wide variety of studio-quality audio equipment is available. In terms of signal level, there are two main categories: low-level devices (typically microphones) and high-level devices (everything else).

Microphone-sensitivity ratings, measured at 74 dB sound pressure

level (SPL), are commonly expressed in open-load microvolts or dBV (decibels with respect to 1 V). The standard impedance for most professional-quality microphones is 150 Ω , although microphones with other impedances do exist. A typical moving-coil microphone with an impedance of 150 Ω generates an open-load voltage of 100 μ V (80 dBV) at 74 SPL. A pre-amplifier is used with such microphones to avoid damping and degradation of the signal-to-noise ratio (SNR) due to excessive signal loss. Microphone pre-amps have an input impedance of 1.5 k Ω or higher.

Audio signals generated by microphones are suitably pre-amplified to line levels and distributed inside broadcast plants or to common carriers for land or satellite transmission. There are two conflicting sets of concepts for

line level, interface impedance and signal level monitoring.

Power matching, dBm and the VU meter

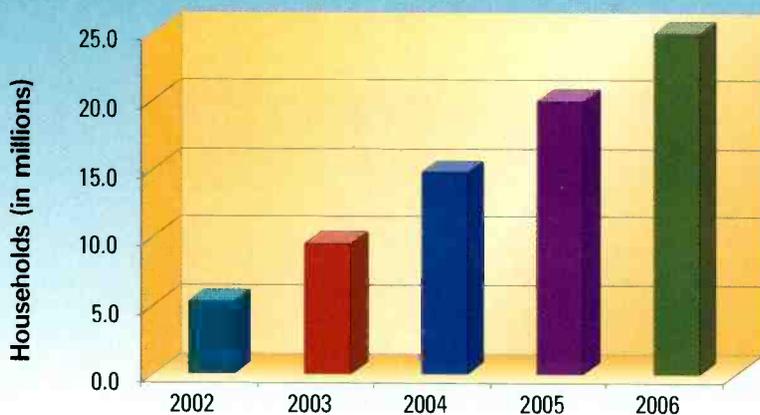
Power matching: This concept was developed by Bell Telephone and first standardized in 1939. The main concern was to develop reliable, high-performance, studio-to-transmitter links. It seemed reasonable to have a system consisting of an impedance-matched source (studio output), a distribution link (cable) and a destination (radio transmitter input). The impedances had to be matched to tight tolerances to avoid echoes on long cable lengths. So Bell specified the impedance as 600 Ω , the reference signal power as 1 mW, and the signal-level measurement instrument as the volume-unit meter — better known as the VU meter.

Given the tube amplifier technology of the 1930s, it may have been necessary to use the power-matching concept inside a studio at that time. But contemporary audio-amplifier output impedances are typically a fraction of 1 Ω (for all intents and purposes, 0 Ω), so raising the impedance to 600 Ω represents a power loss. Figure 1 shows the distribution of a typical power-matched, 600 Ω impedance audio signal. The 600 Ω build-up impedance causes a 6 dB voltage loss between the signal source (the pre-amp output at 0 Ω) and the load (the line-level amplifier input at 600 Ω).

The dBm: One milliwatt dissipated into a 600 Ω impedance generates a 0.77459 V RMS voltage (rounded up to 0.775 V RMS). So this signal level was designated as 0 dBm. When dissipated into other load values, different voltages result. Power levels other than 1 mW are expressed in dB with respect

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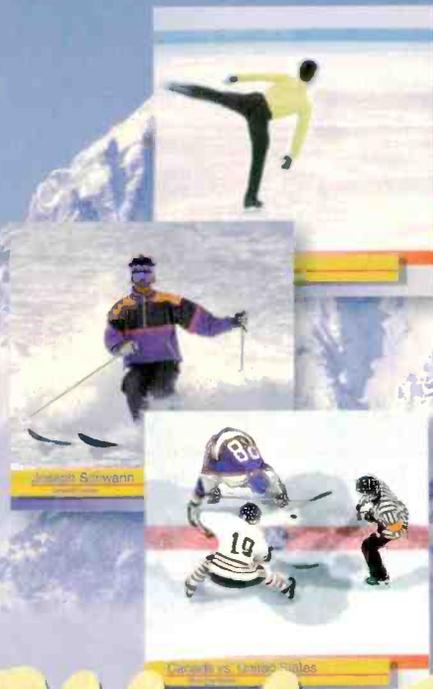
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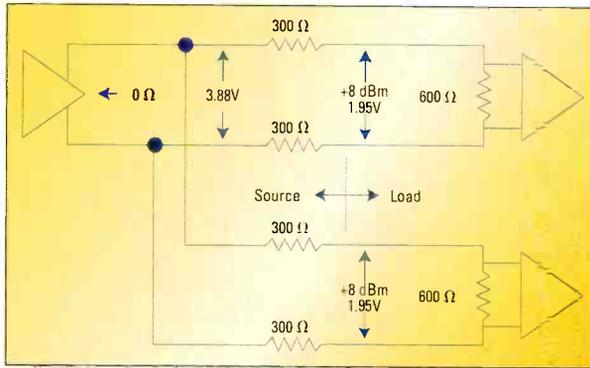


Figure 1. Typical block diagram of power matching circuit

to the reference 0 dBm power level according to the formula:

$$N(\text{dB}) = 10 \log_{10} (P/P_{\text{ref}})$$

where $N(\text{dB})$ = The number of decibels

P = The measured power level

P_{ref} = The reference power level of 1 mW

The formula can be extended to the measurement of voltages as follows:

$$N(\text{dB}) = 20 \log_{10} (V/V_{\text{ref}})$$

where $N(\text{dB})$ = The number of decibels

V = The measured voltage

V_{ref} = The reference voltage of 0.775 V RMS

The assumption here is that the voltage is measured across identical impedances (e.g., 600 Ω)

A standard operating level (SOL), also called alignment level, of +8 dBm into 600 Ω was originally chosen in North America. Some authorities, including sound-recording studios, opted for a +4 dBm SOL inside the plant. The SOL represents the steady-state maximum level or peak program level as measured with a standardized audio-signal-level meter (VU meter).

The VU meter. The VU meter was developed primarily to control and monitor audio programs. The specifications of the VU meter reflect the philosophy of the 1930s. Essentially, the VU meter is a moving-coil, RMS-type audio-signal-level measuring instrument. It is fit-

ted with two scales:

- A VU scale, extending from -20 to +3, with 0 (the reference deflection) marked at about 71 percent maximum scale reading

- A percentage scale, with 100 percent corresponding to 0 VU

The VU meter has

under steady-state sinusoidal voltage conditions. Its dynamic characteristics are such that if a sinusoidal signal with certain characteristics is suddenly applied, the pointer will take 0.3 s to reach certain reference deflection. The signal that will produce this effect is one that has a frequency between 35 Hz and 10 kHz and an amplitude that produces a reference pointer deflection (0 VU) under steady-state conditions. This characteristic of the VU meter was chosen to approximate the assumed response of the hu-

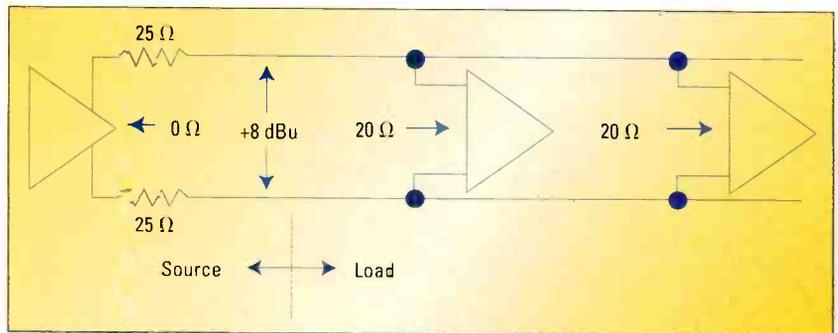


Figure 2. Typical block diagram of voltage matching concept

an input impedance of 7.5 k Ω and, as such, has a minimal loading effect on the 600 Ω source impedance. Its sensitivity is adjustable such that the VU reference level (0 VU) can be made to correspond to the SOL (+4 or +8 dBm)

man ear. But the 0.3 s risetime characteristic of the VU meter introduces a masking effect. Essentially, the instrument is unable to give accurate audio-signal-level indications when fed complex-wave, fast-risetime input signals.

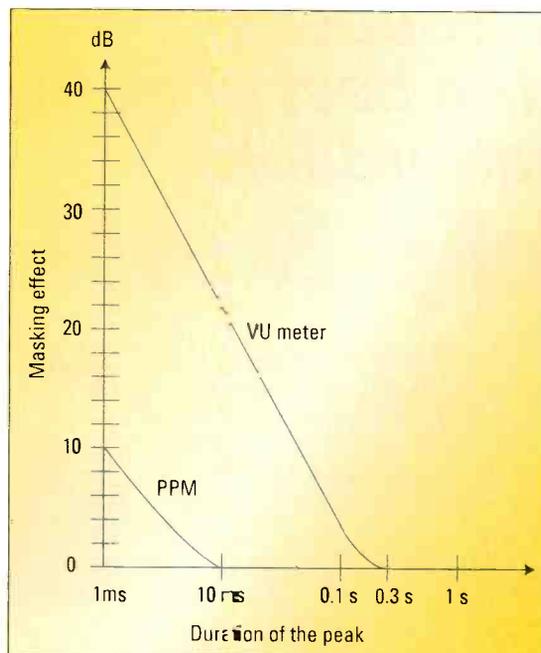
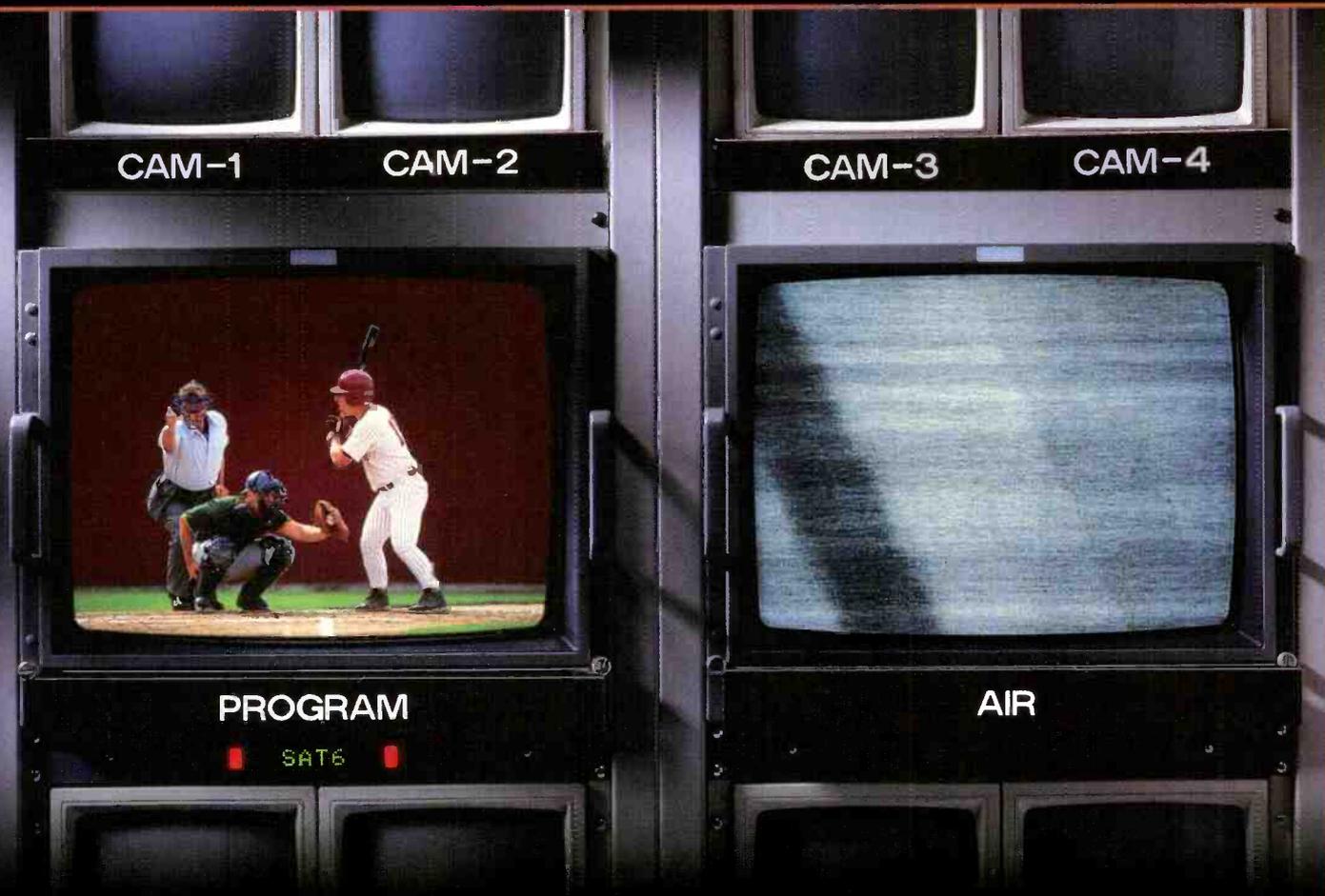


Figure 3. Masking effect of typical VU meter and PPM for a given tone duration

An instantaneous speech or music signal level may in reality be 10 VU or more above the readings of the VU meter. As a result, the recording and distribution elements in the system need quite a bit of headroom to avoid clipping the sudden bursts that often occur in audio signal levels. Typically, audio equipment designed to handle an SOL of +8 dBm is capable of handling output signal levels in excess of +18 dBm at a total harmonic distortion (THD) not exceeding 1 percent. Such undistorted audio peaks, unnoticed by the operator watching the VU meter, are likely to reach the audiotape recorder or transmitter and overload it. The situation is further complicated by FM audio transmitters that use high-fre-



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quency pre-emphasis with a time constant of 75 μ sec, resulting in a 14 dB boost at 10 kHz. To avoid overmodulation and achieve an acceptable SNR, transmitters use various types of limiter/compressor combinations.

Voltage matching, dBu and the peak-program meter

Voltage matching: This concept is typical of modern studio installations. Figure 2 shows a typical voltage-matching, audio-signal distribution. The signal source has an output impedance of approximately 50 Ω and the load is approximately 20 k Ω . The signal level is expressed in dBu and the SOL in North America is +4 dBu or +8 dBu. This considerably reduces the power requirements of the signal source, since it is required to dissipate only a minute amount of power across the load. An added advantage is the improved frequency and transient response of the system, resulting from the fact that the capacitive loading of the shielded-balanced audio cable has a lesser effect across a source impedance of 50 Ω than it has across a source of 600 Ω . The interface with common carriers retains the power-matching philosophy to avoid return-loss problems with long cables, which could result in echoes.

The dBu: The dBu assumes a near-zero signal source impedance and a near-infinite load impedance. Under these idealized open-load conditions, the source does not dissipate any measurable power into the load and the signal source voltage is unaffected by the load. The reference signal is 0.775 V RMS. For practical purposes, the dBu concept requires signal source impedances of approximately 50 Ω and load impedances equal to or greater than 20 k Ω .

The audio signal levels are expressed

according to the formula:

$$N(\text{dB}) = 20 \log_{10} (V/V_{\text{ref}})$$

where N(dB) = The number of decibels

V = The measured voltage level

V_{ref} = The reference voltage of 0.775 V

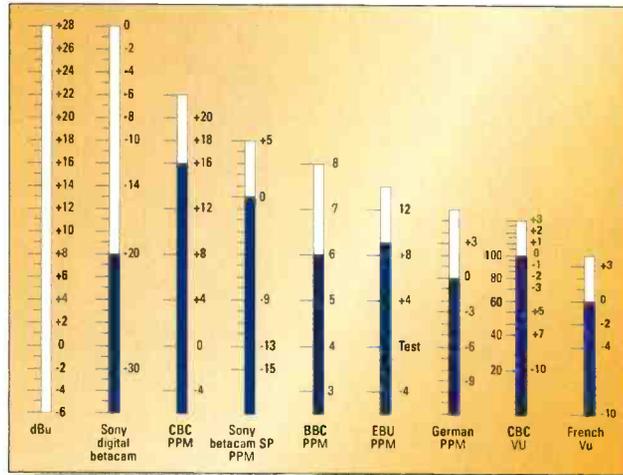


Figure 4. Upper-scale details of some audio level meters used throughout the world and the corresponding steady-state signal level in dBu

The peak-program meter (PPM): The PPM is a peak-reading instrument capable of accurately displaying audio-signal transients. The meter's input impedance is bridging, that is, it is greater than 6 k Ω . Some current designs feature a 10 ms attack time (risetime) and a 2.65 s fallback time. This characteristic amounts to a "sample-and-hold" approach to audio signal-level monitoring. It allows the user to accurately monitor audio signal levels under steady-state as well as program conditions and reduces the need for large amounts of headroom in amplifiers. Neither the scale nor the display is universally standardized. Some type of compression is required to reduce the dynamic range of the audio signal, which otherwise would exceed the transmitter and receiver capabilities.

Living with the two types of meters

Unfortunately, there are two entrenched camps: one steadfastly preferring the PPM and the other pre-

ferring the VU meter. Figure 3 shows that the PPM is capable of more accurately displaying audio signal peaks than the VU meter. In an effort to satisfy all users, some contemporary equipment manufacturers offer equipment with selectable VU or PPM rise/fall times.

Figure 4 shows details of the upper part of the display scale of some audio-level meters used in various countries. This drawing clearly shows that, in addition to transit-response differences, various organizations have different reference levels (SOL) and meter display scales. This situation creates problems in international television program exchanges, and is not likely to change in the near future. The problem is complicated by digital equipment

that normally references all audio levels to the maximum signal level before clipping, which is identified as 0 dBFS (zero dB full-scale). Therefore, all audio levels have a negative-dBFS value, with the SOL set normally to -20 dBFS indicating that the equipment has a 20 dB headroom. This new approach creates confusion with audio operators who have an analog background and a strong attachment to the VU meter.

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

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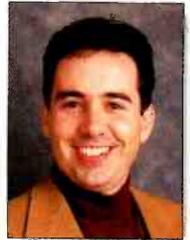
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Backups for IT-based facilities

BY BRAD GILMER

Backup systems for television facilities began to appear almost immediately after paid advertising. Loss of commercials meant loss of revenue, and it did not take people long to figure out that having a backup plan makes financial sense.

Today, almost every television facility has some sort of backup plan. But as IT-based facilities become the norm, are new backup strategies required? Video servers are now employed in approximately 70 percent of all television facilities. For critical applications, engineers frequently specify mirrored or duplicate servers. Given an IT infrastructure, are other strategies available?

Full redundancy

For the really big guys, full redundancy is frequently employed. If they need one server, they buy two. If they

Fully redundant systems seem easy to build: design your facility and then multiply it by two. But like almost anything in life, things get a little more complicated. It takes a lot of hard work to design a fully redundant system that really is redundant. For example, you might design a completely separate transmission path,

expensive to build a redundant IT infrastructure. This is because the cost of most off-the-shelf IT equipment is so low. In Figure 2 on page 50, a server is fitted with two Ethernet cards. These cards feed two separate Ethernet switches. From there, the redundant networks are supplied to PCs fitted with redundant Ethernet

If you don't have an unlimited budget, how can you backup your systems — especially as we move towards IT-based television?

but run all the equipment from a common house sync generator. Furthermore, over time, redundant systems have a way of becoming intertwined as facilities are modified or expanded. In the end though, fully redundant systems may make sense for some people.

cards. This example is extremely simple and, of course, the server is a single point of failure. However, the total cost of the redundant network shown in this figure is about \$400. Building redundant Ethernet networks is a topic for another column. But, for now, rest assured there are many different ways to configure a network so that there is no single point of failure.

High reliability, high availability and fault tolerant

When considering backup strategies for IT, you may run into some unfamiliar terms, or terms that are used interchangeably, but have subtly different meanings.

There are three approaches engineers can take to building bulletproof IT-based tele-

vision systems: high reliability, high availability and fault tolerant.

High reliability means that the component or system has a high mean time between failures (MTBF). The system can run a long time before

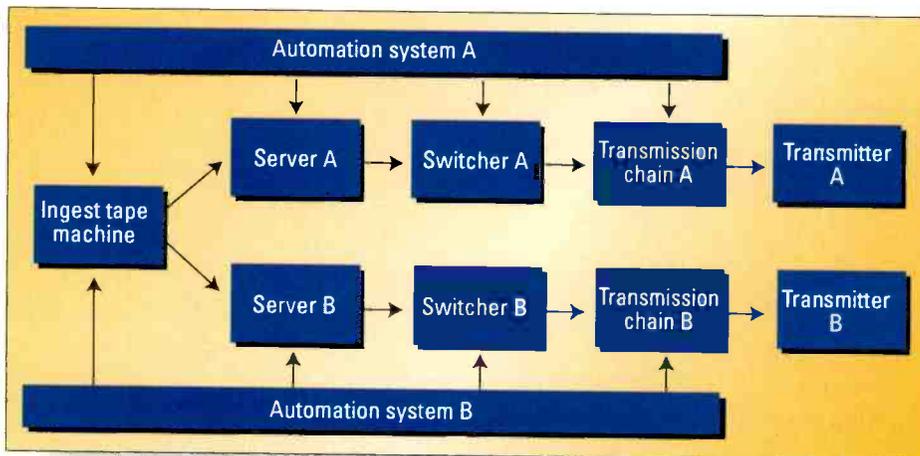


Figure 1. Simplified diagram of a fully redundant system

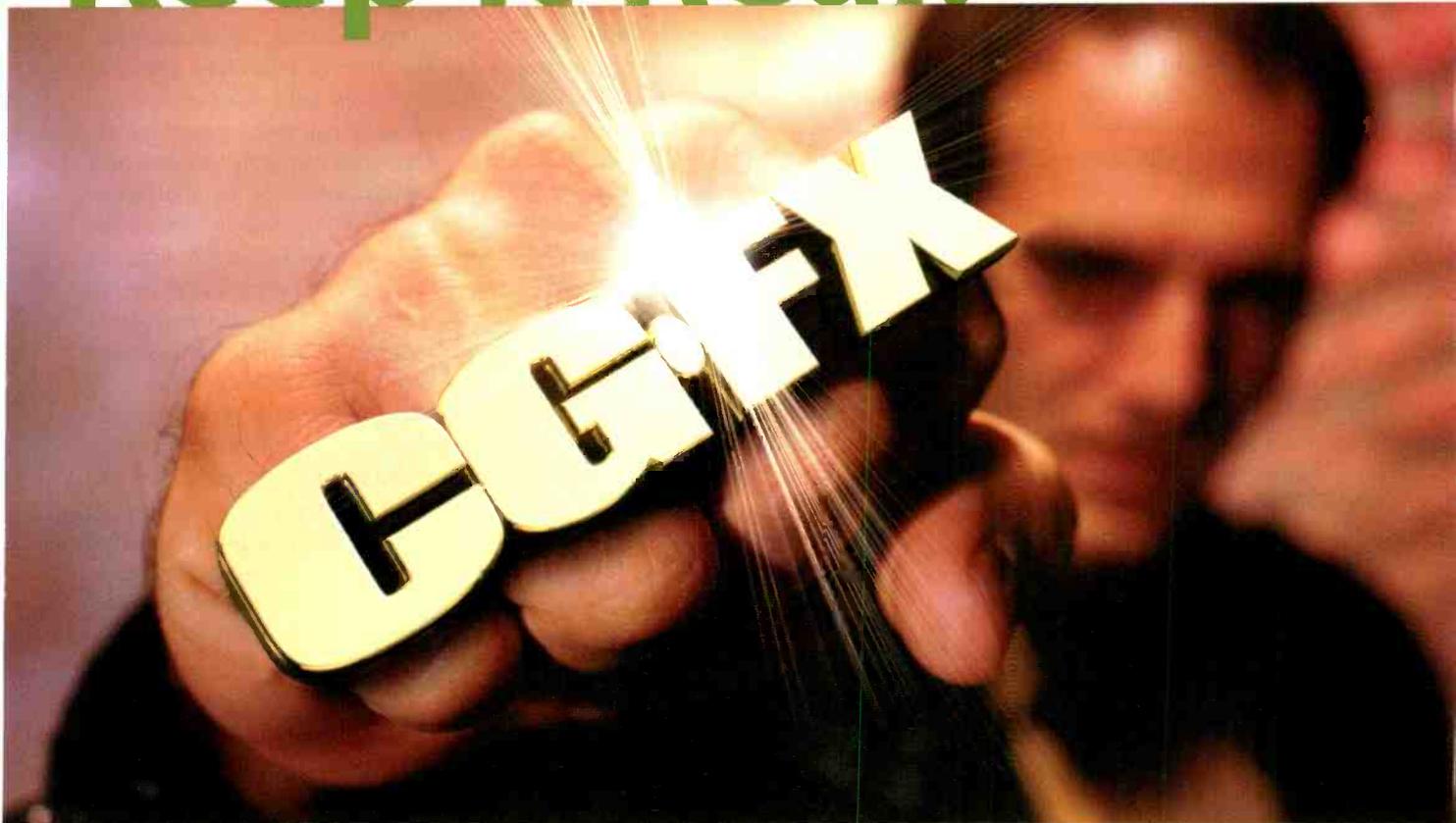
need one switcher, they buy two. The operations are driven by two completely separate automation systems, with a single ingest process used to populate the video servers (see Figure 1).

If you don't have an unlimited budget, how can you backup your systems — especially as we move towards IT-based television? In many cases, while it may not be possible to build a totally redundant facility, it is not prohibitively

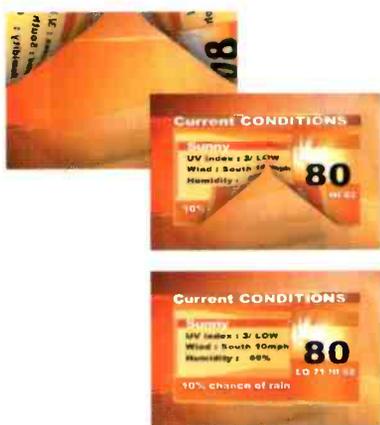


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failing. Using high-quality components, overrated parts and building a high-quality device usually achieves high reliability. Highly reliable devices may undergo extensive testing including "shake and bake," in which the assembled systems are subjected to extremes of temperature and vibration. Highly reliable systems are usually built and tested by a single vendor. This is to assure that the system and all its components meet the design specifications. Needless to say, highly reliable systems can have a high price tag but, in some cases, this solution can be the most economical, depending upon the cost of outages. Furthermore, it may be that the functionality or performance you require is only available in a high-reliability device.

The second approach, high availability, uses a different strategy. The point is not to prevent failures, although high-quality components can be used. Instead, a designer uses off-the-shelf components to design a system so that a single failure has little impact. An example of a high-availability disk system might include multiple just-a-bunch-of-disks (JBOD) arrays, perhaps RAID configured, perhaps not. The costs of the arrays are low enough that the whole array can be duplicated economically. Another example

might be to design a network with two completely separate Ethernet systems. The servers and clients might have two Ethernet cards in them instead of one. High availability typically takes advantage of the low price of consumer computer hardware. It might seem cumbersome to put together two completely separate Ethernet networks. But from a cost standpoint, Ethernet is practically

free these days, unless you are talking about the very high-speed technology.

The effect of using this approach is impressive. If two devices are combined in a hot standby configuration, the MTBF of the total system increases by the square of the individual MTBF numbers! Furthermore, the cost of off-the-shelf equipment can be substantially lower than equipment manufactured for high reliability. But, as pointed out above, off-the-shelf equipment may not have the functionality or performance you require.

Don't get the wrong idea — high-availability systems are typically well engineered. They can provide excellent recovery from faults, and may provide a lower overall cost than high-reliabil-

ity dual disk controllers and automatic changeover software. Many fault-tolerant systems are designed so that backup devices go on-line without any service interruption. The only way you know there has been a failure is by checking status monitoring and alarms. Therefore, checking for alarms on fault-tolerant systems is critical. If you lose a power supply in a dual-power-supply unit, the output of the device will be unaffected. However, if you fail to detect the problem and subsequently lose the other supply, you could be off the air.

High-reliability systems may come with 24-hour support that is geared for the IT and business world. This support can be costly, but it can really be a lifesaver in critical applications. High-availability systems may not

come with this level of support (and associated cost). This can be a good thing or a bad thing, depending on your expectation.

The choice of high reliability, high availability or fault tolerance may be as much philosophical as it is economic or technical. Some users feel much more comfortable with systems that are designed as a whole, and that have IT-type support. Others feel more comfortable with systems built out of readily available components that they can easily see and understand.

When considering IT-based systems and the issue of reliability, be sure to think about your own engineering philosophy and buy the appropriate solution.

Backup the database

Imagine getting a call to come to your facility in the middle of the night. The automation system seems to be up, but it is unable to find any

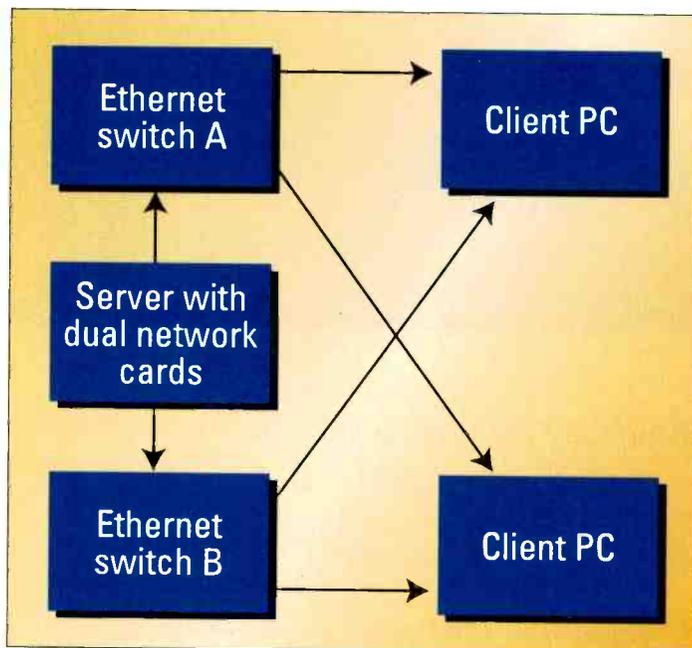


Figure 2. Redundant Ethernet can provide backup at minimal cost.

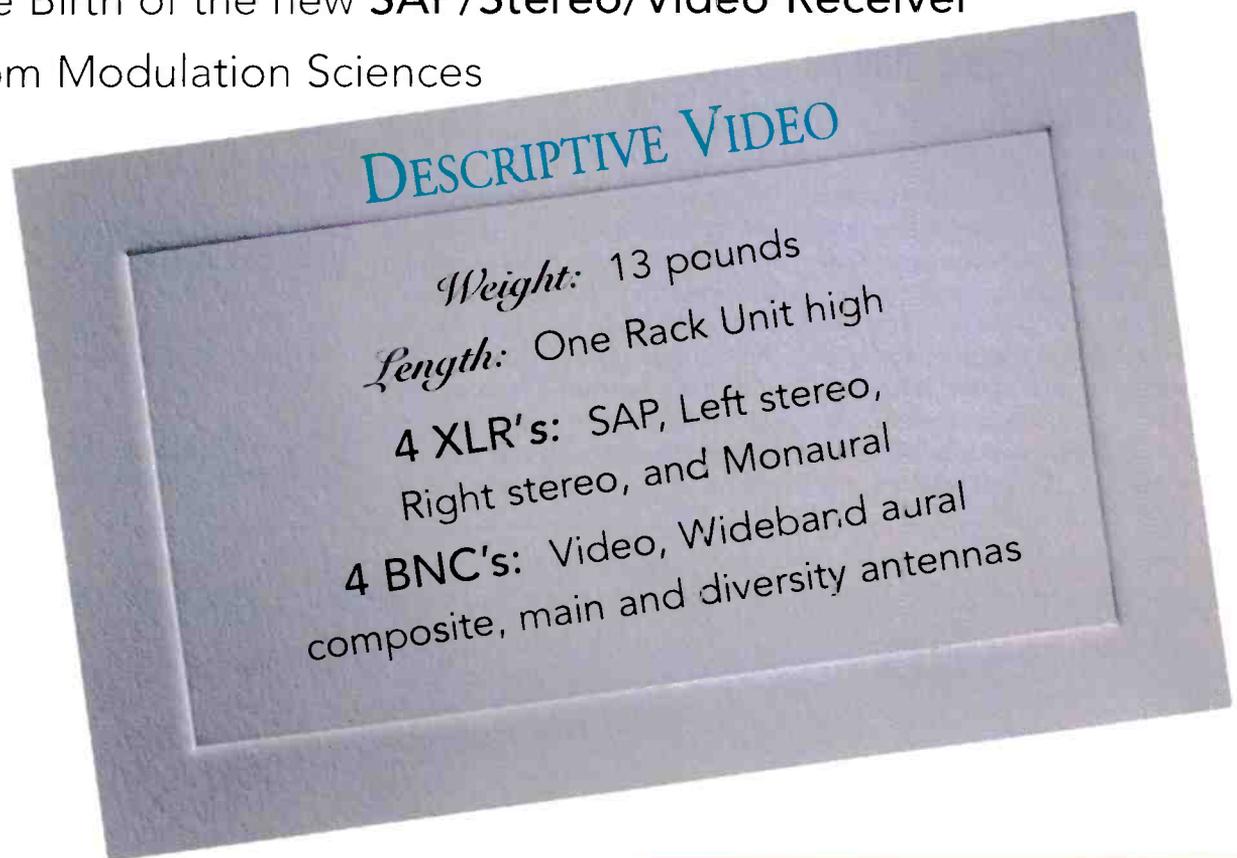
ity systems. But, typically, high-availability systems may have a higher fault rate than fault-tolerant systems, although this depends entirely on decisions made by the system designers.

In the fault-tolerant approach, systems are designed so that a single fault will not cause a total system failure. Fault-tolerant systems frequently include things like dual power supplies, redundant disks,

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commercials or programs. You have a small system; perhaps it stores a few thousand items. After some research, you determine that the database in the automation system has become corrupted. Depending on what has gone wrong, you might have things back on

author lost the database in a large, tape-based robotic system. Over 1000 tapes were spread out on the floor, and engineers and operators scrambled to locate the correct tapes and get them back in the machine before they were needed for air. It

are the best option. There are many tape-backup systems available on the market. It almost doesn't matter what option you choose, just as long as you have something in place. Systems with tape changers now make it easy to rotate tapes on a regular basis without having to remember to physically change a tape. For critical applications, you have several options. Modern databases allow you to mirror the database onto separate disks in the same server, or even mirror entire servers. There are many choices, but the most important factor is to put a backup plan in place so that you won't have to pick up the pieces after a disaster. **BE**

The choice of high reliability, high availability or fault tolerance may be as much philosophical as it is economic or technical.

in a matter of minutes. But without a proper backup strategy, the first thing you should do is go put on a pot of coffee — it's going to be a long night.

How very true is the old adage that you really don't appreciate what you've got until it's gone. If you have ever lost a database in a modern television facility, you know how true this saying is. Several years ago, the

was an amazing three or four hours, but the staff managed to get the system back on the air. As that operation has moved to IT-based television, the scene described above is in the past. Pulling tapes is no longer an option.

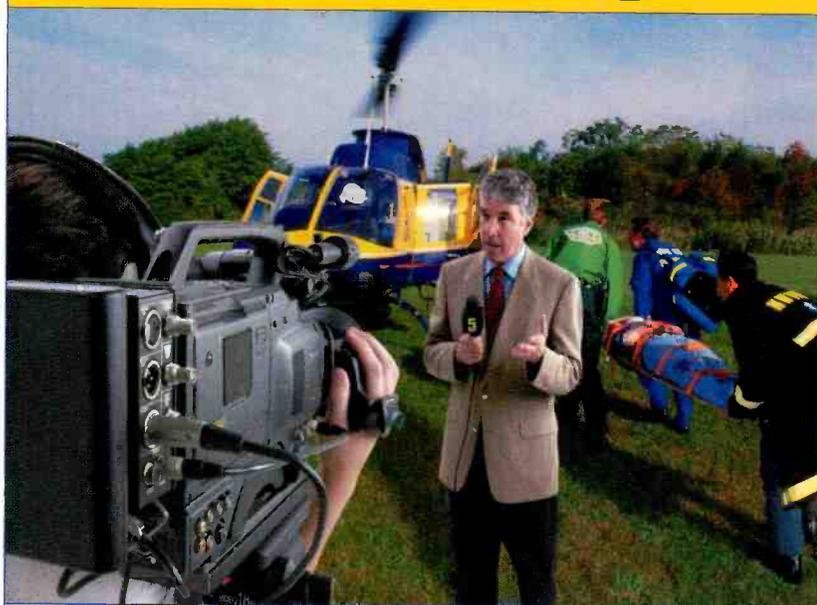
Since the database is such a critical part of almost any on-air operation, having a backup plan and using it is critical. It may be that tape backups

Brad Gilmer is executive director of the AAF Association and technical moderator of the Video Services Forum.



