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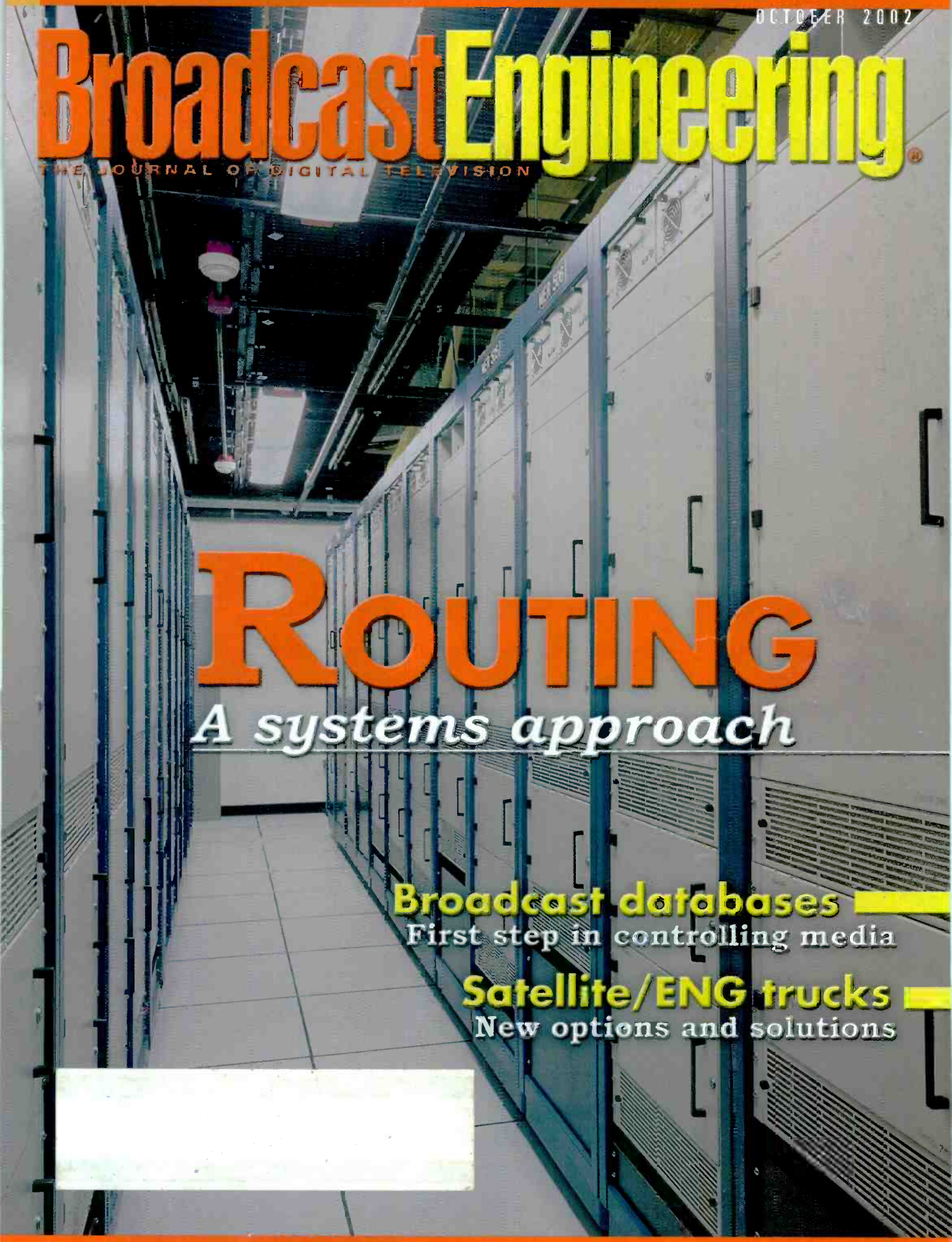


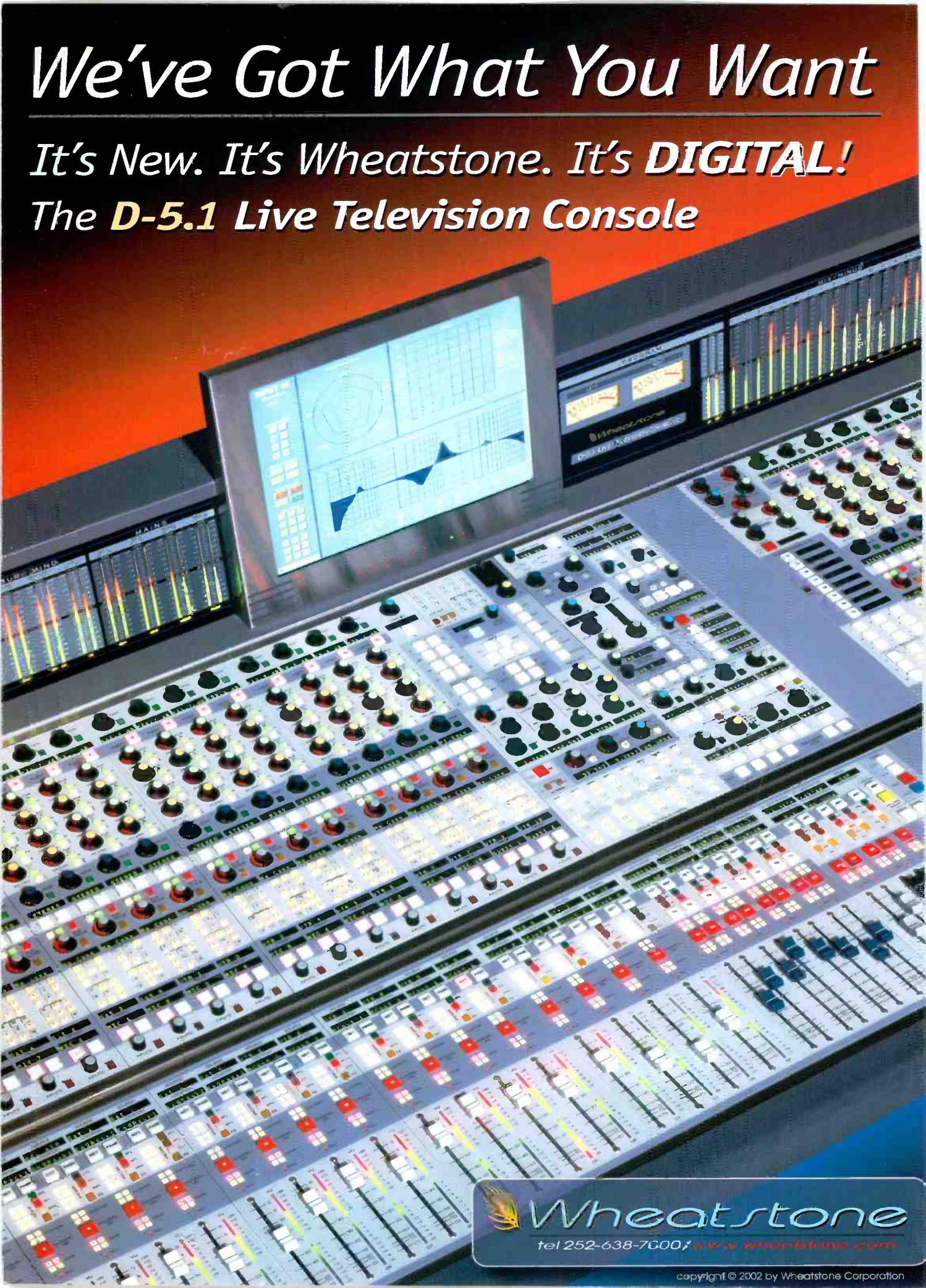
ROUTING

A systems approach

Broadcast databases
First step in controlling media

Satellite/ENG trucks
New options and solutions

A PRIMEDIA PUBLICATION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CASE STUDY

Communications Corporation of America, Lafayette, Louisiana

Company Name:
Communications Corporation of America

Headquarters:
Lafayette, Louisiana

Stations:
KADN – Lafayette
KLAF – Lafayette
WNTZ – Natchez, Mississippi

Critical Needs:
Simplified multi-channel operation
Integration with existing traffic system
System reliability
Centralcasting capabilities

Lou Strowger
Chief Engineer for Communications Corporation of America

Even with 20 to 22 hours of syndicated content played out daily, Lou Strowger, Chief Engineer for Communications Corporation of America, felt that operator errors were costing his Lafayette broadcast center too much money.

"We knew there had to be a better way to run things," said Strowger, who is responsible for engineering operations at 22 middle market stations throughout Texas, Louisiana and western Mississippi. Strowger was ready to make the move to station automation.

Before installing the Odetics AIRO™ Automation System, co-located stations KADN, KLAF and WNTZ required 3 master control operators – one for each station – as well as a prep operator. "Each station was operated independently, with no common server, and no machine control," explained Strowger.

After evaluating different products, Strowger decided to upgrade to the AIRO system. He felt Odetics offered the reliability his operations demanded, and his past experience working with the company had been positive.

Most of the programming for the three stations is bartered – syndicated shows with commercials included and a few local ad avails. Programs are taped daily, logged for in and out points, and played on the scheduled air date. The broadcast team's first task was to integrate AIRO with an existing traffic system to create compatible logs, build as-run reports and reconcile daily schedules.

Odetics worked with Strowger's team to create a new interface to the traffic system. Despite these obstacles, the AIRO system was up and running within a week after installation. "There were no surprises with Odetics," added Strowger.

Learning to operate AIRO is quick as well. "Many of our operators have little or no experience in a control room, but training on AIRO is pretty easy," said Strowger. "It takes only a few days to get an operator up and running with the system. We probably spend more time teaching them about station procedures or using Windows than automation."

From a familiar Windows interface, AIRO allows a master control operator to simply prepare the play list to match the log from the station's traffic department. The AIRO system automatically cues each tape and inserts local spots according to the schedule. "We now use a single master control operator and one prep operator to manage all three channels," commented Strowger. "Certainly, cost was a factor, but our focus is more on reliability."

Worry-free AIRO has provided Strowger, a 25-year industry veteran, with the opportunity to completely dispense with the headaches and responsibility incumbent with managing independently operated stations. He feels he receives excellent engineering support from Odetics. "Every little problem we encounter, they're right on top of it. I trust Odetics. I know they're going to do what they promise and they're going to do it right."

get on AIRO™

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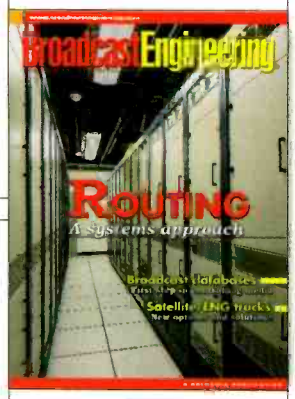
CONTENTS

FEATURES

BEYOND THE HEADLINES

DIGITAL HANDBOOK



ON THE COVER: Space planning was essential in housing 32 racks for 32 matrix frames to build out this 1024x1024 serial component digital router (MER 2) at EchoStar's facility in Cheyenne, WY.

(continued on page 8)

Studio

Field

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720p

480i

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CONTENTS

Systems Design & Integration

Systems Design Showcase

Transmission & Distribution

New Products & Reviews

Applied Technologies

Field Reports

Technology in Transition

New Products

Departments

Name this famous broadcaster

Name this famous broadcaster. Where did he work when he wasn't promoting Chyron products, like this one? All correct entries will be eligible for a drawing of the new *Broadcast Engineering* T-shirts. Enter by e-mail. Title your entry "Freezeframe-October" in the subject field and send it to: bdick@primediabusiness.com. Correct answers received by Dec. 17, 2002, are eligible to win.

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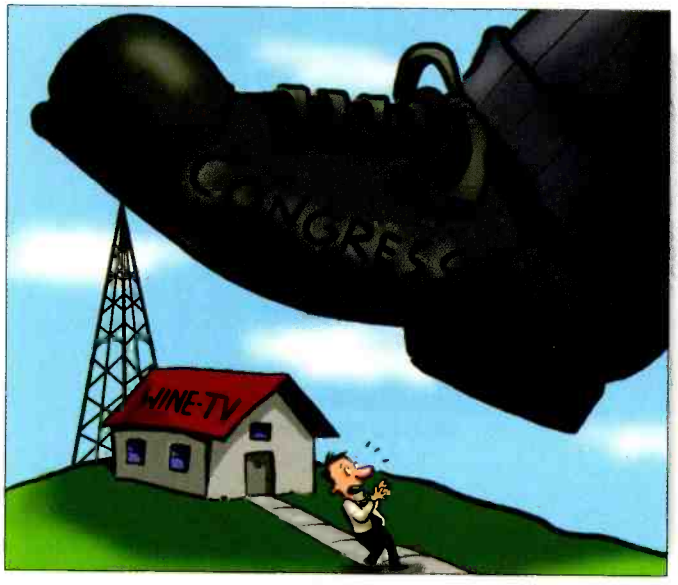
Will Congress crush broadcasters?

If you're to believe House Energy and Commerce Committee Chairman W.J. "Billy" Tauzin (R-La.) and Ranking Democrat John Dingel (D-Mich.), television stations are going to convert to full-time DTV operations by Dec. 31, 2006, – or go out of business. There would be no 85 percent exception.

Pit bull Tauzin decided to follow up on his earlier threat to involve Congress if broadcasters, CEA, cable and Hollywood didn't come up with a workable DTV implementation plan. "Clearly it's time for us to provide leadership in this area," he said.



Okay, since when did Congress provide "leadership" on anything? Controversy, confusion and chaos, yes. Leadership, no.