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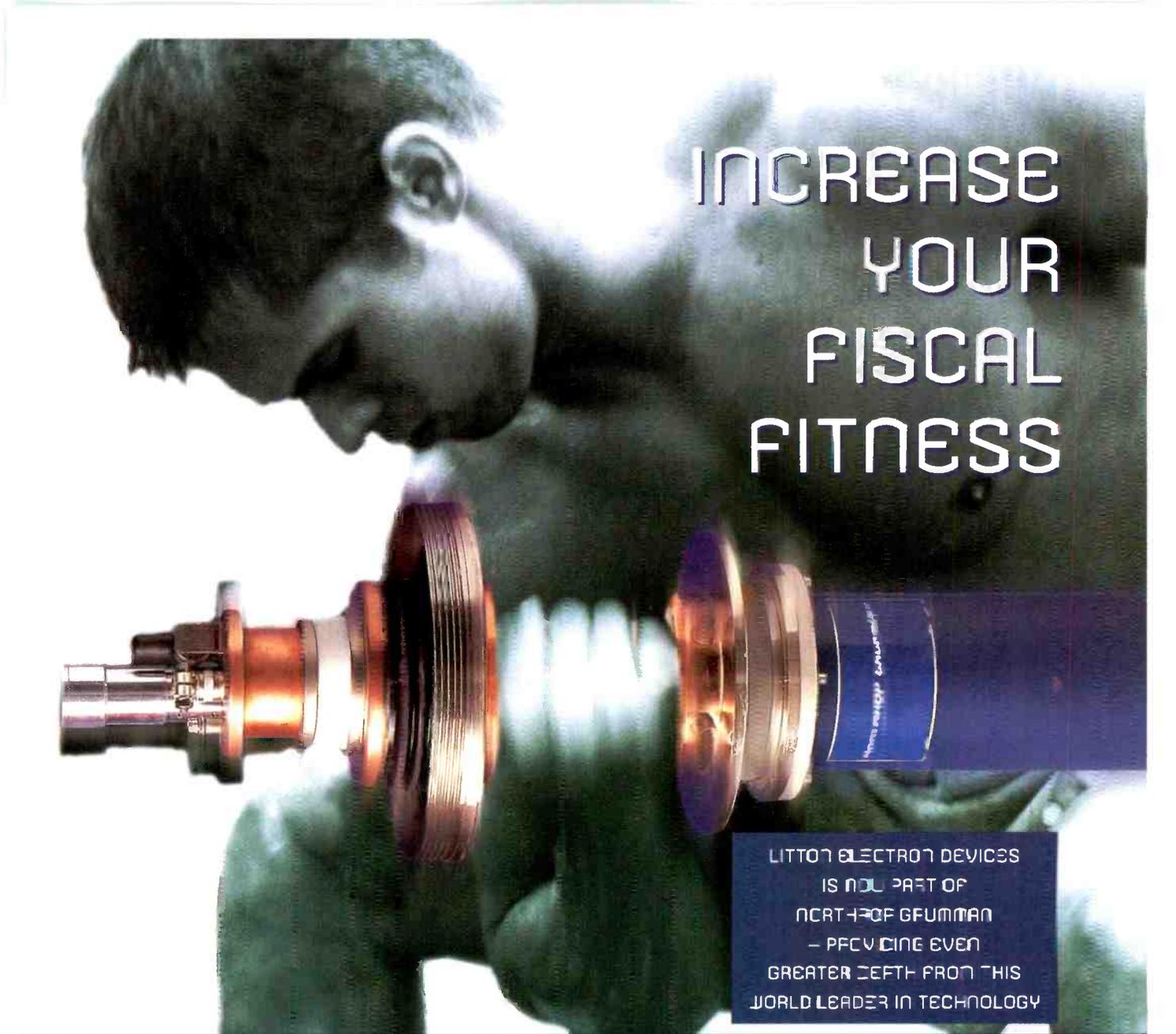
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Mixers - smarter than ever

BY BENNETT LILES



If you were selecting a sound mixing console 10 years ago, you would have only needed to ask how much space it would occupy, how many input channels were required, and how many auxiliary outputs on each channel would be included on the board to suit the planned application.

While in the past decade there have been enormous improvements in analog audio mixers and related equipment, most of the new trends established in that time have been in the digital realm. This certainly doesn't mean that analog is dead. Major manufacturers are still producing capable analog boards with a variety of features including a degree of snapshot storage. But with digital video upon us, computerized tools available and productions for multiple recording formats

equipment that has been traditionally placed near the mixer. Most of it is gone. Even the ubiquitous patch panel is disappearing, replaced by digital patching and routing within the mixer or its rack-mounted electronics. The concept of having audio signals processed exclusively by physically separate units and never

Metering

On the mixer itself, the most visible modern feature is the increasing use flatpanels. These have evolved from the analog VU meters, which are still abundant, to segmented bar graphs, to the all-LED display evident on the latest models. One advantage of the flat-panel

Major manufacturers are still producing capable analog boards with a variety of features.

passing through the mixer has been around for at least thirty years but new digital interfaces have taken this concept to its ultimate end. The latest top-of-the-line (and price) digital mixers use multi-channel audio digital interface (MADI) to put the routing power into electronic bits rather than pounds of copper. MADI is an international standard (AES-10) that allows 56 audio channels on a single coaxial cable or fiber-optic interface. A single pair of coaxial cables can provide 54 bi-directional channels of audio and machine control. When using fiber-optic cable as the medium, runs of up to two kilometers are possible without signal degradation. This has revolutionized the connection of multi-track recorders and the relationship between mixers and station routers.

displays is that changes can often be made with software upgrades rather than buying and installing new modules. Metering has always been a source of wide variance in individual operator tastes, and in response, the latest top-end digital and analog mixers may be ordered with a choice of metering module types. With the advent of internal signal processing including noise gates on each channel, many input modules now include a gain reduction meter beside each input fader. These are desirable for live sound applications using a large array of microphones. Surround sound capabilities have also made vectorscope displays and panning joysticks popular options.

Mix-minus

Another indication that designers have been listening to operators has been the addition of dedicated mix-minus routing. For years, broadcast sound operators have specified VCA fader control as the best way to generate post-fader, mix-minus outputs. The VCA fader option, like many other features, was originally included on mixers for other purposes but was



This Neve Libra Live II exhibits a combination of bar graph, ballistic VU and flat-panel displays.

becoming common, it is inevitable that the big new trends will be digital.

MADI

On visiting a digital broadcast audio control room, the first big change anyone would notice is in the

machine control. When using fiber-optic cable as the medium, runs of up to two kilometers are possible without signal degradation. This has revolutionized the connection of multi-track recorders and the relationship between mixers and station routers.

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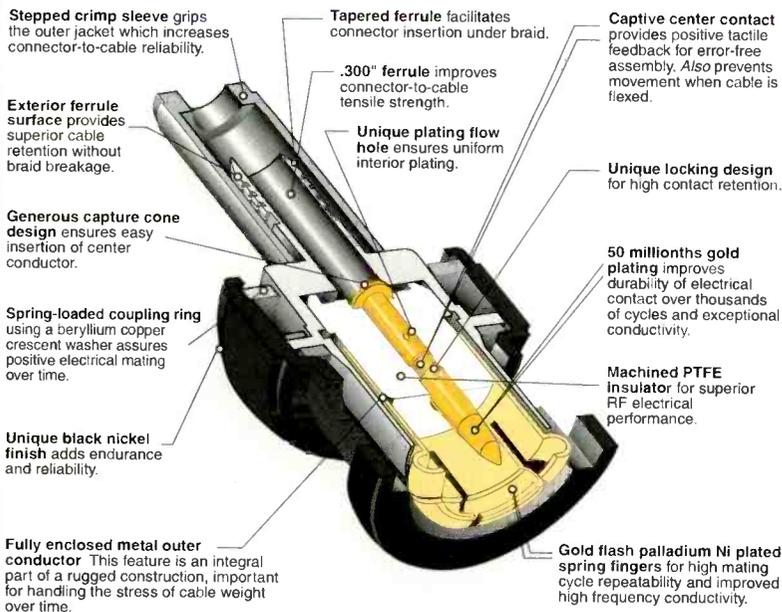
adopted by broadcast sound operators as a handy tool for generating mix-minus feeds. The latest digital and analog mixers include a dedicated mix-minus control section where various signals can be selectively subtracted, overall and independent level control is provided, and talkback can be individually assigned.

Total recall

Snapshot storage and recall has been around for awhile, but the newest advance with storing setups is the scope of parameters that can be stored and the choice of internal or external storage media. With more routing and patching functions being incorporated into mixer electronics,

the natural progression in snapshot storage is the ability to also store and recall routing configurations. This is a truly significant step. Every broadcast sound operator has a bag of stories about how their state-of-the-art mixer could store and recall snapshots in a flash, only to have the entire show setup trashed by someone making unannounced changes on an external router or patch panel. In stations where there are several mixers of the same make and model installed in multiple control rooms, the advantage of an external storage medium can save the day when

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equipment failure requires moving the operation to another control room on short notice. The least expensive answer to this situation has been to slip a Type III PC card into the mixer and download the snapshot to the card. Even with a single control room plant, external snapshot storage can be a relatively cheap hedge against total board or computer failure where the snapshots are wiped out. Combined with all-flat-panel displays, snapshot storage can also store all-important individual channel identification (until the show's guests decide to switch seats).

Surrounded

One popular and current issue is whether or not to go with a mixer that includes surround sound mixing and monitoring. Just do it. The chances are that any top-end digital mixer that otherwise has the needed features will also have some degree of control and



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monitoring of 5.1 mixes. The driving force behind the trend to surround sound features on broadcast mixers is the increasing prevalence of multipurpose production. While being mixed for a live broadcast audience, the same show may also be recorded for later use on a DVD, Internet or as a radio feature. The consumer market is also

making its demands in this area. Practically every home theater system

HAL does sound

The basic physical source for these

Practically every home theater system now offers surround sound as a basic property.

now offers surround sound as a basic property.

new capabilities is the rapidly increasing integration in digital signal processing. DSP advances have made it possible to include on one chip features that five years ago would have occupied a large slice of the entire mixer frame or several rack units of auxiliary processing equipment.

Along with this has come the true marriage of computers and mixers. Digital workstation features, including time code display and selective machine control, have been incorporated into the center section of many recent mixers. When combined with automation and snapshot storage, these boards can handle live production and then quickly convert to a post-production role.

This has a large potential in remote trucks where there are pre- and post-show packages to assemble. In fact, the primary reason that mixers have maintained their physical form with faders and separate meter sections is simply a matter of the human interface. It can all be done on a computer but few operators would seriously entertain the notion of mixing a live show with a keyboard or mouse. These tools are used to navigate the huge array of setup options and modes.

The major cost advantage of heavy computer/mixer integration is evident when upgrades are needed. Most manufacturers offer a wide range of downloadable software upgrades for the popular computer operating systems. Instead of buying more meters or adding another copper-based patch panel, a simple software upgrade can do it all. **BE**

Bennett Liles is a freelance writer and TV production engineer in the Atlanta area.

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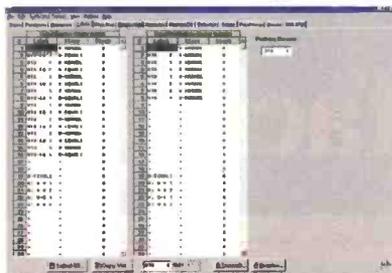


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SHOWCASE

ASCN uses Grass Valley Group M-2100 SD and M-2100 HD master control systems to control programming in their new HD facility.



ASCN's new HD facility

BY JON HAZELL

Portland, OR-based Action Sports Cable Network (ASCN) has quietly and quickly built a green-field, high-

definition broadcast facility from the ground up.

Begun as an extension of the cable

company that televised the NBA's Portland Trailblazers games, ASCN has grown into a completely digital

From the desk of

Richard L.

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SYSTEMS DESIGN SHOWCASE

sports network that provides 24-hour programming to cable-system and satellite-based viewers from northern California to southwest Washington. Its programming is a mix of the region's professional, collegiate and amateur athletics, including regular-season games.

The network facility actually got its start at a basketball game in 1999. That night, as the Portland Trail Blazers played the Houston Rockets, the contest was shot and recorded in

HD. Trail Blazers executives were amazed at the results: Instead of seeing only the offense on either end

that to profitably manage its operation, it needed a flexible infrastructure that could get any signal,

Sports programming is an unrivaled platform for showcasing HD quality.

of the floor, they could see the defenses setting up, action away from the ball and far greater detail in the crowd. The totality of the experience was superior to anything they had seen.

The business case for building an HD facility was straightforward. Despite a proliferation of formats, the quality of HD images is without peer — and sports programming is an unrivaled platform for showcasing that quality. So the network invested for the long haul with a two-pronged strategy for building its audience and its brand: deliver high-quality, standard-definition programming in the near term and promote and showcase its high-definition capabilities for long-term success.

Over the next two years, as the broadcast-equipment market matured, the network honed its HD broadcast center design philosophy. At the heart of that philosophy was a strong belief in flexibility —

anywhere, any time.

Design team

Mike Janes, director of engineering
Jon Hazell, chief engineer
Steve Calou, project manager/lead engineer
Chris Crummet and Sandi Wolfe, engineers
General contractor: R&H Construction, Portland, OR

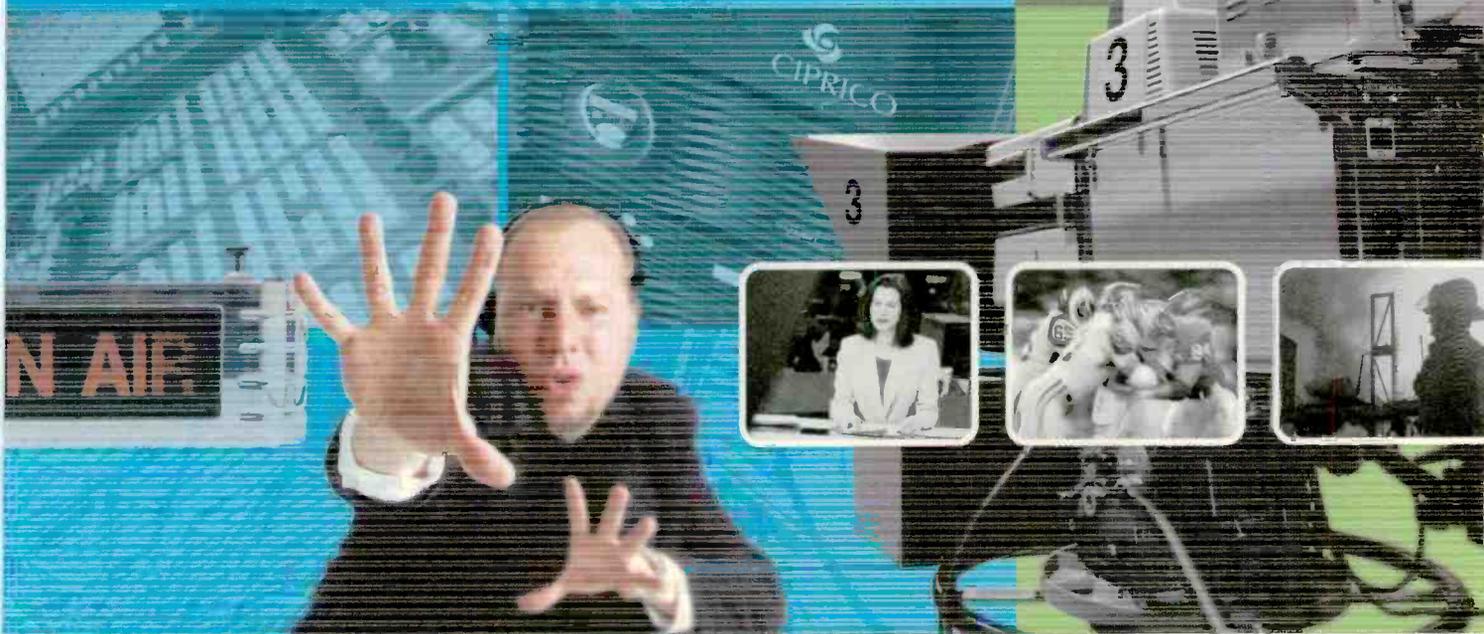
Equipment list

Grass Valley Group Series 7500 WB wideband digital routing matrix
Grass Valley Series 7500 NB narrowband digital routing matrix
Profile XP Media Platform systems
M-2100 SD master control system
M-2100 HD master control system
Sony HDC-750 HD cameras
Vinten Quattro pedestals
Fujinon 26:1 HD lenses
QTV prompters
Sony HDC-750 HD camera
Fujinon 10:1 wide-angle HD lens
Sony MVS-8000 HD production switcher
Sony HD and SD monitors
Sony HDW-500 HDCam VTR
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ASCN uses six Grass Valley Group Profile XP Media Platform systems for playout, interfaced with the network's automation system, tape machines and other systems for easy expansion.

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ASCN is promoting the capabilities of its regional sports network by placing HD receivers and screens in Portland-area sports bars to receive its HD broadcasts of high school and college games. Photo courtesy Grass Valley Group.

Flexible infrastructure

High on the network's list was a high-capacity signal-management infrastructure. Instead of feeding signals into distribution amplifiers and using a small routing switcher to move them around, the network wanted a high-bandwidth solution that could handle everything from SD, HD and analog video signals to AES, embedded and analog audio. If a producer, for example, wanted to take a piece of HD video, move it to an SD nonlinear editing suite for incorporation into a feature package, then send it back to an HD server for playout — perhaps embedding or de-embedding audio along the way — the signal-management infrastructure had to provide that kind of flexibility.

In five months, the network built a fully equipped HD broadcast center that includes a four-camera studio, online HD editing facility, uplink fa-

cing matrices, a 7500 NB series narrowband AES audio router and two Grass Valley Group M-2100 digital master-control systems.

To profitably manage its operation, the network needed a flexible infrastructure that could get any signal, anywhere, any time.

cility and a small mobile truck. The nerve center of this operation is a signal-management and distribution infrastructure that includes six Grass Valley Group Profile XP Media Platform systems for playout and ad insertion, two Grass Valley Group 7500 WB series wideband rout-

For video signals, the network deployed two 128x128 7500 WB series digital routers, which can manage and distribute digital signal from 10 Mbits/s to 1.5 Gbits/s. The routers offer unrestricted, non-blocking, deterministic switching through a flat crosspoint matrix to ensure that

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the network's input and outputs are always available. Scalable to 1024x1024, they can be configured to handle SD and HD signals in the same frame simultaneously, creating workflow and capital-equipment efficiencies as well as a cost-effective HD upgrade path.

For audio signals, the network uses a 256x256 narrowband audio router. Scalable to 1024x512, the router gives the network the infrastructural elasticity necessary to handle a range of signals, including AES/EBU digital audio, Dolby Digital, Dolby E, surround sound, 5.1, AC3 and asynchronous data rate streams.

The network also deployed six Profile XP Media Platform systems: four SD PVS 1000 systems and two HD PVS 2000 systems. There were several advantages to this approach. First, the platforms enable the network to easily expand as its operation grew. Second, the servers interfaced easily with the network's automation system, tape machines and other systems. Finally, and specific to the high-definition platform, the PVS 2000 system offered the slow-motion performance necessary for the network's high-quality sports programming.

Controlling the network's operation are Grass Valley Group master-control systems. The ability of the systems to handle 525- and 625-line, standard-definition digital formats and all leading HD signals gave the network the flexibility it needed. And their ability to interface with the network's automation system en-

abled them to mesh smoothly into its infrastructure.

Today and tomorrow

Since going on the air July 1, 2001, the vast majority of the network's original programming has been produced in HD, and broadcast in both HD and downconverted standard-definition formats. At the same time, the network is assiduously promoting its HD capabilities by striking agreements to place HD receivers and screens in Portland-area sports bars. The network has three screens in place and projects to have seven more

by the end of the year.

Today, ASCN is part of a core group of Paul Allen-owned companies including Action Sports Entertainment Mobile and Post Up Productions.

By offering high-value, regional programming, ASCN can capture the audience necessary to be cost effective today. And by continuing to promote the quality of HD images and associate its brand with that quality, it increases the chances that these viewers will keep tuning in.

BE

Jon Hazell is chief engineer for the Action Sports Cable Network.



For audio and video signals, ASCN chose Grass Valley's 7500 NB series narrowband audio router and the 7500 WB series wideband digital router.

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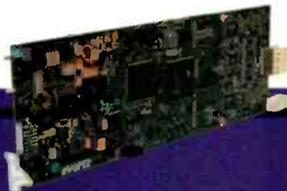


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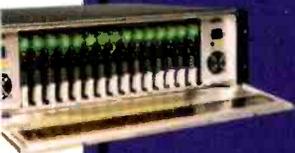
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Electrical wiring 101

BY BRAD DICK, EDITORIAL DIRECTOR

What engineer out there hasn't been called upon to replace a light switch, circuit breaker or other electrical device? Most of us have, I'll bet. Unfortunately, as knowledgeable as we broadcast or post-production engineers think we are, the worlds of *power* and *audio/video* are vastly different. And, making a mistake at 120 V AC can have far different consequences than at audio or video levels.

Fortunately, some of the basics you learned in electricity 101 apply. Once you understand some of the terminology, you're off in the right direction. Let's begin with a review of some basic terms.

It's elementary, Dr. Watson

Receptacles, switches, plates and cord connector bodies are available in a wide range of sizes, ratings and styles with specific features and characteristics to meet most design/application requirements.

Have you ever wondered what the

difference is between a 48-cent light switch and one that costs three dollars? The terms "economy," "competitive," "intermediate" or "residential" are sometimes used to indicate that the device is economically priced or designed for light-duty applications. Terms such as "specification" or "super-specification" would indicate devices that are of better

quality, designed for greater reliability and usually higher priced. Your favorite hardware store may use the terms "residential" for the cheap switch and "commercial" for the more expensive switch. Are the commercial versions different? Well, they certainly cost more.

None of these terms has an official status with standardizing agencies such as Underwriters Laboratories (UL), Factory-Mutual (FM), Electrical Testing Laboratories (ETL), or the

National Electrical Manufacturers Association (NEMA).

Presently, UL lists wiring devices for only two grades, standard and hospital grade. All devices, whether termed intermediate, economy or specification, must meet identical UL requirements (although as mentioned above, specification grade devices are typically

One of the most common mistakes non-electricians make is to select the wrong AC device.

of better quality construction).

Select your switch

There are two basic types of snap switches - AC general use and AC-DC general use. A "T"-rated AC-DC is also available for 125 V, tungsten filament lamp loads.

The AC-DC type is designed with a quick-make/quick-break action requiring rugged springs and components to assure dependable operation. If T-rated, its contacts are designed to handle the high inrush current of incandescent lamps. The AC-only type has a somewhat slower make/break action.

For example, AC-DC general-use switches are rated 3 A, 5 A, 5 A or 6 A, 10 A, 20 A, 30 A and 40 A, and 60 A at 125 V; AC general-use switches are rated 15 A, 20 A and 30 A at 120 V. Ratings for other voltages are also provided.

All AC general-use switches are marked AC in addition to their electrical rating. AC-DC general-use switches usually are not marked AC-DC, but are always marked with their electrical rating.

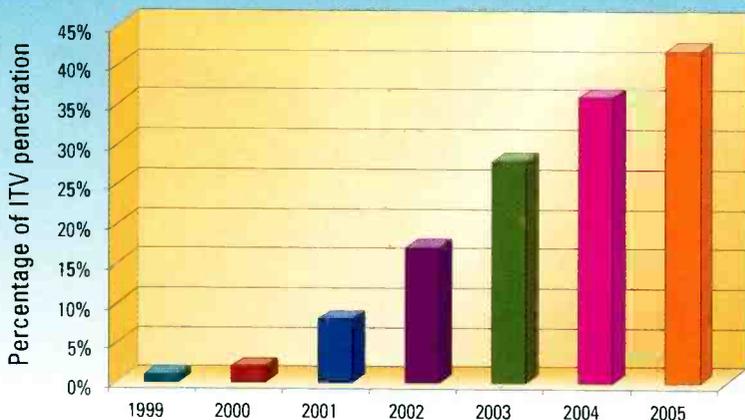
Mercury switches have an AC rating of 125 V, 15 A or 20 A, but they are also T-rated at 10 A, 125 V DC.

Flush snap switches are available in the following types: single-pole; double-

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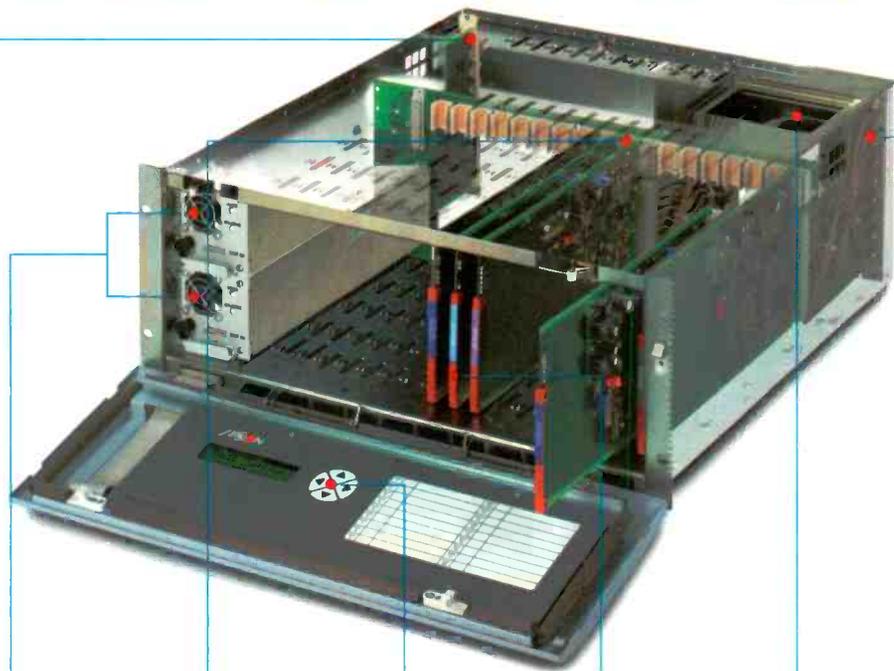


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pole; three-way; four-way; two-circuit; maintained contact, SPDT, DPDT; and momentary contact SPDT, DPDT; SP normally open, SP normally closed; DP normally open and normally closed; and three-way. Most of these switches can be obtained with key-lock design and ratings vary among manufacturers.

Use the right terminal

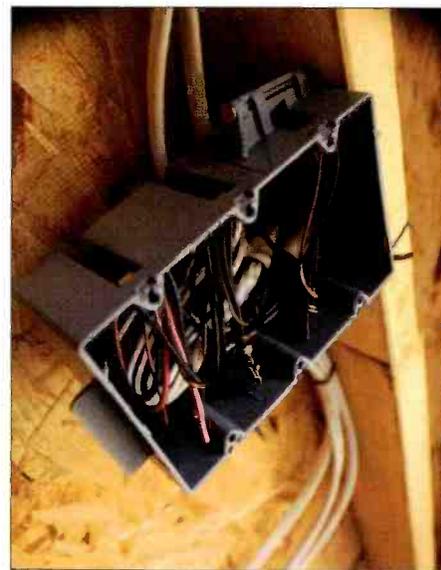
How many times has someone asked you which wire goes to which terminal? The terminals on AC power devices are typically labeled "white" and "black." Boy, does that cause the poor neophyte problems if he runs into a three-way circuit using a red wire.

Switches may also be identified for the type of wire they are rated for. Line terminals of 15 A and 20 A switches marked *CO/ALR* are for use with aluminum, copper and copper-clad aluminum conductors. Terminals of switches rated 30 A and above marked *AL/CU*

also are suitable for aluminum, copper and copper-clad aluminum conductors. Also, switches furnished only with screwless pressure terminal connectors are acceptable for use with copper and copper-clad aluminum conductors, *but are not suitable for use with aluminum conductors.*

Switches provided with push-in screwless pressure terminal connectors have a particular advantage when they are ganged in the same box. Sec. 380-8(b) of the NE Code prohibits ganged snap switches with exposed live parts if the voltage between adjacent switches is over 300 V. Because switches with pressure-type terminals have no exposed live parts, they can be used to satisfy this Code rule.

Wall-mounted occupancy (motion) sensors can replace standard wall switches, and many of these models incorporate a switch mechanism for override capability. The area they can



Electrical wiring seems simple in comparison to that of a routing switcher or transmitter. However, don't assume you know enough to stay out of trouble just because you understand Ohm's Law. Your life, and the lives of your staff, could well depend on what you don't know.

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cover depends on several factors, including the mounting location and height, room configuration, furniture, the sensor's sensitivity setting and type of motion detection. While they may sound neat and are often recommended by architects, I've found them unreliable in my conference rooms. It's embarrassing to have the lights go off in the middle of a client demonstration.

X10 to the rescue

Electronic enhanced switches (typically using X10 technology) provide a number of features that are increasingly being used in residential and institutional occupancies. For example, fully automated lighting controls allow any indoor or outdoor light to be remotely controlled from virtually any point within the system, which consists of controllers and receivers.

Configured as wall switches and re-

ceptacles, the receivers accept command signals sent through the existing AC branch circuits. In addition, a wall-mounted programmer can be used or a pocket-sized, handheld controller can control these devices.

A word of warning from firsthand experience. These controlled circuits can be unreliable. I've found my X10 circuits turned on by lightning and children pushing the wrong buttons on universal remote controls. It may sound cool to program your coffee pot to come on automatically in the morning. But, what happens if it's accidentally turned on while you're away. Some circuits are better left to manual activation.

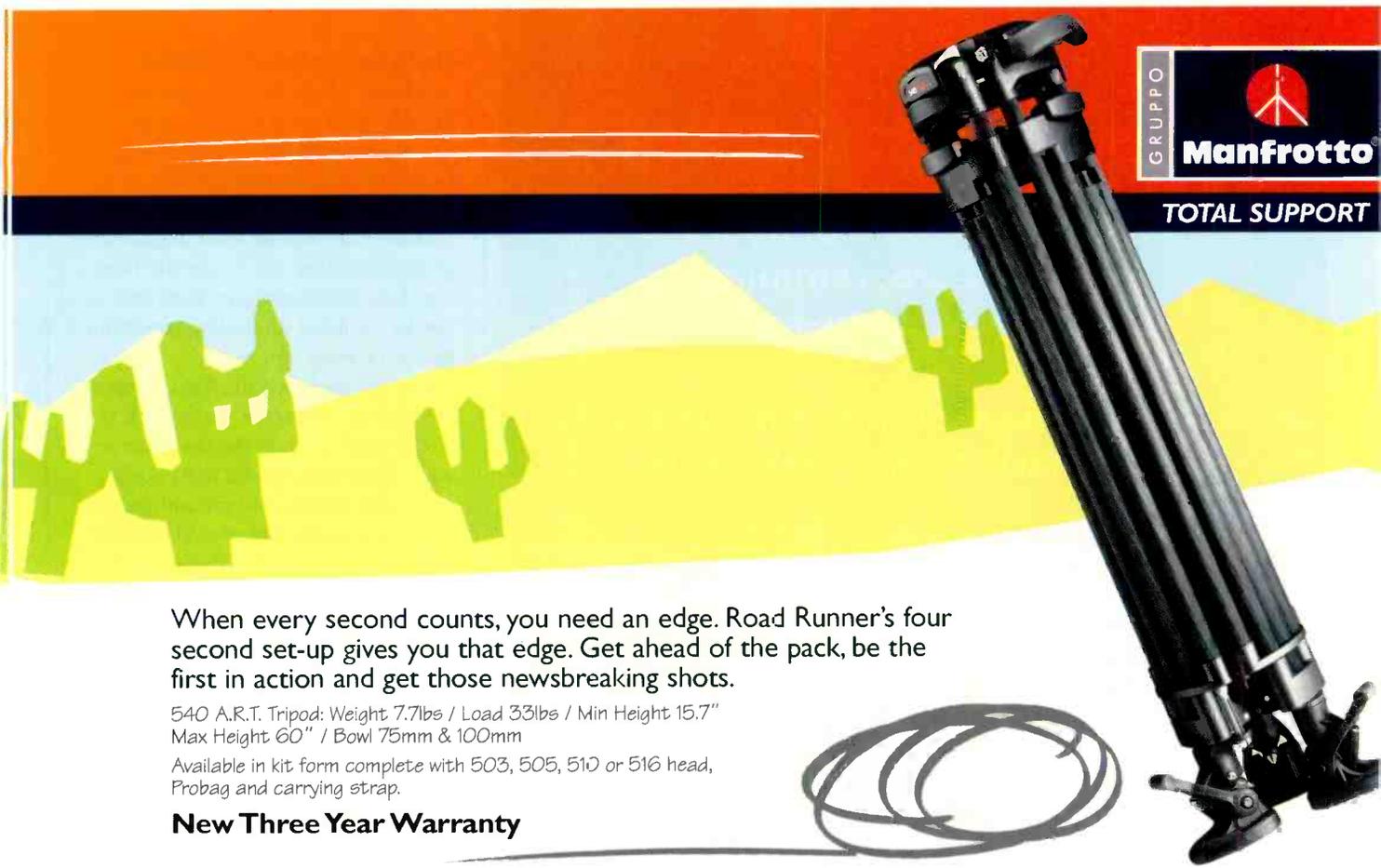
Receptacles. Receptacle ratings range from 10 A to 400 A, with some sizes available at 125, 250, 277, 480 and 600 V. Most popular are the 15 A and 20 A flush type, rated at 125 V and 250 V. These are available with several different slot configurations in grounding and

nongrounding type. NE Code rules require that receptacles installed for the attachment of portable cords shall be rated at not less than 15 A, 125 V or 10 A 250 V. Sec. 210-7 states that the receptacles on 15 A or 20 A branch circuits must be of the grounding type.

Receptacles located outdoors but protected from direct contact with rain by a roof or overhang are considered to be *damp areas*. These receptacles must be protected by a closable cover when the plug cap is not being used.

In *wet areas*, the receptacles must be protected by a cover that will not be affected by rain when the plug cap is installed. Any cover acceptable for use in wet locations (outdoors without protection of roof or cover) also is acceptable in damp areas.

Grounding-type receptacles are available with special grounding means designed into their box-attachment screws that automatically ground the



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grounding terminal to the box when the receptacle is installed.

Special receptacles. Split-bus receptacles are available in flush duplex types with ratings of 15 A or 20 A, 125 V or 250 V. Typical units consist of duplex assemblies with one parallel-blade receptacle (125 V) and one tandem blade receptacle (250 V), or two parallel-blade

receptacles. Split bus receptacles make it possible to wire separate circuits or controls to each set of line terminals.

Many standard parallel-blade duplex receptacles contain a break-off feature that permits the connection of both receptacles on a single circuit, or a jumper can be removed on the line terminal bus to permit two-circuit operation.

GFCI devices. Receptacle-type ground fault circuit interrupters (GFCI) can, in many instances, be used in place of circuit-breaker type GFCIs to provide protection from shock hazard. A receptacle-type GFCI may be wired as a terminal device or as a feed-through unit to protect additional downstream receptacles. When properly installed, the device automatically shuts off power when it detects current leakage to ground of a few milliamps, preventing serious injury or electrocution.

These GFCI devices are available with a number of installer-friendly features. For example, one manufacturer offers a device with two back wire holes per termination to allow for a multiple of wiring options without having to pigtail and use wire connectors. It also has easy-to-read Line/Load markings. The NE Code specifies those areas where GFCIs are required. However, GFCI protection should be provided for any type of circuit where there is a danger to personnel from ground faults.

Isolated ground circuits

Isolated grounding receptacles are for use where electronic equipment can be adversely affected by pickup of transient signals, interference or RF from surrounding equipment.

Rather than relying on a mechanical ground path through the metallic housing of the raceway system, these devices use an insulated grounding conductor in the raceway to provide a separate "pure" grounding path. This separate grounding conductor is run with the circuit conductors in the same raceway and is connected with the normal equipment, but connects to ground only at the service equipment ground terminal.

So, there you have it, the basic rules for wiring the boss's office. Or not! Just remember the cardinal rule, keep one hand in your pocket and the other on your favorite beverage. That way you're sure to stay out of trouble. **BE**

Acknowledgement: This article was adapted from the original written by Joseph Kinsley for Broadcast Engineering's sister publication, Electrical Construction and Maintenance.





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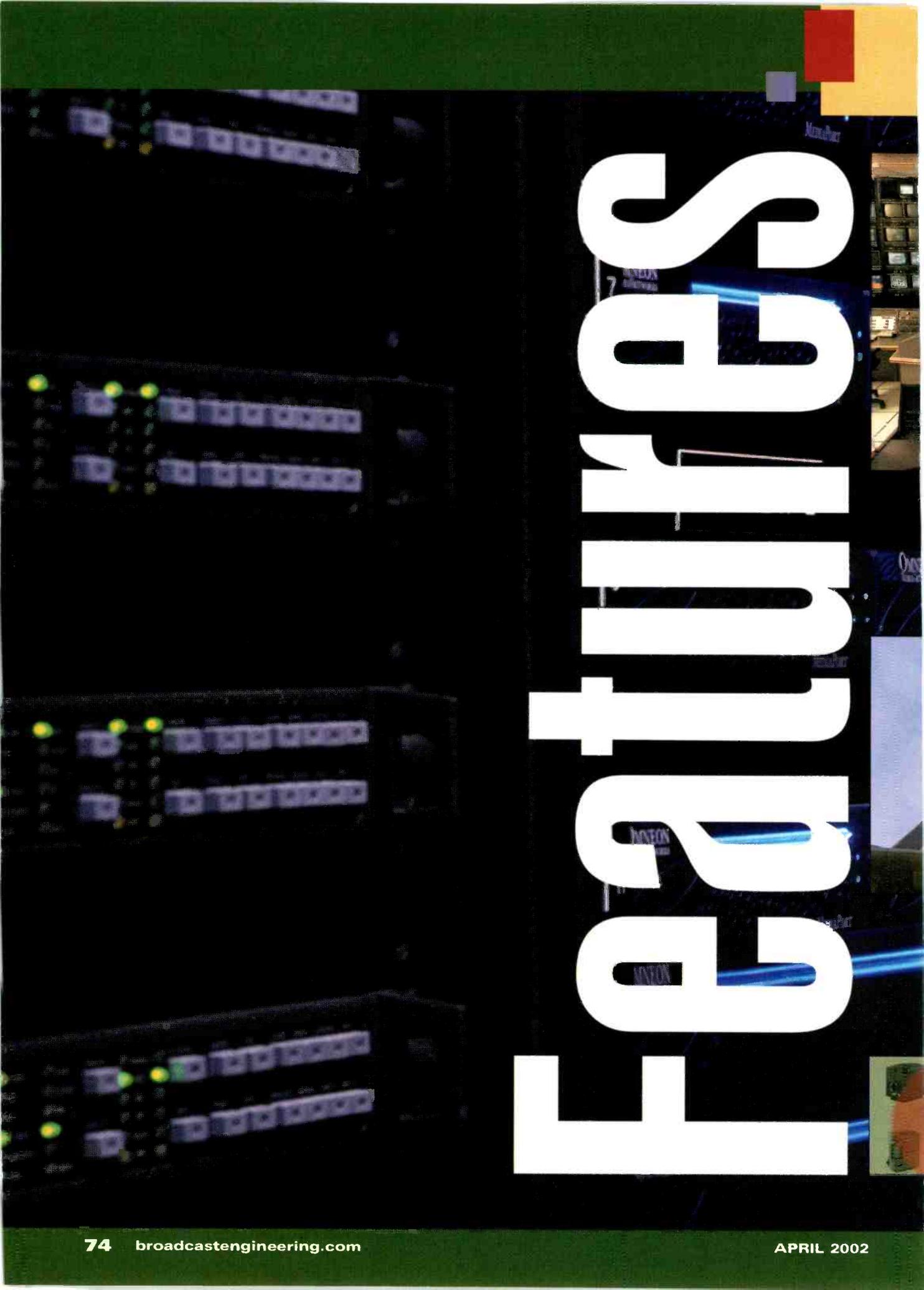
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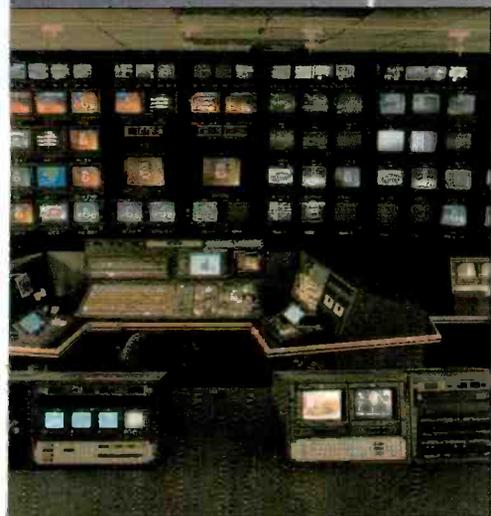
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**Video storage
and networking
for centralcasting**



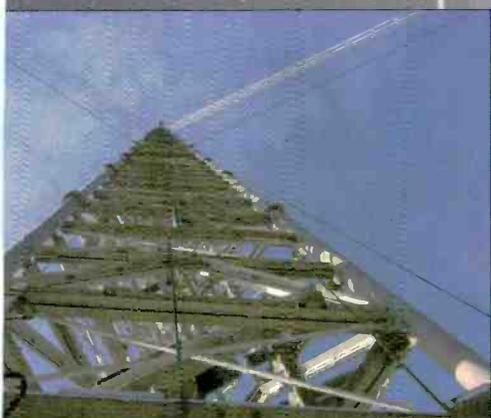
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**Planning for
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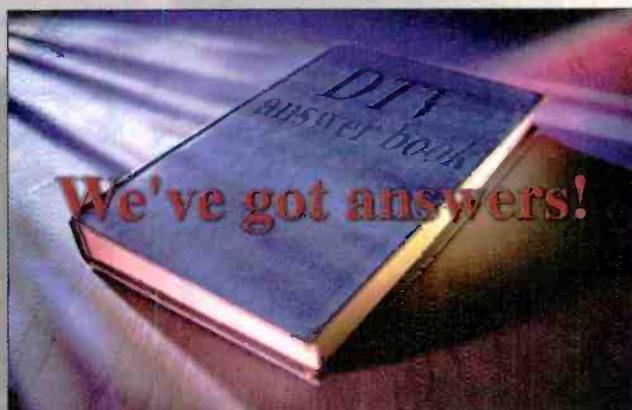
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NAB update





Video storage and networking for centralcasting

BY JOHN LUFF

The agenda in corporate board rooms is seldom published in the newspapers. But, in these times, one thing is certain: The agenda of most broadcasting CEOs is dominated by the costs of LTV conversion

and operations, declining revenue, increasing cost, consolidation and centralized operations. The motivation to consider centralized operations is simple. Costs are rising, ad sales are slumping, and cash flow from operations is hurting. Broadcasters must consider anything that holds the promise

of delivering a salve to the wound. At press time, a federal court had struck down the FCC's cap on multiple ownership, and sent it back to the FCC to reconsider. At the same time, the court struck down the rules against cable ownership of broadcast licenses. As a result, a new round of consolidation is



Today, one reason a TV station may build feature-laden control rooms is to provide for additional channel capacity. If it's not HD+SD, it could be multichannel SD or even centralcasting for a group of stations. WTVJ-TV, Miami, FL. Photo by Carmen Schettino Photography, Sarasota, FL. Facility by A.F. Associates.

likely, increasing the pressure on broadcasters to consider centralized operations over wide geographic areas.

Pressure has a way of escaping the confines of any vessel. Engineering and operations executives are under pressure to find centralization models that can provide savings in the

short term and facilitate growth. No one disputes the imperative, but the issues are complex and strike to the heart of the technology of television in fundamental ways. When viewed at the business core, the broadcast industry sells the assembly of media items into a continuous stream in such a way

that the pieces sold (commercials) are enhanced in viewership by the programs that wrap them. This process of concatenation of elements in a time sequence has been developed into a mature business with largely computerized business operations, and often with automated assembly.

Storage for centralized operations

There is a resemblance between this process and the factory floor in a rust-belt industry. The company buys raw materials (programs), brings them to a factory (master control), builds a product (broadcast stream) to the orders sent in by sales and operations (traffic and programming), and sends it out (transmission) before sending an invoice and packing slip (accounting

stored and played out using new tools with far-reaching implications for the possibilities of centralized operations.

The distribution and tracking of programming on videotape has been with us for over 40 years. The use of servers has been with us since the early 1990s. Asset-management tools are barely five years old. Satellite distribution began in the 1960s, but digital distribution over satellite is far newer. Distribution of spots on a store-and-forward

uniquely different than storage for unitary station operations. By its very nature, it requires more volume of storage, the tracking of more items and effective strategies to protect the media assets related to multiple broadcast licenses. It is also clear that some parts of broadcast operations cannot be fully eliminated from the local station – most specifically, ingest of locally produced spots and programming. Strategies that will work for centralized operations must allow for that reality while pulling the maximum portion of the local operation into line with new economic reality.

Storage for centralized operations need not be entirely centralized. Asymmetric distributed storage is a powerful tool that facilitates the local storage of spots produced in each market. In any case, the management of the media must take into account the need to ingest on short notice, and then ensure that the spot is available at the right time to play back to air.

There are two methods of handling this process. One is to use appliances that compress the media, store it, and prepare it to be transmitted over data networks, and decompressed and re-stored in a broadcast server at the centralized operations center. This process can be done quite inexpensively using the Internet to send media as files via FTP and proprietary techniques. The tools use secure encryption, error correction and protection, and network-aware transmission techniques to ensure the media is delivered exactly as it was received. Tools now exist to convert the files, normally MPEG, into the correct flavor for storage on local servers at the centralized operations site with metadata transparently transferred. In the future, GFX, developed by Grass Valley Group, and MXF, developed by SMPTE, hold the promise of allowing servers from different manufacturers to interconnect directly, eliminating the translation step.

Broadcasters must consider anything that holds the promise of delivering a salve to the wound.

and log reconciliation/affidavits). Each of these facets has been radically reinvented in the last generation, indeed in the last few years. The first to change was business operations, and most stations have complex software products

basis became a real business in the mid-90s, and now promises to expand into program distribution in the next few years. These dynamics have required a thorough review of how we store and use media in our broadcast “factories”



A large news room need not rely on a single server. However, the use of multiple servers for multiple users is not a trivial task. Translation between file formats is only now being addressed well. News department, WTVJ-TV, Miami, FL. Photo by Carmen Schettino Photography, Sarasota, FL. Facility by A.F. Associates.

that manage their broadcast inventory. But media played out, spots and long-form alike now are being distributed,

to build the products of the new media millennium.

Storage for centralized operations is

Media servers

The second method of accomplishing this is to site a network of servers, using

smaller and less costly servers at the local station to ingest media and make it available over a private network to the server(s) at the centralized operations center. Though MXF technology will eventually make it possible to use servers from multiple manufacturers, for now it is more practical to build a

delivery server and pull relevant media into the air chain. Though the standards are essentially complete, implementation requires rigor on the part of the distributors, which is something they have not had to provide in the past. For instance, the start time cannot be even a frame off for effective unattended

than that in a unitary station. The cost of make-goods in any single market is no higher. But with the increase in the number of markets potentially at risk, the financial consequences of a serious systemic failure would resemble the broadcast equivalent of a nuclear meltdown. A unitary station in a modest market might protect itself by mirroring the server (exactly duplicating the hardware and media content), or by using either a "partial" backup (sometimes called unbalanced backup) or tertiary servers.

An unbalanced backup recognizes the fact that a total failure of the primary server is unlikely, and even more unlikely to be irreparable. The assumption is that backing up the next six to 12 hours of content should be sufficient. This reduces the cost of storage, especially when only the primary server is equipped with RAID storage. In a centralized operations center, the volume of media can be an order of magnitude higher than it would be in a unitary station. This might make an unbalanced backup seem even more attractive, but the economic equation must have two factors in it: the likelihood of a failure that is not repaired when the backup is drained of relevant content, and the cost of the time lost in that event. In general, this model is too risky for centralized operations.

The tertiary model, sometimes called a library/air model, can be an effective method of reducing the total cost of storage while increasing the reliability. This approach uses two identical servers (air and protect), and a "library" server that is used for ingest and connection to any archive device. The library



Networked storage like that provided by Omneon's networked content server can offer broadcasters a solution for meeting the unique storage requirements of centralized operations. Production control room at WWSB Channel 40, an ABC affiliate in Sarasota, FL.

seamless network of servers from one company. When spots are ingested at the local station, the automation system requests a transfer to the central operations center, usually via FTP on a dedicated network. After transfer, the spot can be deleted from the local station's storage, or kept there for backup.

Media can also arrive from one of several service providers (Vyvx, PathFire and others). Their delivery to a local computing-industry-based server with playout capability almost gets it into the air-chain servers, but not quite. MXF provides a path for metadata to be transported with the file and directly imported into the software management applications in the local server. Doing so will eventually allow the local playout system to interrogate the

use with an automation system. Segment times must be similarly accurate, and data about the commercial content must also be complete so that the local log can be reconciled without manual entries. The technology exists, and business practices must catch up to the

technical art. Storing all of this in metadata is the key to success.

Fault tolerance

In the general sense, media storage for centralcasting requires more rigor in fault tolerance and disaster recovery

server transfers media to the air and protect servers sufficiently before air to meet standard operating guidelines. Instead of having perhaps 100 to 200 hours of air and protect, this allows perhaps 50 hours of duplicated storage, with a larger quantity of storage available to the

Storage for centralized operations need not be entirely centralized.

library server. It would be possible, for instance, to have late-arriving spots ingested into the station's local server and then transferred to the library server without the potential of resource conflict with the air and protect servers. The library server would transfer the media

server is expanded. The air chain (air and protect) remains the same size. A third chassis also means that, in the unlikely event of a failure in either air or protect, the library server could be used directly to air. This would permit more time for repair or routine maintenance

Operations) distributes the playout of media between the central operations center and the local station. At the same time, the automation and media-management systems are similarly distributed. This type of dispersion of the load may well reduce the load in the WAN circuits and provide simple disaster recovery. Programs that can be received and switched to air easily via automation (often network programming and local programs like news and public affairs) are not sent to the central operations center for concatenation into the final emission stream, but rather kept local without interconnection impact.

System I/O must also be considered. It is quite possible today to require analog I/O for legacy videotape ingest, SDI I/O for normal operations, and network

The financial consequences of a serious systemic failure would resemble the broadcast equivalent of a nuclear meltdown.

to the air chain after it has arrived, and well before air.

This strategy keeps three copies of all media, but reduces the potential for continued growth in two servers as needed. As storage needs grow, only the library

of the air and protect servers. With three high-reliability devices, the laws of statistics predict a greatly enhanced reliability for the total operation.

One variety of centralized operations (called Distributed Broadcast



The master control room at WWSB Channel 40 utilizes Sundance Digital's Intellisat to control the Omneon networked content server system for satellite ingest. Also displayed are the Sundance Fastbreak on-air and prep stations.

FTP I/O. Increasingly important is DVB ASI I/O (270 Mbits/s MPEG data using NRZ data). ASI is the preferred method of ingesting HD content (which should not be subjected to multiple compression cycles), as well as compressed files from service-provider servers via MXF. Distributing the I/O across multiple frames is also highly advisable to enhance reliability.

Shared storage

So far, this discussion has dealt with individual servers with locally attached storage. But shared storage, under several names and many technical flavors, might well make more sense. Its potential advantage is that it requires only one copy of the media, which is then available to all playout ports. An ingest station can be designed with minimal features at lower cost. It eliminates the complexity of the process of transferring media between servers, and thereby saves money. Networked storage is a well-developed concept in the mainframe-computing industry, which requires extremely high reliability. When the reliability of the storage is insufficient, one can construct a backup system to mirror the entire storage network and playout devices as well, effectively replicating the entire system. This could eliminate any potential cost savings that networked storage can provide, but, if the company is particularly risk averse, this might be an attractive option. Many systems using these highly redundant topologies are being installed today in cable-origination and broadcast plants, including news-only operations.

One must consider the topology of the entire centralcasting enterprise as one holistic problem. Indeed, when viewed from 30,000 feet up, a system that uses a storage network and ingest servers at the local station is a hybrid of two approaches. It must, however, operate as seamlessly as if it were all in one room. In reviewing disaster recovery, some have suggested that geographic dispersion of the assets is an advantage. DirecTV and EchoStar both use redundant facilities

capable of feeding the entire system after a catastrophic failure. Those who had data and video lines underneath the World Trade Center learned rapid-fire lessons in disaster recovery. While not appropriate for the majority of applications, it is possible that, as centralized operations become more important and the centers grow larger, such redundant facilities may well become important. The potential for acquisition of broadcast licenses raised in a recent federal court ruling might make for strange bedfellows in a centralized operations center for broadcast and cable origination combined. That may well lead to geographic dispersion of backup media and facilities.

Server backup

At the end of the day, the most important transitions in media technology are those that are deceptively

strategies in centralized operations, since the failure of any media could be restored from the archive. The process would be painful, as archives are not intended to be real-time media, but it could be done in an automated process. Even in a "tapeless" playout center for many stations, one could make an effective case for keeping good old reliable videotape around just in case the shared storage network crashes and something has to be put to air quickly. While the videotape is playing, the restore process could begin and gradually return the operation to normal with all media again residing in the network and all playback proceeding from server I/O ports.

Media management

When one builds a complex holistic system of online, near-line and offline storage (data tapes on the shelf), the final piece of the puzzle is media man-

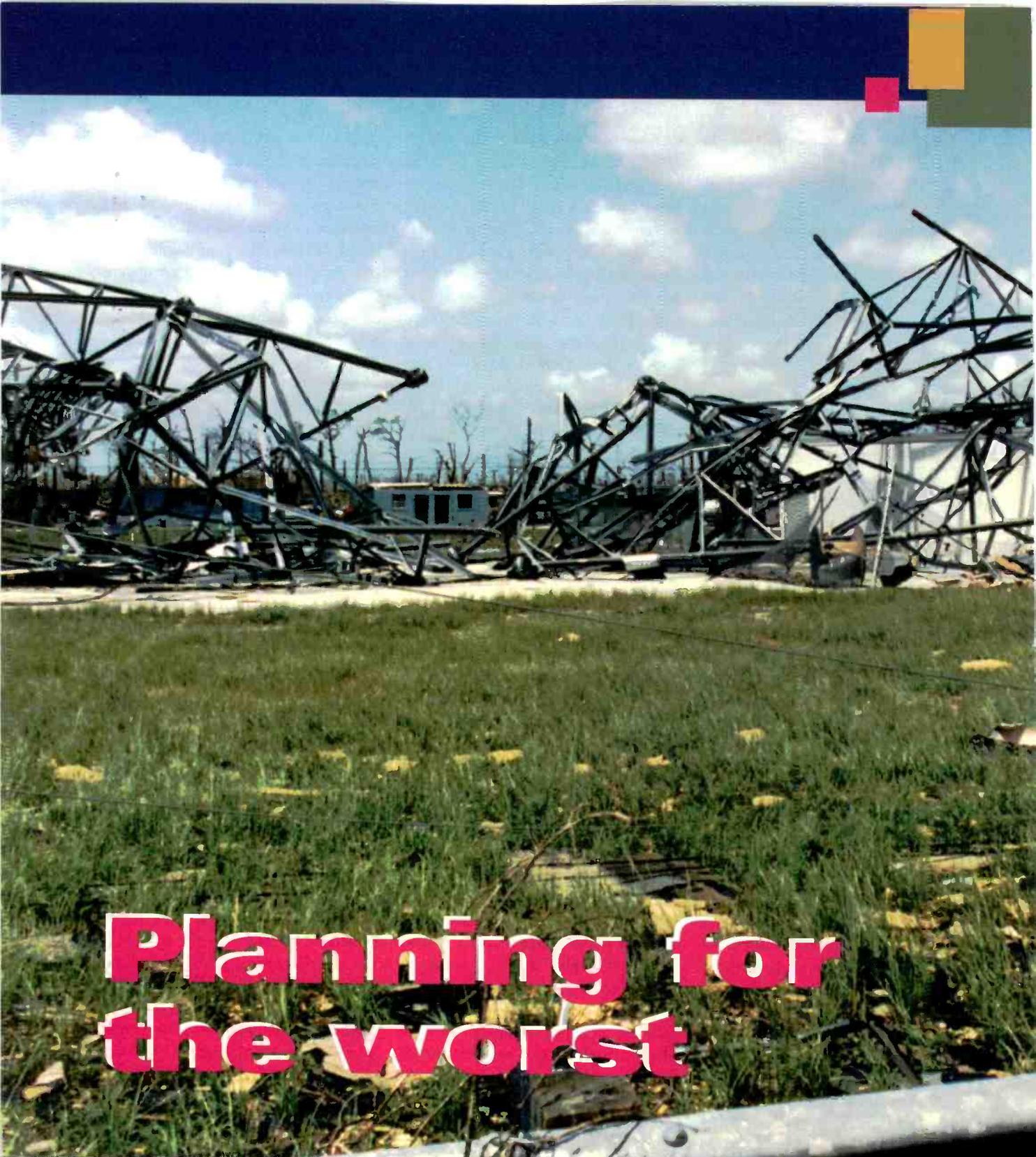
Those who had data and video lines underneath the World Trade Center learned rapid-fire lessons in disaster recovery.

simple yet far-reaching in their impact. This discussion has been largely about storage of content in servers, but the backup to servers is equally critical. At one time, that was videotape. In many stations today, it still is. And though the future seems to hold the promise of service providers delivering all content electronically, the death of linear tape is overlaid. In New York, one station refuses to take even satellite delivery of programming, preferring the reliable delivery of videotapes.

In many applications, server backup may continue to be videotapes on vault shelves for a long time to come. In others, a data-tape backup of the content is more appropriate. An increasing number of companies are choosing to install archive robots with multiple data-tape transports as the final element in the storage puzzle. In particular, this can permit modified storage

agement. The central media-asset management (MAM) system must be the traffic cop that knows the whereabouts of all content, as well as all of the metadata associated with it. The servers at the stations, the servers in the centralized operations center and the archive (shelf and robot, as well as videotapes) all contain critical assets from which the broadcast factory must assemble the final product. The fact that there is a large number of individual elements in the combined broadcast streams of several (or many) stations under the control of a centralized operations center means that literally hundreds of entries might be made every business day. Managing such a system without MAM would be a difficult task indeed. **BE**

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



Planning for the worst

BY MICHAEL GROTTICELLI

When the North Tower of the World Trade Center came crashing down on Sept. 11 of last year, it exposed the broadcast industry to the liability of not having a backup sys-

tem. Only WCBS-TV New York and Univision's Spanish-language station WXTV-TV were able to stay on the air because they had backup transmitters located on the Empire State Building. The rest, except for Fox, which has digital facilities on Empire, lost their

entire analog and digital broadcast operations within hours.

While horrific tragedies such as this are rare, broadcasters are vulnerable to a wide array of potential disasters such as severe weather conditions and local power outages. If not anticipated,

How much protection is necessary? This is a question broadcasters must consider as they try to implement emergency plans on limited budgets.



such events could severely affect a broadcaster's business.

The terrorist tragedy caused virtually every station in the United States to review its safety precautions and put new emergency plans into effect. These improved plans include increased

spending for additional power generators, alternative low-power transmitter sites, UPSs and power generators, and fully redundant, fail-safe systems. It also has led stations to institute different operating procedures within studios, administrative offices and even mailrooms.

Yet, the need for additional dollars for safety at a time when overall ad revenue is down and most capital is being directed at the digital television buildout has tied the hands of many chief engineers. Some of this added cost can be built into new DTV budgets. But this prospect raises two important questions: How much protection is necessary? And how much is management willing to spend to ensure the safest and most reliable operation?

Martin Faubell, vice president of engineering at Hearst-Argyle Television, acknowledges that most of the focus in broadcasting today is on revenue growth and cost reduction. He's concerned that if broadcasters need to pay for some of the service agreements they've had historically, safety will suffer.

Among Hearst-Argyle's 27 owned and/or operated stations located across the country (from Plattsburgh, NY, to Honolulu, Hawaii), there is no general safety plan. Each station is responsible for its own procedures. When Faubell is deciding how much to allocate for safety issues, he said he finds it helpful to look at all of the variables associated with a particular market and the risk of damage due to potential outside conditions.

For example, Hearst's KMBC-TV, located in Kansas City, MO, has facilities spread out among six floors in an old downtown building. The cost to install a backup generator on every floor, given the history of power outages in that city, is not justified, Faubell said, even though there have been a few times when Kansas City lost power and parts of the station went black for several hours. But he cautions that every station should have at least one generator to keep the studio operational.

New York rebounds

After the disaster on Sept. 11, it was nearly two weeks before most New York City radio and TV stations were back on the air, with weakened signals. The outage cost them an estimated billion dollars in lost ad revenue.

Since September, all of New York's major stations have been broadcasting



Are you sure your tower meets today's structural requirements? They've changed and your insurance company could require that, although your tower is old, it has to meet current standards.

from the Empire State Building, but have set up a backup transmit site in Alpine, NJ, several miles north of the city. However, declaring that Empire is not suitable to full-power operation, (and thus their coverage area is compromised), these broadcasters have formed a coalition to consider another, more permanent site within the surrounding metropolitan area.

The lesson here is that stations should have an alternate transmitter site, operating as a lower-power backup that could be brought into operation on short notice. Some have suggested that this alternate site could be rented to another broadcaster and/or loaned out to a local emergency service such as EMS during normal operation to help pay for its upkeep.

It's also important to develop relationships with UHF stations to share transmitters in the event of an emergency. This was the only way that stations in New York City were able to get back on the air. Aside from their fiber-optic feed to the various cable TV companies that carry their signals, WABC-TV, WNBC-TV and others relied on the lower-channel broadcasters to carry their signal. The local Fox stations

(WNYW-TV and WPIX-TV) were able to get on-air from their pre-existing digital facilities on top of the Empire State Building.

The fact that all of the stations in New York City came together to help one another speaks volumes about the character of the various chief engineers, but also provides a lesson in how cooperation in an emergency benefits everyone within a market. It's become clear that discussing emergency plans with your cross-town competitor on a regular basis is smart business.

Learning from this experience, Faubell said that Hearst-Argyle management has encouraged its chief engineers to establish reciprocal deals with competing stations in their respective markets to guard against one station going off the air.

California power

Last spring and summer, when the state of California was experiencing a wave of power outages due to the rising cost of electricity, some stations were caught off guard. Some went off the air for hours at a time. It's critical to avoid any loss of power because even the slightest interruption in service

might cause viewers to switch channels.

Although stations had backup generators, the power-outage problems prompted some to make significant improvements. KVEA-TV in Corona, CA installed a new generator at its transmitter site near Los Angeles.

At KTVU-TV in San Francisco, director of engineering Ken Manley uses generators ranging from 2500W for a radio repeater to 350 kW for studio equipment. The station also has diesel-powered UPSs that automatically go into operation when the local power service fails.

Caterpillar, Kohler and Onan are the brands of gasoline- and diesel-powered generators stations use most often at the transmitter; many stations use UPS protection at the studio as well.

Adam Perez, chief engineer at KION-TV in Salinas, CA, said that because of the recurring power problems, his station now places a high priority on generator maintenance. Also, if it weren't for pollution restrictions in California, he estimates it would be more cost-efficient to run a diesel generator at the station's transmitter site than a gasoline one.

The high cost of electricity (many stations are paying thousands of dollars per month) is even causing some stations to consider alternative energy sources.



Planning on a live standup in the rain? Have you checked your AF and RF cables for proper grounding and safety? A little water in a microphone or RF connector will end a live shot.

Several wind generators on a mountaintop might pay for themselves over time, but they are not a reality at this point because they haven't proven to be 24-hour reliable.

Hurricanes and tornados

Stations located in the Midwest's infamous "Tornado Belt" and others in areas plagued by high winds, hurricanes and stormy weather have their own set of precautions in place. System integrators building new digital facilities in these states use heavy steel, extra guy wires and underground cabling where appropriate when installing towers and antennas. This added strength also comes in handy for co-located sites from which several stations broadcast jointly.

Since Hurricane Floyd in 2000, stations have learned to stock up with food and clothing supplies when a threat is identified. Frances Harkey, general services supervisor at WBTV-TV in Charlotte, NC, who manages the building and security services, said they've taken to storing cots, blankets and pillows for employees to sleep at the station during the most critical hours of a storm.

Floor-to-ceiling windowed studios have become popular with the public, but they expose the station to harsh elements. They often use industrial-strength double glass, but no glass is immune to breakage. So these are now routinely boarded up with plywood in the hours leading up to a storm.

Conducting emergency drills is also important to avoid catastrophe. Florida-based Hearst-Argyle stations in West Palm Beach, Orlando and

Winter conditions

WMTW-TV in Poland Spring, ME, routinely deals with adverse icing of its antenna and transmission lines. In the past, the station had been broadcasting from the area's highest peak on Mt. Washington, NH. But it recently

suspended above the transmission-line cables to prevent melting pieces of ice from falling directly onto the cables and snapping them or perhaps injuring someone on the ground.

The station's coverage is sometimes affected by ice collecting on its 70-foot



Winter storm conditions can adversely affect broadcasters. Stations in northern states may find their towers are frequently iced over, not only putting them in danger of collapses like the one shown above, but also increasing the danger of falling ice to nearby areas, cars and people.

relocated its transmitter to West Baldwin, ME, to avoid the harsh conditions of the New Hampshire wilderness. Broadcasting from what is now the largest tower in Maine at 1667 feet (constructed by Irving, TX-based SpectraSite Broadcast Group), the station is using

dielectric multi-panel antenna, but there's not much the station can do about it. Connor has considered a single-channel, traveling-wave antenna inside a radome, but WMTW-TV needs the extra panel space.

The use of de-icers on antennas is pointless in the bitter cold of a Maine winter because they simply create a layer of water between the metal of the antenna and the external ice crust, which brings more problems.

In addition to heavier steel and more cross bracing for the tower, Warren Construction Group helped Connor build a two-story, reinforced-concrete transmission building in less than a year. It's complete with several transmission rooms, two 10,000-gallon fuel tanks, and a generator room capable of generating over 800 kW of electricity per hour (which is much more than they need). The ceiling of the building

It's critical to avoid any loss of power because even the slightest interruption in service might cause viewers to switch channels.

Tampa, FL, perform annual, highly detailed drills to practice emergency procedures for when a transmission tower goes down or the power goes out. It's through these types of simulated emergencies that mistakes can be made without adverse effect and a good contingency plan created.

dual Caterpillar diesel generators that operate in parallel and redundant transmission lines to broadcast its signal to viewers.

As is the case with many stations located in cold climates, chief engineer Jack Connor and his engineering team have designed a series of "ice bridges"

includes two inches of rubber tire padding to protect it from ice dropping off of the tower.

During the design stage, Connor said he overbuilt the tower to hold as much hardware as possible to suit the station's needs and to develop income from other stations that might locate there in the future.

Conducting emergency drills is important to avoid catastrophe.

WMTW-TV is now broadcasting an analog signal from West Baldwin, but they plan to go digital by May 1 if weather permits the installation of a new transmitter and antenna. If the weather doesn't cooperate, the station will ask for an extension to go digital by midsummer.

Re-sorting the mail

The threat of the U.S. mail system being used to target television stations has also caused stations to rethink how they deal with visitors and outside correspondence. As a new, general policy among New York City-based stations (as well as the local newspapers), no mail will be opened without a return address clearly written on the outside of an envelope.

At Jefferson-Pilot-Communications-owned WBTV-TV and its sister WBTV-DT, new mailroom procedures now call for all mail and overnight packages to be sorted in a ventilated area totally isolated from the studios and to be delivered to specific employees only after it has been thoroughly checked. WBTV-TV's Harkey said that her station has worked closely with the local police department to identify exposed areas. She recently had the police tour the station and report on how it could be more secure.

Other procedures suggested by police include new security gates, the cutting of lower tree limbs to provide greater vision of the station's property, and an extensive security-camera system that includes 24-hour videotaping of daily activities. A new policy also

mandates that no visitor is allowed past the station's lobby without an employee escort.

Insurance policies

There's no doubt that manufacturers of transmitters and related equipment become a major factor when disaster strikes. By all accounts,

Harris, Larcan, Thales Broadcast & Multimedia and others were instrumental in providing replacement transmitters to get New York City stations back on the air. Most even deferred payment and spent substantial resources to help.

Executives at these companies suggest

month. These are ideally suited to be installed as backup systems.

For station management, make sure your station's insurance policy includes a wide variety of disaster situations. When the World Trade Center came down, there was some discussion about whether New York stations were protected against a building collapse. In the short term, it was acknowledged that they were covered for the physical equipment (e.g., replacement of transmitter, antennas and transmission lines), but negotiations are still pending regarding how much of the millions in installation costs used to build the analog and digital facilities on top of the North Tower will be refunded.

In the end, no emergency plan can protect against a tragedy as monumental as the Sept. 11 attack on New



You'll never be able to completely prevent a tower collapse. However, plan now how you'd repurpose and relocate transmitters, antennas and STL equipment so your time off the air is kept to a minimum.

that when a station is purchasing specific transmission equipment, it should also discuss contingency plans. Stations might also want to purchase replacement parts that have been known to fail during normal operation.

Chief engineers might also look into the new generation of low-cost, low-power transmitters that will be introduced at the NAB convention next

York City, but with careful planning and some extra expense, stations can prevent, or at least manage most emergencies. Remember the old adage, it's always better to be safe than sorry. **BE**

Michael Grotticelli has covered all aspects of the broadcast industry for over 10 years. He can be reached at AMGMedia@AOL.com.

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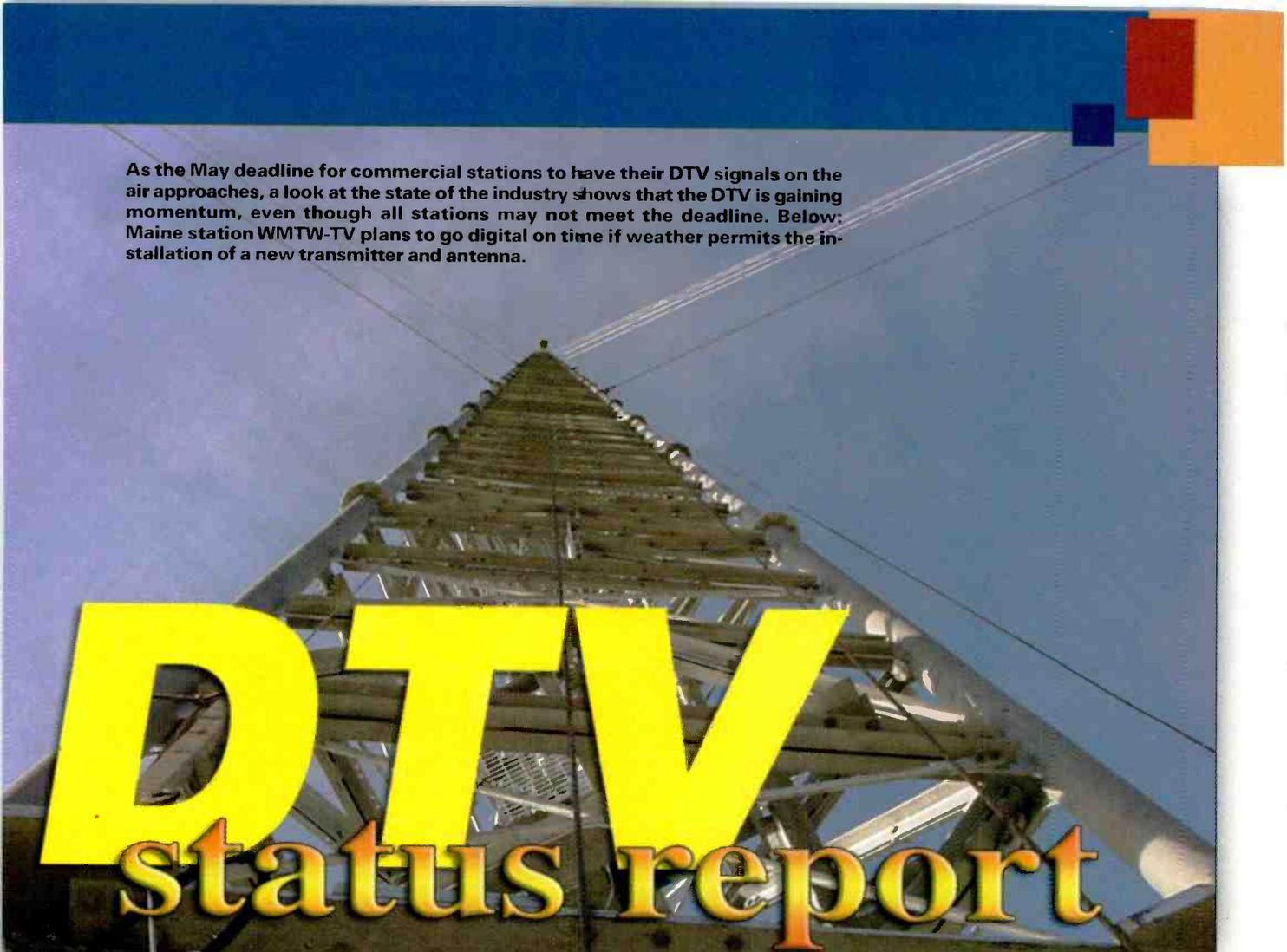
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As the May deadline for commercial stations to have their DTV signals on the air approaches, a look at the state of the industry shows that the DTV is gaining momentum, even though all stations may not meet the deadline. Below: Maine station WMTW-TV plans to go digital on time if weather permits the installation of a new transmitter and antenna.



DTV

status report

BY JIM BOSTON

We are currently in the worst advertising market since World War II. The current economics make for unfortunate timing, but our path towards DTV was set long before our present business climate developed. DTV will soon be universally available, in theory. The first day of May is the deadline for all commercial stations to have their DTV signals on the air. Not all are going to make it, but the industry is showing momentum as some of the obstacles facing broadcasters in their DTV buildout are being knocked down to size. However, a couple of sizable roadblocks still stand.

Status of DTV stations

The first is the state of the DTV universe. According to the FCC, 87 percent, or 1686 television stations, have been granted a DTV construction per-

mit or license. Currently, 179 stations are on the air with licensed facilities and 76 are on the air with special or experimental DTV authority.

There are currently 160 construction permits for commercial stations that have not been issued due to international frequency coordination problems, conflicts with each other and a

network stations in markets 11-30, 95 percent of those are on the air with some type of DTV signal.

Many stations are aggressively pushing to meet the May 1 deadline, and a significant amount of construction activity is under way. The FCC did allow stations to seek extensions during the month of February by filing Form

Many stations are aggressively pushing to meet the May 1 deadline, and a significant amount of construction activity is under way.

variety of other technical reasons.

The 40 network-affiliated stations in the top ten markets were all up and running, but the destruction of the World Trade Center has taken WNBC-DT and WABC-DT down. Of the 79

337 and stating whether technical, legal, financial or other reasons were going to prevent them from meeting the deadline. According to a recent NAB survey, 75 percent of the stations that have yet to go on the air or apply for



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DTV plan to seek an extension (see Figure 1). Next month we will list stations requesting more time. Last year, the FCC issued a Memorandum Opinion and Order on Reconsideration in which they stated that some of the DTV rollout requirements might be hindering instead of helping the cause.