My eyes are bleary from reading the 150 pages of testimony and drafts. Since most *Broadcast Engineering* readers have not had the opportunity to actually review Tauzin's proposal, it might be useful to emphasize several points from the hearings. Keep in mind that Tauzin calls the document ". . . [an] omnibus Digital Television (DTV) bill ... represent[ing] the Committee's starting legislative point to solve the DTV problem" (energycommerce.house.gov/107/drafts/dtv_staff_draft.pdf).

Here are some key points of the proposed legislation:

- Under the bill, all analog TV broadcasts would cease by Dec. 31, 2006. No exceptions.
- The FCC would be forced to set a specific date where each network affiliate broadcaster would be required to pass through "without degradation" any network DTV signal. No downresing would be permitted.
- Within 180 days of the bill's passage, the all-digital devices capable of demodulating a DTV signal would have to implement a broadcast flag. It's unclear whether this would prevent consumers from time-shifting programs. It would specifically prohibit any Internet transmission of flagged programs.
- As of July 1, 2005, the manufacture of DTV equipment with analog outputs would be prohibited. Professional equipment is exempted.

In total, these provisions would obsolete every analog DTV product out there. Before you laugh at those of us who bought HDTV sets, consider that this provision could even obsolete your own home stereo system. As the proposed bill is currently worded, a new TV set would not be compatible with your current home audio stereo. Because all new TV sets would be prohibited from having any analog outputs, you'd have to replace not only your TV set, but your entire home audio system, too!

Finally, Tauzin totally lowered the boom on broadcasters' heads by specifically proposing to amend the Communications Act of 1934 to prohibit any dual must-carry by cable. No cable system would be required to carry simultaneously both the analog and digital signals from a TV station.

While Tauzin admitted the hearing was intended primarily for discussion purposes, anyone who's been around a while knows that this draft wasn't conceived without an intent to move in the directions outlined.

Unless the industries involved in the implementation of DTV can get on with the DTV transition in a more timely manner, Congress is going to step on our heads, and it won't even feel the bump.

Brad Dick
editorial director

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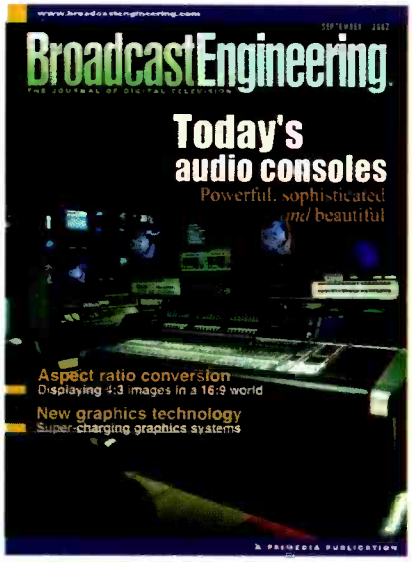

Timing issues

Dear Mr. Robin:

I work for the regional TV station in Yugoslavia. We have been almost completely analog for the last 12 years and have no real experience in digital equipment. Now we have some secondhand digital equipment, and we are trying to combine it with what we already have. What we have now is a Philips production switcher with component inputs for cameras, and other inputs are SDI. The trouble is that we have only two SDI sources: DVCPRO and a frame synchronizer. So we're going to put an analog switcher before that synchronizer in order to have more sources available. At the end we have DigiMix as a keyer.

What we want to know is the method of measuring all these paths and doing timing, taking into consideration that all we have is some old Tektronix analog waveforms and vectorscopes.

KRESIMIR VLAHEK

Michael Robin responds:

Dear Mr. Vlahek:

In response to your note, I have several suggestions. First, provide all analog and digital equipment with a common PAL color-burst reference signal.

Second, time and phase all analog sources feeding the analog production switcher to your normal PAL tolerances and check the results by switching from one source to another while monitoring the analog PAL output with a PAL vectorscope and a waveform monitor referenced to the central PAL color-burst reference.

Following these steps should be sufficient. Normally, digital production switchers with SDI inputs feature a synchronizer at every input with a tolerance window of +/- 0.5H. I am not familiar with the Philips production switcher you are using, but in all likelihood, it operates in a manner similar to other products I am familiar with.

Insofar as the analog-component camera inputs of the Philips digital production switcher are concerned, I am assuming that each set of component analog signals is digitized for further digital processing, so it would seem normal that it uses the same synchronizer circuitry as the SDI inputs. If this is the case, steps one and two should suffice.

Normally, you would want to monitor the SDI output of the switcher. To this effect, I would suggest a digital waveform monitor of the Tektronix WFM601 family, whose decoded analog GBR or Y, B-Y, R-Y outputs feed a component analog color monitor. That version would allow you to verify the integrity of the SDI signal, as well as that the resulting analog PAL signal is valid and legal.

I hope these suggestions are of help.

REGARDS,
MICHAEL ROBIN

Freezeframe winners

December Freezeframe:

What TV station lays claim to being dedicated in 1955 by then-Vice President Richard Nixon? It was also the site of the famous Nixon/Kennedy debates. It claims to be its city's first stereo broadcaster and its first DTV station.

Many readers thought that the answer was WBBM-TV in Chicago, which did play host to one Nixon/Kennedy debate. However, it was WRC-TV in Washington, D.C., that was dedicated by Nixon.

Winners:
Tom Weeden, WMTV/WMTV-DT
Xen Scott
John Terhar, National Geographic Channel
Pete Misisco, Fairfax Public Access
John Sullivan, WKMG

January Freezeframe:

Name and date this VTR. Called a "Videocorder," it claimed "electronic editing" complete with the ability to "tape your material from other tapes, or off-the-air, or live camera and insert them into your pre-corded tapes with perfect synchronization."

The following people named the VTR correctly, which was the Sony EV-320F Videocorder, however, no one guessed the correct date. The EV-320F was introduced in 1971.

Winners:
Frank De Nys, Ross Video
John Johnson, KTVQ
Andy Delle, Laser Pacific Media
Al Guajardo, NASA
Tony Trent, NASA
Ron Whittington
John Turner, Turner Engineering

February Freezeframe:

In what year was color television first demonstrated? The system employed three-spiral scanning disks for both the transmitter and receiver. Bonus if you can provide the lines of horizontal resolution the system was capable of.

No one guessed the correct answer. Color television was demonstrated for the first time in July of 1928 by John L. Baird in England. The system was capable of somewhere between 20 and 30 lines per frame. BE

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Unconditional access

BY CRAIG BIRKMAIER

Early in the last century, the United States government entered into a bargain with the pioneers of what has become an incredibly lucrative franchise: broadcasting.

The Telecommunications Act of 1934 defined the terms of this bargain, creating the Federal Communications Commission to regulate the telecommunications industries, including broadcasting. In essence, the government "lent" broadcasters a chunk of a public resource – i.e., a license to use the airwaves to broadcast audio, and later video, to the masses. In return, broadcasters were charged with offering a free public service. If a broadcaster abused the public trust, the FCC could pull their license.

The products of broadcasters are available to anyone; there are no conditions set to access these products other than the purchase of a radio or TV receiver. As a result of this bargain, broadcasters have been held to different standards than competitors who have used conditional access technology and subscriber fees to provide a degree of control over the content they deliver.

The freedom to access content delivered through the air does not necessarily mean that this content is *free*. The ability to offer something more than the minimal public service commitments imposed by the government requires that revenues be generated to pay for the content that most of us want to see. Thus *free* has become synonymous with *advertiser supported*.

There is no question about the fact that commercial broadcasting is a profitable business. TV stations in the top 25 U.S. markets, affiliated with the major broadcast networks, typically enjoy profit margins in the range of 35 percent to 50 percent. The total revenues produced by television broadcasters in 2000 – the most profitable year in their history – were $40.843 billion. Radio broadcasters added another $19.819 billion. TV revenues slid 12 percent in 2001 to $35.930 billion, while radio revenues slid 7.4 percent to $18.360 billion.

The real beneficiaries of broadcasting are the folks who suck from the small end of the mass media funnel.

The mass media funnel

Despite the fact that broadcasters see more than $50 billion in revenues each year, and some enjoy profit margins that greatly exceed most of the companies that advertise, a big chunk of those revenues are used to pay for content.

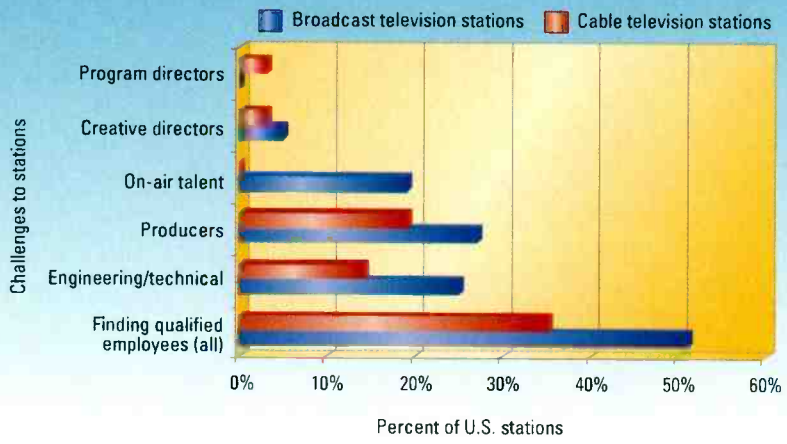
The real beneficiaries of broadcasting are the folks who suck from the small end of the mass media funnel:

- The Hollywood studios that produce motion pictures and TV programming;
- The record companies that produce popular music;
- The small number of artists who reach the top and can demand millions from the studios and record companies;
- College athletics, professional sports franchises and professional athletes;
- And the politicians who created the mass media franchises and use them to set the public agenda and retain their power.

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

Help wanted

Qualified broadcast and cable employees are hard to find



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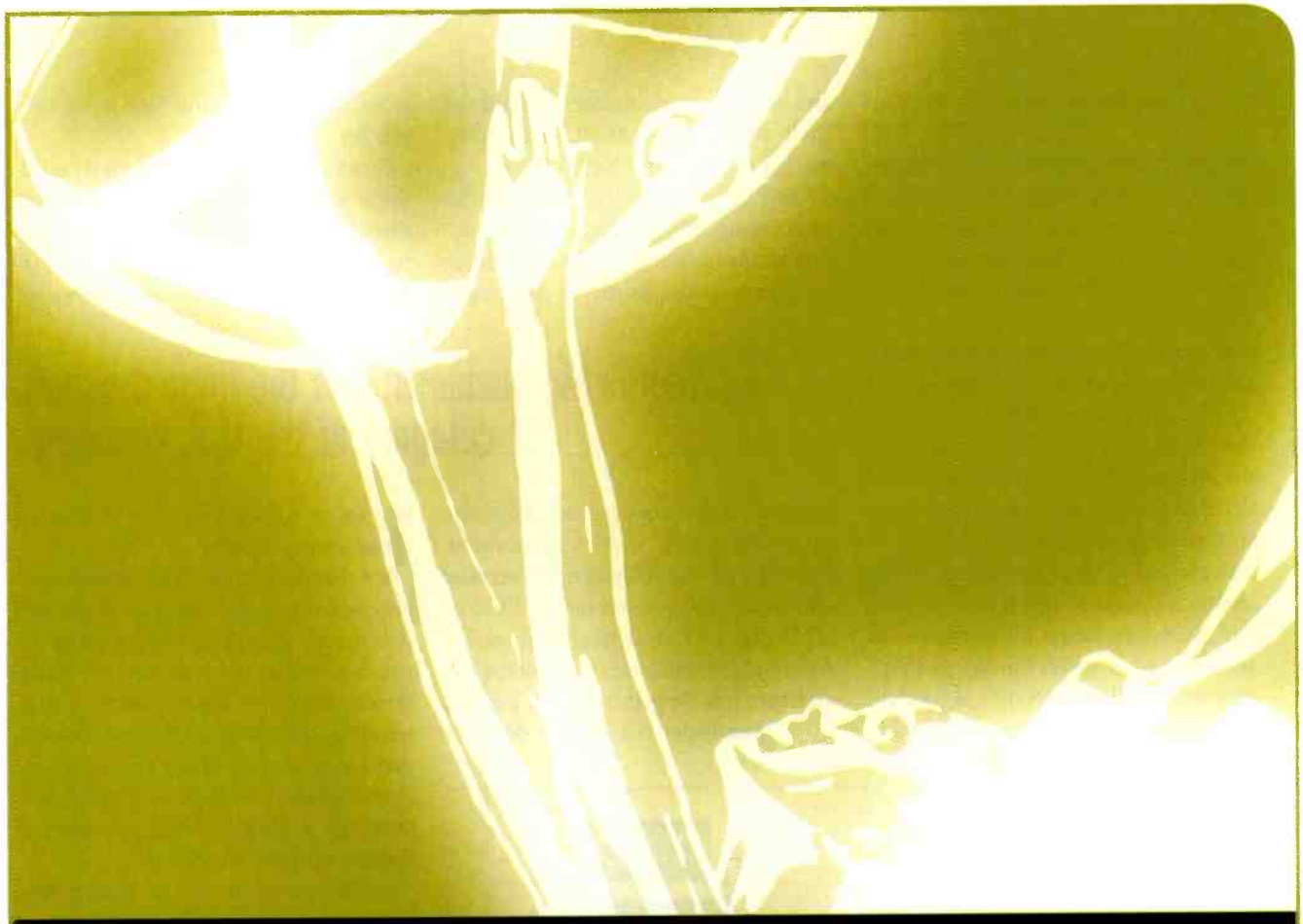

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Content is big business; it is the largest export category of the U.S. economy. It is a business that continues to be driven in part by the public's appetite for entertainment, and in part by the ability to charge ever more for a product that broadcasters have been providing for *free*.

How did the content moguls reach the lofty position they enjoy today?

It should come as no surprise that they used the power of the mass media. If advertising can stimulate the demand for a product or service, it can stimulate the demand for content.

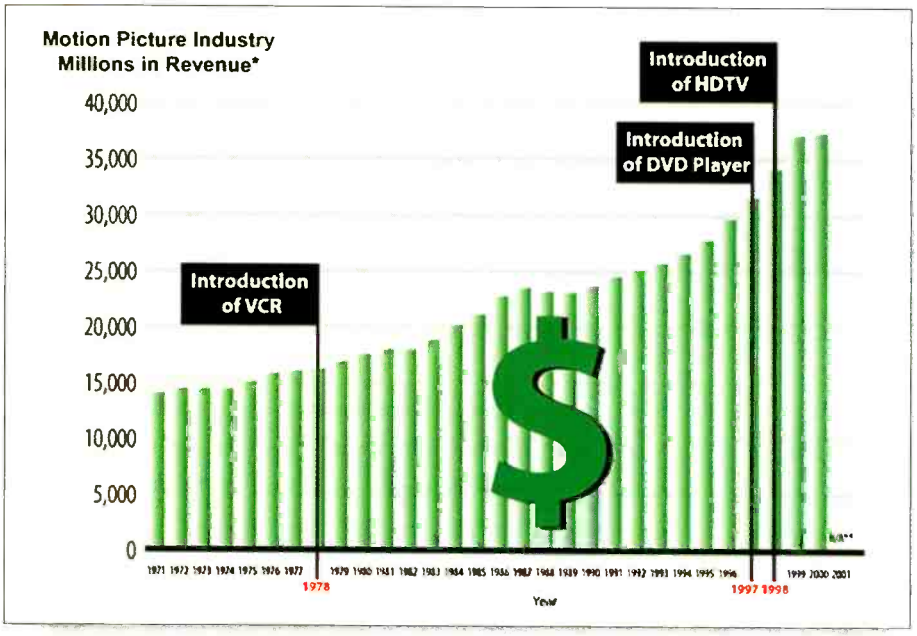
Television coverage of sporting events stimulates interest in sports, which in turn helps fill stadiums. In the case of a government-granted monopoly called the National Football League, local TV blackouts are used to make sure that those stadiums are full.

Radio broadcasting is the promotional arm of the music industry. The popularization of music via broadcasting drives demand for recorded music and concert appearances by top artists.

And the TV and motion picture industries use television programming and promos to stimulate demand for their artists and content: at theaters, on TV, on VHS and on DVD.

The TV receiver, a device that five decades ago provided unconditional access to the only source of video entertainment in the home, is no longer controlled by broadcasters. Approximately 85 percent of U.S. homes now subscribe to a multichannel TV service; and nearly 100 percent have a VCR or DVD player to watch packaged media. As a result, broadcasters' share of the TV audience has slipped from 100 percent to less than 40 percent, and this does not take into account the time spent watching packaged media content.

Content is big business; it is the largest export category of the U.S. economy.



The Consumer Electronics Association has historically challenged attempts to limit consumer recording rights. This CEA graph illustrates that motion picture industry revenues continue to grow despite – or perhaps because of – the introduction of "threatening" technologies.

Waving the conditional access flag

Apparently consumers have reached a rather profound conclusion. Maybe the deal between broadcasters and the politicians isn't all it was cracked up to be. Maybe *free* is too high a price to pay for TV.

Consumers have demonstrated their willingness to pay for content directly, even if they are still subjected to the advertising that supports broadcasters. And they are willing to pay more for content that is *free* of those annoying ads.

But direct payment for content carries with it some baggage. Content producers and distributors need to prevent those who have not paid from accessing the content. They need two things that broadcasters do not have: a technology solution for conditional access and an infrastructure for collecting the payments. Cable and DBS have both.

Conditional access is easier for packaged media since it must be purchased. But packaged media, not to mention radio and TV broadcasts, can be copied. Copyright owners have never liked this, but the fact that they are willing to provide *free* content via broadcasters undermines their case that all forms of copying should be illegal.

In 1982, Jack Valenti, president and CEO of the Motion Picture Association of America (MPAA), warned: "The VCR is to the American film producer and the American public as the Boston strangler is to the woman home alone."

To the MPAA, home recording technology would undermine the value of their franchise. But the consumer electronics industry and consumers won this battle. The principle of fair use was created via the Supreme Court "Betamax decision," and was later embodied in U.S. statutes.

The court found that the possibility of a technology being used in a manner that infringes on copyright protections does not justify banning a technology that can be used for non-infringing

EFA Model 53

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purposes. It ruled that making copies of a program for personal use does not infringe on the rights of the content owner. Recording a radio or TV broadcast, or making personal copies of content to use on other devices is a legal, non-infringing use.

Hidden behind the Broadcast Flag is an overt effort to control the flow of digital media content on every device that speaks the language of bits.

At least that's the way it has been for the past 20 years. If the content moguls get their way, however, the ability to make legal copies of content will be severely curtailed.

Once again they are running up the red flags, warning their pals in Congress that all things digital are a threat to their survival but, as the figure shows, their revenues continue to grow. The terms of the debate have evolved from the 1982 vision of "illegal" *taping*, to *copying*, to *downloading* and now *pirating*. Consumers, who are spending billions each year for their entertainment fixes, are now *criminals* in the eyes of the content moguls.

Rather that pointing to the obvious – that broadcasting is the promotional engine that drives the content industry – broadcasters are buying into the spin that the consumer is a threat. The fact that the content moguls own most of the major networks could be a major factor; however, there are other issues in play here as well.

Digital recording technology – a.k.a. the personal video recorder (PVR) – makes it easier for consumers to skip commercials and to control the consumption of programming. In broadcasters' eyes, this threatens to undermine the advertiser-supported model, not to mention the value of program adjacency in capturing channel surfers.

Broadcasters would like to extend the business model, offering content protected by conditional access. This would allow them to compete with programming that contains sex, violence and speech that is currently restricted in free-to-air broadcasts, and to participate in the revenues generated by premium services. The 1996 Telecommunications Act authorizes such services; in 1998 the FCC issued regulations that allow broadcasters to offer ancillary services if they share five

percent of the revenues generated with the government.

Broadcasters would like to protect their exclusive market-based franchises. Distribution infrastructures that have no physical boundaries, like the Internet, represent an opportunity to extend their reach into other markets, and the reach of competitors into their market.

Thus, broadcasters have raised a flag of their own...the Broadcast Flag.

On the surface, the Broadcast Flag appears innocuous enough. Just a few bits that tell a receiver whether a program can be copied: unlimited times, once or never. But the technologies needed to make the Broadcast Flag useful as a deterrent to illegal copying are mostly useless...especially with respect to eliminating the sharing of video via the Internet.

Hidden behind the Broadcast Flag is an overt effort to control the flow of digital media content on every device that speaks the language of bits. Digital TV receivers are one target; personal computers another. However, it is the networks that will interconnect all kinds of devices in the future, including the Internet, that are the real target.

Today it is not uncommon for a motion picture to appear on the Internet within a day or two of release...sometime before the release. How is this possible? For one, Hollywood is responsible, as they provide advance copies of many movies to industry insiders and movie critics. Somehow, some of these copies find their way to the Internet. If all else fails, someone simply sneaks a camcorder into the theater and shoots the movie right off the screen. The quality is not as good as a digital master, but it is good enough.

Shooting a TV show off the display will be even easier in the privacy of a home or office. There are so many "analog holes" to plug that it will be impossible for the Broadcast Flag to work in a meaningful way. And this completely ignores the reality that it will not slow down professional pirates for one nanosecond.

It appears that the era of *free* TV may be drawing to a close, as unconditional access to broadcasts will be nevermore. **BE**

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

BEYOND THE HEADLINES

FCC staff to get tough with DTV permittees

BY HARRY C. MARTIN

Senior-level staff members in the Media Bureau believe they have little flexibility with regard to future extensions of the deadlines for TV stations to complete construction of digital television facilities.

When the Commission first established procedures for stations to seek extension of the May 1, 2002, DTV construction deadline, it indicated that it would delegate authority to the staff to grant up to two six-month extensions. The full Commission would review any further requests for additional time. As a result, the staff believes it lacks the authority to approve any further extension requests that suggest the completion of construction might extend past the next six months.

Some group owners had hoped to present the Commission with a plan whereby they would construct DTV facilities for stations in sequence, according to a set schedule, without having to undertake the overwhelming expense of constructing facilities for all of the stations at the same time. The staff rejected this plan, however, because the proposed schedule called for some stations to have their DTV facilities completed more than six months after their current extended deadline.

The staff announced that all extension applications had to be filed 60 days in advance of the current extended construction deadline.

The staff further noted the proposal to impose fines upon stations that are not able to complete construction within the next six months. While subject to change, the original thinking on the amount of such a fine was in the neighborhood of $20,000. While this hard-line stance may reveal the Commission's lack of understanding of the real-world problems faced by television stations in today's marketplace, and especially those in smaller markets, broadcasters should be aware of the looming threats facing them.

Recent DTV initiatives

On Aug. 9 the Commission adopted deadlines for the introduction of DTV tuners and initiated a rulemaking to address what copy protection standards should be adopted to protect the producers of digital programming.

DTV tuners. The Commission established July 1, 2007, as the deadline for all television sets with screen sizes 13 inches or greater and all video receiving equipment, including VCRs, DVDs and DVRs (TiVo), to include digital reception capability. To reach this goal, the following schedule was established:

- Receivers with screen sizes 36 inches and above – 50 percent of units must include DTV tuners effective July 1, 2004; 100 percent of such units must include DTV tuners effective July 1, 2005.
- Receivers with screen sizes 25 to 35 inches – 50 percent of units must include DTV tuners effective July 1, 2005; 100 percent of such units must include DTV tuners effective July 1, 2006.
- Receivers with screen sizes 13 to 24 inches – 100 percent of all such units must include DTV tuners effective July 1, 2007.
- TV interface devices — VCRs, DVD and other players/recorders that receive broadcast television signals – 100 percent of all such units must include DTV tuners effective July 1, 2007.

Copy protection. High quality programming, such as movies, is not likely to be available on DTV until protections are in place that will prevent the programming from being pirated and distributed free on the Internet.

On Aug. 9, the FCC released a Notice of Proposed Rulemaking to review whether the FCC should enter the fray and implement the "flag" mechanism broadcasters and programmers have been developing. Such a technological flag could be embedded in program material broadcast in the DTV mode, and consumer electronics devices such as VCRs would be programmed to reject programming containing the flag.

Such a plan may speed the development of digital programming, but the Commission questions whether government endorsement of this mechanism is necessary, or if the flag is the appropriate technological solution to the problem. The Commission is also seeking comment on the likely impact of such protections on the public's access to programming, and their ability to utilize current and future digital equipment. BE

Dateline

Oct. 10, 2002, is the due date for electronic filing of Forms 398 (children's programming reports), and also for the placement in stations' public files of their quarterly lists of issues and responsive programs for the quarter ending Sept. 30, 2002.

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

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

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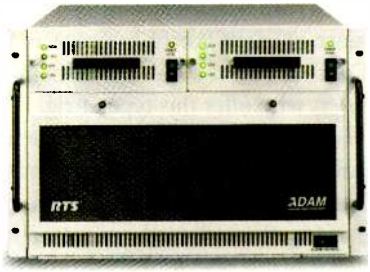

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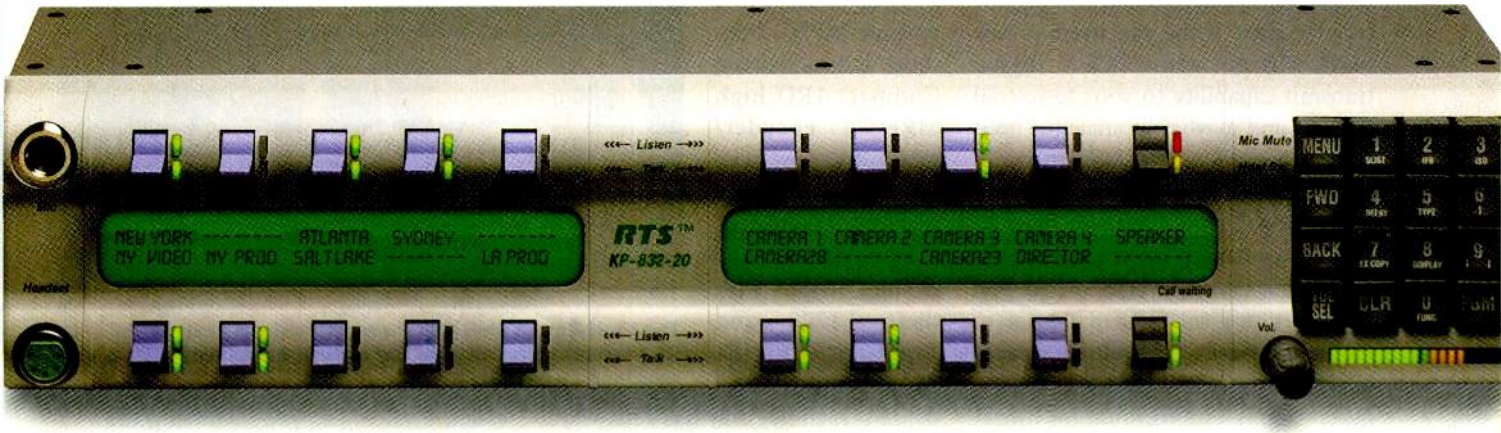

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Satellite/ENG systems

BY JONATHAN HIGGINS

Finding money for anything these days is a struggle, and like anything else, the spending on trucks is likely to have several digits before the decimal point. But let's say your general manager has given you the opportunity of coming up with a wish list for an SNG truck, ENG van or remote semi-trailer. There have been a number of new developments in the last year or so. What could you find to spend money on?