Signal requirements

So the FCC relaxed, at least temporarily, a few of the requirements. Probably the most significant is that it will allow stations to initially sign on with lower-power signals than originally assigned and not lose their interference protection in areas where they don't replicate their Grade B signal.

Originally, the plan was a good old-fashioned land grab where the first to cover fringe areas of service would be protected against interference when DTV stations in adjacent markets

pushed their signal out to tangential coverage areas. The DTV latecomer would be the loser in any interference issues.

Now the FCC says that won't be the case. The FCC doesn't want DTV license holders to delay because of the burden of financing full-power facili-

FCC increased the signal strength to those levels a year ago by 7 dBu. The power levels go into effect at the end of 2004 for commercial stations and in 2005 for educational stations, even though they were adopted last year.

Many transmitter companies are now offering low-power transmitters

The ATSC standard is extremely flexible, offering broadcasters the capability to offer HDTV, SDTV and data in a variety of combinations.

ties or having to wait on the additional hardware a full-power vs. lower-power station would require.

Currently, the DTV station will only have to cover its city of license with a DTV service contour (35 dBu for channels 2-6, 43 dBu for channels 7-13, 48 dBu for channels 14-69). The

(up to 1 kW TPO), which gives stations a lower-cost start-up option. Most of the transmitters can later be reused when the station increases their power. A TV station's staff can often install this transmitter by themselves. Jay Adrick, vice president of strategic business development for

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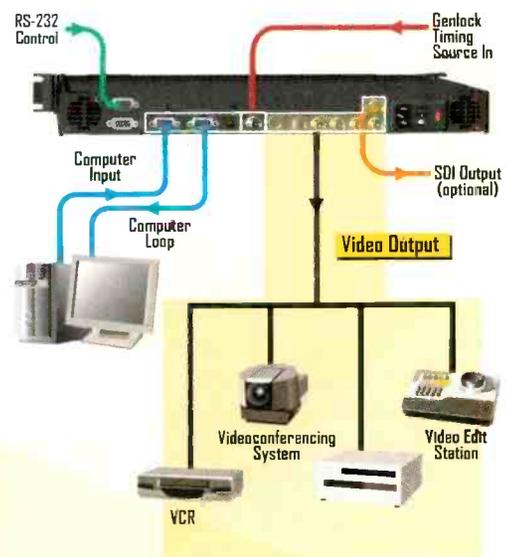
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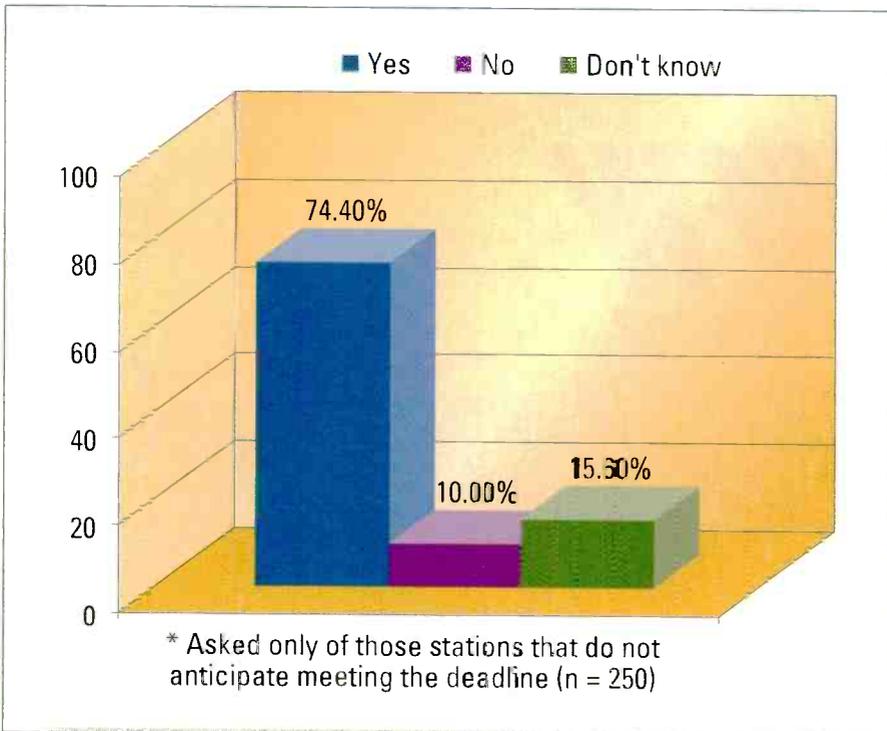


Figure 1. Stations' plans to seek deadline extensions. Source: NAB

Harris, and Dave Glidden, director of TV transmission products for Harris, say that they have seen a steady rate of installs, about four per week, among all transmitter vendors, and that those who need to be on the air by May 1 have generally placed orders far enough in advance to meet that requirement. The U.S. television market has placed orders for approximately 700 transmitters to date. They haven't noticed a shortage of tower crews, the required hardware past the gas-stop, or tower appurtenance delaying the buildouts.

The FCC took a couple of additional steps to lessen the financial load on DTV stations. Although it didn't extend the April 1, 2003, date at which a DTV station must simulcast 50 percent of its NTSC schedule, it did allow, in the near term, stations to be on the air only during prime-time. John Morgan of the FCC points out

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that the exception are the top 30 market network affiliates, who must continue to keep their DTV on the air any time their NTSC is transmitting.

The commission is also temporarily deferring its requirement that commercial stations with NTSC and DTV assignments within the channel 2-52 DTV core decide which of the two channels they would keep when NTSC finally goes dark. This will allow broadcasters to gain more experience with their new DTV channel assignments before having to choose between the two.

One of the ongoing distractions that has been laid to rest, at least in the core channels, is the modulation debate. 8-VSB's once tenuous hold on the DTV standard is now certain, despite efforts of COFDM proponents. Still, some are now worried that COFDM has not been totally pushed off the table. In the coming auction of channels 52-59, the winning bidders for the spectrum can use the channel any way they wish. This means that successful applicants can use the channel to transmit 8-VSB, COFDM or other types of modulation. Some believe that the winning bids may be too high to justify the use of 8-VSB for TV applications.

Receiving DTV

The NAB says that at least 75 percent of U.S. households have access to

at least one DTV signal. That is only if they put up an antenna to receive it. *Broadcast Engineering's* DTV receive antenna expert, Peter Putman, has a Web site demonstrating that in many locations DTV can be received with inexpensive antennas. DTV receivers' processing power continues to improve, especially their ability to reduce the effects of multipath. Prices for these receivers continue downward also. In June, Zenith will offer an integrated DTV receiver with 32" display that will retail for under \$1500. (See Figure 2.)

Many feel that the cable industry is thwarting the DTV rollout, as only a few cable systems are providing 8-VSB

pass any PSIP info, and they effectively dissolve the transmitted ATSC bit stream back to a single NTSC stream. In addition, cable systems that air both the NTSC and DTV signals of a broadcaster often put the DTV signal in their digital tier of services. Even worse, the bit rate for a channel there is often below 1 Mbit/s.

ATSC streams

Broadcasters are still not certain what to put in their ATSC streams. DTV was originally sold to Congress as HDTV. But the ATSC standard is extremely flexible, offering broadcasters the capability to offer HDTV, SDTV and data in a variety of com-

Using the full bandwidth to produce stunning pictures in HD might be the fastest way to make DTV economically worthwhile.

DTV signals to the home. Most cable systems use QAM technology for their distribution and STBs. Many believe this is the cable industry's way of controlling viewer access. Some broadcasters have wondered whether DTV stations could band together and create mini over-the-air cable-type channel lineups by integrating their PSIPs. The cable industry generally won't

combinations. In a bid to bring in some revenue sooner rather than later, other models besides HD are being considered. Some revolve around some form of data transmission along with an SD program. Unfortunately, the data proponents are still looking for customers, many of whom are worried that the real savior of broadcast television, HD, is not

being given a fighting chance. It could be argued that SD on ATSC produces video that simply exchanges NTSC's set of transmission artifacts with a set of ATSC artifacts. The MPEG encoding process used in the ATSC DTV standard produces sharper pictures, eliminating noise and ghosting. But the spatial and temporal artifacts that can occur as a result of the broadcaster trying to fit as many signals or other data into the channel as possible can be distracting. Using

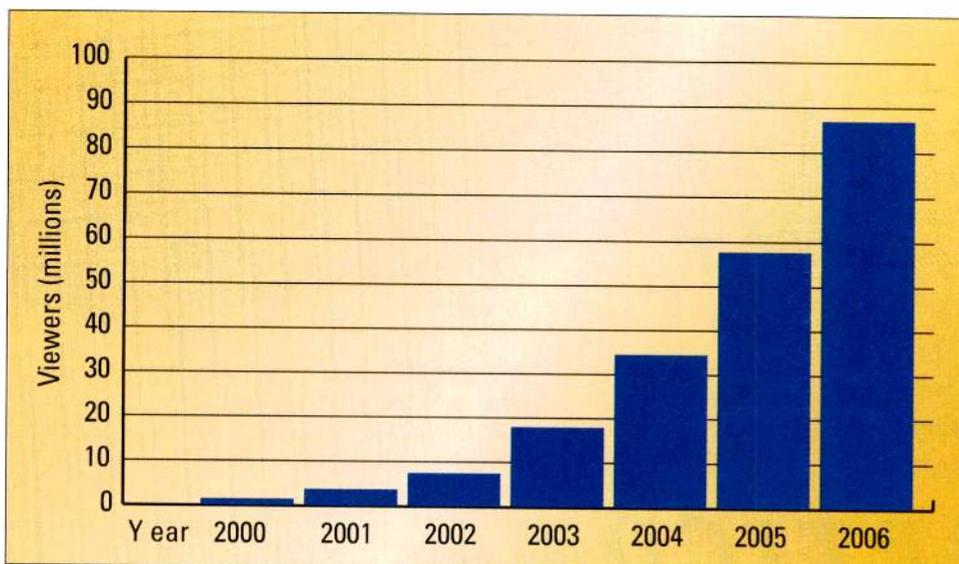


Figure 2. Digital reception will soon explode, and set-top box technology will drive the increase. Source: Allied Business Intelligence, www.alliedworld.com

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the full bandwidth to produce stunning pictures in HD might be the fastest way to make DTV economically worthwhile.

Promoting HD

There are groups that are doing just that. The Dispatch Broadcast Group, which has stations in Columbus and Indianapolis, has been an early promoter of HD. They believe that broadcasters will have to help educate

Broadcast group does resort to multiple SD when it serves the viewers' interest. WBNS-DT Columbus, which serves a large college basketball market, has aired simultaneous games on their DTV channel when they were of interest locally.

The NAB is helping to push HD as well. In three markets, Houston, Indianapolis and Portland, OR, a "DTV Zone" promotional campaign is being launched in conjunction with the

ket. John Taylor of Zenith says that his company realizes that the manufacturers must do their part to educate not only the public, but also those charged with selling DTV products to the consumer. Figure 3 shows how viewers are receiving HDTV signals.

HD programming continues to grow, even though much was made that Fox did not offer the Super Bowl in HD this year. Virtually all of CBS's and ABC's entire prime-time lineups and movies are in HD. NBC's DTV affiliates broadcast the Salt Lake Winter Games in HD, but only on a one-day delayed basis. The effort required to receive those signals decreases as the receive hardware evolves and becomes less expensive.

The DTV puzzle

With DTV we don't have the vertical integration reach that RCA had with the introduction of color television, namely a broadcast equipment manufacturer, broadcaster, and television receiver manufacturer all rolled into one. But even then color technology took a few years to gain enough velocity to take flight. With more than 325 DTV products on the market today and more affordable receivers coming, DTV has gained some velocity. Unfortunately, DTV has one roadblock that color TV never had to overcome – cable! As the gatekeeper to almost 80 percent of American homes, all it takes is a Quam-only STB to keep broadcasters' digital signals invisible. However, if the industry, FCC and cable can agree on some new carriage rules and common technology, the final piece of the DTV puzzle will be in place.

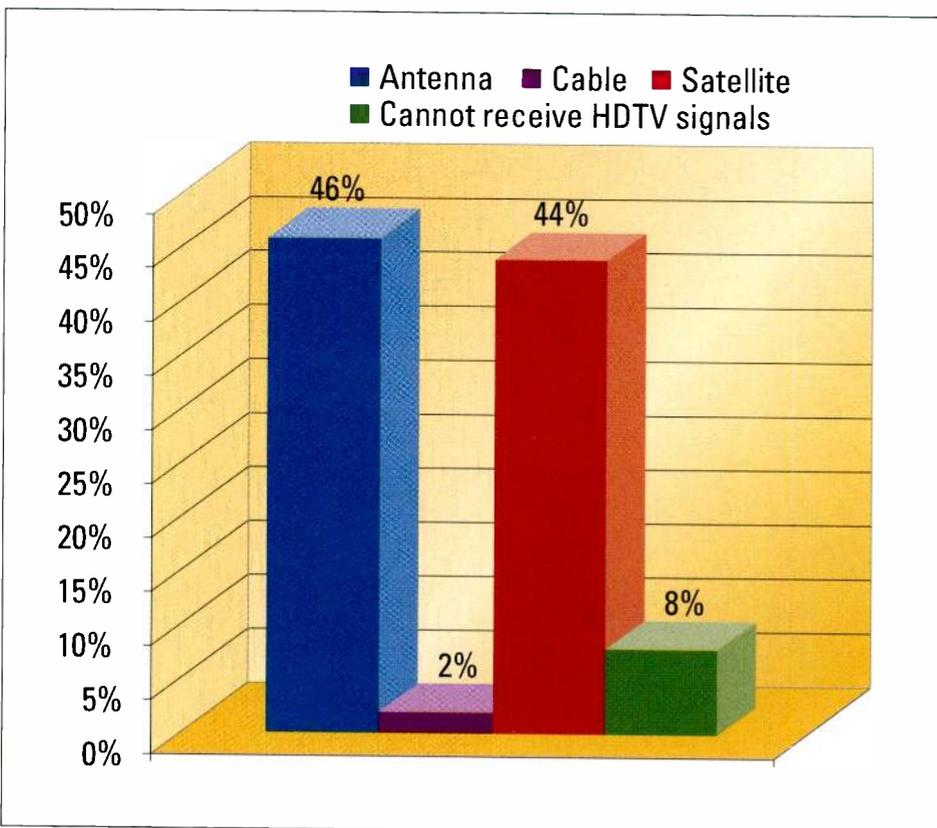


Figure 3. The primary way viewers receive HDTV signals

the public by reaching out into the community. Their stations did some of the earliest DTV-aired HD remotes, as far back as 1998. Marvin Born, director of engineering for the group, says their stations are committed to HDTV. Instead of merely passing the network's HD content, they have the capability to play back HD locally as well. To do justice to HD, and to prevent the artifacts from interfering with the remarkable video quality, most of the bit stream is devoted to the HD signal. The Dispatch

Consumer Electronics Association. Dennis Wharton of the NAB says that his organization has produced a 30-second spot that the local stations will air on their NTSC stations for free. In conjunction with that, local retailers are expected to place commercials on those stations to promote HD products. These three markets were selected because all the networks have affiliate DTV stations on the air. Set makers are providing high-definition TVs for public demonstrations in high-profile DTV Zones in each mar-

Jim Boston is a West Coast consultant.



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With the new UTAH-400 High-Density Digital Routing Switcher we are taking the design of large routing switchers in a completely new direction. Just take a look at the features:

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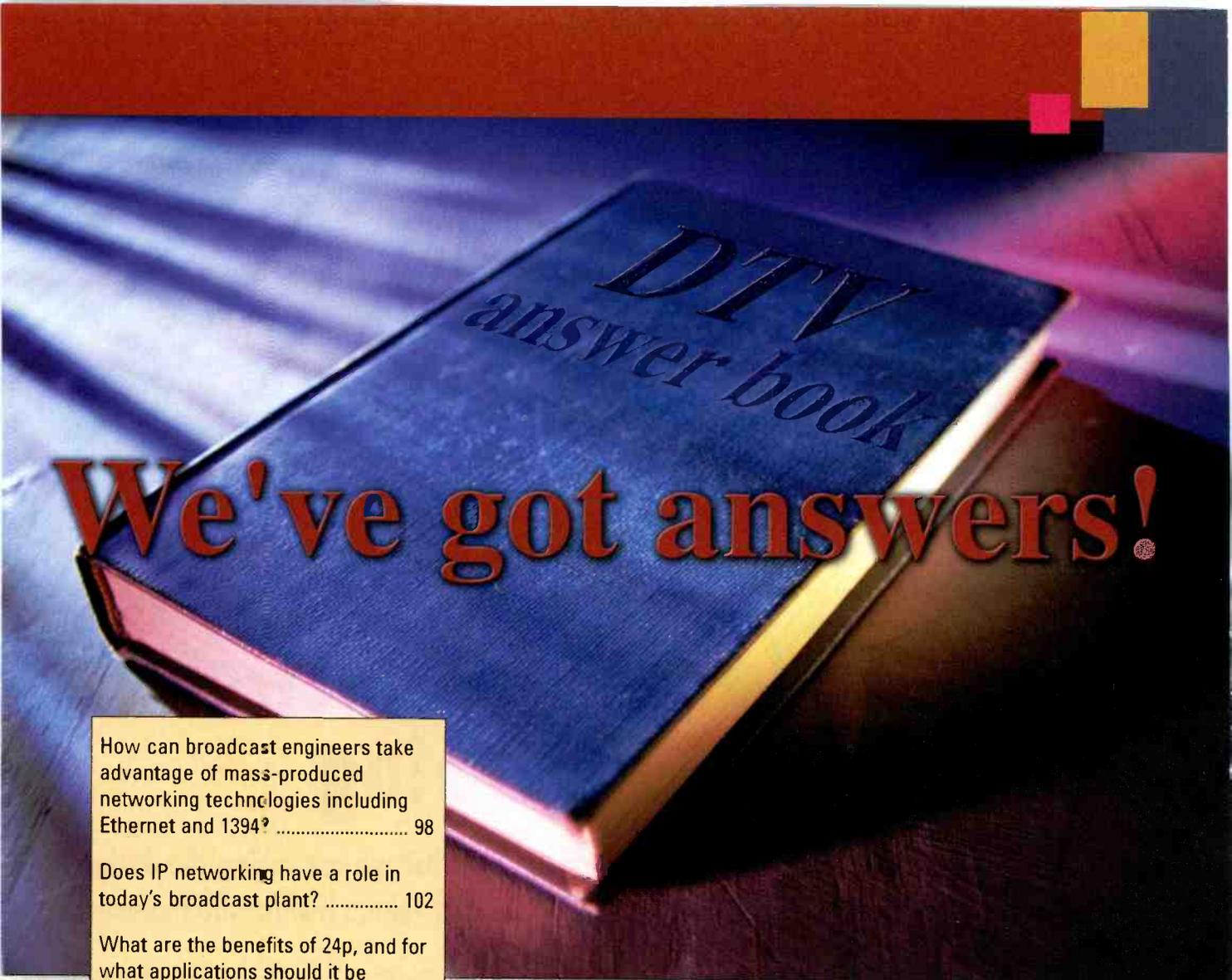
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We've got answers!

How can broadcast engineers take advantage of mass-produced networking technologies including Ethernet and 1394? 98

Does IP networking have a role in today's broadcast plant? 102

What are the benefits of 24p, and for what applications should it be considered? 106

How can broadcast engineers take advantage of mass-produced networking technologies including Ethernet and 1394?

BY BARRY BALLANGER



Apple Computer first introduced FireWire in the late 1980s for the consumer market. In 1995, Sony released the DCR-VX1000

digital video camcorder, the first commercial product to feature an IEEE 1394 interface.

The standard provides a way to move high-bandwidth video and audio digital traffic among peer devices — digital video recorders, DVD, camcorders, and high-speed/high-resolution printers and scanners. It supports hot-swapping and plug-and-play to improve the experience for consumers who want to use 1394-enabled products.

FireWire users can connect as many as 63 devices to a single bus with a maximum distance between devices of 4.5 meters. Greater distances are possible

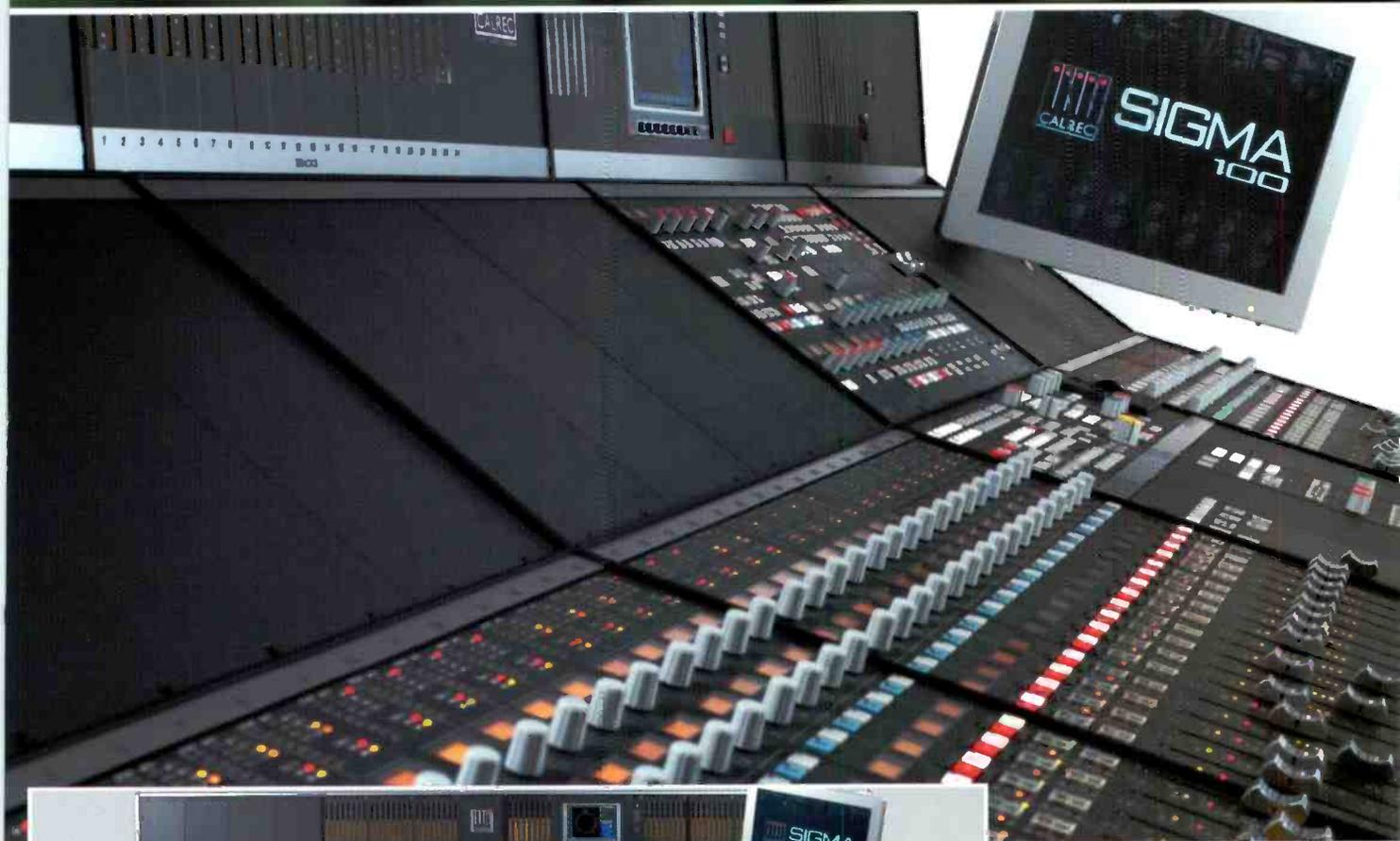
with repeaters. More than 1000 bus segments can be connected to bridges, and the standards organizations are currently working on extending the distance to 25 meters.

As most consumer electronic devices available on the market now support either 100 or 100/200 Mbits/s, plenty of headroom remains in the original 1394 specification. But as more devices are added to a system and improvements in the quality of the A/V signals being transmitted increase, more bandwidth is needed.

SOUNDWAVES



THE CALREC BROADCAST AUDIO NEWS UPDATE



New Entry Level Digital Console

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- 8 Groups

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integration.

PRODUCT UPDATE

New Digital Broadcast Production Console Launched At NAB

Calrec launch the new Sigma 100 medium format digital audio production console at the 2002 NAB Convention in Las Vegas, NV, USA.

The second all digital production console from Calrec, the Sigma 100 is based on the well established Alpha 100 digital system architecture. This advanced architecture, which is scaleable and provides high levels of redundancy, is already field-proven as the platform for the Alpha 100 large format production console, in service for over 18 months. Designed to offer similar specification and functionality to Calrec's S2 console, of which nearly 100 have been sold world-wide, Sigma 100 is targeted at large news studios, medium-sized general purpose production studios and Outside Broadcast vehicles.

A Unique Range

The introduction of Sigma 100 represents a milestone in Calrec's strategy of achieving a range of digital audio production solutions for a wide spectrum of broadcast requirements. For many years Calrec has provided a range of broadcast-specific console designs that has increasingly separated Calrec from its competitors through its breadth and comprehensive approach. Calrec is now unique in offering a full range of broadcast specific, high performance consoles. This covers small units suitable for field recording and small remote production vehicles to very large designs used in intense news, entertainment and sports productions. The introduction of the Sigma 100 console establishes Calrec's product development program to offer a similar wide range of dedicated solutions for broadcasters in the digital domain.

Sigma 100 Dual Path Faders with Wild Assign

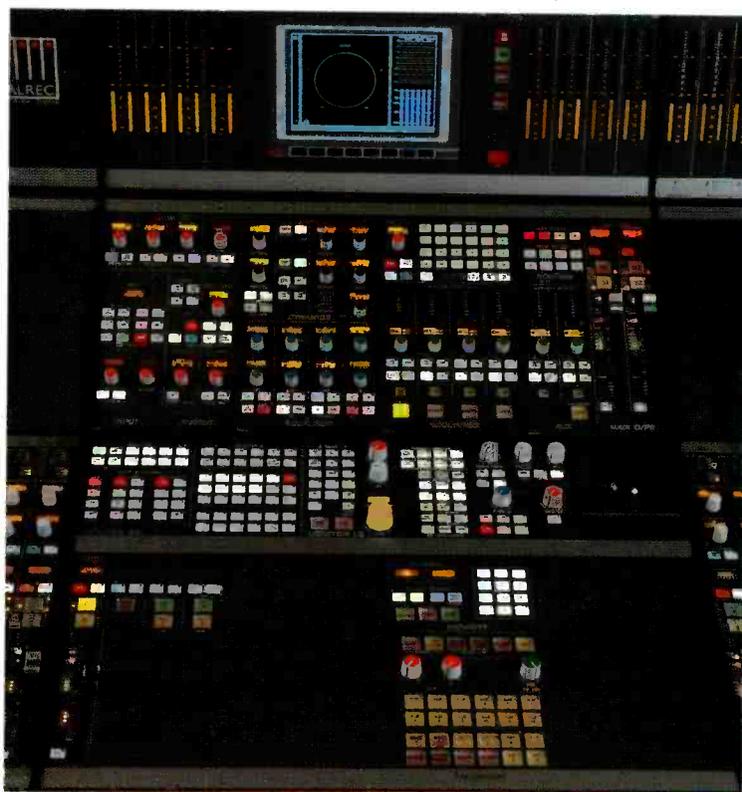


Cost-effective Solutions

Sigma 100 has been carefully configured to provide a high level of facilities and a no-compromise technical specification at a very competitive cost. It is aimed at production facilities that do not require large-format consoles and the costs associated with such products, but cannot sacrifice reliability, ergonomics or technical specification in the search for the correct budgetary fit.

The Sigma 100 is available in four cost-effective processing / input configurations and three frame sizes with a variety of additional optional input and output interfaces. These packages ensure no excessive expenditure is needed to meet the demands of very busy, medium-sized studios by providing focused levels of technical provision keenly targeted at a number of price points. ■

Sigma 100 Control Surface



"On all our visits to the Calrec factory, my colleagues and I have all been really impressed by the dedication, commitment and enthusiasm from all of the Calrec team."

Channel Four
Senior Sound
Supervisor
Rob Eggleton.

Sigma 100



Sigma 100 Monitor Panel

Sigma 100 Key Features:

Excellent Ergonomic and Mechanical Design

- Intuitive and easy to learn control surface
- Compact console sizes - up to 64 faders and 72 channels
- Extremely light weight and small footprint

Modern purpose - designed system architecture

- Full automatic redundancy for:
 - all system DSP cards
 - all control processors
 - all power supplies
- All cards and panels are hot-pluggable
- Embedded control system works independently of host computer

High Level of Facilities

- Up to 24 Multitrack / IFB Outputs
- Mix-minus Output per channel
- 12 Aux busses
- 4 Stereo/Surround 5.1 Outputs
- 8 Audio sub-groups
- Unlimited VCA Groups
- Flexible GPI switching
- Powerful signal processing available at all times:
 - EQ and dynamics on all channels
 - Compressor / expander on Groups
 - Surround compressor on Main Outputs

V1.10 Software on Alpha 100

The Alpha 100 is now available with v1.10 software. This latest upgrade provides the Alpha with the functionality of an integrated audio-matrix, allowing inputs to be fed directly to outputs independently of the console infrastructure.

Operating on both sides of the Atlantic, the Alpha 100 - on whose architecture Sigma 100 is based - is now on air 24 hours a day, seven days a week.

In the US, NBC have on-air Alpha status at New York's Rockefeller Centre, KNSD in California, KXAS in Fort Worth and WTVJ in Miami, NBC's first dedicated all digital station.

Meanwhile, Pittsburgh-based NEP have an Alpha 100-OB installed in their Supershooter 9 remote unit, and the Ackerley Group have had an Alpha on board their all digital OB unit since they acquired it from Panasonic in early 2000.

In Europe SIC in Portugal are on-air 24 hours a day in a news studio, and are also broadcasting live from a OB vehicle, while German broadcasters WDR have a truck out on the road. Channel Four in the UK are also broadcasting live output with a 52 fader desk at 124 Facilities in London, while Granada are

broadcasting with a 48 channel console in Manchester. The BBC have also ordered a 88 Fader desk for their CMCCR Remote unit in addition to a console in studio TC3 used for Top of the Pops and Later with Jools Holland.

In all these facilities, reliability has been a key feature.

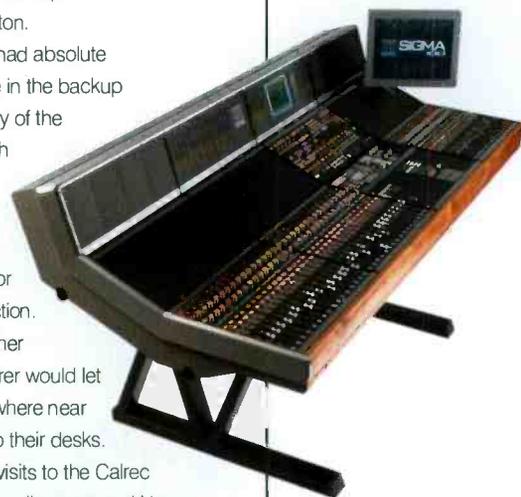
"Calrec actively encouraged us to do anything we wanted to the demo desk, including hot swapping cards and turning the desk off," says Channel Four Senior Sound Supervisor Rob Eggleton.

"They had absolute confidence in the backup redundancy of the desk, which further convinced me of it's suitability for live production.

"No other manufacturer would let us do anywhere near as much to their desks. On all our visits to the Calrec factory, my colleagues and I have all been really impressed by the dedication, commitment and enthusiasm from all of the Calrec team." ■

"The desk is a pure broadcasting product and has features as standard which on other consoles count as extras. The Alpha 100 has proved itself to be the perfect choice."

SIC Sound Supervisor,
Daniel Bekerman



Sigma 100

Calrec Strengthens Customer Support Team

Calrec have strengthened their Customer Support team with the appointment of 33-year-old audio engineer Brian Gay.

Brian, a former Mechanical Engineer, joined Calrec after mature study for a BSc in Audio Technology and has joined Stephen Brant and Peter Walker on the support team.

With a rapidly expanding customer base Calrec are committed to maintaining their strong after-sales service, both internally and through their global network of distributors. ■



Support Engineer Brian Gay

"Calrec's engineering and customer support has been outstanding."

Pat Sullivan,
Game Creek Video (USA)

Major Digital Activities at NAB and AES

Calrec Audio will unveil the brand new Sigma 100 medium format digital audio production console, featured on page 2, at NAB in Las Vegas (booth L2263) and AES in Munich (booth 4D17).

Designed to offer similar specification and functionality to Calrec's S2, Sigma 100 is targeted at large news studios, medium-sized general purpose production studios and Outside Broadcast vehicles. The console is based on well-established Alpha 100 digital system architecture and provides high levels of redundancy.

Also on show is the Alpha 100.

Providing 48 multitrack/matrix outputs, 20 auxiliary busses, eight audio groups and four main outputs - each of which can simultaneously be mono, stereo or Surround.

All desk functions are memorised to snap-shots and full control system reset is achieved without audio interruption.

The C2 is designed for mobile vehicles and studios with limited space. The C2 is a flexible system design which enables group slots to be populated with channels to provide a wide choice of console formats.

The Lip Stick' audio/video mistiming measurement system, removing the need for subjective estimation of sync error by providing accurate measurement over a complete range of transmission mediums. ■



Exhibition Diary

Exhibition	Location	Dates
NAB	Las Vegas	8-11 April 2002
AES Europe	Munich	10-13 May 2002
KOBA	Seoul	23-26 May 2002
BIRTV	Beijing	22-25 Aug. 2002
IBC	Amsterdam	13-17 Sept. 2002
AES USA	Los Angeles	5-8 Oct. 2002
Interbee	Tokyo	14-16 Nov. 2002
SBES	Birmingham	20-21 Nov. 2002
Tonmeister	Hannover	22-25 Nov. 2002

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Panel News

A pending new 1394a specification offers efficiency improvements including support for low power, arbitration acceleration, fast reset and suspend/resume features. Also in development is

ments. Broadcasters are also using hardware devices to transcode DV via 1394 to SDI and back again. An example is the Miranda DV Bridge Plus, which also provides RS-422 machine

The intent of IEEE 1394 was as a parent/child relationship.

IEEE1394b, which will extend the original 1394-1995 and 1394a efforts in three primary ways. First, it increases the speed to 800 Mbits/s and 1.6 Gbits/s, while adding the architectural infrastructure to support 3.2 Gbits/s and beyond. It also specifies alternative media that allow 1394 products to be connected at distances of up to 100 meters. Finally, it is more efficient, lower in cost and easier to manage.

Broadcasters are taking advantage of IEEE 1394 today in low-cost editing packages such as Avid's DV Express and Apple's Final Cut Pro in their news, promo and production depart-

control and time code.

The intent of IEEE 1394 was as a parent/child relationship (a device is connected to a host adapter to talk to an operating system), not as a full-scale network operation. In theory, however, the new 1394b standard could be implemented as a switched architecture in much the same way we route SDI, audio and machine control across an X-Y switch. This would provide the ability to literally hang a hard drive on the router as a pooled storage device.

Barry Ballanger is director of technology for Doyle Technology Consultants.

BY CARSTEN BAUMANN

Ever since new network technologies were introduced, broadcasters have been investigating and exploring the possibilities for using

them in their operations. Several years ago, ATM appeared to be the future standard, not only for WAN connectivity, but also for in-house distribution.

The traditional X-Y crosspoint switch seemed to become obsolete as broadcasters envisioned that device, such as VTRs, cameras, monitors and even microphones would have a built-in ATM network interface connector, and all equipment would be simply plugged into a large enough switch. A

central network management system would control all signal flows and ensure smooth operation.

This was a good idea that hasn't been realized, because it is cost prohibitive. With the exception of a few installations in the audio domain, ATM was never successfully implemented in the local broadcast environment. However, it has been well adopted in the WAN market.

Ethernet and packet switching have long been the underlying technology for computer networks and the Internet. Broadcasters are beginning to use them for voice and video communications as new and improved network technologies, such as DiffServ, MPLS and VPNs, become widely available.

Using these new technologies, the formerly unreliable and unpredictable IP networks now offer high qual-

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ity of service. These new services, in combination with highly developed IP gateway technology allow broadcasters to exchange high-quality real-time and latency sensitive applications over IP networks as an alternative to conventional distribution methods. From a business perspective, using IP net-

limits, benefits, and performance characteristics to integrate SDI/IP gateways. At the same time, traditional network designers need to understand that broadcasters will need to move gigantic amounts of data routinely. SDI moves 270 Mbits/s in real time. Every bit needs to be delivered

Ethernet, there is currently sufficient bandwidth available to accommodate up to three SDI signals (810 Mbits/s) via a single switched IP network path.

IEEE 1394

IEEE 1394, also known as FireWire, was originally designed as an inexpensive consumer interface to connect cameras with computers for editing, and to replace the cumbersome SCSI interface for storage devices. It appears to be attractive for certain broadcast applications and has been adopted by a few manufacturers. 1394 currently provides bandwidth of approximately 400 Mbits/s, but 1394b supports up to 800 Mbits/s, and future upgrades will allow up to 3.2 Gbits/s via fiber interconnects. To provide equivalent networking capabilities to Ethernet, companies can use

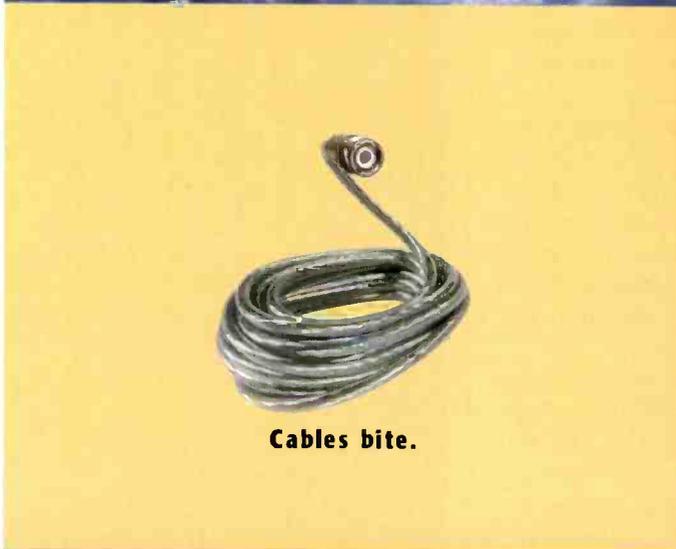
Cost is one of the most critical factors determining whether a technology will be successful or not.

works to distribute high-quality video and audio content is becoming economically more attractive.

Current installations demonstrate that broadcast engineers need to understand network architecture — its

with minimal latency on time — no packets dropped, no packets repeated.

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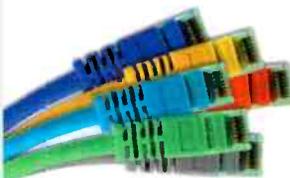
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FireWire switches to build larger networks. It is questionable if these networks are cost competitive with Ethernet, as the majority of network communication architectures are based upon Ethernet. Most likely IEEE 1394

will find its niche, but may be less widely adopted in broadcast applications.

As cost is one of the most critical factors in a technology's success, Ethernet might become the most dominant network architecture within the broadcast

community. I believe that, in the not-too-far future, we will see a wide range of applications running on Ethernet.

Carsten Baumann is director of product management for Leitch.



**BY STAN
MOOTE**

In today's broadcast facilities, Ethernet typically is used to control and monitor various vendors' equipment. Having a simple and low-cost common physical and data link layer allows for easy integration

and scalability. Since Ethernet is the backbone of the Internet, it allows for global access. This can make a broadcast engineer's job easier because it requires almost no local presence. Remote diagnostic, control and monitoring are the key installations using Ethernet.

Does IP networking have a role in today's broadcast plant?

Using IP over Ethernet for real-time long-haul data distribution is becoming attractive as well. IP over Ethernet provides an alternative to conventional distribution methods. Connecting geographically distributed local broadcast stations using Ethernet is a key method for centralcasting.

and scalability. Since Ethernet is the backbone of the Internet, it allows for global access. This can make a broadcast engineer's job easier because it requires almost no local presence. Remote diagnostic, control and monitoring are the key installations using Ethernet.

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HAMLET

EXCELLENCE IN VISION

Scalability and dynamic bandwidth allocation make IP over Ethernet a powerful tool in today's fast-changing broadcast environment. Ethernet already provides the dominant network architecture when video and audio servers exchange information using FTP. It is also used in WANs, MANs and LANs. Security issues arise, but can be solved by using encryption or conditional access.

For in-house, real-time critical data distribution, from a commercial perspective, Ethernet seems to be a little bit far out. First, to use Ethernet to distribute SDI signals requires bandwidth. Even multiple 270 Mbits/s SDI signals fit nicely into gigabit Ethernet. It also needs to provide reliable QoS, and Ethernet's QoS mechanisms are maturing.

But distributing SDI signals over IP networks inside the broadcast facilities still seems to be cost prohibitive. Considering that most traditional broadcast products don't provide Ethernet NICs, an external video and audio-to-

considering one layer of SDI, a dual layer for stereo audio, and half a layer of control. But we can see that more and more equipment vendors are implementing Ethernet NICs in their equipment for signal connectivity.

Scalability and dynamic bandwidth allocation make IP over Ethernet a powerful tool in today's fast-changing broadcast environment.

gigabit Ethernet gateway is required. In recent studies, we found that IP gateways account for 80 percent of the solution cost. Gigabit Ethernet Layer 2 switches will account for the remaining 20 percent of the solution cost.

Currently, the break-even point is somewhere around a 128x128 matrix,

Ethernet NICs inside the equipment will allow for a more cost-effective solution, and using a switched packet network approach to the design of broadcast facilities will become more feasible. In my opinion, we are currently at the same stage as when SDI was introduced several years ago. In

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the beginning, only a few equipment vendors provided SDI I/O ports, and external conversion equipment was required to take advantage of the digital signal enhancements. Now most equipment provides SDI I/Os. I be-

lieve it is fair to assume that this will happen with Ethernet and with gigabit Ethernet as well.

Stan Moote is chief technology officer for Leitch.

What are the benefits of 24p, and for what applications should it be considered?



BY MICHAEL BRINKMAN

The two factors driving the spread of 24 fps video acquisition into areas traditionally reserved for film origination are cost sav-

ings and convenience. In the hands of skilled practitioners, film remains a truly magnificent medium for capturing images. But the realities of today's less-time/less-money production world make it increasingly difficult to budget for the high costs of the film stock, processing, printing and telecine sessions needed to move pictures captured on film into the broadcast world. For a growing list of producers, the image quality of high-definition video, coupled with the immediacy and convenience of videotape, makes a compelling argument for switching to electronic origination. As an example, the producers of a 22-episode television series recently reported that switching to HD will save them \$750,000 in production costs this year.

Of course, the basic arguments about cost savings and convenience apply to HD in general and not specifically to the 24 fps versions of HD that most closely mimic film. The debate over frame rate(s) has reached a near reli-

gious fervor. Some declare that even 60 "frames" per second is "too slow," while others hold to the belief that some magical story-enhancing quality resides in the 24 fps cadence.

The most obvious reason to acquire video at 24 fps is to facilitate distribution of the final product on film. A one-to-one relationship of video frames to film frames simplifies much of the post-production process. The lower the

budget for any given project, the greater the impact of the up-front savings over shooting film. The dollars formerly dedicated to film stock, processing and printing charges can be used to improve the final product. And, because videotape is reasonably inexpensive and reusable, the director and actors may now have the luxury of shooting multiple takes or employing creative techniques that simply can't be done when burning budget-limited film stock. There is little question that shooting 24 fps HD can have a positive impact on a lower budget feature.

The choice of frame rate is not always so obvious if the final distribution will be via a broadcast television signal. 24 fps video is a good choice if

the project calls for shooting both film and video, particularly if 24 fps film makes up a sizeable portion of the overall footage. Also 24 fps origination and mastering makes it easier for many post facilities to perform a conversion to 25 fps, 625-line (PAL) if overseas distribution is anticipated. Thus, 24 fps HD is becoming an alternative to shooting film for some episodic programs.

But what about more transitory, general-purpose programming that will not be syndicated or high motion/action programming like sports? In the case of the later, 60 fps HD is a far better choice than 24 fps. With 2.5 times more frames per second, 60 fps brings fluidity and grace to moving objects. Several notable examples — like ShowScan — exist of shooting 60 fps film and playing back at 60 fps, but the cost of such production remains prohibitive in all but the most specialized applications. We should also remember that 30 fps high-definition (1080i/60 format) remains the

Others hold to the belief that some magical story-enhancing quality resides in the 24fps cadence.

most affordable way to shoot and post HD. If production budgets remain depressed, there is a real possibility that 30 fps HD will be rediscovered as an affordable compromise between the drama-enhancing "look" of 24 fps and the motion-handling elegance of 60 fps.

So, while there is no doubt that the use of 24 fps HD will continue to expand as the tools become easier to use, there is equal reason to believe that creative cinematographers will discover the advantages offered by affordable, higher frame rates. Look for developments in both directions. **BE**

Michael Brinkman is vice president of strategic relations for Panasonic.

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NAB update

As a further guide to the new technology being shown at this year's NAB show, the Broadcast Engineering staff has compiled a second installment of over 100 more new products. Use the following listings to find what you're looking for at the show and to get in touch with manufacturers. Issue advertisers are indicated by colored listings.

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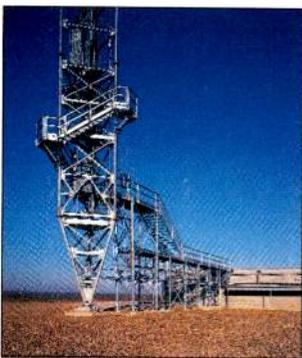
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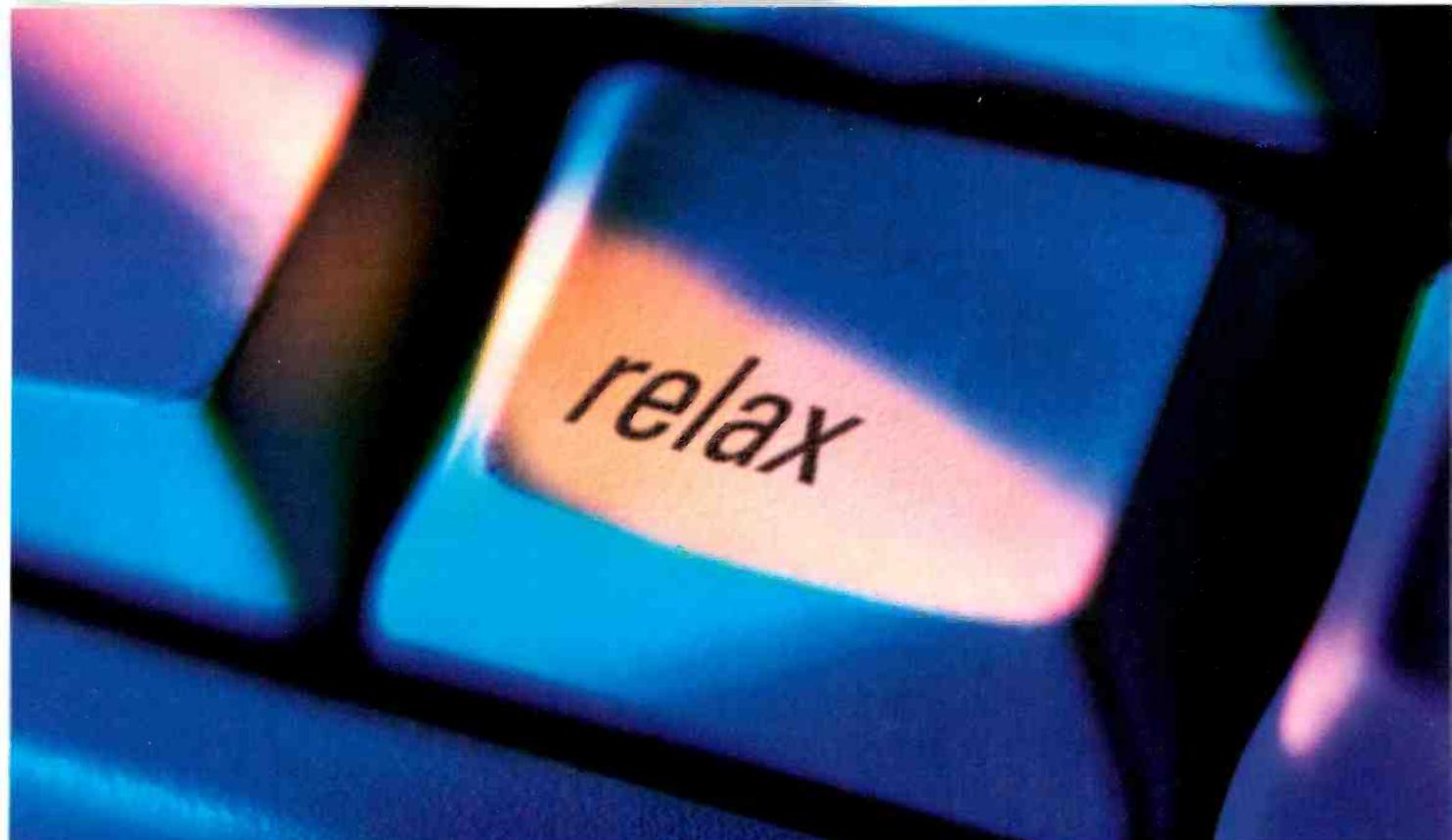
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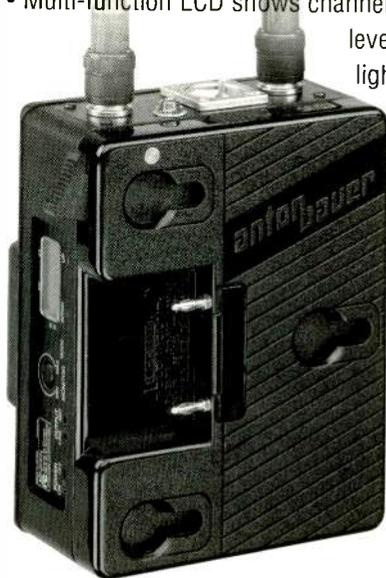
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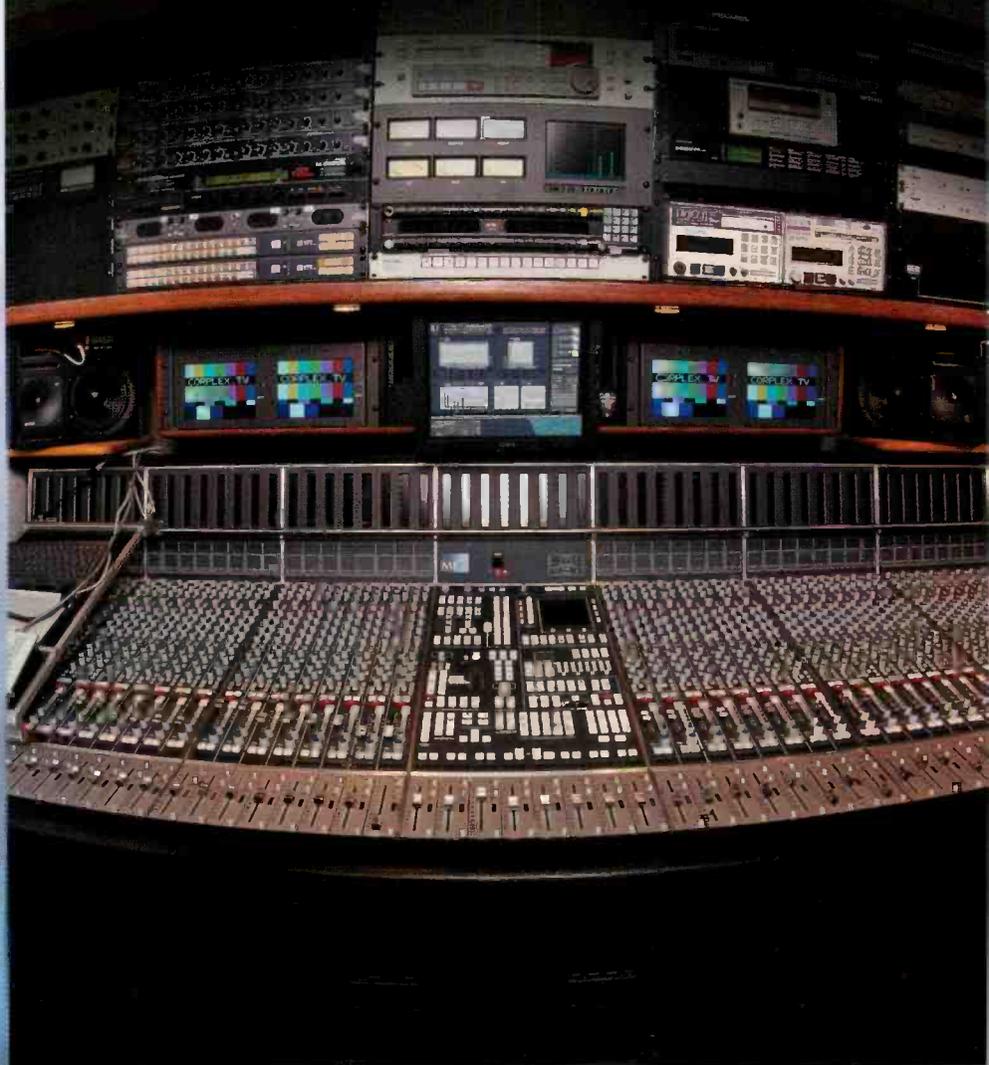
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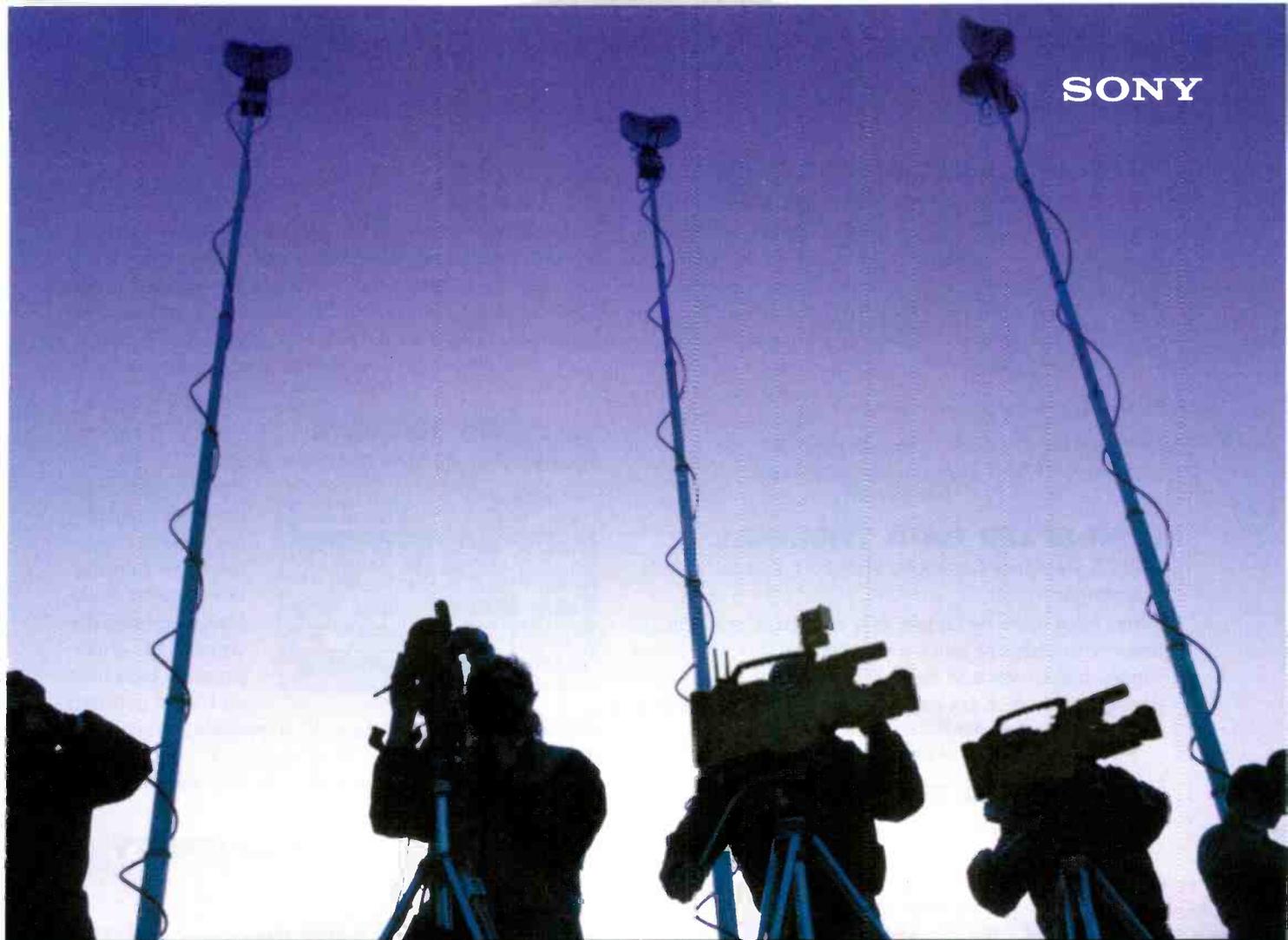
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Offers rates up to 64 kbits/s; fully automatic tracking antenna with different moving options; 10-32 V DC power supply, transceiver and handset cradle plus cables; standard Mini-M voice, fax and data operation at 2.4 kbits/s.

954-973-3100; fax: 954-973-4800; www.gmpcs-us.com
Booth: S9943

WEBCASTING TOOL

Thomson/Grass Valley Group Webable

Streamlines the process of moving material from the Profile XP media platform to the Web; features a simple drag-and-drop method for creating streaming media; allows users to locate and view media assets, and encode them for online viewing.

530-478-3000; fax: 530-478-3755; www.grassvalleygroup.com
Booth: L19524



REVIEW SYSTEM

Imagine Products TEP-mail

E-mail-based collaboration and review applet for video producers to share video logs; only a Web

browser is required at the recipient's end to look at video clips, comment on them, and with the click of a button send those comments back to the shooter.

317-843-0706; www.imagineproducts.com
Booth: L12803

DUALBAND ANTENNA

Dielectric Communications TUV-M and TUV-I

These new additions are ideal for the low and mid-band (channels 2-6) VHF broadcaster who has a UHF DTV channel with limited tower capacity or aperture; superturnstile antenna for VHF service.

207-655-8152; fax: 207-655-7120; www.dielectric.com
Booths: L2915, L8442

RECEIVER

Azden 1000URX

Features true diversity electronics in conjunction with removable twin high-gain antennas and Azden's proprietary diversity logic control (DLC) circuitry for superior, noise-free reception; uses dielectric filters for improved image rejection and fifth-order filters for an improved S/N ratio.

516-328-7500; fax: 516-328-7506; www.azdencorp.com
Booth: L2562

INTERNET SERVICE

Accuweather Accuweather.com Alert



Opt-in Internet-based service delivers weather forecasts and information to users' desktops or e-mail; designed to cross-promote broadcast and Web content;

available in a co-branded model to provide stations with advertising revenue.

814-235-8638; fax: 814-235-8609; www.accuweather.com
Booth: L12233

TWO-ANTENNA TRUE DIVERSITY RECEIVER

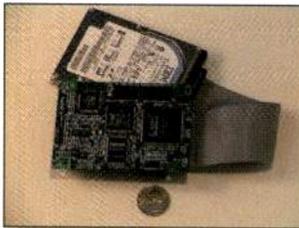
Avalon RF DX502/DX602

Intended for low-weight mobile applications; the DX502 tuning frequency range is from 900 MHz to 999 MHz in steps of 1 MHz; the DX602 tuning frequency range is from 2350 MHz to 2483 MHz in steps of 1 Mhz; broadcasts quality FM video signals and two FM modulated audio subcarriers; powered by an external battery or AC adapter.

619-401-1969; fax: 619-401-1971; www.avalonrf.com
Booth: S1528

DIGITAL VIDEO RECORDER BOARD

Fast Forward Video RECON



When combined with notebook hard drives or solid-state memory, provides a cost-efficient, small DVR solution; features broadcast-quality video capture and playback at 60 fps.

949-852-8404; fax: 949-852-1226; www.ffv.com
Booth: L5553

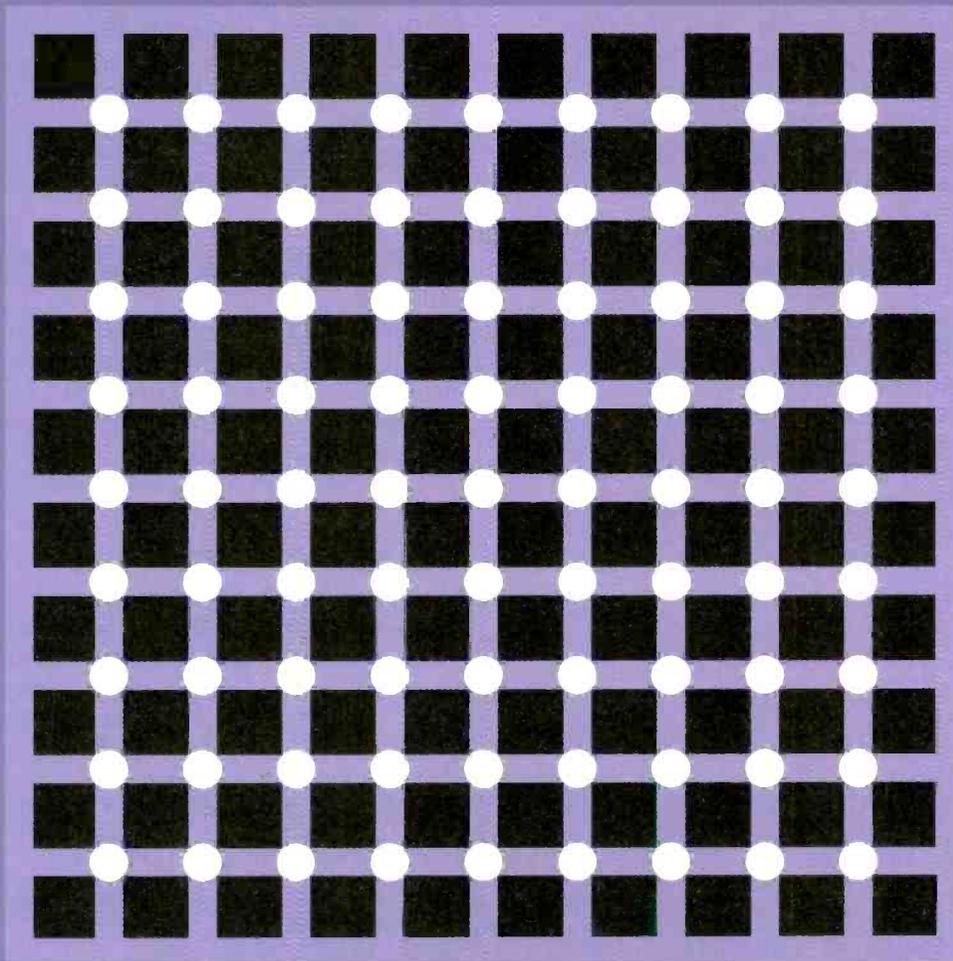
MEDIA STORAGE

Ciprico diMEDA 2400:

NAS performance levels exceeding 75 Mbits/s aggregate bandwidth is delivered through a single node; features fault-tolerant dual-node architecture.

763-551-4000; fax: 763-551-4002; www.ciprico.com
Booth: S5733

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804-342-2900; fax: 804-342-1107

www.acousticsfirst.com

Booth: L1957

LOGO GENERATOR

Miranda Technologies DLG series

Configured as a basic logo inserter; gradually expands to include EAS insertion, input switching, AB mixing, still store, text insertion, audio storage and insertion, automation control, and full master control panel capability.

514-333-1772; fax: 514-333-9828; www.miranda.com

Booth: L10611

EDITING SYSTEM

Pinnacle Systems Cinewave HD

Delivers native 24-frame film editing from acquisition to distribution; features real-time compositing, filters, and image and motion control; complete system for uncompressed SD and HD content creation.

650-526-1600; www.pinnaclesys.com

Booth: L10623

PROFESSIONAL DIGITAL A/V MIXER

Panasonic WJ-MX50A

Four sources can be switched and any two of them routed to the program buses; A/B program buses can be monitored at the A/B program outputs while the mixed picture is monitored at the preview output; compatible with a wide variety of video editing devices.

800-528-8601; www.panasonic.com/broadcast

Booth: L7214

3-D DVE OPTION

Ross Video Squeeze & Tease 3-D

Addition to the Synergy digital production switcher; brings 3-D manipulation, perspective, sub-pixel motion and scaling to Squeeze & Tease's ability to fly any type of key.

613-652-4886; fax: 613-652-4425; www.rossvideo.com

Booth: L11429

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- High Quality Audio Broadcast
- Transfer Large Files

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GMPCS Personal Communications, Inc.

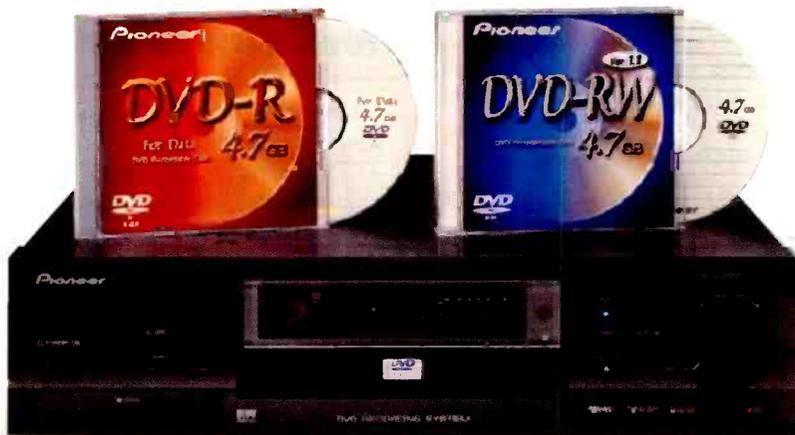
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Pioneer *sound.vision.soul*

VIDEO CAPTURE CARD

AJA Video KONA:

Kona-SD is a 10-bit uncompressed SDI video capture and output card with QuickTime compatibility; Kona-HD is a high-definition video capture and output card; both capture and output video with one channel I/O; features a robust audio system with AES inputs for 6 ch asynchronous audio at 32-96 Khz.

530-274-2048; fax: 530-274-9442; www.aja.com

Booth: L12257

VIDEO/AUDIO/DATA MULTIPLEXER

Opticom FMX-48000

Compatible with PAL, NTSC and SECAM video signals; features include multimode or single-mode operation over one fiber, 7 MHz or 10 MHz video bandwidth, true DC restoration and flat frequency response.

858-450-0143; fax: 858-450-0155; www.opticom.com

Booth: S4833



WIDEBAND 32X32 ROUTING SWITCHERS

PESA Switching Systems Cougar

wideband and Cougar combo

Deliver 300 MHz wide bandwidth performance; preserves crisp, vivid images for the highest resolutions of RGB, RGBHV and HD applications; the Cougar wideband is housed in a 3RU, and the Cougar combo is housed in a 4RU chassis.

631-845-5020; fax: 631-845-5023; www.pesa.com

Booth: L8449

PLUG-INS FOR IQ AND NEW GRAPHICS PRODUCTS

Quantel IQ plug-ins

Suite includes a total of 17 effects and transitions; sensible defaults allow

straightforward effects and transitions to be quickly set up and executed; comprehensive parameter controls are available for precision tweaking and execution.

+44 1635 482 22; fax: +44 1635 815 815; www.quantel.com

Booth: L8424



TRANSRATING AND STATISTICAL RE-MULTIPLEXING SOLUTION

Scientific-Atlanta Transis RateCompressor

Employs new Intellirate transrating technologies such as closed loop processing; can handle large bit-rate reductions; its Smartstart feature makes setup simple for operators; can be added easily to existing installation when transrating is required.

770-236-6190; fax: 770-236-6464; www.scientificatlanta.com

Booth: S4522



MOTION- COMPENSATED VIDEO ARCHIVE PROCESSOR

Snell & Wilcox Archangel

Enhancements include an expanded filter set for the real-time restoration of film

and video-based archives; uses Ph.c phase correlation technology, which allows the noise-reduction circuitry to differentiate between noise and motion within the footage.

+44 20 8917 4300; +44 20 8607 9466; www.snellwilcox.com

Booth: L9837

BROADBAND SOLUTIONS

TANDBERG Television broadband solutions

Designed to deliver broadcast-quality TV, interactive and video-on-demand services over IP; products include ITTV delivery platform, ITTV portal and ITTV pilot, a cost-effective, packaged solution that provides operators with all they need to deliver video over the network in one package.

+44 23 80 84 197; fax: +44 23 80 484 330; www.tandbergtv.com

Booth: S4555

IP GATEWAY

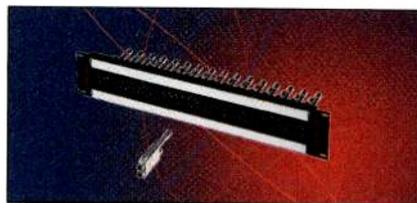
Thales Broadcast & Multimedia OPAL

Designed for high-speed Internet data broadcasting over any DVB-compliant network; dedicated to encapsulate Internet data into an MPEG-2 transport stream; supports Optimux, a technology that optimizes IP data insertion.

+33 1 34 90 31 00; fax: +33 1 34 90 30 00; www.thales-bm.com

Booth: L8700

PATCHBAYS



Switchcraft SWC MVP/SWC VAP

New line of mid-size video jacks, patchcords and patchbays.

773-792-2700; fax: 773-792-2129; www.switchcraft.com

Booth: L5649

INTERNET-ENABLED AUDIO/VIDEO SERVERS

Panasonic IDVR-100 and IDVR-200

Both models are capable of playing approximately 30 minutes of MPEG-2 HD encoded video at the nominal 19 Mbits/s data rate from a single 7.4 GByte capacity DVD-R or DVD-RAM disk; can play back 24-frame and 60-frame progressive HD images plus stereo or optional 5.1 channel surround sound.

800-528-8601; www.panasonic.com/broadcast

Booth: L7214

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Toll-free Sales and Service Support Line : 1 800 962 4267
For more information and your nearest contact, please visit our website : www.thomsonbroadcast.com

DV DESKTOP EDITING VTR

Panasonic AG-DV2000

Delivers digital component video quality of more than 500 lines of resolution and a high S/N ratio of 50 db; records for more than two hours with full editing capabilities; features one-touch editing keys and versatile programmed editing functions, including assemble editing for up to 40 scenes and insert editing.

800-528-8601; www.panasonic.com/broadcast

Booth: L7214



DVCPRO CAMCORDER

Thomson Multimedia LDK 140

Offers 22-bit digital signal processing capabilities; designed for camera operators who are challenged by a

broad range of assignments requiring frequent adaptation to the requirements of diverse customers.

818-729-7700; fax: 818-729-7710;

www.thomsonbroadcast.com

Booth: L19524

ROUTER

Chyron Pro-Bel Sirius

Features built-in analog and digital signal conversion for video and audio; different formats can be mixed and matched within the same frames; supports up to 128x128.

631-845-2000; fax: 631-845-3888; www.chyron.com

Booth: L12200

TELE ZOOM LENS

Thales Angenieux ENG Tele 26x7.8aif.hr

Combines the widest angle f7.8 mm to a 26x zoom ratio; focal range covers most applications from f7.8 mm to f203 mm, reaching f406 mm with the built-in range extender; features fast aperture of f/1.8.

+04 77 90 78 00; fax: +04 77 90 78 01

www.angenieux.com

Booth: L9332

DIGITAL BATTERY

Anton/Bauer Propac 14

Extends runtimes of up to five hours on DVC format camcorders; does not require limiting when operating both a camera and on-camera ultralight up to 85 W.

203-929-1100; fax: 203-929-9935

www.antonbauer.com

Booths: L19507, L7203

BROADCAST CONSOLE

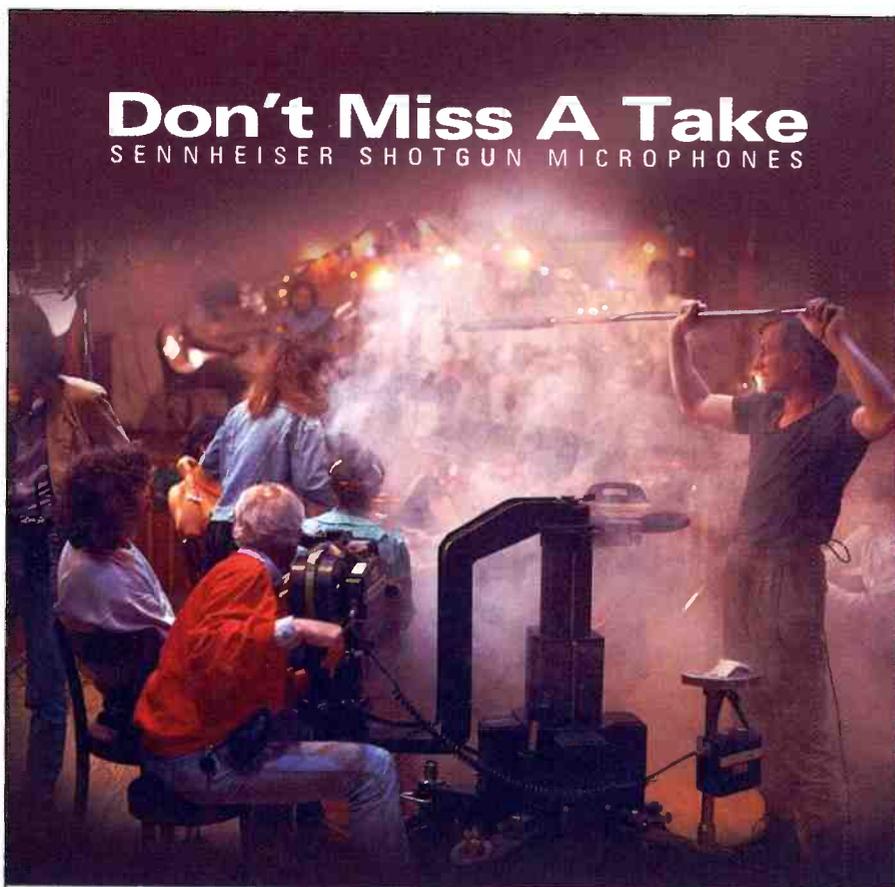
Calrec Audio Sigma 100

Available in four processing/input configurations and three frame sizes; includes a variety of input and output interfaces; provides high levels of redundancy, with hot-swappable cards and panels; all channels include four-band EQ, separate filters and mix-minus outputs.