There has been a dramatic rise in the requests for complete rebuilds and refurbishment of SNG and ENG trucks, as well as remote trailers.

You could do what many stations are doing and take the opportunity to refurbish and upgrade an existing vehicle. In the last year or so there has been a dramatic rise in the requests for complete rebuilds and refurbishment of existing SNG and ENG trucks, as well as remote trailers. Based on your market topography, why not convert your aging ENG van with a digital COFDM microwave link, even though it will, of course, have an associated cost at your receiver sites. If the van needs a new mast, why not add COFDM digital transmit capability to your terrestrial RF path and maybe eliminate the need for that hazardous telescopic mast?

The upgrade to digital capability on existing SNG trucks has also been an attraction for many. You could turn your SNG truck into a "hybrid," where you fit a short mast with a COFDM link to extend the truck's newsgathering capabilities. If you're looking for a new vehicle, there is a momentum for hybrid terrestrial RF transmit and digital Ku uplink capabilities in a smaller-profile unit such as a van. The van-sized unit is very maneuverable in all markets and can be more energy efficient. The digital Ku path is less costly on airtime, with more efficient use of rack space. Wolf Coach is one of a number of manufacturers who offer this type of rig.

For larger SNG/EFP units, some truck builders offer under-floor generators. This offers the facility the option of removing the onboard generator from that valuable operational area and slinging it under the chassis to achieve space savings and reduce noise levels inside the operational area. Some customers want an engine-driven PTO and an under-floor generator, giving them both backup and the ability to sell power to the poor guy in the truck pool whose generator has just died on him!

Compression

You no longer need to allow 2RU or more of rack space for a separate MPEG-2 encoder and modulator. Compact 1RU high MPEG-2 encoder/modulators have been appearing over the last year from a number of manufacturers, including Scopus with their E1700 and Tandberg with the E5714. Standard offers the 1RU high but only half-rack-width L1000 encoder/modulator. Advent Communications has just introduced a 1RU encoder/modulator/upconverter, with a choice of L-, C- or Ku-band outputs. In the Ku-band unit, the uplink chain is virtually in one box apart from the HPA. You don't have to worry about one part failing and the whole thing becoming useless – you just carry a spare 1RU unit in the back!

What about that hot topic – the use of opportunistic data? Tandberg is targeting the DSNG market by offering two-way connectivity with an IP encapsulator. This allows an SNG truck in the field to be connected to the station's LAN, so IP LAN traffic can be transmitted over the same MPEG-2 circuit as the video traffic. This gives high-speed data transfer or network access "for free" at the remote location, potentially giving journalists remote access to their e-mail or to the newsroom system to file stories. This certainly beats the problem of not even getting a cell phone connection when all the cells are jammed at that breaking news story.

Tandberg also sells a unique (but proprietary) system of signal pre-correction called PreKor, i.e., pre-distorting the signal to overcome the non-linearity when you drive the TWT very hard. Their solution for correcting distortion

The Wolf Coach ENG/SNG van offers hybrid terrestrial RF transmit and digital Ku uplink capabilities in a smaller-profile unit.

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in SCPC satellite links can increase data capacity using either QPSK, 8PSK or 16QAM modulation. In addition, Tandberg claims the system improves 16QAM link budgets, typically by 4- to 6dB. Overall, the system is claimed to optimize the quality, power and capacity of the signal at the output of the satellite.

Light over copper

Covering both ENG and EFP is the use of fiber optic to connect cameras to trucks. While it's been around for over five years in a form applicable to ENG/EFP, the development has now extended to HD. Telecast Fiber's compact digital ENG/SNG CopperHead camera fiber analog multiplexer was one of the hits of NAB 2001, and is now available for SDI and HDTV cameras. Fitted with a heavy-duty two-fiber connector, the multiplexer is available with an optional tactical grade fiber cable.

Telecast Fiber's compact digital ENG/SNG CopperHead camera fiber analog multiplexer is now available for SDI and HDTV cameras.

For EFP, Telecast's Viper II multiplexer system offers digitally multiplexed HD video, SDI video, AES/EBU audio and uncompressed 1.5Gb/s HD or 270Mb/s SDI channel. All camera signals – HD/SDI program video, analog program video, dual program audio, intercom, tally call, return video, genlock, CCU data and auxiliary data – are on a single analog audio channels. Coarse wavelength-division multiplexing (CWDM) combines light signals from different lasers onto one fiber, so add eight-channel CWDM capability and you can stack up tens of video and audio channels onto a single fiber that's a little over one-fourth of an inch in total diameter. This is a heavy-duty transport system, and though it's not cheap, what's the harm in adding it to your wish list? This stuff is quick to rig, and even field repairs are not the nightmare they used to be.

Wires ... what wires?

For EFP applications, the attraction of truly mobile digital wireless cameras without the risk of blind spots or breakups in the stadium are a TD's dream. A number of manufacturers are now marketing digital MPEG/COFDM/RF wireless camera packs that offer just this – the BMS CarryCoder, Tandberg Voyager Lite and Gigawave, to mention a few. What about the delay? The video from the cabled goal camera showing the ball hitting the back of the net, followed by the wireless touchline camera showing a picture half a second back in time is enough to send shudders down any TD's spine. Well, the delay is now better – a lot better. With some of these digital camera packs, the delay is down to only two or three frames. One frame would be better – and it will come.

Laser links has come a long way in the last few years. The Canobeam-2 laser link can be set up in minutes, and requires no FCC license or frequency allocation. These benefits, along with auto-tracking and no RF interference, make it easy to transmit bi-directional HD or SD digital video and audio signals. This is just the thing for connecting that remote camera at the top of the stadium without interference from your neighbors.

So there are some ideas for your wish list – now just scare up the money! BE

Jonathan Higgins is a satellite communications consultant and author of "Satellite Newsgathering," available from many book dealers.

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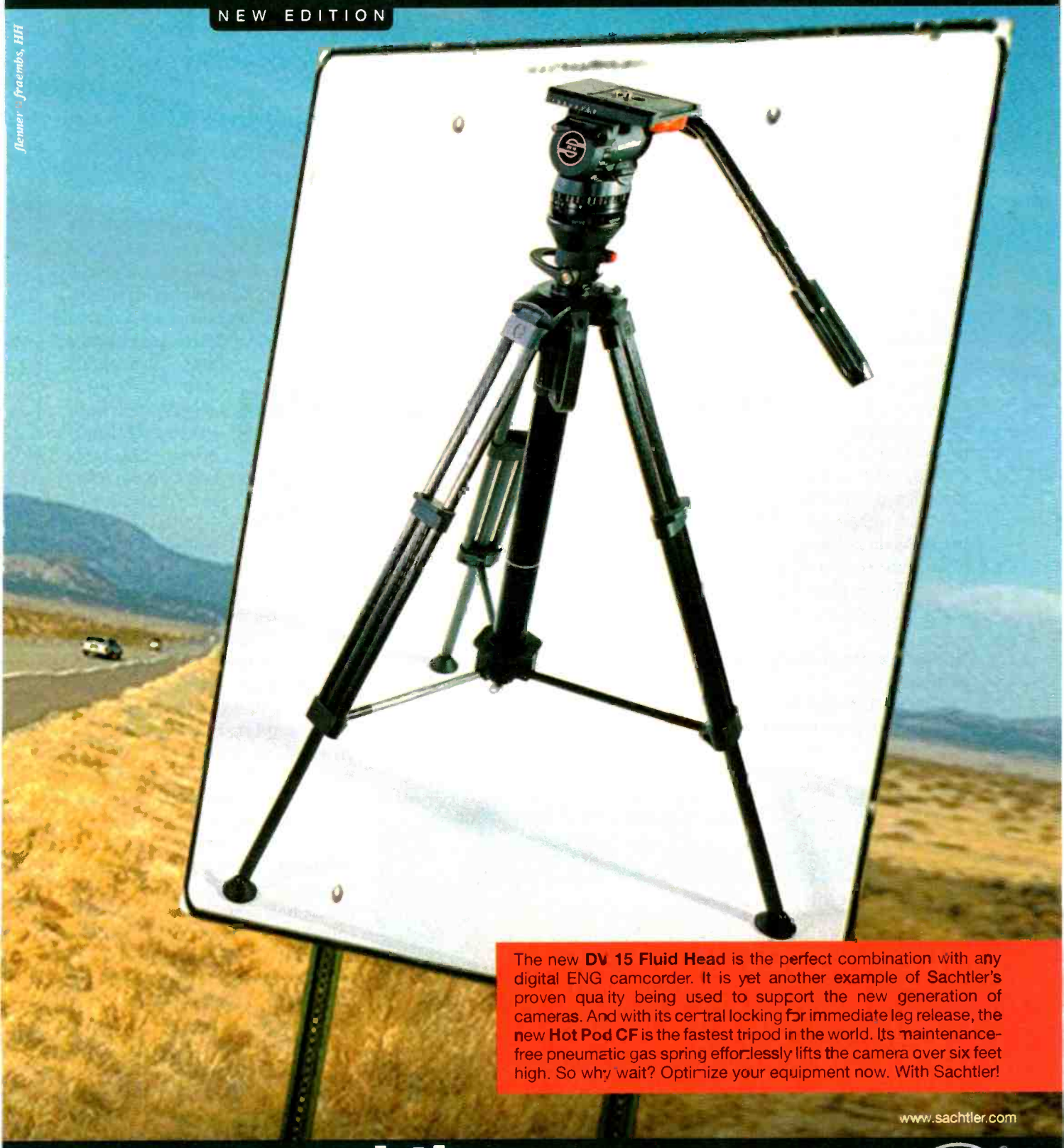

The new **DV 15 Fluid Head** is the perfect combination with any digital ENG camcorder. It is yet another example of Sachtler's proven quality being used to support the new generation of cameras. And with its central locking for immediate leg release, the new **Hot Pod CF** is the fastest tripod in the world. Its maintenance-free pneumatic gas spring effortlessly lifts the camera over six feet high. So why wait? Optimize your equipment now. With Sachtler!

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set your ideas in motion!

The digital resolution concepts

BY MICHAEL ROBIN

In the analog video world, the picture resolution is expressed in lines per picture height (LPH) and reflects the losses caused by the vertical and horizontal picture sampling processes. The choice of the transmitted bandwidth ensures near-equal horizontal and vertical resolution in the two contemporary scanning standards (525/59.94 and 625/50). The advent of digital processing of video signals has introduced a new twist in the concept of picture resolution. This article will analyze some of the implications.

Sampling frequency considerations

The ITU-R BT.601 Recommendation (Rec 601) is the first international agreement on how to migrate from two incompatible analog composite television standards (525/59.94 and 625/50) to a common component digital sampling concept. The dominant digital coding is based on the use of one luminance (E'_Y) and two scaled color-difference (E'_{CB} and E'_{CR}). Early proposals for the sampling frequency of the E'_Y signal specified a multiple of the subcarrier frequency (F_{sc}) of the associated composite video signal. This resulted in the 4:2:2 strategy of sampling E'_Y at $4F_{sc}$ and each of the color-difference signals at $2F_{sc}$, hence 4:2:2.

Family member	E'_Y sampling frequency (MHz)	E'_{CB}, E'_{CR} sampling frequency (MHz)
4:4:4	4 x 3.375 = 13.5	4 x 3.375 =13.5
4:2:2	4 x 3.375 = 13.5	2 x 3.375 = 6.75
4:1:1	4 x 3.375 = 13.5	1 x 3.375 = 3.375

Table 1. Sampling rates of various members of the Rec 601 family

The major achievement of Rec 601 is choosing a set of sampling frequencies common to both the 525/59.95 and the 625/50 scanning standards. The selected frequencies are common multiples of 3.375MHz, as well as the line (horizontal) scanning frequencies (F_H) of both standards. A family of sampling rates based on the reference frequency of 3.375MHz has evolved, resulting in the well-known 4:1:1, 4:2:2 and 4:4:4 sampling strategies. Table 1 shows how the sampling frequencies are derived from 3.375MHz. Table 2 shows the relationship between the 4:2:2 component digital format sampling frequencies and F_H in both scanning formats.

The sampling frequency imposes Nyquist constraints on the maximum sampled analog video frequency, which has to be lower than half the sampling frequency to avoid the occurrence of aliasing. It has therefore a direct bearing on the frequency response and the number of horizontal picture elements (pixels) that the system can handle. Table 3 lists significant parameters of the Rec 601 4:2:2 format. Sampling E'_Y at 13.5MHz results in 858 pixels in the 525/59.94 scanning standard and 885 in the 625/50 standard. The digital active line accommodates 720 Y active pixels in both standards. Under ideal conditions, given the Nyquist frequency of 6.75MHz, 720 pixels per active line is equivalent to a horizontal resolution of 3/4 x 720 = 540LPH. Rec 601 specifies an anti-aliasing and reconstruction filter cutoff of

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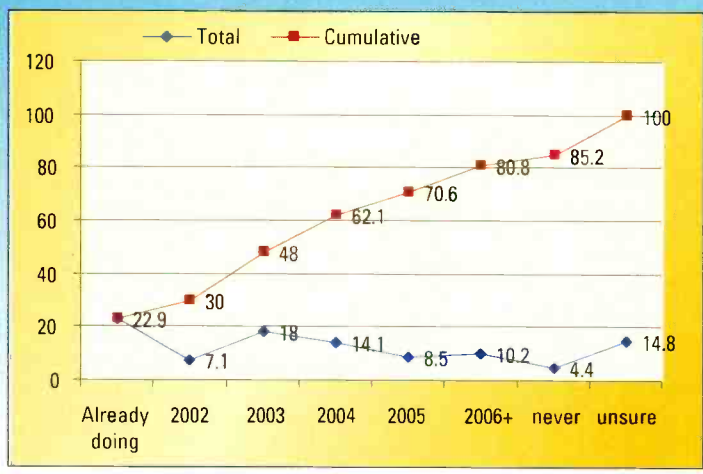

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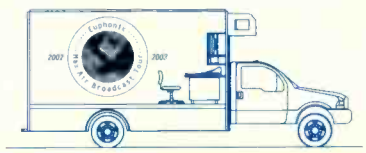
Don't Miss the

Max Air Broadcast Tour

Max Air is a new 96-channel digital audio mixing console designed for on-air and live-to-tape broadcast production applications.

The Euphonix Max Air Broadcast Tour demonstration vehicle hits the road for a 37 city trip that will include the Las Vegas NAB convention in April 2003. This specially commissioned truck is outfitted with a 96 channel Max Air mixing system and simulates a local TV station digital audio control room.



Society of Broadcast Engineers (SBE) Local Meetings

The Max Air Broadcast Tour vehicle will be present at local SBE chapter meetings for hands-on demos of the audio and video systems.

US Tour Dates

Arrival Date	Last Day	Location	SBE Local Chapter Meeting Dates
2002			
Wed Sep 25	Fri Sep 27	Minneapolis	Wed Sep 25
Mon Sep 30	Fri Oct 04	Chicago	Tue Oct 01
Mon Oct 07	Fri Oct 11	Detroit	
Mon Oct 14	Fri Oct 18	Indianapolis	Tue Oct 15
Mon Oct 21	Fri Oct 25	Cleveland	Mon Oct 22
Mon Oct 28	Fri Nov 01	Pittsburgh	
Mon Nov 04	Fri Nov 08	Boston	
Mon Nov 11	Fri Nov 15	Philadelphia	
Mon Nov 18	Tue Nov 19	Wash. D.C.	Tue Nov 19
Wed Nov 20	Fri Nov 22	Baltimore	Wed Nov 20
Mon Nov 25	Fri Nov 29	Holiday	
Mon Dec 02	Tue Dec 03	Miami	Tue Dec 03
Wed Dec 04	Fri Dec 06	Tampa	Thu Dec 05
Mon Dec 09	Fri Dec 13	Atlanta	Mon Dec 09
Mon Dec 16	Fri Dec 20	Birmingham, Montgomery & Huntsville	Wed Dec 18
Mon. Dec 23	Wed Jan 01	Holiday	

Arrival Date	Last Day	Location	SBE Local Chapter Meeting Dates
2003			
Thu Jan 02	Fri Jan 03	Nashville	Thu Jan 02
Mon Jan 06	Thu Jan 09	New Orleans, Baton Rouge & Shreveport	Mon Jan 06
Fri Jan 10	Tue Jan 14	Houston	Tue Jan 14
Wed Jan 15	Wed Jan 15	San Antonio	Wed Jan 15
Thu Jan 16	Fri Jan 17	Austin	Thu Jan 16
Mon Jan 20	Tue Jan 21	Tulsa	Tue Jan 21
Wed Jan 22	Fri Jan 24	Oklahoma City	
Mon Jan 27	Fri Jan 31	Dallas Ft. Worth	Thu Jan 30
Mon Feb 03	Fri Feb 07	Phoenix	
Mon Feb 10	Wed Feb 12	San Diego	Mon Feb 10
Thu Feb 13	Fri Feb 21	Los Angeles	Mon Feb 17
Mon Feb 24	Tue Feb 25	Sacramento	Tue Feb 25
Wed Feb 26	Fri Feb 28	San Francisco	Wed Feb 26
Mon Mar 03	Thu Mar 06	Vancouver	
Fri Mar 07	Tue Mar 11	Portland	Tue Mar 11
Wed Mar 12	Tue Mar 18	Seattle	Thu Mar 13
Thu Mar 20	Fri Mar 21	Salt Lake City	Fri Mar 21
Wed Mar 26	Fri Apr 04	Las Vegas NAB Exhibition Las Vegas	Thu Mar 27
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If your station is located in one of the 37 cities and you would like the Max Air Broadcast Tour to stop by your facility please contact Euphonix Sales Coordinator Jonathan McDonell at (650) 846-1114 [jmcdonell@euphonix.com]

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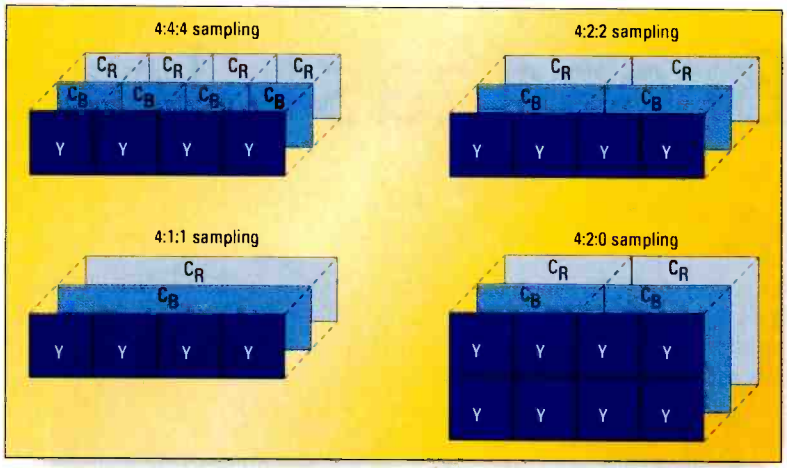

Figure 1. Spatial representation of several sampling structures

5.75MHz, which reduces the E'_Y analog horizontal resolution to 455LPH (449LPH in 625/50). The E'_{CB} and E'_{CR} signals are subsampled by a factor of two at 6.75MHz. This results in 429 pixels in the 525/59.94 scanning standard and 432 pixels in the 625/50 scanning standard. The digital active line accommodates 360 C_B and 360 C_R active pixels in both standards. Under ideal conditions, given the Nyquist frequency of 3.375MHz, 360 pixels per active line is equivalent to 3/4 x 360 = 270LPH. Rec 601 specifies an anti-aliasing and reconstruction filter cutoff of 2.75MHz, resulting in an E'_{CB} and E'_{CR} signal analog horizontal resolution on the order of 218LPH (215 in 625/50).

The abovementioned analog resolution figures assume ideal brickwall low-pass filters. Such filters don't exist in practice, so the actual resolution could be worse.

Under the influence of the computer industry, various bodies have started referring to the number of samples (or pixels) per active line as horizontal resolution and to the number of active lines per picture as vertical resolution. This is misleading. For example, compare 720 pixels (horizontal resolution in the computer world) with the actual horizontal resolution of 455LPH. The figures for vertical resolution are also misleading. Compare 483 (number of active lines) with 338LPH (using a 0.7 Kell factor). Table 3 summarizes the situation for the two SDTV digital studio standards.

Scanning format	Line scan frequency F_H (kHz)	E'_Y sampling frequency (MHz)	E'_{CB}, E'_{CR} sampling frequency (MHz)
525/59.94	15.73425	858 x F_H = 13.5	429 x F_H = 6.75
625/50	15.625	864 x F_H = 13.5	432 x F_H = 6.75

Table 2. Rec 601 4:2:2 component digital format sampling frequencies

Figure 1 shows the spatial representation of several sampling structures along a scanning line. The 4:4:4 sampling structure shows that for every Y pixel there is a time-coincident C_R and C_B pixel. The 4:2:2 sampling structure shows that for every group of four Y pixels there are two C_B and C_R pixels. The 4:1:1 sampling structure shows that for every group of four Y pixels there is one C_B and one C_R pixel. The 4:2:2 and 4:1:1 strategies subsample C_B and C_R horizontally while keeping the vertical resolution intact. An MPEG subsampling strategy, known as 4:2:0, subsamples C_B and C_R vertically as well as horizontally using a process of interpolation.

The 4:2:2 sampling concept has undergone an evolution and, presently, it refers to a digital system where for every four Y pixels, there are two C_B and C_R pix-

Scanning format	525/59.94		625/50	
Component	E'_Y	E'_{CB}, E'_{CR}	E'_Y	E'_{CB}, E'_{CR}
Sampling frequency (MHz)	13.5	6.75	13.5	6.75
Nyquist frequency (MHz)	6.75	3.375	6.75	3.375
Cut off frequency (MHz)	5.75	2.75	5.75	2.75
Number of pixels per total line	858	429	864	432
Number of pixels per active line	720	360	720	360
Total lines per frame	525		625	
Active lines per frame	483		576	
Vertical resolution (LPH)*	338		403	
Resolution factor (lines/MHz)	~79.2		~78	
Horizontal resolution (LPH)**	~455	~218	~449	~215
Line scan frequency (KHz)	15.73425		15.625	
Vertical scan frequency (Hz)	29.97 frames per second		25 frames per second	
Large area flicker (Hz)	59.94		50	
Small area flicker (Hz)	29.97		25	

* Vertical resolution (LPH) = active lines per frame x Kell factor (0.7)

** Horizontal resolution (LPH) = resolution factor (lines/MHz) x cut off frequency (MHz)

Table 3. Rec 601 4:2:2 significant parameters

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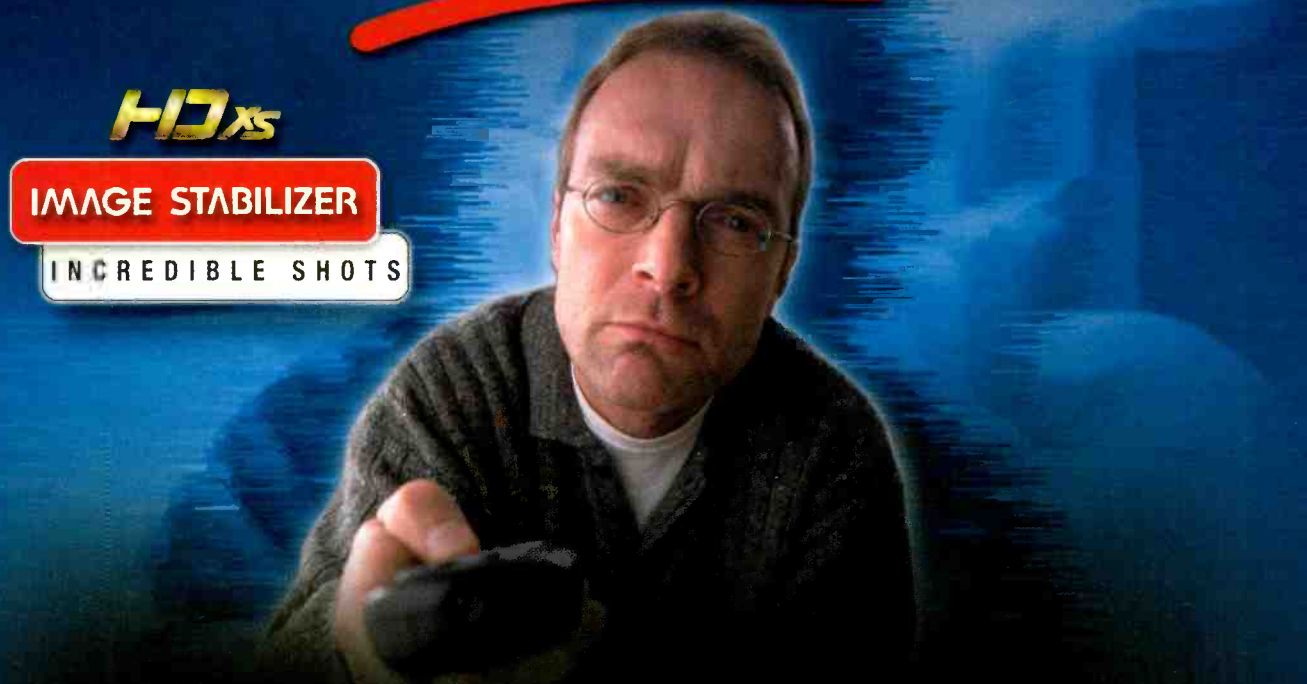

With the remote in hand, or within reach, viewers don't have to settle for shaky images, and usually won't. Which is why broadcasters request Canon's HD lenses equipped with built-in Image Stabilization technology.

The technology is now available on Canon's new breakthrough 100X and industry standard 86X and 75X long lenses, as well as their 40X EFP portables, and can be purchased as an adapter (Vari-Angle Prism) for their IFxs and HDxs ENG lenses. With it, directors and camera people can broadcast images that turn viewers on, and not away.