+44 1422 842159; fax: +44 1422 845244

www.calrec.com

Booth: L2263



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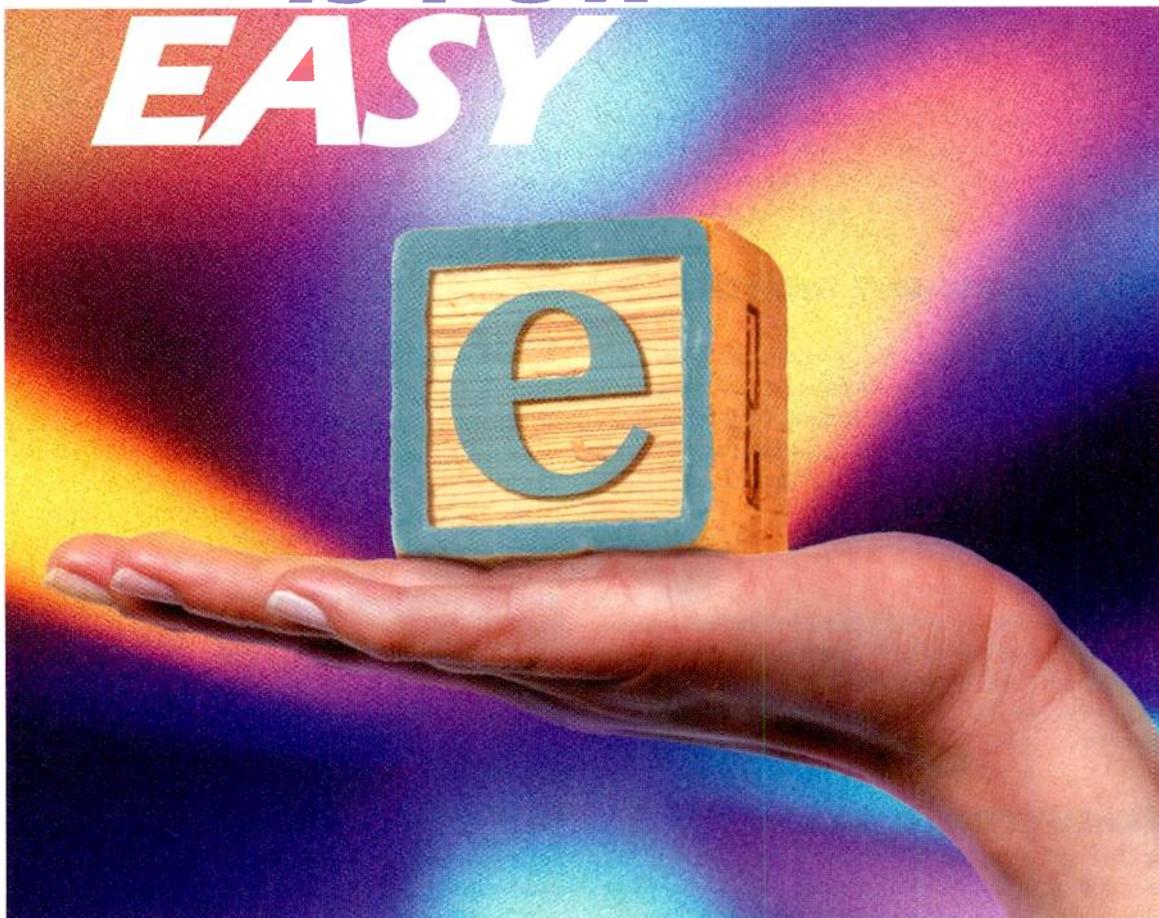
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www.dolby.com/tvaudio

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PROGRAMMABLE SOURCE-ASSIGNMENT PANEL

Clear-Com RCS-2000

Accessory to Clear-Com's party-line; main switching unit is an eight-channel by 24-station group assignment matrix; up to six RCS-2000s can be wired together; programmable via PC; offers remote controlled switching for medium to large systems.

510-496-6666; fax: 510-496-6699; www.clear-com.com
Booth: L8463



12-BIT COMPONENT DIGITIZER

Fortel DTV ADC-331

Generates three SDI outputs; input signals can be in RGB, Betacam, MII, SMPTE or EBU format; automatic scaling is controlled by front-panel selection of the input format; input luminance is accepted with or without setup.

770-806-0234; fax: 770-806-0244; www.fortelDTV.com
Booth: L21306

DIGI SCOPE

Hamlet Video Digi Scope

Provides the same high level of functionality and ease of integration but without the integral screen, displaying on any external monitor (SDI, component YUV or RGB, composite or SVGA) wherever the measurement display is required.

+44 1494 793 763; fax: +44 1494 791 283; www.hamlet.co.uk
Booth: L12500

TRANSMITTER

Harris UHF solid-state ATSC transmitter

Features 460 W or 900 W from a single compact cabinet; includes an FCC mask filter built-in for ease of installation; its real-time adaptive correction (RTAC) system provides continuous and automatic correction for linear distortions; uses a 320x240 pixel color touch screen.

321-727-9207; www.harris.com
Booth: L1351

BATTERY SYSTEM

IDX Technologies Endura

Allows two E-50 direct mount batteries to be stacked together on a camera back; fits directly onto new cameras that have the wedge style V-mount already built in; uses the lithium ion technology.

310-891-2800; fax: 310-891-3600; www.idxtek.com
Booth: L11349

WIRELESS INTERCOM

Telex Communications BTR800

Features two intercom channels, stage announce with relay closure, wireless talkaround, 1440 frequencies and all metal beltpacks.

952-884-4051; fax: 952-884-0043; www.telex.com
Booth: L8437

WIRELESS CAMERA MODULE

Broadcast Microwave Services Carry-Coder

Module provides wireless digital transmission of audio and video signals; can be installed in a backpack or plugged directly into the back of most professional video cameras; also available in a package for helicopter applications.

800-669-9667; fax: 858-391-3049; www.bms-inc.com
Booth: L4912



GLOBAL SATELLITE SYSTEM

Intelsat global satellite services

Broadcast services support satellite news gathering; special events, such as news, sports and entertainment; studio-to-studio; television broadcasting; and direct-to-home.

+44 208 899 6035; fax: +44 208 899 6194; www.intelsat.com
Booth: S9033



NONLINEAR EDITOR

BOXX HDBOXX

Editor offers variable frame rate support for Panasonic's AJ-HDC27V HD cinema camera; features 10-bit

and eight-bit YUV and eight-bit RGB support; system supports all HD and SD formats, including 16:9 aspect ratios and 2k film resolution.

512-835-0400; fax: 512-835-0434; www.boxxtech.com
Booth: S2329

TRANSMITTER

AI (formerly Acrodyne Industries) Quantum QEXD1

Remote parameter monitoring available; alternative to going low power in NTSC or DTV; offers a budget-conscious version of high-power quantum in a single-cabinet, single-tube system.

410-568-2105; fax: 410-568-1546; www.acrodyne.com
Booth: L8457

PARALLEL HD/SD DIGITAL DISK RECORDER

Leitch dpsRealityHD

Work on projects for both HD and SD formats and DVD and Internet distribution; make edit decisions and preview work on SD equipment while producing HD material; HD VCRS and monitors can be used throughout the process.

757-548-2300; fax: 757-548-0019; www.leitch.com
Booth: L19511

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Winsted Model T2802

Moves laterally on ADA-recognized anti-tip racks with a patent anti-tip bracket; five-cabinet system holds up to 2940 3/4-inch

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952-944-9050; fax: 952-944-1546; www.winsted.com

Booth: L19520

COMMUNITY BROADCAST FACILITY

Spectrasite Broadcast Group community broadcast facility

Allows multiple broadcasters to use a common transmission site in order to shorten project timelines and preserve capital; Spectrasite obtains the site, gets zoning approval, and builds and manages the facility.

888-468-0112; www.spectrasite.com

Booth: L6841

AUDIO RECORDER

360 Systems Digicart-E



New networkable audio recorder operates at 16 or 24 bits and at all sample rates; features a large LCD display; files are compatible with earlier Digicarts; editing tasks include trims, fades and level adjustments.

818-991-0360; fax: 818-994-1360; www.360systems.com

Booth: L2034

AUDIO MIXER

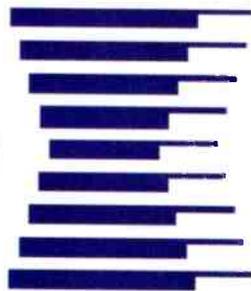
Henry Engineering Micromixer

Four-input, two-output stereo mixer for line-level sources; balanced bridging inputs accept balanced and unbalanced sources; provides adjustment from off to +10 dB of gain.

626-355-3656; fax: 626-355-0077; www.henryeng.com

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Tel: 408 260 1000 www.snellwilcox.com

CAMERA INTERCONNECTION SYSTEM

LEMO USA 3K.93C

Hybrid fiber optic HD camera interconnection system that, by using fiber optics, allows transmission over longer distances and at higher levels of definition; has a compact design with two single-mode fiber contacts, two power contacts and two signal contacts.

707-578-8811; fax: 707-578-0869; www.lemo-usa.com
Booth: L11262

BOOMSETS

Sennheiser HMD series

Lightweight design; 102 dB SPL headphone monitoring system attenuates ambient noise by 32 dB; features a supercardioid microphone mounted on a flexible, acoustically isolated boom.

800-434-9190; fax: 860-434-1759;

www.sennheiser.com

Booth: L2923



MASTER CONTROL SYSTEM

Harris MC-PK DTV

Comparably priced to individual components that need to be integrated into a system; available in four basic models with a wide range of configurations and options; versions are available for either single-channel HD or single-channel HD/SD applications.

513-459-3400; fax: 513-701-5323; www.harris.com

Booth: L5414

SIGNAL GENERATOR

HORITA BSG-50

Multiple-output blackburst, sync pulse and audio tone generator; six user-configurable BNC video/pulse outputs; sync signals may be set individually as composite sync, composite blanking, H drive or V drive; also features a separate buffer for each output.

949-489-0240; fax: 949-489-0242; www.horita.com

Booth: L11961

TRIPOD SERIES

Miller Fluid Heads Sprinter

Features include dual, side-action Sprint-Loks, fully variable mid-level spreader, rapid setup transport clips, sprint-grip carry handle and reinforced 100 mm bowl.

973-857-8300; fax: 973-857-8188; www.miller.com

Booth: L18942

AUDIO PRODUCTION CONSOLE

Midas Broadcast 2000

Offers an eight-input pre-selector that is split into two halves; the first four inputs are set up for mic inputs, and the second set of four inputs are set up for line inputs.

+44 1562 741515; fax: +44 1562 745371; www.midasconsoles.com

Booth: L8437

LOW-DELAY MPEG-2 ENCODER

Standard Communications L1000

Features encoding delay of less than 100 ms in either 4:2:2 or 4:2:0 formats; dissipates less than 20 W of power on AC or battery operation; switchable between DVB-T or DVB-S modulation; suitable for SNG, ENG and action sports.

310-532-5300; fax: 310-532-0397; www.standardcomm.com

Booth: S8133



TIME BASE CORRECTOR/VIDEO SYNCHRONIZER

Prime Image Model Digital 50 III

TBC/synchronizer includes full proc amp control on all inputs; features freeze control for either field or a frame, and full-time or selectable composite color bar generator.

408-867-6519; fax: 408-926-7294; www.primeimageinc.com

Booth: L12253

ASPECT RATIO CONVERTER

Leitch ARC-6001

Dual standard (525/626) serial digital 270 Mbits/s aspect ratio converter supported in the Genesis platform; allows conversion from ratios such as 4:3, 14:9, 16:9, and 21:9 to 4:3, 14:9, 16:9, and 21:9, and will perform picture aspect ratio conversion on a video signal under GPI control or automatically.

800-231-9673; fax: 757-548-0019; www.leitch.com

Booth: L19511

CONSTANT EFFICIENCY AMPLIFIER

Northrop Grumman Electron Devices L-4200 series

Next generation of high-power broadcast tubes for the UHF television industry; operates at peak powers up to 130 kW; offers a 50 percent improvement in efficiency compared with a standard IOT when operated in digital service.

570-326-3561; fax: 570-326-2903; www.littonedd.com

Booth: L6256

MAGNETIC MEDIA PRODUCTS

Maxell professional media magnet media products

Media family includes digital products such as Digital Betacam, Betacam SP, Betacam SX, DVCPRO, HDCam, D-5, D-2 and D-3.

201-794-5900; fax: 201-796-8790; www.maxell.com

Booth: L8964

VIDEO SERVER

Seachange International Broadcast Mediaservers

Stand-alone video servers use RAID5 storage to scale to 490 hours of storage; handles 4:2:2/4:2:0 MPEG-2 and MPEG-1 media files.

978-897-0100; fax: 978-897-0132; www.schange.com

Booth: L19564

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Exhibition Categories

- Audio Equipment ● Cameras and Related Equipment
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- Editing and Production Equipment
- Electronic Displays ● System Conversion Equipment
- Output Systems ● Relay Systems
- Transmission Systems ● Lighting Equipment
- Measuring Equipment ● Transmission Cables
- Electric Power Units ● HDTV Systems
- Satellite Broadcasting Systems ● Virtual Systems
- CG Production Systems ● DVD Systems
- Multimedia Systems ● Software
- Multiplex Broadcasting Systems ● Others

TRANSMISSION SYSTEM

Fiber Options B780G



Designed to support RGB signals for projector and plasma display screens and XVGA (1600x1200) computer systems with resolution up to 2k by 2k pixels; features both BNC and HD-15 computer interface connectors.

631-567-8320; fax: 631-567-8322; www.fiberoptions.com
Booth: L11043

NONLINEAR EDITING SYSTEM

Panasonic newsBYTE50:

DVCPRO50/DVCPRO native nonlinear editing system with a dual, built-in 50 Mbits/s, 4:2:2 DVCPRO50/DVCPRO VTR; features the ability to load DVCPRO50 video at 2x real time; load DVCPRO video at 4x real time; also offers high-speed, lossless DVCPRO50/DVCPRO transfers to/from tape, direct recording to the timeline and an easy-to-use interface.

800-528-8601; www.panasonic.com/broadcast
Booth: L7214

LONG-PLAY STUDIO VTR

Panasonic AJ-HD 1600 VTR

Records for up to 124 minutes on a single cassette; can play back all DV-based cassettes; offers eight 16-bit PCM audio channels to accommodate 5.1 surround sound plus stereo sound mixes.

800-528-8601; www.panasonic.com/broadcast
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Acterna Optical Network Management System (ONMS)

Offers operators significant commercial advantage through increased productivity, reduced network downtime and easier, faster network provisioning; monitors the physical and optical layers of the fiber network from a single, stand-alone remote test unit; Web-enabled.

301-353-1550; fax: 301-353-9080; www.acterna.com
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Hamlet Video LCD Scope

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+44 1494 793 763; fax: +44 1494 791 283; www.hamlet.com
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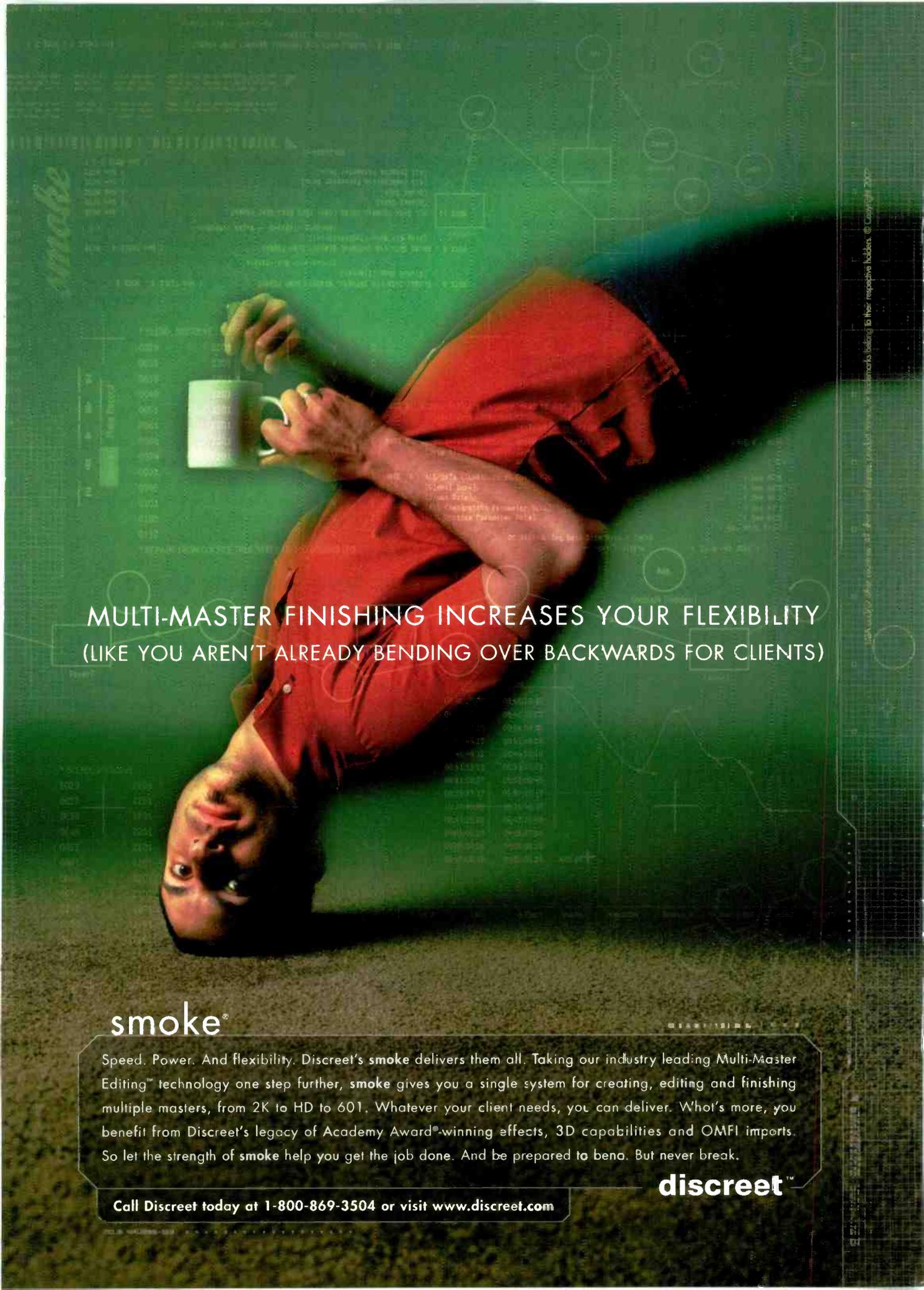
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+44 208 6249468; www.bbctechnology.com

Booth: S3952

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562-906-9000; fax: 562-906-9100; www.marketec.com/solutions

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Terrasonde digital audio toolbox

DSP-powered unit has four main sets of I/O connectors, two digital inputs, digital output and analog output, as well as word clock in and out and a serial port; supports AES, S/PDIF, TOSLINK and ADAT at bit depths of 24 bits and sample rates to 96 kHz.

303-545-5848; fax: 303-545-6066; www.terrasonde.com

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Thales Broadcast & Multimedia Ultimate

Covers analog power from 500W to 60 kW and in digital from 125W to 15 kW rms; allows easy upgrade of transmitters from analog to digital changing the exciter.

413-569-0116; fax: 413-569-0679; www.thales-bm.com

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MINI-DV CAMCORDER

Panasonic AG-DVX100

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Data Check Tuner Six Pack Model 26040

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858-578-0101; fax: 858-578-9215

www.datacheck.com

Booth: L12272

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+04 77 90 78 00; fax: +04 77 90 78 01; www.angenieux.com

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952-917-0306; fax: 952-917-0648; www.adc.com

Booth: L9849

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16x9 DV Sunshade

4" x 4" sunshade designed for DV camcorders; facilitates professional filter effects, precision flair control and fine-tuning of lighting; system includes a full-sized rectangular shade, a housing for most DV lenses, a French flag, one rotating and one fixed 4x4 filterholder, plus a clamp adapter.

818-972-2839; fax: 818-972-2832; www.16x9inc.com

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Aphex 204

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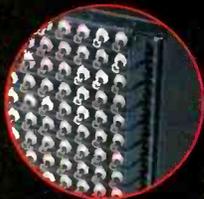
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www.adtecinc.com

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www.astro-systems.com

Booth: L20661

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www.avicatech.com

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Omneon Video Networks networked content server



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408-585-5000; fax: 408-585-5099; www.omneon.com
Booth: S20402

EDITING SYSTEM

Avid Technology NewsCutter XP

Integrates with linear acquisition systems; fits into any existing linear or nonlinear news production environment; when connected to Avid Unity for News, allows editors and reporters unlimited access to all media; links directly to Avid iNEWS so you can view rundowns, write scripts and drag-and-drop stories directly into the NewsCutter bin, eliminating retyping errors and streamlining the production process.

978-640-6789; fax: 978-640-1366; www.avid.com
Booth: L13200

MODULAR MEDIA SYSTEM

Axon Digital Design SYNAPSE

Cost-effective system with a continually expanding product range; features the high-density of the frames, flexible remote control capabilities and an Ethernet-based remote control system; the system is Internet-enabled and also provides the ability to get remote firmware updates through the Internet; does not require external fan units and does away with unpopular card dip switches.

+31 13 511 6666; +31 13 511 4151; www.axon.tv
Booth: L19277

AUDIO DISTRIBUTION SYSTEM

Benchmark Media Systems System 1000

Offers over 15 different modules and four power supply options, numerous controllers and accessories; cost-effective mono, stereo and microphone pre-amp power DAs and router-switcher, mix and control modules.

315-437-6300; fax: 315-437-8119; www.benchmarkmedia.com
Booth: L2208

DIGITAL COMPONENT SWITCHER

Brick House Video VTB-1D

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800-982-2629; www.trompeter.com
Booth: L6731



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Broadcast Technology DTMD 1000

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+44 1264 332 633; fax: +44 1264 334 509; www.btl.uk.com
Booth: L9844

INSTANT REPLAY CONTROL PANEL

BUF Technology Sport

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858-451-1350; fax: 858-451-6589; www.buftek.com
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TRANSMITTER CONTROL SOFTWARE

Burk Technology AutoPilot 2

Designed to enable station engineers to monitor and control multiple Burk ARC-16s transmitter remote control systems; can monitor and control an unlimited number of transmission sites and record all activity; offers an intuitive interface and easy navigation; ARC-16s are easily configured with AutoPilot 2's step-by-step setup wizard; features scripting technology for automation and unattended control.

800-255-8090; fax: 978-486-0081; www.burk.com
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408-954-4500; fax: 408-954-4502; www.canopuscorp.com
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800-321-4388; www.canon.com
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530-477-2000; www.videoframesystems.com
Booth: L20377

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505-898-1455; fax: 505-898-0159; www.burstelectronics.com
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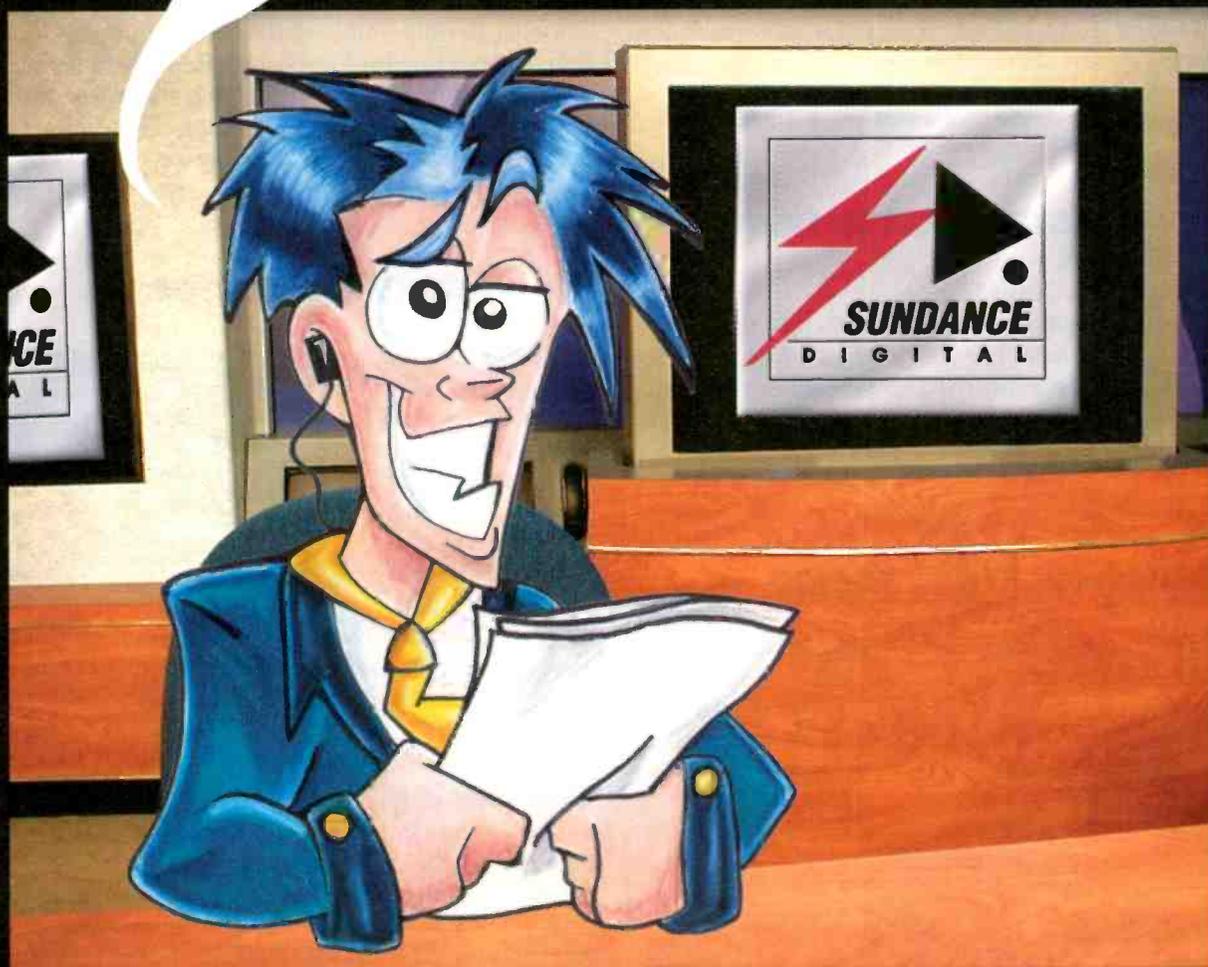
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801-575-8801; fax: 801-537-3099; www.utahscientific.com
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TELEVISION CONSOLE



Wheatstone SP-8

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252-638-7000; fax: 252-635-4857; www.wheatstone.com
Booth: L2515

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Zandar FusionPro

HiResolution Multiviewer

Multi-image display technology and image processing; modular, flexible multi-window display processors for large-scale audio-visual display applications in broadcast monitoring; 3RU frame that can accept a variety of two-channel cards to allow for input formats including NTSC/PAL, digital video and computer sources.

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Booth: L12141

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408-542-2500; fax: 408-542-2511; www.harmonicinc.com
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FIBER OPTIC TRANSMISSION SYSTEM

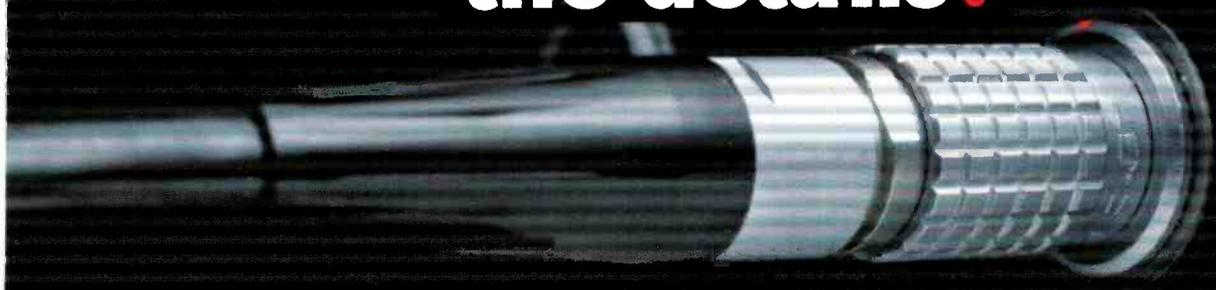
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NAB Booth # L11262



NEWSROOM AUTOMATION

Comprompter NewsKing

Combines Microsoft Windows 2000, SQL and Word into a powerful newsroom structure with easy point-and-click operation to provide quick access to scripts, wires, news-cast rundowns and archives; requires Windows NT or 2000 workstations and network.

608-785-7766; fax: 608-784-5013; www.comprompter.com
Booth: L11657

CAPTIONING SOFTWARE

Computer Prompting and Captioning CaptionMaker

Works in conjunction with captioning hardware and a time code reader in two easy steps; first, the software automatically retrieves the captions and timing information; second, the software reinserts the captions synchronized with the video as it is Webcast; CaptionMaker software is also capable of producing captions for Webcasts which have not been previously captioned; the software runs on Windows 95/98/NT/2000/XE.

301-738-8487; fax: 8488-TTY-8489; www.cpcweb.com
Booth: L11768

NONLINEAR/LINEAR HYBRID EDITING SYSTEM

Editware Fastrack VS

Specifically designed to interface with and control disk-based video servers, with the added benefit to control VTRs, mixers, switchers, character generators and other peripheral devices; true hybrid system; gives the editor flexibility and connectivity of a Windows platform, as well as the linear editing ability to utilize a video switcher, digital video effects device and audio mixer along with additional equipment such as VTRs in a nonlinear environment.

530-477-4300; fax: 530-477-4304; www.editware.com
Booth: L8368



SILICON STORAGE APPLIANCE

DataDirect Networks s2A 3000

Allows IT professionals to easily create highly scalable, simple-to-deploy and easy-to-manage storage area networks for broadcast, post and digital media facilities; based on the company's enterprise-class Silicon Storage Appliance technology.

818-700-7600; www.datadirectnet.com
Booth: S5744

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703-875-9100; fax: 703-875-9161; www.digigram.com
Booth: L13362

GRAPHICS SOLUTION

FOR-A Corporation of America digiStorm

Turnkey 3-D on-air graphics solution that leverages the best-of-breed components of FOR-A's lines of real-time graphics and virtual studio systems; real-time, high-quality 3-D CG graphics animation for sports, weather, mapping and statistics box applications.

352-371-1505; fax: 352-378-5320; www.for-a.com
Booth: L10019

VIRTUAL SET

FOR-A Corporation of America digiWarp

2-D virtual set that can be operated by one person; backgrounds can be created from 2-D and 3-D computer graphics, photo library CD images or images taken from digital cameras; current users of digiWarp can upgrade to digiStorm for increased productivity, flexibility and 3-D camera movements.

352-371-1505; fax: 352-378-5320; www.for-a.com
Booth: L10019

WIDE-ANGLE ENG LENSES

Fujinon A13x6.3E/A13x6.3

Provides cost-effective, high-end program production; feature the widest focal length (6.3 mm) and highest magnification of 13x (82 mm focal length at telephoto end and 164 mm with a 2x extender) among all professional lenses; both lenses are designed for 2/3-inch cameras.

973-633-5600; www.fujinon.com
Booth: L18241

MODULAR FRAME SYSTEM

Videotek SQM Signal Quality Manager



Provides 24-hour signal quality monitoring concerns and real-time alarms with logging; multiple card and frame-based design with a variety of input cards to measure and analyze video and audio from multiple sources and instantly report any errors to a master control point.

610-327-2292; fax: 610-327-9295; www.videotek.com
Booth: L10631

DISK RECORDER

Doremi Labs v1-u.hd

Designed as a drop-in replacement for any HD videotape recorder; uncompressed recording removes generation loss from the processing chain; provides higher resolution than tape-based solution at a lower cost.



818-562-1101; fax: 818-562-1109; www.doremilabs.com
Booth: L12539

MPEG RECORDER/PLAYER

Tektronix MTX100

Captures and plays out MPEG-2 data streams at the high data rates needed to verify and troubleshoot designs for high-performance consumer and professional video products and systems.

800-835-9433; www.tektronix.com
Booth: L8411

SDI/HD MULTIPLEXER

Telecast Fiber Systems Python Plus4

Format-independent digital distribution unit that transports four channels of serial digital video on a single optical fiber; capable of handling all standard digital formats from 19.4 Mbits/s up to uncompressed high-definition television at 1.5 Gbits/s; applications include studio-transmitter links, connections in and between production and post-production facilities, and SD/HD traffic between metropolitan switching centers.

508-754-4858; fax: 508-752-1520; www.telecast-fiber.com
Booth: L18859

CAMERA ROBOTICS CONTROL PANEL

Telemetrics CP-D-3A

Features a modular design that can be easily expanded and upgraded; the basic panel includes a high quality three-axis joystick for pan, tilt and zoom functions; these functions have speed select knobs to adjust for joystick sensitivity; options include camera ROP control, iris master black control, and a rocker switch for variable speed control of the Televator Elevating Pedestal or camera track left and right.

201-848-9818; fax: 201-848-9819; www.telemetricsinc.com
Booth: L9853

1 KW DAB COMBINER

Teracom Components 1 kW DAB combiner

Family of DAB combiners has established a record of proven service throughout Europe; these DAB requirements have met all the requirements of the Eureka 147 specification and individual broadcasters specifications; filters with up to eight sections in constant impedance or reflective configurations have been supplied for systems requiring stable group delay and rejection characteristics.

207-627-7474; fax: 207-627-7473; www.teracom-c.com
Booth: L1515

SATISFYING YOUR REQUIREMENTS, EXCEEDING YOUR EXPECTATIONS.



SIGMA 100

NEW DIGITAL PRODUCTION CONSOLE

- Intuitive and easy to learn control surface
- Compact console sizes - up to 64 faders and 72 channels
- Extremely lightweight and small footprint
- Full automatic redundancy for all system DSP cards, control processors and power supplies
- All cards and panels are hot-pluggable
- Embedded control system works independently of host computer
- Up to 24 Multitrack / IFB Outputs
- Mix-minus Output per channel
- 12 Aux busses
- 4 Stereo/Surround 5.1 Outputs
- 8 audio sub-groups
- Powerful signal processing available at all times

Scalable and providing high levels of redundancy with hot-swappable cards and panels throughout, Sigma 100 is aimed at production facilities that do not require large-format consoles but cannot sacrifice reliability or technical specification. Sigma 100 is available in four cost-effective processing configurations and three frame sizes with a variety of I/O interfaces.



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FAX: (615) 872 7080
EMAIL: redwood@isdn.net

SD/HD NOISE REDUCTION PRODUCT

Teranex StarFilm

Incorporates advanced algorithms for grain removal, dirt concealment and noise reduction for SD and HD material; allows the user to work with either NTSC or PAL material, or HD 1080p 23-, 24- or 25-frame film-based material in the same platform; both the SD and HD modes will share the same user interface and control architecture; runs on the Teranex real-time digital video platform with a unique processor-per-pixel technology that yields compute power in the trillions of operations-per-second (TeraOps).

407-858-6000; fax: 407-858-6001; www.teranex.com
Booth: L5847

ROUTING SWITCHER

Leitch Integrator series

Routing switchers provide medium- to large-scale routing of most signal formats; modular design provides hot-swappable modules, optional redundant power supplies and logic cards; user can mix different signal formats in the same 4RU, 6RU or 8RU frame.

800-231-9673; fax: 757-548-0019; www.leitch.com
Booth: L19511



SAP/STEREO/VIDEO RECEIVER

Modulation Sciences MSI 189

Provides simultaneous all-mode reception for SAP, stereo and monaural audio via balanced, line-level KLR connectors; features a stable synthesized tuner; uses dual antennas inputs; operating channel is selected by jumpers inside the receiver.

800-826-2603; fax: 732-302-2060; www.modsci.com
Booth: L5210

NEWSROOM SYSTEM

ParkerVision PVTV NEWS CR4000 system

Features advanced software that simplifies the user interface for single operator control; improves upon the Transition Macro timeline management and workflow processes of previous PVTV systems while expanding its automation functionality; capabilities of the CR4000 bolster the profile of the PVTV News line to provide true live production automation solution.

904-737-1367; fax: 904-731-0958; www.parkervision.com
Booth: L5503

SOLUTIONS ON DEMAND

SignaSys Solutions on Demand

Range of engineering, consulting, project management, design, installation and procurement services designed to fit the needs of network affiliates, independents and noncommercial stations looking for an inexpensive way to update their facilities; literally an "engineering department on call" by allowing TV stations to supplement their staff by adding SignaSys engineers and installers to complete projects.

408-998-8037; fax: 408-998-8064; www.signasys.com
Booth: L9132

AUTOMATION SYSTEM

Inscriber Technology AutoCG Max

Fills tagged data fields of Inscriber layouts with live data from popular news vendors; uses the CII message protocol for maximum connectivity to link compatible news vendors.

519-570-9111; fax: 519-570-9140; www.inscriber.com
Booth: S3937

HDTV ENABLED SET-TOP BOX

Pioneer New Media Voyager series

Offers viewers the ability to decode various HDTV formats and enjoy maximum picture quality from both analog television sources and HDTV broadcasts; features a built-in ATSC digital decoder with video outputs that can pass native 1080i signals or downconvert those signals based on display limitations.