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Format	SMPTE 293M SDTV 720x483P		SMPTE 296M HDTV 1280x720P		SMPTE 274M HDTV 1920x1080i	
Component	E'_Y	E'_{CB}, E'_{CR}	E'_Y	E'_{CB}, E'_{CR}	E'_Y	E'_{CB}, E'_{CR}
Sampling frequency (MHz)	27.00	13.5	74.25	37.125	74.25	37.125
Nyquist frequency (MHz)	13.5	6.75	37.125	18.5625	37.125	18.5625
Cut off frequency (MHz)	12.00	6.00	30.00	15.00	30.00	15.00
Number of pixels per total line	858	429	1650	825	2200	1100
Number of pixels per active line	720	360	1280	640	1920	960
Total lines per frame	525		750		1125	
Active lines per frame	483		720		1080	
Vertical resolution (LPH)*	338		504		756	
Resolution factor (lines/MHz)	≈29.7		≈19.5		≈29	
Horizontal resolution (LPH)**	≈358	≈178	≈583	≈291	≈775	≈387
Line scan frequency (KHz)	31.5		45.00		33.75	
Vertical scan frequency	60 frames per second		60 frames per second		30 frames per second	
Large area flicker (Hz)	60 Hz		60 Hz		60 Hz	
Small area flicker (Hz)	60 Hz		60 Hz		30 Hz	

* Vertical resolution (LPH) = active lines per frame x Kell factor (0.7)

** Horizontal resolution (LPH) = resolution factor (lines/MHz) x cut off frequency (MHz)

Table 4. Significant parameters of three 16:9 aspect ratio studio production formats

els. There is no mathematical relationship with the line scanning frequency.

ATSC considerations

The members of ATSC could not agree on a single picture format concept. As a consequence the ATSC standard supports a range of program materials originating in different picture formats. Two program format levels are represented, namely HDTV and SDTV. There are two 16:9 aspect ratio HDTV production formats: SMPTE 296M (720 active lines progressively scanned) and SMPTE 274M (1080 active lines interlace scanned). There are several SDTV formats with a choice of 16:9 or 4:3 aspect ratio, interlaced or progressively scanned, as well as a 4:3 VGA format. Accounting for all picture scanning formats and frame rates, there are 18 picture formats supported by the ATSC standard, based on the nominal frame rates of 60Hz, 50Hz and 24Hz. If we take into consideration the NTSC-friendly rates of 59.94Hz, 29.97Hz and 23.976Hz formats, we end up with 36 picture formats. Table 4 presents the significant parameters of three basic 16:9 aspect ratio production formats — SMPTE 293M, SMPTE 296M and SMPTE 274M. The listed horizontal and vertical resolution figures, in LPH, are shown for comparison only. As shown, the progressive scanned formats are superior in terms of flicker but require considerable analog baseband bandwidths. All formats are compressed prior to transmission using MPEG-2 methods. Since progressive scanned signals are easier to compress, it is predictable that in the long run interlacing will be abandoned. BE

Since the video signals are digitally generated, certain analog resolution concepts do not directly apply to computer displays.

Michael Robin, a fellow of the Society of Motion Picture and Television Engineers and a 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.*

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

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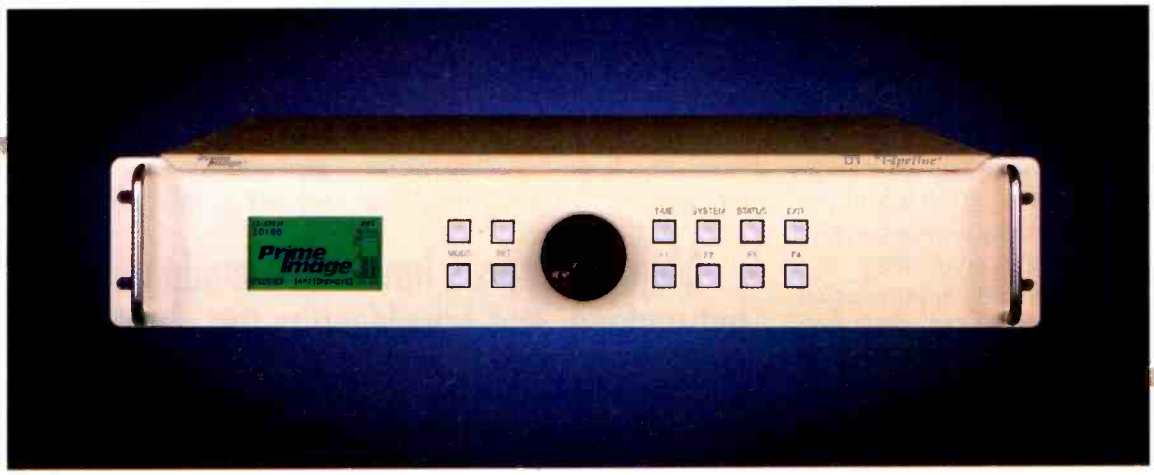

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The perfect broadcast server

BY BRAD GILMER

Here are some thoughts on the "perfect broadcast server" compiled from discussions I have had with people over the years. If you agree with what is written here, or especially if you disagree, send me an e-mail at brad_gilmer@primediabusiness.com. Some of the things here are contradictory but, in a perfect world, we could have anything we want, even if some of our wants conflicted.

The server should support digital interfaces including SDI, SDTI, ASI and AES audio. The server should support analog video and audio as well, although this could be handled in external conversion. The requirement for SDI and SDTI is clear. ASI is being used both as an STL interface and as a distribution interface. AES is the standard audio format. The perfect server would have anywhere between one and 20 video channels, with most users happy with four. Likewise, audio requirements are all over the map, but seem to settle somewhere between eight and 16.

In an ideal world, the server would support all video formats, including MPEG TS (long and short GOP), DV native, etc. Many people have told me that they would like a server to take in a piece of video and play it back in a wide range of video formats, performing the conversion on the fly. People running multi-language facilities asked for track patching – the ability to switch any audio channel to any output in real time.

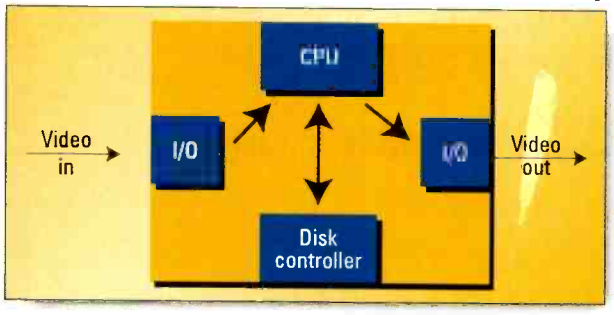

Figure 1. Systems that run video through the CPU may suffer from poor performance.

Major advances have been made in the area of networking, and broadcasters are chomping at the bit to move forward. The server should be Ethernet-friendly, both from the standpoint of file transfer, and monitoring and control. There should be support of standardized implementations of Simple Network Management Protocol (SNMP). SNMP and the monitoring software that goes with it should not only tell us that a server or part of a server has died, but it should alert us that a problem is pending. Users are asking for more control of servers over Ethernet. As an example, setup parameters could be established over Ethernet rather than requiring separate RS-422 connections to each server. One idea I heard was to provide a file analyzer to detect any problems in the incoming file. I would extend this to silence/video breakup detection as well. Some servers are used in an automated ingest environment. If an error occurs during ingest, there is no way to know until the ingested material hits air. If the file is delivered in MPEG or some other format, it would be good to have an optional analyzer that could detect file format problems. This is above and beyond error correction algorithms employed during transmission.

Fibre Channel is great, but with 40-Gig Ethernet on the horizon, and Gig-E available today, servers should support transfers via either medium. The network architecture should be fault tolerant with dual networking cards configured in redundant nodes or rings. Operators should be able to disconnect one network without taking down all the servers. The network should automatically reroute around the segment that is down. The system should allow users to take advantage of off-the-shelf protocols and tools such as FTP to access and administer their systems.

Major advances have been made in the area of networking, and broadcasters are chomping at the bit to move forward.

There is a lot of talk in the industry these days regarding metadata. GXF, MXF, AAF and proprietary formats move information along with the basic video and audio. As networking becomes more popular, users naturally see the need for an "electronic tape label" that describes the information being transferred in the file. Users in the post-production environment see the need for a more full-featured information set for the exchange of information such as layering, composition and effects. Users are now asking for metadata support in servers.

The server should support faster-than-real-time transfer and multiple-stream transfer over the same medium.

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As networks get faster, users are asking for connection-based virtual channels from one server to another. Material can be streamed between servers as fast as the network will allow, or it can be streamed across a preset number of "pipes" or virtual connections within the network. There should be a user-definable priority scheme for setting bandwidth control on clients both for network file transfers and total server capacity.

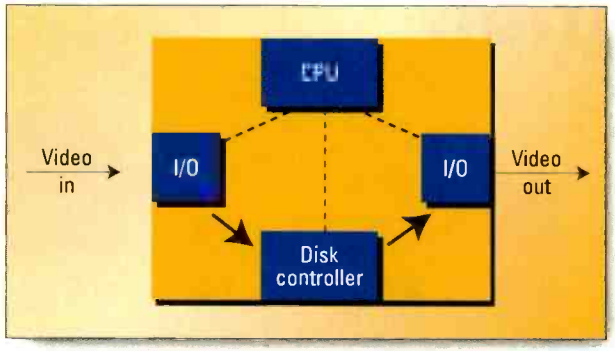
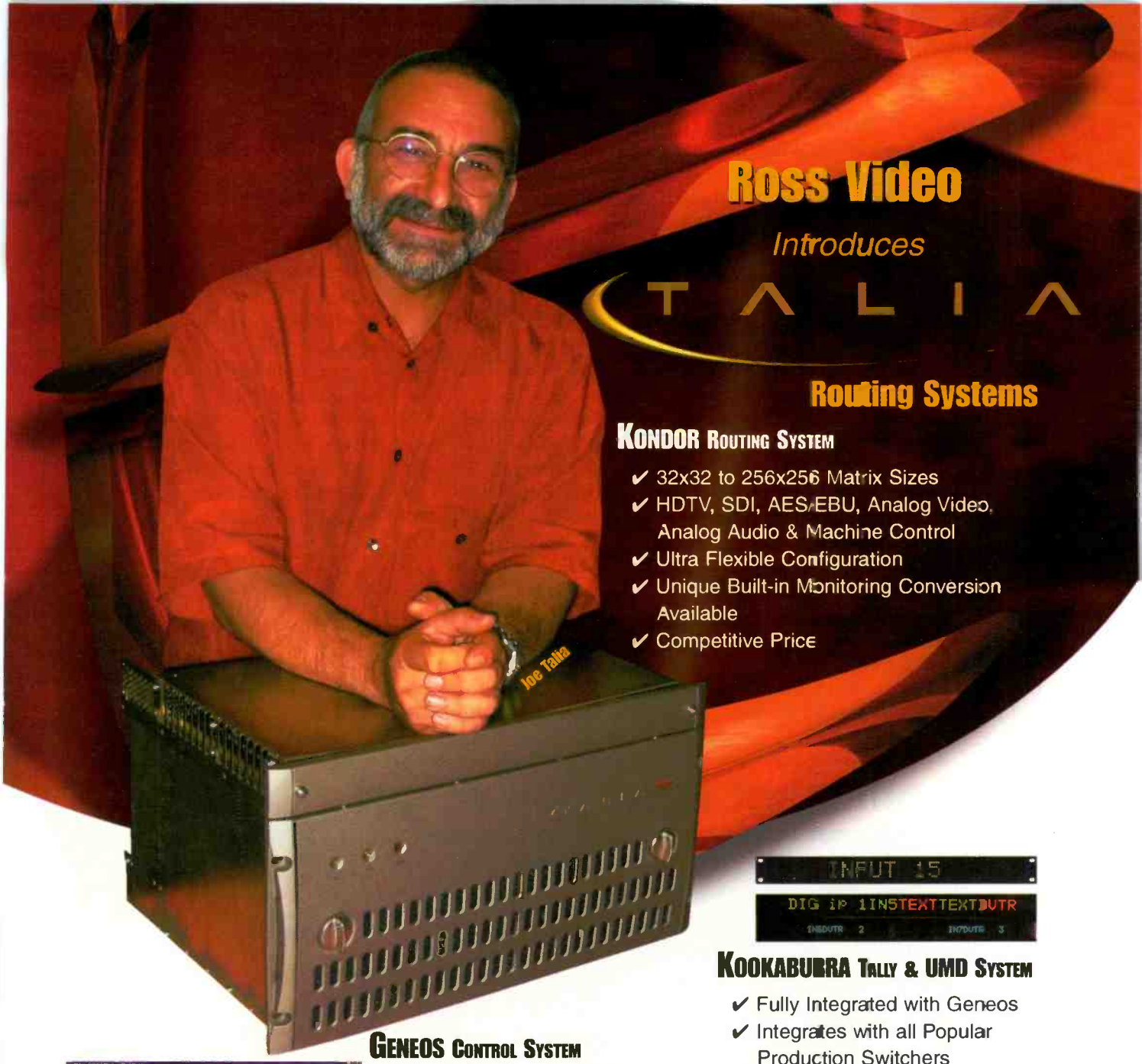


Figure 2. High-performance video servers typically direct "reads" and "writes" to and from storage systems without passing through the server's central CPU.

Everything should be modular – power supplies, CPU, I/O, fans, disks, you name it. Filters should be easily accessible without removing any screws. Speaking of screws, the server should be designed so that everything can be swapped out without having to remove a large number of screws. Parts should be hot-swappable and interchangeable with other servers. Midplane designs with modules that plug into both the front and the back of the server seem to be popular with users. The server must be designed so that it can withstand the rigors of a mobile service. It should allow for addition of storage quickly and easily. The storage should be available to a large number of I/O units and available to other servers without bottlenecks. Fault-tolerant everything. Need I say more?

There seem to be two distinct camps regarding manipulation of video and audio once it is inside the server. Some people want a no-frills bit-bucket. Others want to be able to manipulate the material with video effects (squeezeback where video is reduced in size during closing credits to play a promo is one common requirement), cuts, audio fades, simple wipes and so on. In some applications, MPEG splicing and logo insertion is required.

The server should be a general purpose IT-type server with SAN or NAS



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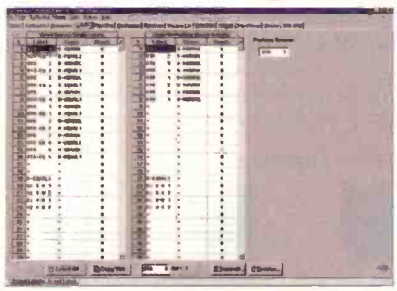

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(pick your flavor) storage. When it comes to operating systems, some users have firm convictions, but the majority of people are just looking for a stable off-the-shelf system that is easily maintained by their staff. They really do not care what OS is used; they just want it to work. The server should pipe I/Os directly to storage without going through the CPU, unless absolutely necessary.

The system should allow the use of message-based middleware for control and integration in large facilities. There is a strong requirement for fully disclosed and well-documented API and control interfaces so that users can smoothly integrate a server into their plant.

The server should have a reasonable cost basis, allowing servers to start small, but become large in a reasonable and cost-justifiable way. The market will naturally support different servers at different price points, with different features. Users will purchase the server that makes sense for their operation. The reality is that many users purchase a smaller server and then expand it as their needs grow. Users are particularly irritated when they try to grow a small server, but storage costs are irrationally high, especially when their buddy next door just bought a 100GB disk drive for $100. There may be valid reasons why this comparison does not work, but manufacturers must be aware that server pricing will always bear some relationship to commodity storage costs, and that users resent it when storage costs for broadcast servers bear little resemblance to what they can buy off the shelf.

The server should have a reasonable cost basis, allowing servers to start small, but become large in a reasonable and cost-justifiable way.

And finally, the perfect server should have a Mean Time Between Failure (MTBF) of infinity, be 1RU high, generate no heat, have no moving parts and cost four dollars. BE

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

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Power quality
in entertainment facilities

BY T.K. WONG

An ideal standard of power quality requires that a perfect sine wave of electrical current be delivered to electronic and other powered equipment. Theoretically, it is possible for an electrical distribution system to achieve that ideal; in reality, it can come close. Unfortunately, in many entertainment facilities the electrical distribution system falls far short of achieving perfect power quality.

The symptoms of poor power quality are well known – equipment spontaneously resets, signal transmission is poor, and background electrical noise is picked up by sensitive electronic equipment. As a result, quality and productivity suffer. Fortunately, there are simple and economical solutions that enable the electrical distribution system to meet a high standard of power quality, ensuring that all the digital electronic devices used in today's studios, control rooms, Avid bays and related technical spaces are functioning at top efficiency.

Symptoms of poor power quality

If equipment resets without apparent reason, it may be due to momentary voltage sag of the power source. Proper operation of electronic equipment depends on constant voltage from the 120V source. Momentary voltage sag to 90V or 100V can cause the equipment to turn off and on. The root cause often can be traced to the high current draw of large motors or chillers operating off of the same transformer or feeder.

Harmonic distortion generated by the power supply often creates poor neutral-to-ground voltage reference, which can adversely affect signal transmission. Let's say the electrical distribution system is delivering a pure sine wave, with 60Hz as the dominant or first harmonic order. However, each piece of digital equipment contains a switch mode power supply that converts AC to DC power. In the process, it attenuates the waveform, throwing third-order "waste" current back into the electrical system.

The PowerSmith T-1000 zero sequence impedance transformer offers a practical solution to power quality issues.

The effect is additive; eventually, third-order harmonics become the dominant order of the waveform. In turn, the neutral conductor becomes a current-carrying conductor, causing a voltage drop on that line. The result is poor signal transmission.

In many cases, zero sequence harmonic distortion can be traced to an undersized neutral conductor. In the past, the National Electrical Code (NEC) allowed downsizing of the neutral conductor because it was considered a non-current-carrying conductor in a three-phase shared neutral system. As discussed above, this is no longer the case in today's entertainment facilities, in which the predominance of digital electronic equipment generates the harmonic distortion which carries the excessive harmonic currents.

Background electrical noise is caused by random voltage fluctuation with broadband spectrum content up to 200kHz. The induced electrical voltage in an interconnecting system is a product of the interaction of the variables of inductance, peak current noise or impulse, and rise time of the peak current. The resulting interference will distort most interconnect signal transmission.

Theoretically, it is possible for an electrical distribution system to achieve that ideal [of a perfect sine wave]; in reality, it can come close.

Economical solutions

Fortunately, there are simple, economical solutions to these power quality issues. Proper space planning is fundamental to good power quality, and it starts with the identification of those portions of the facility that are operating critical loads vs. those operating chillers, pumps and so forth.

Isolating critical loads on separate transformers or feeders from those running chillers and motors will solve problems related to voltage drops and spontaneous equipment resets.

Effective branch circuit design is a basic, economical, yet effective approach to providing good power quality. Separating the branch circuits for computer loads and other equipment such as copier, printer, appliance and convenience outlets, is the industry standard for providing clean power. This means no more than four to six PCs on a 20A, 120V circuit; or a custom solution based on amperage of equipment.

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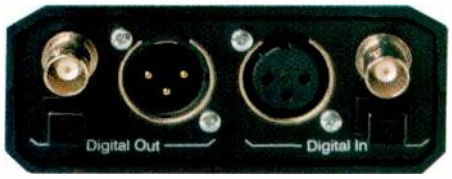

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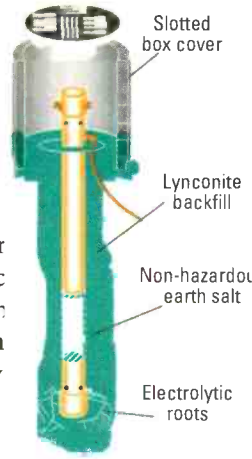
helps to reduce the effects of harmonic distortion. The shorter conductor runs to the source, often minimizing any neutral-to-ground voltage distortion.

An effective solution for low zero sequence harmonic distortion is the installation of a zero sequence filter in each panel serving highly nonlinear loads. This passive filter system traps third-order harmonics generated by AC to DC power conversions.

About five years ago, active zero sequence filters were introduced to stop harmonic distortion at the source by sampling the waveform of the electrical current, mathematically analyzing it, and injecting into the electrical distribution system the required frequencies to compensate for the distortion. However, if there is a flaw in the mathematical computations, this type of filter actually can introduce further harmonic distortion into the electrical distribution system. Until this technology is proven, the simpler (and less expensive) passive filter remains both a prudent and effective solution.



The NEC requires that any grounding system, like this Lyncole XIT grounding system, tie back to the building ground system.

The grounding myth

The grounding myth often dominates discussions of background electrical noise. There are two parts to this myth. First, "an isolated ground system never ties back to the building ground system"; and the corollary, "the better the ground, 5Ω or less, and the more isolated it is from the main building ground, the better off our equipment will be." Both parts are false.

First, the NEC requires that any grounding system tie back to the building ground system. As for the corollary, most entertainment facilities simply do not need sophisticated isolated ground power or other expensive grounding methods.

One of the simple methods to identify grounding issues is to measure neutral-to-ground bond at panels that serve the equipment and at load side. Continuity testing between equipment racks' ground bonding is also recommended to ensure that the network racks are at the same ground reference.

Before designing a ground system, a site grounding test – either a soils analysis if it is a new site, or a grounding probe on an existing site – should be performed to identify the soil resistance.

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A value of 25Ω or below is considered a good ground reference for most entertainment facilities.

In an older facility, where a neutral ground conductor may have been downsized in the past, power quality often can be improved simply by replacing the old wire with a properly-sized neutral conductor. For technical grounding, a simple radial/star grounding is an effective, economical and code-compliant solution at almost all production facilities. All equipment racks with associated ground bus bars can be bonded with ground conductors, and the main connection back to the ground source located at the rack nearest to the building's steel structure.

If a design space has equipment specifications requiring a 5Ω grounding point, and the site tests above 25Ω, grounding can be improved by applying ground rods, ground rings or even an electrolytic ground.

Effective branch circuit design is a basic, economical, yet effective approach to providing good power quality.

Another solution for mitigating electrical noise is utilizing the "60V Balance Power System." This unique system allows the delivery of 120V of power at 60V to ground in lieu of 120V to ground as in conventional power systems. This system provides an "ungrounded floating neutral conductor," which eliminates ground electrical noise, and its installation requires additional electrical components for safety protection.

At the far end of the spectrum, a facility with broadcast antenna will require a specialized grounding system. This typically involves a safety ground system and a site RF ground system. Both systems should be designed to deliver both lightning and RF grounding; the end result will be a unique solution for that facility.

Power quality is a crucial issue in the design and operation of entertainment facilities. Although the perfect wave may prove to be elusive, it is essential to design an electrical distribution system that meets the standard necessary to ensure that all the electronic devices used in daily activities, from shooting to post-production editing, are functioning at top efficiency. **BE**

T.K. Wong, P.E., is a senior associate with the Sports and Entertainment Market Focus Group at Syska Hennessy Group.

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Rainbow Network Communications' NY command center

BY STEVE LEWIS

Rainbow Network Communications (RNC), a subsidiary of Rainbow Media Holdings and Cablevision, provides technical services to networks including AMC, MuchMusic USA, FOX SportsNet, as well as other sports, news and entertainment channels. The development of the company's new television facility in Bethpage, NY, was guided by many hours of planning and needs analysis.

The old origination operations were housed in confined and overextended spaces in a former telco central office building in Floral Park, NY. The chance to relocate the technical operation to Bethpage, near the Rainbow Media/Cablevision headquarters, presented an opportunity to create a new blueprint for the technical broadcast operation.

Communications Engineering (CEI) of Newington, VA, was selected to assist in the design, engineering and integration of the 46,000 square feet of technical space and 11,00 square feet of office space. The design team faced significant challenges regarding the base building considerations, as well as in the technical development of the facility. The Bethpage building received wholesale upgrades and environmental treatments to prepare for its central role as RNC's broadcast command center.

The Bethpage building received wholesale upgrades and environmental treatments.

Above: The technical operations center (TOC) monitors all incoming, in-house and outgoing feeds. The station's network operations center (NOC) can be seen through the window in the background.

CEI performed a comprehensive 24-hour acoustic analysis of the existing structure, which was used to develop

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appropriate design fixtures and techniques to greatly dampen sound and quiet the television operation spaces. The acoustic design utilizes a building shell within the outer building structure to isolate and absorb exterior noises from the internal technical operation areas, including the acoustic isolation of new utility systems for power and HVAC.

The next challenge was to develop a technical blueprint that would take advantage of the latest technology and techniques to cover existing needs and anticipated future growth. More than 20 years of origination expansion had gradually progressed via a series of individual channel investments. In the new facility scenario, a shared infrastructure made great sense, but how were the individual channel technical requirements to be best served? Finding the right combination of shared vs. dedicated technical components emerged as the key design consideration. The design team aimed to configure and size the underlying infrastructure to achieve economies of scale, while also tailoring the rooms and spaces to meet the differing needs of each channel. Moving away from a "one room, one channel" orientation became necessary to produce efficiencies, even though the layout had worked successfully for past incremental channel expansion efforts.

Goals for the project included meeting each channel's needs, improving the signal quality with the latest digital technology, establishing greater operational flexibility and providing redundant capability for plant systems and signal paths.

The majority of the programming the station takes in is ready to air, but customization and preparation is often needed. Pictured is one of the two main linear online editing rooms, utilizing a GVG Kalypso two-M/E production switcher and an Accom Axial 3000 online editing system.

A shared infrastructure made great sense, but how were the individual channel technical requirements to be best served?

A unifying infrastructure

The new facility provides broadcast capabilities for RNC's entire broadcast "assembly line," which covers the gamut from signal ingestion, program editing, promos and interstitial creation, quality control, and live and recorded playback through automated multichannel master control and satellite uplink. The design team catalogued each channel's unique requirements and categorized the key similarities and differences in order to design an overall facility approach. The infrastructure was developed to provide ample capability to each channel in the form of router matrices, audio and video I/O, physical space for operations, pre-production activities, and other parameters.

The RNC facility originates 16 individual program channels presently, with three types of programming: automated delivery of previously recorded programming, which includes long-play server-based programs; live television events such as sports programming; and interstitials and promos. These different operational processes led to alternative master control room designs.

The complexity of sports channel programming necessitated the flexible shifting of resources between live and recorded playback methods. Complicating the sports programming further are the geography-driven, program-specific split feed requirements and other important viewing rights issues that dictate specific origination instructions on a program-by-program basis.