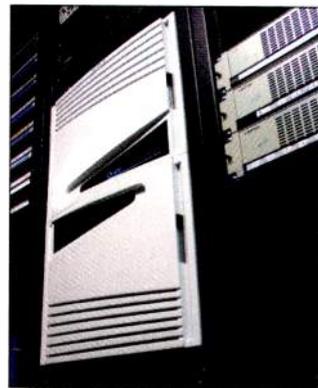
818-295-6656; fax: 818-295-6658; www.pioneerelectronics.com
Booth: S3320

ROUTER

Quartz Q256

For users whose current needs are met with SDI bandwidth the Q256 is cost-effective, without carrying the overhead of HD I/O components; newly released HD input and output modules extend the versatility of the system; packs a 256x256 matrix into only 16RU, including redundant power supplies, redundant controllers, and input and expansion capabilities.

888-638-8745; fax: 530-839-2207; www.quartzus.com
Booth: L22419



CAMERA

ARRI ARRIFLEX 435 Advanced

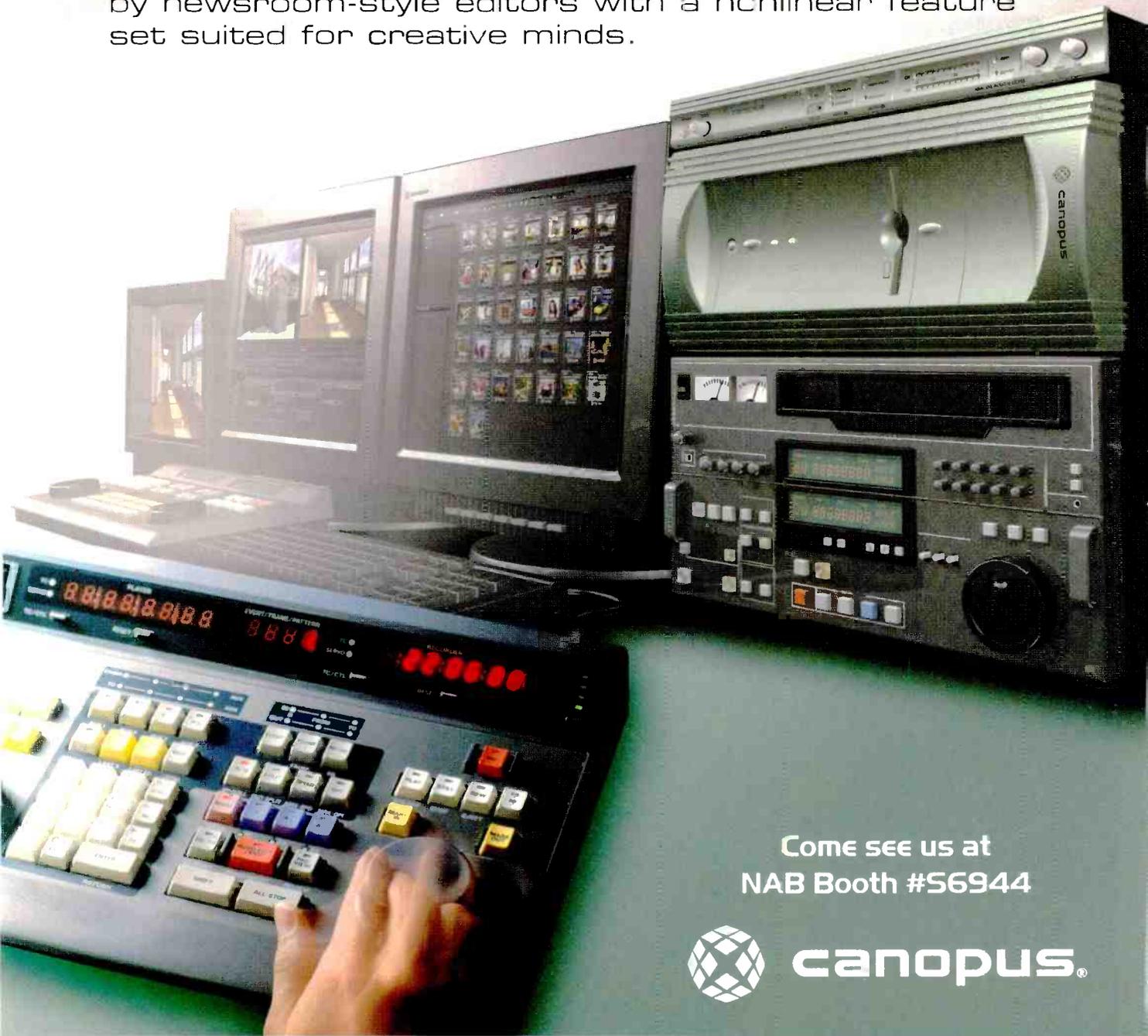
Offers comprehensive accessories and new interfaces for applications including motion control to in-camera effects with speed ramps; features an electronically adjustable mirror shutter; new minimum frame rate has been reduced to 0.1 fps.

845-353-1400; fax: 845-425-1250; www.arri.com
Booth: L11437

CWS100

Canopus Workstation

Introducing CWS-100, a high-performance editing workstation that combines the linear workflow used by newsroom-style editors with a nonlinear feature set suited for creative minds.



Come see us at
NAB Booth #56944



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DIGITAL MEDIA SERVICES

AT&T digital media services

Help broadcasters to create, manage and deliver content; offers include both broadcast content management and distribution, as well as streaming media for the Web; single-source storage, hosting and content collection/distribution networking.

800-288-3199; www.att.com/business
Booth: S5523

GRAPHICS SYSTEM

Radamec Scenario XR

Gives producers real studio image quality and ease-of-use in one package; renders sets in real time including reflections of live inserted elements; running under the Windows NT operating system, Scenario XR imports 3-D set designs from industry standard packages and uses Radamec's new 436VR camera sensor head and lens encoders to provide accurate camera position information.

877-RADAMEC; fax: 732-846-0544; www.RadamecBroadcast.com
Booth: L12268

MULTICHANNEL AUDIO TOOL

Dolby Laboratories DP570

Accepts up to eight audio channels configured as four pairs and, regardless of their original order, outputs them in the SMPTE-recommended order using a built-in router.

415-558-0200; fax: 415-863-1373; www.dolby.com
Booth: L19535



HD DISK RECORDER

Accom WSD/HD

HD disk recorder allows users to record longitudinal time code with the original material; users may choose whether to preserve discontinuities or replace them with internally generated time code.

650-328-3818; fax: 650-327-2511
www.accom.com
Booth: S3904

DOWNCONVERTER

Folsom Research SmartVIEW

Computer-to-video downconverter automatically locks to interlaced and non-interlaced computer sources up to 1600x1280 and converts video to NTSC or PAL composite, S-video (Y/C), Betacam and RGB output.

916-859-2505; fax: 916-859-2515
www.folsom.com
Booth: L14824

PRODUCTION SERVER

Avid AirSPACE

Available in either DVCPRO25/50 Mb/s or IMX 50 Mb/s MPEG formats; capacities range from 12 hours to 244 hours; 6RU chassis; provides streaming of broadcast-quality video; any of the AirSPACE capacities and I/O configurations can be upgraded at any time.

978-640-6789; fax: 978-640-1366
www.avid.com
Booth: L13200

VIDEO ROUTER

Evertz X1200 series

Twelve-input video routers for 270, 360 and 540 Mb/s standard-definition, serial digital signals and 1.5 Gb/s HD serial digital signals; available in video-only or video with AES versions.

905-335-3700; fax: 905-335-3573
www.evertz.com
Booth: L11443

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R20CE	SDI to Component and Composite Converter, Rack Mount Module	\$990

800-251-4224
530-274-2048
www.aja.com

NAB Booth #L12257



Truth in Broadcasting.

Truth: The JVC DV500 costs less to buy—and own—than any other broadcast camera.

Truth: Virtually no downtime. JVC's unique pre-aligned transport module can be replaced in minutes—even in the field. That keeps your DV500s on the street, not on the bench.

Truth: You don't have to wait to begin saving. By delivering the features, performance and image quality of cameras costing 2 to 3 times more, JVC's DV500 saves money the moment you buy it. You can afford to put more cameras in the field.

Truth: You can recoup your initial investment in tape savings alone. The DV500 uses proven, reliable 63-minute DV tape, available everywhere for a fraction of the cost of Beta SP, SX, DVCPRO or DVCAM. In typical broadcast use, tape savings could exceed the purchase price! And tapes recorded on the DV500 can be played back on DVCPRO and DVCAM systems.

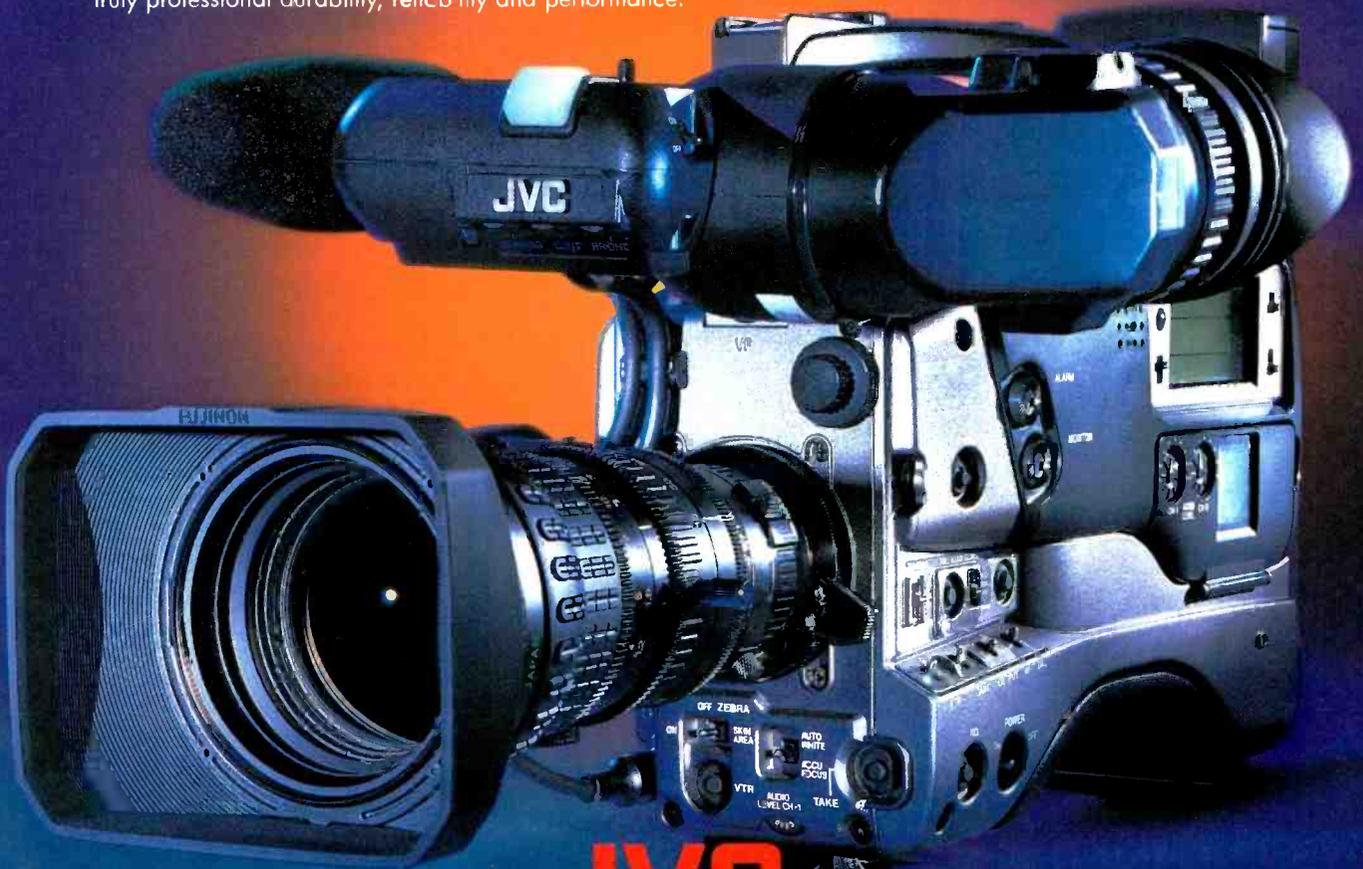
Truth: You don't sacrifice quality to save money. Despite its modest cost, everything from the DV500's die-cast magnesium housing to its advanced 14-bit DSP ensures truly professional durability, reliability and performance.

Compare the DV500 with any other broadcast camcorder—the truth will set you free of the illusion that you need to spend more for an amazing digital camera.

To find out more about the DV500, visit our Web site or call 1-800-532-5825.



All critical VTR components and electronics are packed into a single, inexpensive modular chassis, replaceable in minutes, even in the field.



JVC

The power to take you further.

www.jvc.com/pro

PROFESSIONAL **DV**

SOFTWARE APPLICATION

Scopus Network Technologies SI-3050

Powerful, yet easy-to-use, PSI/SI generation, editing and injection software application for broadcast headend systems; based on a client/server architecture, it provides a graphical user interface for all DVB-SI and MPEG-2 PSI tables, as well as EPG generation.

858-618-1600; www.scopus.net

Booth: S3927

RECEIVER/DEMODULATOR

Rohde & Schwarz EFA 93

New analog NTSC System M demodulation for the EFA family of receivers/demodulators; it can be added to the successful Digital EFA-53 (8-VSB) to give the terrestrial broadcaster a dual-format precision demodulator with a full suite of measurements; allows the addition of a QAM demodulator for U.S. cable compliant to ITU-J83.b specifications, creating one receiver/demodulator that covers all three broadcast/cable modulation formats.

410-910-7832; fax: 410-910-7801;

www.rsa.rohde-schwarz.com

Booth: L5510

MEDIA SERVER

SGI Media Server

Completely integrated solution for serving video, audio and data that is based on open video, data networking, file transfer format and storage technology; the high throughput of the server facilitates simultaneous ingest, data network-based file transfers to the server, and playout to air of multiple video channels; solution for centralcasting architectures that require acquisition, commercial insertion spot playback and facilities distribution.

650-960-1980; www.sgi.com

Booth: S5418

DIGITAL BROADCAST CONSOLE

Solid State Logic Aysis Air Plus 'SC'

Designed specifically for the daily broadcast tasks of owned and operated stations, affiliates and other broadcasters looking for a smooth, cost-effective transition to digital broadcast; has built-in redundancy and security features such as hot-swappable faders and is capable of expansion as station challenges grow; comprehensive reset capabilities allow greater capacity and thus studio efficiency.

+44 186 584 2300; fax: +44 186 585 2212;

www.solid-state-logic.com

Booth: L2731

All the right moves.



Telemetrics' TM-CTS Curved Trolley System turns a new corner in versatility, performance and price. With low-profile aluminum curved and straight tracks that can be easily mounted on lighting truss, the ceiling or shelf. A precision engineered trolley with smooth and quiet operation that can be configured for single coax cable connection and high-speed operation. Plus pan, tilt, zoom and focus capability.

The TM-CTS also integrates with Telemetrics' complete line of control panels, software, receivers and accessories to meet virtually any camera robotics application. Add some new moves to your productions with Telemetrics – the camera robotics company with all the right moves.

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UPDATE

IBC2002 leads the world in electronic media



With a vigorous demand for exhibition space and an overwhelming response to the call for conference participation IBC2002 is well on track to be another informative, stimulating and above all relevant event.

By constantly adapting to the changes in the industry, IBC remains unquestionably the world's electronic media event. Whether your interest is in broadband or digital cinema, acquisition or post, creative or technology, IBC is the only truly international convention.

Peter Owen IBC Exhibition Chair says, "IBC2002 looks forward to an event well supported by exhibitors and visitors alike. In the generally less volatile business climate of the European broadcast scene, IBC will bring together 800+ exhibiting companies and 45000+ visitors from over 120 countries. IBC's exhibition formula of diverse but relevant products, technologies and services will this year be supported by new free customer briefing sessions.

Whether supplier to customer or business to

business, all relationships enjoy the vibrant, efficient nature of IBC's high quality environment. IBC2002 will maintain the tradition of quality and will also point to a new confident future for our industry"

A five-day exhibition and conference allows the visitor or delegate enough time to investigate their subject in depth. With everything located on a single, compact site all of that time is productive, with none wasted travelling between centres. And the layout of the RAI Centre ensures there are plenty of places to meet and talk for the all-important networking.

The exhibition continues to grow in strength and stature. This year it will occupy all eleven halls of the RAI Centre.

The team has taken a completely fresh look at the layout of the exhibition, again to assist visitors by grouping products more logically. It gives added focus to some of the new areas of the industry, too: digital asset management has its own themed area in hall 9, for

instance, and consultancy and added value service companies can be found in halls 9 and 10.

Over recent years the structure of the conference programme has grown into a number of cohesive streams. Last year supersessions were introduced, tackling a number of key topics from all angles with papers, workshops, discussions and demonstrations. Most important, it gave an opportunity for people from the production and business worlds as well as technologists to share knowledge.

This year the streaming is further refined, with each day of the conference focussing on one of the hot topics of the day: mega-supersessions, if you like. These six topics – radio, digital cinema, interactivity, content management and exploitation, delivery and news – will each have a range of sessions for a comprehensive analysis of the state of the art.

That is IBC2002: a conference bringing together creative and technical thinkers from around the world and a comprehensive exhibition of over 800 stands. Whatever your role in the electronic media industry, you cannot afford not to be there.

IBC AT NAB

The IBC team will once again have a stand at NAB. Why not come and visit us and pick up a copy of our IBC Preview? Also on the booth you will find the latest floor plan and conference programme. September is approaching fast so why not stay ahead of the game and plan your trip now. The IBC team will be delighted to help. We look forward to meeting old friends and making new ones.

You can find us at stand L10720 (next to Pinnacle).



IBC tackles key management technical & creative issues.

IBC has always been seen as the leading international forum for the exchange of technical ideas, and that certainly remains the cornerstone of the conference.

But the nature of today's electronic media is that creative talents are keen to exploit the latest technology, whether it is a post production tool,

interactivity or the latest in broadband delivery mechanisms. IBC has met this need by attracting artists and producers to the event, and drawing them in to the conference programme through sessions aimed at their needs and guaranteed technical jargon free.

This year's innovation is to

add to the usual mix of papers and panels five day-long sessions, each looking at one of the topics driving developments in the industry. Over the coming issues of *IBC Update* each will be introduced by their executive producers. Here Norman Green talks about d-cinema day and Neil Dormand discusses the news day.

Changing Goliath – how and when will the d-cinema revolution arrive?

How far is it from implementation to acceptance on a large scale? How does it work and is it future proof? Where are we on standardisation, and are the proposed standards just a fit to today's technology or the result of innovative thinking? How

have producers and directors found the d-cinema quality, particularly when making "non-computer-special-effects" productions?

Who is going to pay for it? The studios, the distributors, the laboratories, the cinema chains? How will independents

pay for d-cinema in the world of multiplexes? Does it open the door to new kinds of content?

Join the d-cinema theme day and find out the answers to these questions and many more. There will be a tutorial, panel and papers sessions on the leading edge of the media business.

Taming technology – boosting creativity & the bottom line

We've banned technobabble from these free sessions designed to help the international creative community harness technology and so make better and more cost effective programmes. At the end of each session we will provide you with links to relevant kit on the show floor. Our overall aim is to introduce programme makers to kit that

enables them to take their audiences into stimulating new territory. We plan to cover the following topics:-

SMALL IS BEAUTIFUL? In these days of cricket stump cameras, DV Cams, disposable cams, laptop editing and satellite phones; we ask Is Small really beautiful?

SOUNDS AMAZING! With wrap-around sound, and digital audio quality that reaches parts

never dreamed of, we devote a full session to the staggering advances in this area of programme making.

CG: AT A PRICE YOU CAN AFFORD. In this session we seek inspiration from the top end kit with the experts who can make it sing - but focus on the lower end where the potential for all programme makers is enormous - at a price that won't break the bank.

News – broadcast, broadband or both?

Against a background of dwindling conventional news viewing we ask what will be the dominant delivery system in the future. In the fight to get on air first, is the technology getting in the way of the story? How can a broadcaster cope with the many delivery methods now available.

Ever since the introduction of ENG, competing news providers have sought ways of getting the story to air the fastest. With more live on the spot reporting, we will start the day by looking at the latest communication methods and ask whether the technology gets in the way of the journalistic process.

Many news organisations now have a multitude of delivering methods, from conventional bulletins, 24 hour channels with interactivity, the internet and mobile systems. How can news providers generate the different content and formats cost effectively?

Finally, we will look to the future. Will all news be by on-demand broadband? Over the air interactive? How will the systems cope with access demands to the big story? Will traditional broadcasting techniques, even over broadband, be the best method of mass delivery?

With the help of prominent news people the day will answer these and other issues arising from the business of news.

Awards Trio at IBC2002

IBC now has 3 Awards; The **International Honour for Excellence** (John Tucker

Award) awarded in recognition of an internationally significant



contribution to any innovative aspect of electronic media.

Previous winners include Roderick Snell, Dr Ray Dolby and Dr Leonardo Chiariglione; The **IBC Exhibition Design Awards** (John Etheridge Awards) are presented to those

exhibitors who show outstanding flair and innovation in presenting and demonstrating their products or services. All exhibitors are automatically entered as a team of judges visits every stand on the show floor;

The **President's Award** recognizes the best paper published at the conference. All papers printed in the conference proceedings are automatically considered for the award and the winner is selected by the paper assessors, the paper session convenors and the session chairmen.

On the floor

The IBC2002 exhibition is already set to make a major impact. With acquisitions and mergers joining some big name companies together on a single stand, and most manufacturers aiming for tightly focussed demonstrations for their visitors, the exhibition will occupy the eleven halls of the RAI Centre without the need for the temporary pavilion constructed for IBC2001.

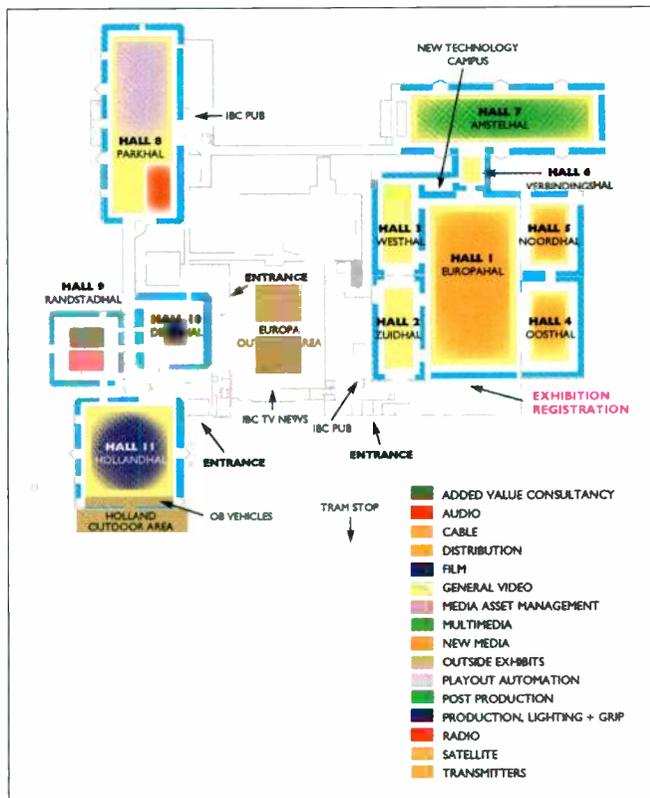
"IBC has always aimed for a logical layout of its exhibition, with product groups kept together and a good balance of large and small exhibitors in each hall. This year we have taken the opportunity to reflect the changing balance of the industry in our themed areas," said IBC Exhibition manager Robin Lince.

Halls 1, 4 and 5 now focus on all aspects of delivery: cable, satellite, broadband and transmitters. Hall 7 remains the post production and graphics

area: Apple, now a major platform for high quality finishing, is in hall 7. Linked to it we have dedicated part of hall 8, just across the bridge, to audio for video, a natural business flow matched by the natural traffic flow around IBC.

Halls 9 and 10 will have an overall theme of added value and consultancy. Systems are getting more complex, embracing computer and telecommunications technology as well as digital broadcast hardware. Broadcasters and facilities are increasingly turning to consultants to help them define and design their projects, systems integrators (in hall 10) to help build them, and digital asset management (in hall 9) to track material through these multi-layer systems.

One final innovation in IBC2002 is an acknowledgement that it often rains in Amsterdam in September! Some of the smaller outside broadcast vehicles will be displayed



indoors, by request, in hall 11 and adjacent to the established outdoor exhibit area.

With a record number of visitors targeted, IBC2002 will be a bustling and busy

exhibition. Manufacturers and service providers who have not yet booked their space should contact the IBC office immediately, as we are close to capacity.

Looking forward to IBC

IBC Exhibition Chairman, Peter Owen, reflects upon the ever changing nature of broadcasting and looks forward to IBC2002.

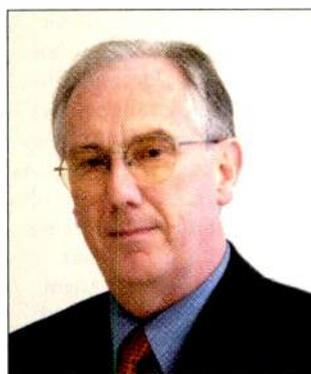
I write this note exactly six months from a horrific event, which almost every member of the human race was soon made aware of. Such is the power of global broadcasting. Formerly delivered by analogue only, today by digital and additionally now broadcast to our PCs and mobile communications devices.

This ever changing definition of broadcasting continues to challenge IBC, on the one hand to widen its offerings whilst on the other to maintain its relevance to our

visitors who not only face the strategic and business issues of broadcasting but also technology choices and content creation for the wider audience.

It's a challenge that IBC is happy to accept and through its links with exhibitors and visitors IBC feels the pulse and senses the changes taking place in this vibrant business that we call broadcast.

In a well themed 11 hall exhibition, quality buyers and quality exhibitors meet, network and assess products, services, technologies and techniques necessary to maintain a lead in this increasingly competitive world. And for the creative and non technical visitors free



IBC Exhibition Chairman, Peter Owen

resolve and determination to overcome the most difficult of circumstances. Since then a post show survey revealed a satisfaction with the event to which they will return in 2002. Exhibitors have already demonstrated their confidence by booking their space for September.

In an age when time in one of the most precious commodities, the choice of show for exhibitor and visitor alike is key to a successful business. IBC2002 will bring together quality exhibitors with quality visitors sharing quality time.

We look forward to seeing you there.





Why we will be at IBC2002

IBC Update asked a range of manufacturers why IBC2002 is so important to them.

“We are located in South Korea, and specialise in DTV/HDTV receivers, MPEG stream stations and DTV modulators. We recently expanded our product range to cover DVB. Through IBC we will introduce these new products and establish marketing channels in Europe.” Jaewon Yim, Teleview, a first time exhibitor.

“IBC is the largest and most important broadcast show in Europe, and attracts broadcasters from all over the world. As an exhibitor, it is our chance to demonstrate our products – especially recent developments – and to show the progress that we have made. It is also a chance to initiate and progress discussions with partner companies, and to meet business acquaintances and old friends from across the industry.” Peter Hajitoffi, Pebble Beach Systems.

Exhibiting at IBC for the first time in 2001, Pebble Beach won the IBC John Etheridge Award for the best small stand.

“These exhibitions are extremely valuable to us, not least because they give us a unique opportunity to meet and communicate with our customers and partners, but also because they provide us with a focus for our product development. At IBC2001 we previewed new technology. As a result of the feedback gained directly at the show, we have been able to improve our technology further.” Adam Welsh, Cintel International.

New-look IBC Website

IBC will be launching their new-look website at the start of April. The new design is up to date and easy to use and has general information about the show, all the latest conference news, details of the themed days and speakers and information on how to exhibit as well as the popular product locator, which gives information regarding all the exhibiting companies and their products. Visitors to the website will also be able to register for IBC2002 and find details on how to book accommodation. Visit www.ibc.org

who manufacture boxes.” Andrew Winter, IBIS.

“During IBC our customers have the chance to get hands on experience of our whole product range, enabling them to choose the precise device for their environment. It is an important opportunity to launch new products, and the variety of visitors from the current and new areas of the business enables us to obtain excellent market research from our ever-changing marketplace.” Steve Nunney, Hamlet.

“We have chosen IBC as a premier venue for the introduction of our new product line to the worldwide market, as it gives us a unique opportunity to showcase our streaming technology on an international stage.” Clive Vickery, Digital Rapids Corporation.

“IBC continues to demonstrate that it is the single show that reaches a significant number of decision makers within the broadcast community. We anticipate launching new product innovations across our range at this critical event.” Eduard Schlauch, Harris Broadcast Europe.

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Benefits of centralcasting at France Télévision Publicité

BY C. JASON MANCEBO

The concept of centralcasting is certainly receiving attention from broadcasters, but what exactly is the attraction? Most broadcasters envision the technology as a centrally located master control system with high-bandwidth IP or other networks from the central location to the local transmission site. Additionally, most think of centralcasting as a technology employed to broadcast long-form content or an entire stream of content, with operations differing geographically, but not in the concept, of live content streaming to air from a centrally located facility.

France Télévision Publicité, however, is proving that centralcasting can do

recently migrated to a centralcasting model and uses the technology to centrally ingest commercial spot content and edit specific commercial break sequences, which are determined by broadcast slots as well as factors such as sports or news events, weather con-

ditions, or peak-audience programs. The broadcaster then distributes the content as video files to remote broadcast locations via a private network.

Based on a hub-and-spoke model,

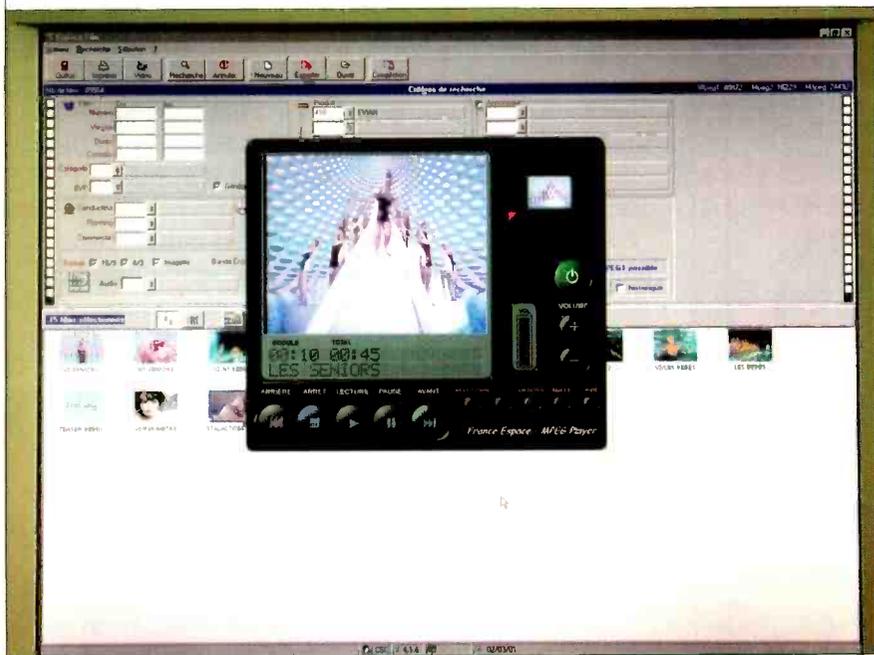
providing MPEG-2 ingest capabilities at the central facility in Paris and a smaller SGI Media Server for broadcast systems providing playout services for the spots at the local transmission facilities. Connection to the server systems is via a private ATM network. This approach is

What exactly is the attraction of centralcasting?

similar to an edge server architecture and provides several benefits for France Télévision Publicité, including quality, cost, flexibility in distribution and improved access to content.

Under a file-based distribution model of centralcasting, the quality of the video is not related to the bandwidth of the network. Because network-based distribution is file-based rather than real-time stream-based, the quality of the video is determined when ingested or recorded. All clips ingested at 50 Mbits/s MPEG-2 will have the same characteristics unless otherwise acted upon by further decoding, compression or transcoding. Simply transferring a file has no effect on its quality.

Because of the open networking capabilities of the media server for broadcast, France Télévision Publicité was able to use an existing network without purchasing hardware to convert physical interfaces. Employing standard IT infrastructure unlocks a world of flexibility and lowers costs. Open-system file servers, the latest high-speed networking, high-performance operating systems and file systems all are examples of technologies employed by forward-thinking



Interface-player showing a typical Télévision Publicité desktop. Operators can ingest commercials at up to 50 Mbits/s, then process, edit and transfer programs at faster than real time using SGI Media Servers. The technology provides dynamic scheduling and customized commercials to be quickly developed and transmitted to broadcasters.

much more. The advertising-production subsidiary of France Télévision

France Télévision Publicité employs an SGI Media Server for broadcast systems

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broadcasters managing and delivering their content as data. As such, they enjoy reduced capital outlay, ease of repair, and greater access to parts and service — all economies of scale.

Prior to implementing the centralcasting model, France Télévision Publicité created videotapes of commercial spot segments, made dubs and transported these dubs via motorcycle or car to the remote broadcast locations. Once these tapes were loaded in the playback machines, the only way to make changes was to repeat the entire process.

Since employing the distribute data, view video approach to centralcasting, France Télévision Publicité has enjoyed the ability to make dynamic changes to schedules. Content can be sent directly from the central location to the transmission servers allowing for last-minute schedule changes, and greatly enhancing revenue. In addition to adding new content to the schedule, the schedule itself can be changed for administrative reasons.

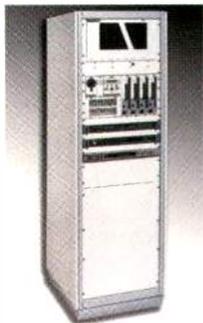
With more than 30,000 commercial spots now in online or near-line storage, the staff at France Télévision Publicité has access to the spots as data, rather than as a library of videotapes. When each of the spots was originally ingested, metadata describing key attributes was entered into the asset management system. Staff members have access to each of these spots via a high-speed Ethernet network. When requests are made for these files, local editing distribution is accomplished in the same manner as wide-area spot distribution.

There are two associated actions — distribution and viewing — that one can do with video. Rather than keep these as a unified process, using this concept removes the bind between the two. Distribution can be accomplished without viewing the video and can be done without time reference. The file that was transferred is identical in all characteristics to the original.

Additionally, as transfers now are not bound to real-time references, characteristics of high-speed data networks can be exploited. It is now common to have 1000 Mbits/s data networks within facilities. File transfer times on these networks are several times faster than real time. For example, a 30-second file of 25 Mbits/s MPEG-2 would transfer via gigabit Ethernet at approximately 30 times faster than real time, including protocol overhead, resulting in a news story with a total running time of one minute transferring in approximately two seconds. Total time for access to content is reduced from more than 10 minutes to less than 15 seconds.

Removing the requirement of real time from its centralcasting architecture and migrating to a central file server and edge-server architecture now allows France Télévision Publicité to enjoy the efficiency of its operations and revolutionize the process of acquiring content. **BE**

C. Jason Mancebo is a senior technology manager for the Media Industries division at SGI in Mountain View, CA.



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Avid's media networks

BY JIM FRANTZREB

People in broadcast are talking about workflow. Workflow improvements mean productivity gains. And, in these competitive times, any significant advantage in cost or capability can have an immediate impact on the bottom line. However, news production has been slow to move from linear, tape-based processes toward nonlinear technology, which provides improved workflow. While digital video servers and nonlinear editing systems have undeniably made playout and editing operations more efficient, the promise of nonlinear technology won't be truly fulfilled until these applications are networked together, that is, until there is an optimal nonlinear workflow. When this happens, everyone in the facility will be able to see, access and use all current and archived media instantly and simultaneously.

To support nonlinear media workflow, a digital infrastructure had to be invented. It had to be capable of supporting dozens of simultaneous high-resolution media streams in real time, and it had to have several other attributes required by broadcasters to support news production. What was needed was a "media network" — a network designed to move, manage and create digital media.

Essential characteristics

For over eight years, Avid Technology produced and delivered shared-media networks to support the workflow of nonlinear content creation. With accumulated experience and substantial customer input, Avid began developing the media network five years ago, and defined it as having the following essential characteristics:

- **Efficient shared storage** — Workflows more efficiently and easily if

media appears everywhere but actually exists in only one place, with the possible exception of a dedicated cache for ingested material, program or spot playout.

- **Ample bandwidth** — The term "media network" implies connection. Handling multiple, high-resolution media steams simultaneously and reliably requires an extraordinary amount of bandwidth.

- **Integrated media asset management** — With news production, media comes in, goes out, and expires with tremendous volume and velocity. How can you find and use what you're looking for most efficiently?

- **Flexibility** — Things change. A media network should not be rigid, proprietary or impose awkward organization. Entire volumes should not have to be locked when one person needs to record. A network should accommodate new applications and technology while supporting legacy components. It should operate with systems from multiple vendors. And it should preserve your investments, growing and adapting with you.

- **Scalability** — As users are added to the network, can bandwidth expand to ensure real-time access by all? If not, media access will become limited or awkward, and will no longer

be in real time.

- **Reliability** — It goes without saying, but there shouldn't be an active single point of failure. Reduced service may be acceptable, but essential operations must continue in event of component failure.

- **Usable** — The system should be transparent, and administration should be complete but straightforward.

Most importantly, to deliver all of these attributes, the data architecture must support all of the above criteria. The architecture should be independent of the base networking technology and, ideally, should allow the use of Fibre Channel, Ethernet, etc.

Today's technology advancements address the above customer-defined criteria. Now, broadcasters have a central storage resource with simultaneous access to any media. Such systems can be configured to support over 100 simultaneous DV25 streams and 200 tracks of 48 kHz audio. Fundamental to these systems is the use of a media-optimized file system (akin to an open media file system), and a server-assisted architecture. To use the media, clients reference the location of media on storage



Avid Unity for News is a shared-media, news-production infrastructure that combines Avid Unity MediaNet, MediaManager v2.5 and TransferManager v1.5 to improve workflow.

reference the location of media on storage

arrays through a controlling server. The actual transfer of the media, however, does not go through the server. Instead, leading industry vendors have engineered an open-media framework that provides high throughput by efficiently striping across every drive in the system using a media-protection scheme that is a proprietary, advanced version of a RAID. Unlike the commonly used RAID3, the newest versions use

The first practical application of such open media frameworks is "virtual storage."

block-level mirroring and striping, which actually adds bandwidth and the flexibility to switch media protection on and off per virtual partition. In such instances, the client automatically selects the media chunk from the drive that can deliver it the fastest. If one drive fails, the media will still be available. High aggregate bandwidth also provides the margin for reliable operation with multiple, high-resolution streams, so that the system has no active single points of failure.

The first practical application of such open media frameworks is "virtual storage." This means that storage is treated as an abstract, elastic and transparent "property." It is seen as virtual partitions or workspaces that can be created and changed at any time without destroying media or interrupting work. If more storage is needed to record a feed, it can be added from the available storage pool.

Browser-based applications address the ability to find and use media. They have the ability to automatically register media metadata when recorded into the system. An advantage of using a Web browser for such a system is that anyone anywhere can find and use the media. In conjunction with dedicated media-transfer clients, users in remote sites can easily search each other's materials and transfer media via existing IP networks. To transfer or edit selected material, users simply drag it into the

bin in their application.

To understand what a media network is, it helps to understand what it isn't. A media network is not a storage-area network (SAN). SANs were developed for general-purpose transaction-processing environments, and optimized to consolidate diverse storage arrays and deliver small chunks of data reliably over conventional networks. Digital video is a far different data type, and

dealing with it effectively affects every aspect of a system's software and hardware. If you look at the defining characteristics of the media network, it's easy to judge whether these systems are your best long-term investment.

Another thing to look at is the role of digital video servers. These purpose-built computers are great at the dedicated applications for which they were designed, such as program and spot layout. Networking servers together and touting them as "environments" that handle ingest, editing and play-to-air, however, falls well short of creating a true media network for two principal reasons. First, digital video servers were never designed to handle large amounts of storage or streams. Second, the file pushing required is inefficient, creating access bottlenecks and/or forcing wasteful media-file replication across servers. In the end, video-server-based networks don't deliver much value for their considerable cost.

Media networks are a new kind of productivity tool; one that comes in many sizes but has several common and essential aspects. Most importantly, the media network is the fundamental digital infrastructure that can provide the workflow improvements that will drive the next revolution in news production. **BE**

Jim Frantzreb is a senior product marketing manager at Avid Technology.

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Triveni Digital's SkyScraper

BY JONATHAN SCHEMBOR

How should we use the bandwidth? This is perhaps the toughest question in DTV programming. That is because DTV programming includes traditional video program content as well as non-program data applications within the 6 MHz bandwidth.

One pioneering DTV application that maximizes bandwidth will be New Jersey Network (NJN) Public Television and Radio's interactive weather channel — a service that does not require a back channel for the viewer to request additional information. The Advanced Television Enhancement Forum (ATVEF) Transport B specification makes this possible. NJN teamed up with AccuWeather,

the main challenge was formatting and embedding the weather information within the ATSC transport stream.

The solution uses an innovative architecture. Triveni Digital formats the AccuWeather data into a visual presentation form and then embeds it within

back channel of any type — such as a telephone line or an Internet connection to a central server.

This application uses the ATVEF Transport B specification to send interactive TV data over the DTV spectrum. As such, the STB's memory

The main challenge was formatting and embedding the weather information within the ATSC transport stream.

the NJN DTV signal using Triveni's SkyScraper interactive DTV broadcast system. Specially designed Zenith set-top boxes then receive the signal throughout New Jersey. (See Figure 1.) This architecture permits rich

stores all data, which is available for interactive retrieval by way of the viewer's remote control. The viewer can bring up various screens of weather information related to cities in New Jersey as well as other selected cities on the menu.

The main benefit for viewers is speed and convenience. Compared to other means of accessing weather data, DTV-based interactive weather information is compelling in that it provides immediate access and frequent updates, as well as ease of use. Rather than having to download a Web site or wait for local weather information from a cable weather channel broadcast, DTV-based interactive weather information is always available to the viewer because all up-to-date information is stored within the STB. Taking advantage of the ATSC DTV standard that provides a flexible, broad-

band 19.4 Mbps pipeline, NJN plans to expand the portal offering to include local traffic, news and other innovative localized channels.

These benefits are important to NJN because it is a test site for national

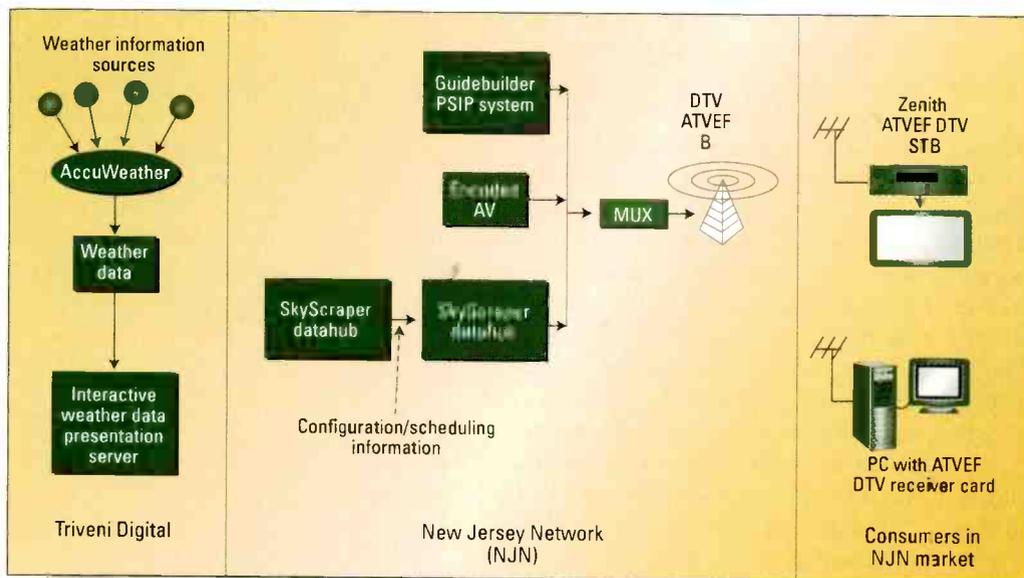


Figure 1. New Jersey Network uses Triveni Digital's SkyScraper interactive DTV broadcast system to format weather data from AccuWeather for embedding in the NJN DTV signal.

Zenith Electronics and Triveni Digital to implement this data virtual channel.

With AccuWeather's highly localized weather-data service and NJN's state-wide DTV transmission infrastructure,

weather content to be sent to large numbers of receiving devices simultaneously, giving each viewer the freedom to interact instantaneously with the received content on an individual basis. And it doesn't require a

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2 Which type of facility or operation best describes your primary business classification? (Check only ONE box.)

- 20 TV Station (including Networks & Low-Power TV)
- 26 Combination TV & Radio Station
- 39 Cable (including Networks)
- 45 Telecoms
- 29 Recording Studio
- 30 Teleproduction Facility/Independent Program Producer
- 40 Post-Production Facility
- 50 Streaming Media — Network Provider/ISP/IDC/Telco, Internet Content Provider/Web Publisher, Services, Software Provider
- 31 Microwave, Relay Station or Satellite Company for TV and Cable
- 33 TV Consultant (Engineering or Management)
- 46 Systems Integrator
- 34 TV Dealer or Distributor
- 35 Other (please specify): _____

3 Which of the following best describes your title? (Check only ONE box.)

- A. Company Management:**
- 01 Chairman of the Board
 - 02 President
 - 03 Owner
 - 04 Partner
 - 05 Director
 - 06 Vice President
 - 07 General Manager (other than in charge of Engineering or Station Operations)
 - 08 Other Corporate/Financial Official
- B. Technical Management & Engineering:**
- 09 Technical Director/Manager
 - 10 Chief Engineer
 - 11 Other Engineering or Technical Title
- C. Operations & Station Management/Production & Programming:**
- 12 Vice President Operations
 - 13 Operations Manager/Director
 - 14 Station Manager
 - 15 Production Manager
 - 16 Program Manager
 - 17 News Director
 - 18 Other Operations Title
- D. Other (please specify):** _____

4 Which statement best describes your role in the purchase of equipment, components and accessories? (Check only ONE box.)

- A Make **final decision** to buy specific makes, models, services or programs
- B **Specify or make recommendations** on makes, models, services or programs
- C Have **no part** in specifying or buying

5 Which of the following types of equipment will you be evaluating for purchase in the next 12 months? (Check ALL that apply.)

- | | |
|--|---|
| <p>1. Audio Products</p> <ul style="list-style-type: none"> 1A <input type="checkbox"/> Audio consoles/mixers 1B <input type="checkbox"/> Digital audio workstations 1C <input type="checkbox"/> Distribution amplifiers 1D <input type="checkbox"/> Headphones, headsets, intercoms 1E <input type="checkbox"/> Telephone interface systems 1F <input type="checkbox"/> Magnetic tape, audio 1G <input type="checkbox"/> Microphones 1L <input type="checkbox"/> Monitors (speakers) 1J <input type="checkbox"/> Recorders, players 1K <input type="checkbox"/> Switchers, routing 1N <input type="checkbox"/> Audio Processing <p>2. Video Products</p> <ul style="list-style-type: none"> 2A <input type="checkbox"/> Camera heads, tripods, pedestals, booms, dollies 2B <input type="checkbox"/> Cameras; lenses 2C <input type="checkbox"/> Graphics, titling, effects 2D <input type="checkbox"/> Nonlinear editing systems 2F <input type="checkbox"/> Editing controllers, systems 2G <input type="checkbox"/> Frame synchronizers, time base correctors 2H <input type="checkbox"/> Lighting systems 2T <input type="checkbox"/> Magnetic tape, video 2J <input type="checkbox"/> Monitors (picture, studio quality) 2K <input type="checkbox"/> Recorders, players 2L <input type="checkbox"/> Robotic camera controls 2M <input type="checkbox"/> Signal processing 2N <input type="checkbox"/> Signal routing, distribution 2W <input type="checkbox"/> Standards, format & scan converters 2P <input type="checkbox"/> Still store systems 2Q <input type="checkbox"/> Switchers, production/master control 2R <input type="checkbox"/> Storage/video servers 2S <input type="checkbox"/> HDTV Equipment 2V <input type="checkbox"/> Virtual Sets 2X <input type="checkbox"/> MPEG compression/encoding systems 2Y <input type="checkbox"/> Projection systems 2Z <input type="checkbox"/> DVD systems <p>3. Test & Measurement Products</p> <ul style="list-style-type: none"> 3A <input type="checkbox"/> Analyzers, audio, video, RF 3B <input type="checkbox"/> Audio, video signal generators 3C <input type="checkbox"/> Waveform, vectorscope monitors 3D <input type="checkbox"/> Digital signal testing | <p>4. Miscellaneous Products</p> <ul style="list-style-type: none"> 4A <input type="checkbox"/> Battery packs, chargers 4B <input type="checkbox"/> Cabinets, racks, consoles 4C <input type="checkbox"/> Cables, connectors 4D <input type="checkbox"/> Carts, cases (equipment, shipping), tools <p>5. RF Products</p> <ul style="list-style-type: none"> 5B <input type="checkbox"/> Exciters 5C <input type="checkbox"/> Fiber optics 5E <input type="checkbox"/> Power amplifiers, cavities 5F <input type="checkbox"/> Receivers 5G <input type="checkbox"/> Remote production vehicles, program relays 5H <input type="checkbox"/> Satellite T/R components, electronics 5P <input type="checkbox"/> STL/ENG components, electronics 5J <input type="checkbox"/> Switches, RF coaxial 5K <input type="checkbox"/> Transmitters 5L <input type="checkbox"/> Antenna systems, towers 5M <input type="checkbox"/> Transmitter, remote controls 5N <input type="checkbox"/> Tubes 5Q <input type="checkbox"/> Weather, radar RF products 5R <input type="checkbox"/> Cable/set top/CA systems <p>6. Automation & Computer Products</p> <ul style="list-style-type: none"> 6A <input type="checkbox"/> Accessories/peripherals 6E <input type="checkbox"/> Automation systems 6H <input type="checkbox"/> Business automation 6T <input type="checkbox"/> Commercial insertion systems 6K <input type="checkbox"/> Machine control 6L <input type="checkbox"/> Newsroom automation 6P <input type="checkbox"/> Record/playback automation 6Q <input type="checkbox"/> Software, engineering 6R <input type="checkbox"/> Software, production, planning 6X <input type="checkbox"/> Video interface cards 6Y <input type="checkbox"/> Networking products 6Z <input type="checkbox"/> Digital asset management <p>7. New Media/Internet</p> <ul style="list-style-type: none"> 7A <input type="checkbox"/> Encoding products 7B <input type="checkbox"/> Internet service providers 7C <input type="checkbox"/> ecommerce technology 7D <input type="checkbox"/> Content creation systems <p>8. System integration/engineering services</p> <ul style="list-style-type: none"> 9. <input type="checkbox"/> None of the Above |
|--|---|

6 What is the budget for equipment and services you are evaluating for purchase in the next 12 months? (Check only ONE box.)

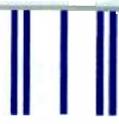
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| 3 <input type="checkbox"/> \$25,000 - \$99,999 | 8 <input type="checkbox"/> \$1,000,000 - \$1,999,999 |
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Triveni Digital's SkyScraper Interactive and their custom

The STB's memory stores all data, which is available for interactive retrieval by way of the viewer's remote control.

solutions team serve as the enabling components between the information provider (AccuWeather) and the broadcaster (NJT). The system includes headend servers to manage the data flow from the information provider to broadcaster, and it lets broadcasters create new ways to reach viewers and generate potential revenue streams. It is a flexible solution that makes it easy to insert interactive material either during program development for program-specific interactions or as stand-alone interactive data blocks. Interactive content can be added to live programming on the fly for sporting events or breaking news coverage, making additional information available to viewers for interaction.

Each station's DTV bandwidth-scheduling conditions are unique. Some stations may broadcast multiple programs simultaneously, each with its own data enhancements. Insertion of enhanced commercials may affect bandwidth for regular program enhancements. SkyScraper Interactive takes many factors affecting bandwidth use into account in real time, and optimizes the insertion timing of interactive data into the broadcast stream.

Broadcasters can integrate the system into almost any DTV station environment without the cost of re-training personnel. The system is interoperable with major data-enhancement authoring systems, traffic and automation systems, multiplexers or IP-to-MPEG-2 gateways. It also has built-in support for Triveni Digital's GuideBuilder metadata-generation system, allowing broadcasters to rapidly enable and automate the inclusion of data enhancements in their PSIP and electronic program guide data.

Interactive local information accessible via television is an attractive way of using the vast DTV bandwidth while providing local viewers with something they can use easily and quickly as they go about their daily lives. **BE**

Jonathan Schembor is vice president of customer services for Triveni Digital.

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Moviola's Journeyman

BY RON MENCER

Merv Griffin Productions (MGP) needed a virtual studio technically capable and rugged enough to survive a month-long road trip for its MTV Campus Invasion tour this past March. The company wanted a portable television studio solution in a box.

The tour stopped at universities all over the country to promote MTV's show lineup. One of the tour displays was a virtual stage where students were interviewed by an MTV personality live from Times Square. On campus, the students stepped up to the virtual "stage" area in front of a DV camera and answered questions while standing in front of a monitor with a microphone. Behind the scenes, a Beta VTR provided the looped footage of the host in Times Square, which was inserted behind the students using a chroma-key process. The students could see themselves with

a portable tool to perform live chroma key in the field. The company chose GlobalStreams' Globecaster as a production/compositing tool because of the system's technical versatility, which includes multicamera switching, real-time 3-D digital video special effects, titling, graphics, keying and animation capabilities. Unfortunately, keeping the sensitive system in one piece and operational on the road was a trial.

A way was needed to protect the

decided to build the Globecaster into its own special transport case. This case would double as the durable transport solution and as the production console. Moviola called on Amalgamated Video International (AVI) in Sacramento, CA, to design and manufacture the mobile solution. AVI came back with a unit complete with a 17" flat-panel LCD control monitor; eight individually assignable, 5.6" LCD monitors; and a control PC, keyboard

The company wanted a portable television studio solution in a box.

system on the road. A solution was developed and a trial run showed exactly what the optimal specifications would be for a practical portable unit.

The issues were twofold: how to transport the system without damaging it and how to make it easy for the operator to use. The system had to be simple enough to be set up and run by an operator with limited knowledge of the components and configuration. This was a budget concern because the tour traveled with two complete systems, and operators with specialized training and experience would have been expensive to employ. MGP needed a solution without a steep technical learning curve.

The Journeyman

About two months before MTV was to depart on their collegiate tour, Moviola conceptualized what was to become the Journeyman as a solution to the issues at hand. Rather than transport the system in standard anvil cases, constantly being packed and unpacked and subsequently banged around, Moviola

and mouse all built into a sturdy metal containers. At the heart of the unit was the Globecaster, snug and secure.

Field setup for these units was a simple and quick process. Once they were off-loaded from the transport trucks, the operators simply had to roll the units up to the stages, open the lids, plug them in and go. This eliminated the need to have expensive technical engineers present. The designers at Moviola also made some improvements in their approach to the compositing. Rather than use the green screen, they felt it would be better to shoot against a beaded glass surface and use a Holoset Ring that attaches to the front of the lens. The product works like a typical chroma key, but in reverse. The ring, outfitted with numerous blue LEDs, emits a blue light in front of the lens, allowing the Globecaster to add the looped video to the background. **BE**



The Journeyman, a virtual studio in a box, has a 17" flat-panel LCD control monitor; eight individually assignable, 5.6" LCD monitors; and a control PC, keyboard and mouse.

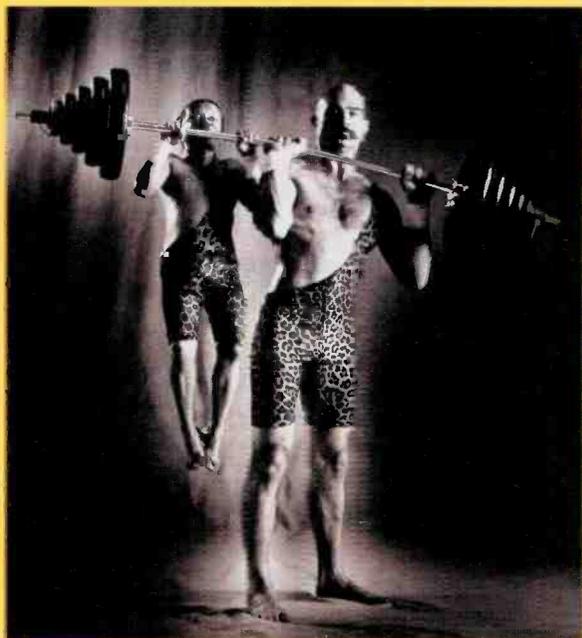
the MTV personality as if they were engaged in face-to-face conversation.

A virtual studio

To perform these virtual interviews, Merv Griffin Productions had to find

Ron Mencer is a business-development executive at Moviola in Hollywood, CA.

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Public Television upgrades with MRC DAR radios

BY WINDELL WOOD AND CHARLIE GRANTHAM

Alabama Public Television (APT) is a statewide network consisting of nine television broadcast stations and 30 microwave relay sites constituting 2200 miles of microwave relay. Network operations are located at the APTV studios in Birmingham, AL.

Upgrade requirements

The network had two major requirements for this upgrade. First, the radios had to be digital-ready because APT had to continue to transport analog audio and video during this buildout. Second, APT had to be able to add equipment without discarding any gear purchased for the initial upgrades. The DAR radio from Microwave Radio Communications (MRC) met these requirements and offered additional features. The DAR is digital ready, is capable of transporting NTSC video and audio, and is easily field upgradeable to digital DS-3 (45 Mbits/s). It is also a basic heterodyne design, necessary for long-haul and multi-hop applications. Characteristics such as network management, high stability and low phase noise, local, and remote monitoring capabilities played a role in APT's decision to use the system. Another strong selling point was MRC's ability to engineer a multi-hop analog and digital microwave network.

Because the DAR radios are easily upgradeable, APT was able to significantly limit the time each station would not be receiving the microwave signal. The feed during this cutover came from a temporary satellite feed.

APT can send two compressed NTSC analog signals simultaneously to receive a live interconnect from any of APT's remote sites for news programs. One of the NTSC signals is coupled and fed

to the NTSC analog transmitter. The transport stream is fed to equipment that inserts the virtual channel table and converts it from ASI to a SMPTE 310M composite signal. That signal is then connected directly to the digital transmitter.

With the 45 Mbits/s (DS-3) bandwidth capability, APT multiplexes a

addition to monitoring off-air signals, APT will have security monitoring at each transmitter site. System operators will also be able to turn the transmitters on an off from network master control as an additional backup to controlling these sites via remote dial-up telephone control circuits. The system also continuously monitors all

Getting back on-air will be quick and hopefully painless.

19.39 Mbits/s ATSC transport stream along with two outbound channels of compressed analog NTSC video and audio to each of the nine broadcast transmitter sites.

APT's microwave paths are bi-directional and employ ATM, a high-speed packet-switching technology capable of data rates of up to 622 Mbits/s. Depending on a station's requirement in the network, it may be necessary to insert digital video, data or information that is carried within the vertical blanking interval of the displayed signal.

APT can feed and switch various digital signals throughout the statewide microwave, all completely seamlessly. The 45 Mbits/s data stream is reduced to an approximate 38 Mbits/s payload; the ATM cell header uses the remaining bits. ATM switching is performed on a cell-by-cell basis, based on the routing information contained in the cell header. Barco's Alcor ATM adapters are used to take in the 45 Mbits/s ASI transport streams and then convert them to ATM signals.

The APT network is a bi-directional system. Once fully operational, it will use the backhaul feeds to monitor each of the statewide transmitter sites. In

fault reporting for the entire network via the MRC site-monitoring, alarm-reporting terminal (SMART) system manufactured by Ardax. Network operations in Birmingham has complete control and monitoring capability of all microwave relay and terminal site locations. The network is displayed on a computer video monitor as a map overlay in a user-friendly graphical fashion. Each site and piece of equipment in the system can be interrogated down to the most minute detail to ensure proper operation. This is a great troubleshooting aid that will minimize downtime. A hot spot, or trouble location will be easily identified. Getting back on-air will be quick and hopefully painless.

APT is currently monitoring its transmitter via a 10baseT Ethernet connection over the digital microwave network, which is a portion of the DS3 circuit. But monitoring will eventually be accomplished using T1 circuits, again a portion of the DS3 45 Mbits/s digital microwave. **BE**

Windell Wood and Charlie Grantham are broadcast services directors for Alabama Public Television.

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NBC installs Calrec's Alpha 100 digital console

BY DAN DALEY

The installation of a Calrec Alpha 100 digital console at NBC's new control room 3A at its New York headquarters provides a glimpse of the processes of evaluation and coordination taking place during the transition from analog to digital.

Planning for the future

The new Studio 3A is part of NBC News' operations. It is intended to service all of the news operations, including the flagship "NBC Nightly News with Tom Brokaw," as well as news specials. The decision to make the new Studio 3A an all-digital room was the first step in an extended conversion process for much of the rest of the complex's technical infrastructure, and will serve as a template for future digital console upgrades.

application (stereo audio is usually more than enough), the inevitability of multichannel audio in broadcast means that it must be considered in any current decision.

NBC always equips a facility for more than one type of production. Studio 3A can be assigned for entertainment or sports, and surround-sound monitoring equipment is already in place. For these applications, 5.1 capability will become more important as the network

fader control or with a dedicated button on the strip. In addition, they wanted a primary and secondary program path originating from separate electronic outputs to establish system redundancy at the console output. The console needed to integrate with various compressed audio formats and with routing systems planned for the room. Perhaps most important was the need for a clear upgrade path. Software upgrades will be the only

Perhaps most important was the need for a clear upgrade path.

expands DTV projects. NBC was able to get a usable deliver date and still maintain all of the features necessary for future projects, like 5.1, by selecting a console with functionality that could be expanded.

Required features

The NBC staff needed easy access to function controls, and a maximum of one layer in addition to the active console layer. NBC is currently using 64 input paths in a combination of mono and stereo in most control rooms. Another

cost-effective way to keep up with changing technical demands.

The implementation of the Calrec Alpha 100 took just over two years to complete, a reasonable window considering the comprehensiveness of the entire new digital suite. While Calrec was completing the Alpha 100's design, NBC used a Calrec S2 analog console as an interim platform. The studio was pre-wired for digital and operated in the analog domain during this period.

The Alpha 100 sets up quickly and can be programmed from a user-saved memory in seconds. It gives NBC News a platform that is a generation ahead of the manual recall available on its analog consoles. Operational training has gone smoothly. As might be expected in a fast-moving news operation, some training was reduced to trial by fire at the onset of a month of "unyielding nightlies" originating from all over the country.

BE

Dan Daley covers the pro audio industry and writes for Broadcast Engineering's sister magazine, Mix.



The ability of the Calrec Alpha 100 console to handle 5.1 surround sound will become increasingly important as NBC expands Studio 3A's use to entertainment and sports.

The dictates of technology, not just the FCC, were at work. Even though the need for 5.1 surround audio mixes is implicitly limited in a news broadcast

important criterion was a mix-minus capability of at least 48 separate dedicated paths. The staff also specified a PFL section that engages by backstop

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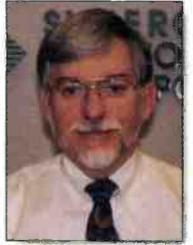
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Newsroom automation systems

BY JOHN LUFF

When college students attend classes in broadcast journalism today they are pretty unlikely to be exposed to manual typewriters, paper roll teleprompters and news distributed on teletype machines. The tools of every trade change and broadcast news has been truly transformed by technology in the last two decades.

In this second in a series on station automation and asset management, we explore the changes technology has brought to the process of writing, editing and approving the content of newscasts. Television is much more than just images, for the content is the message of television. Broadcast newsroom automation systems demonstrate the best in technology, where complex tools have evolved to allow the journalists to concentrate on the content instead of the process. A well-implemented newsroom automation system can speed the creation and editing of the content and manage the flow of the broadcast in the control room and studio during the few minutes when the work of the journalist is featured live, hopefully without warts. Production and management strategies which would have been simply impossible are facilitated. Without new tools for new approaches to content, the immediacy of television news would be diminished.

Newsroom automation systems are a complex database and communication system at their root. They provide links between video, audio, graphics and text, and allow the sorting of the media objects into a sequence for eventual play to air. The first (widely available) such system, devoid of many of the features of the current crop of products, was developed by a British company in the 1980s and 1990s (BASYS, which was absorbed into Avid in the 1990s). BASYS

was a character mode application. It provided the ability to pull wire copy (AP, UPI, Reuters) into a database, sort the stories into directories, and allow the journalist to create scripts for stories and send them to an editor for insertion in a running order. Control over peripheral devices was not initially provided, and as with any new market, once a product class is defined by one innovator, other inventors look for ways to

manage the interfaces. By implementing MOS, manufacturers facilitate the extension of the hardware and software solutions in the newsroom. Ingest, storage, archive, browse and editing software and hardware need to communicate effectively with each other and MOS is one standardized element of the landscape of communication necessary to harmonize the entire electronic newsroom.

Browsing and editing have moved

The tools of every trade change and broadcast news has been truly transformed by technology in the last two decades.

improve it and extend its capabilities.

One of the innovators was in fact one of the providers of news wire services, AP, who clearly saw integrating their service offering completely into a newsroom automation system as facilitating their long-term service business. These such products are all about features. Some things you should look for are the ability to keep accurate timings in the assembled program and facilitate changes in show rundown at any point up to and even during an event on air.

Control over hardware is an important function in modern systems. The ability to call up stillstore pages, set running order on video servers playing back finished stories, load and call up character generator pages, and provide teleprompter outputs (or interface to third party teleprompting systems) are very important.

Interfacing complex software products developed with proprietary feature sets is not for the faint of heart. A common software interface specification, Media Object Server Communication Protocol, or MOS for short, has been developed by a consortium of companies concerned about finding effective ways

from the very large station to a much more affordable price range. In a nutshell, a low bit rate "proxy" of the full bandwidth video is stored on a server and it can be the same server as where the full bit rate resides. Clients to the browse server application gain access to a shared library of media and metadata and provide low bandwidth usually less than full screen copies of the content on conventional unmodified workstations running Windows. Once the story has been cut and conformed it is made available to the playout server system, which the newsroom computer system can then sequence into the playlist.

Next month this series concludes with a review of MAM, Media Asset Management systems. **BE**

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

IN ADDITION

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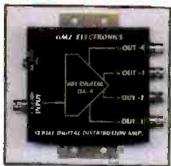
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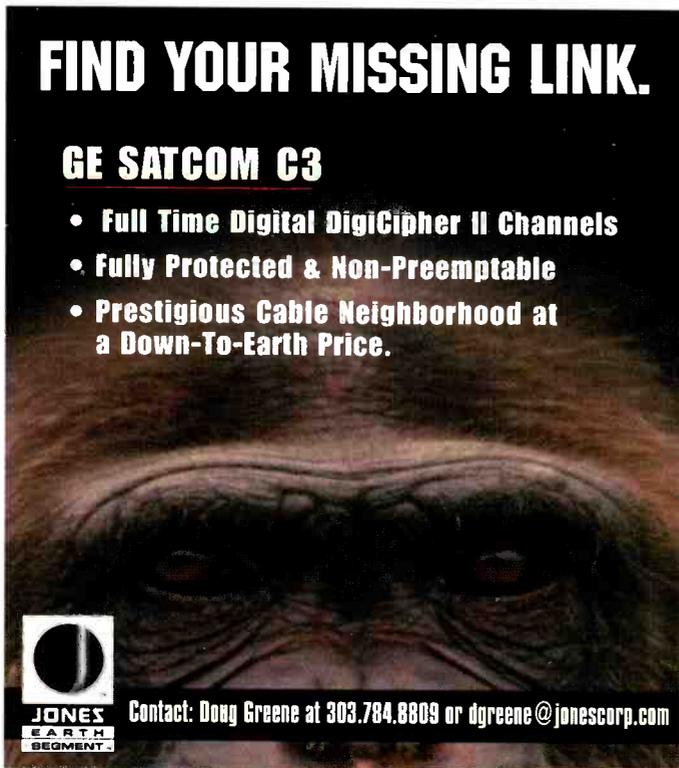
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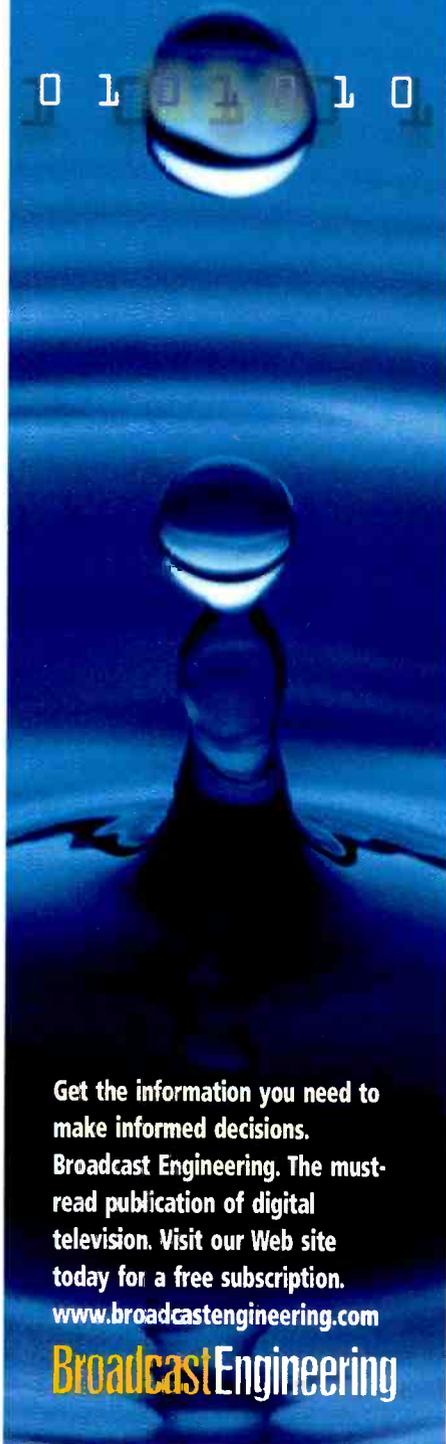
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Arbitrary rules

BY PAUL MCGOLDRICK

The day in 1980 when CNN went on the air on cable systems should have been the day that the ownership rules for television were rethought. From that quiet start when most people thought a 24-hour news operation was neither feasible nor wanted, the world of broadcast television in the United States was changed. There was even more change in 1985 when – at the personal suggestion of Fidel Castro to Ted Turner – CNN International was created. These changes resulted in a single entity being capable of broadcasting information directly into the nation's homes.

The ownership rules were created by government out of fear: Fear that a medium could dominate nationally, as happened for the moguls of the print industry. But as soon as there were more than three sources of news — beyond ABC, CBS and NBC — an arbitrary percentage of viewers that an owner could address became unnecessary. Three judges in a federal appeals court described the 35 percent rule recently as “arbitrary and capricious and contrary to law.” They were ruling in the case of News Corp. and Viacom, who both ended up addressing about 37 percent of the nation's population through acquisitions.

The appeals court did not, unfortunately, throw out the rule, even though it had found it unlawful — it remanded it back to the FCC to justify its existence. Given that the new chairman of the FCC, Michael Powell, has already been heard to wonder aloud about the rule we can only hope that the consumer groups that are already whining about the court's decisions will not get the taxpayers' money tied up in the Supreme Court.

The negative thing (I think it's negative, at least) about this court decision is

in the long term it will assist in facilitating a trend that I have already forecast. The amalgamation of the television industry is following what has already happened in several cycles in the radio industry. The networks are already in strained relationships with their affiliates. The affiliates, in many cases, are financially strained, and the conversion

Indiana with viewers in Portland, OR, and Orlando, FL. In addition to radio, it has TV properties, print publications and international radio properties, but it's in the Portland and Orlando markets where the company is showing its ignorance of its own existence.

TV broadcasting makes its money from advertising. Maybe somebody



The moral must be that any person or body that tries to control the delivery of information in this era is doomed to failure.

to DTV is not a happy prospect for many of them. If this appeals court decision holds, you can be sure that many of them are going to be gobbled up for a small fraction of their street worth today because they can be literally squeezed out of business by the networks or groups.

This is akin to the travel industry: Travel agents were created by the industry to facilitate growth and offer convenience for the traveler. Travel agents are being crushed by the industry that created them because there are now easier and more profitable distribution methods — i.e. the Web. So with the affiliates, who were created by the industry to distribute product to people the government wouldn't allow networks to cover. When that need disappears — as it seems to have done — the affiliates will disappear. Instead of the local studio in small cities, we will begin to see the modern radio station's look, but to save money the equipment location will probably be right at the terrestrial broadcasting site. If there is any local programming — and there won't be at the lower DMA cities — it will be minor and upconverted.

One particular example involves Emmis, a corporation centered in

will come up with a way of making money from datacasting in this digital age — maybe — but until then broadcasters need to be able to tell advertisers how many people are watching and charge accordingly. You don't, therefore, prevent people from watching your station, do you?

Well, Emmis believes it needs to. In fact, the man who runs the show has failed to come to terms with DirecTV for re-broadcasting the KOIN signal in Portland and the WKCF signal in Orlando for those cities' DirecTV subscribers. Emmis believes it needs a better deal than any of the other stations have agreed to. That is arbitrary, indeed, and unfair to everyone involved.

The moral must be that any person or body that tries to control the delivery of information in this era — or even a percentage of information — is doomed to failure. **BE**

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Send questions and comments to:
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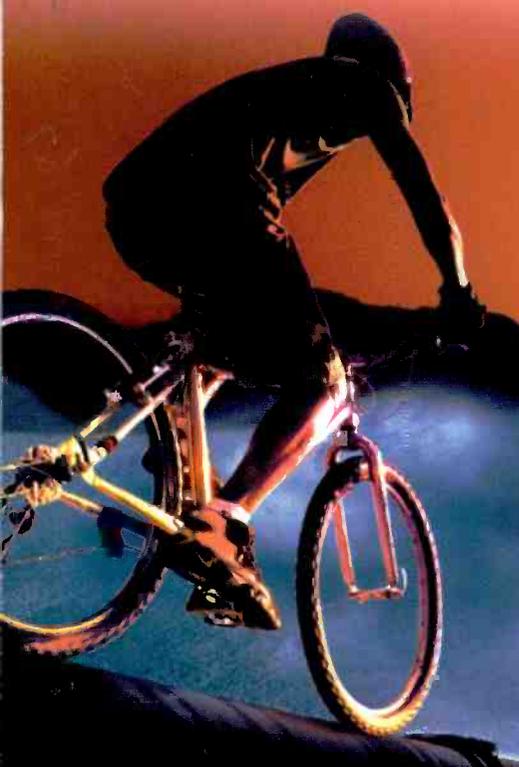
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