Another consideration was HD capability. RNC originates HD programming on a nightly basis for FOX SportsNet New York. Among the integrated HD solutions in the facility is a Dolby AC-3 ready audio and HD-ready cable plant, along with patching systems that can distribute 1.5Gb high-definition video and Dolby E audio signals. The wideband routing systems are also

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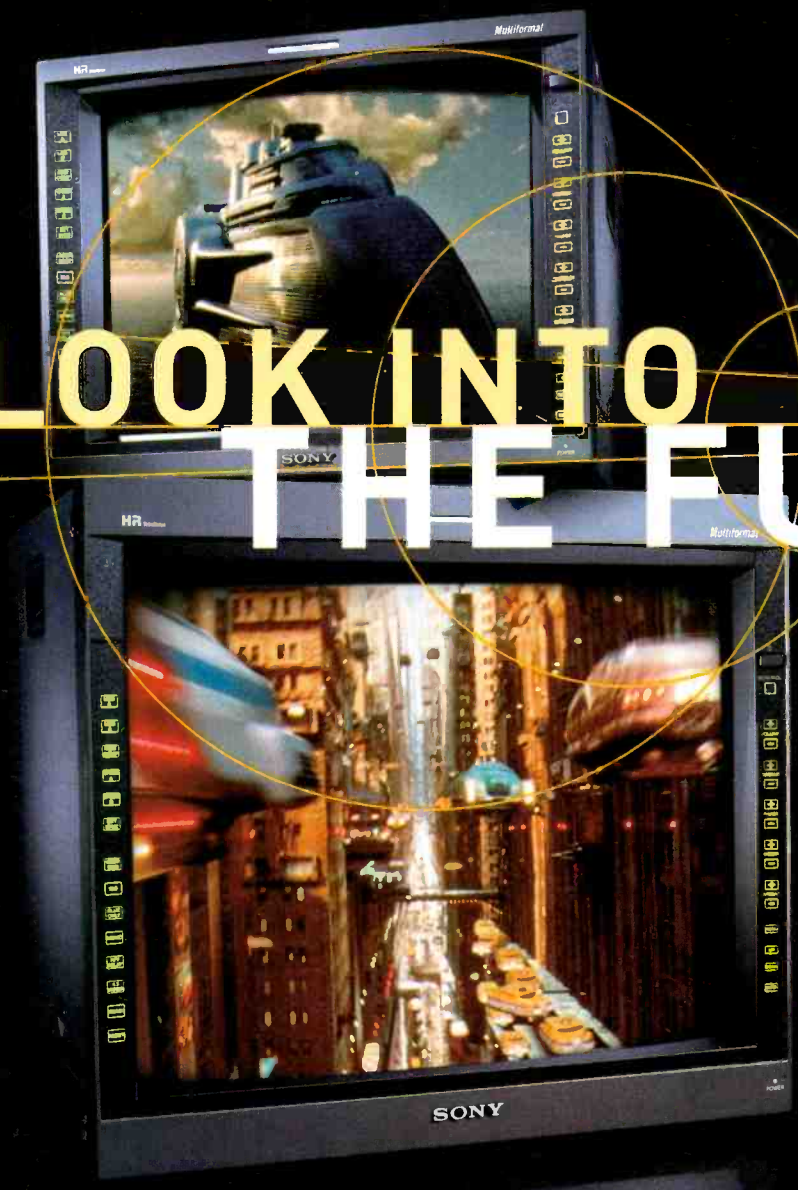

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capable of supporting 1.5Gb signals facilitywide.

Facility layout

It was determined that equipment and system solutions would be integrated within similar room layouts to the greatest extent possible to support the free movement of operations staff throughout the facility. A key facility design concept was the creation of flexible groupings of multichannel control rooms, called clusters. The facility utilizes three clusters of four rooms each to meet the needs of the various sports, news and live programming channels.

RNC created flexible "clusters" of multichannel control rooms to allow switching between individualized live programming and control of up to four channels in multichannel mode. The single-tier control room above includes a GVG M2100 master control switcher, GVG Profile XP servers, and Sony monitors and VTRs.

Whether the facility is originating live programming or static playback channels changes unpredictably, so each cluster is designed for quick shifting between four individual live channels, each with its own dedicated room and operator, and multichannel operation controlled by a reduced combination of rooms and operating staff. A different master control solution is used for the long-play programming channels.

Pre-production areas are used for the ingestion of programming materials and the preparation of content files for air. Each master control room in each of the clusters shares these large areas to prepare its individualized programming for eventual automated server playout. Centrally developed interstitials, promotions and commercials are reviewed for technical quality and ingested in the central pre-pro area for use by each of the master control rooms.

A key facility design concept was the creation of clusters of multichannel control rooms.

The telecommunications hub provides all of the fiber cabling interconnections in and out of the facility. The integrated communications lines include fiber and copper cable, microwave, and connections. The facility manages more than 16 uplinks and downlinks, as well as distribution services to the metro area cable systems. The technical operations center (TOC) manages all the telecommunications and satellite

Design team

Rainbow Network Communications
Steve Pontillo, senior vice president and general manager
John Barbieri, vice president of engineering
Mike Malozzi, manager of video engineering system design
John McMahon, director of broadcast engineering

Communications Engineering (CEI)
John Wesley Nash, executive vice president and COO
Jim Conley, vice president of engineering
Jeff Steele, senior project engineer
Raef Alkhayat, project manager
Jeff Harland, vice president of integration services
John Tarsia, systems integration manager
Don Brassell, senior systems support manager
Ruber Huertas, senior systems support engineer

Equipment list

Grass Valley Group routing systems
Grass Valley Group M2100 master control switchers
Grass Valley Group Profile XP servers
Grass Valley Group Kalypso production switchers
Louth automation systems
RTS Intercom communications systems
Tektronix test systems
Chyron graphics and CG systems
Sony monitors and VTRs
Panasonic VTRs

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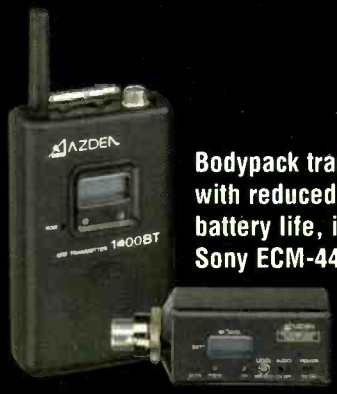
- Earphone-out with level control.

1000URX-AB

1000URX-Si



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signals for the Bethpage operation. The TOC's monitor wall and control solution includes 250 monitors and is equipped with automated, color-coded, under-monitor display systems. The TOC feeds represent all incoming, in-house and outgoing feeds. The video wall and area were designed to incorporate a wide array of audio/video and control alarms to automate the presentation of problem issues. Operators manage the incoming sources, network feeds and confidence monitors for the facility. The network operations center (NOC) manages the distribution of prepared signals to the affiliate cable systems based upon viewing rights, program schedules and other specific programming details. The NOC also schedules and manages all transmission routing (fiber and satellite) for live backhaul acquisition.

Pre-production areas are used for ingest of programming materials and the preparation of content for air. The pre-production area above is used to create individualized channel content, such as sports programming for FOX SportsNet.

While the majority of the programming arrives in Bethpage ready to air, there is still much customization and preparation to be accomplished on a tight schedule. Promotions, interstitials and longer programs are created and customized for various channels. A centralized editing server was designed around a GVG Profile with six I/O channels that provides digital disk recorder services to the other editing and graphics systems. The facility includes two linear online rooms utilizing a GVG Kalypso two-M/E production switcher, Zaxcom AES audio mixer, Accom Axial 3000 online editing system, Abekas DVE system and a Chyron iNFiNiT! CG system. Two Avid 9000 nonlinear editors are also used, as well as PC graphics tools like PhotoShop and After Effects. Future HD application tools will be provided for emerging HD content. The facility also provides a full complement of closed-captioning capability for live and recorded programming. A screening room is used to create dubs for distribution and five quality control/encoding rooms are used to evaluate, review and prepare program content.

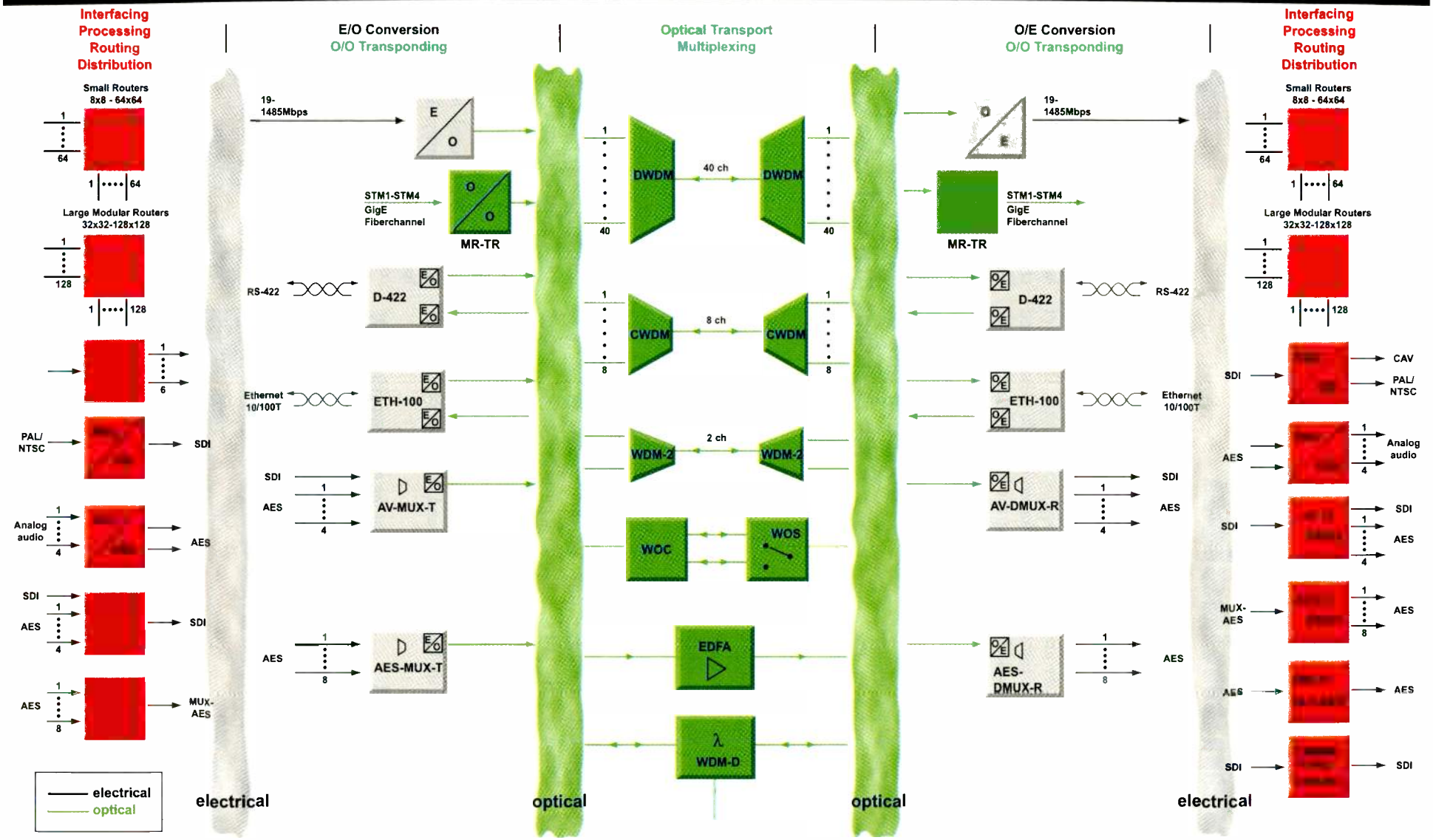
Operators in the central pre-pro area review centrally developed interstitials, promotions and commercials for technical quality. These materials are used to supplement the individualized program content created by each channel.

The origination hub is sized for over 200 racks and is currently filled at 70 percent capacity. The facility uses six 256x256 GVG routing systems passing SDI signals and two AES audio channels (the equivalent to two stereo pairs) with uncomplicated upgrade to HD signals. Paired with the routing systems are audio/video test stations and HD-capable patching systems. Some analog video and audio routers are also integrated into the operation, as well as a compilation of VTRs and tape formats.

Looking forward

The facility is continually upgrading its capabilities and services. The flexible design of the facility provides control solutions, system resources and shared infrastructure that can deliver the traditional broadcast television channels, as well as newer interactive entertainment choices. BE

Steve Lewis is director of sales and marketing at CEI.



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Basics of transmission line selection

BY DON MARKLEY

Everyone seems to spend their time picking out just the right transmitter and antenna for that new system. The transmission line often becomes the weak sister that is given little thought, but its selection and design are decisions that will have to be lived with for many years.

The simplest of systems include such applications as low-power television or translators at mountaintop sites. The power is low, usually 1kw or less, and the length is short. In such cases, just about anything will do that can handle the power. A line such as a 7/8-inch semi-flexible cable with foam dielectric comprises an inexpensive and low maintenance solution. Such a cable is rugged and resistant to damage and requires zero maintenance other than to check the hangers occasionally. While the loss in db per 100 feet might seem a bit high at the upper UHF channels, there will be little difference in the ERP for short cable runs.

In dealing with the smaller cables such as 7/8 inches, up to 1 5/8-inch foam dielectric types, the only real problem is in the hangers. Simply fastening the line to the towers with wraplock is totally unacceptable and may lead to significant cable damage over the years. The use of wraplock forces the cable to be pressed up against the tower, including over flanges and bolt heads. No matter how well the cable may be installed initially, it will move due to wind, thermal expansion, tower movement, etc. That will cause abrasion of the outer jacket and, eventually, the outer conductor. An opening in the outer conductor exposes the dielectric to the elements in a manner beyond the design expectations. The cable should still be resistant to moisture, but should never be forced to maintain its integrity in such a situation.

With larger power levels and greater lengths, the choice of cables becomes more difficult. The primary considerations are usually the efficiency of the cable run and the power handling capability. Another consideration is the maximum usable frequency for the larger cable sizes at the higher UHF channels. Then there is the old problem of whether to use semi-flexible cable, rigid transmission line or waveguide. Old habits may tend to sway the user one way or the other on this.

Selection and design [of transmission line] are decisions that will have to be lived with for many years.

Traditionally, rigid transmission lines or waveguide have been the choice in the United States, while semi-flexible cables have been popular in Europe and Asia. There is no really big difference in power handling capability or system efficiency between semi-flexible cable and standard rigid line. The semi-flexible line has to be installed carefully, as does the rigid line, and can be damaged badly if hoisting grips and load lines are not used properly. Hoisting grips MUST be used, no matter who tells you differently. Also, the right hangers MUST be used – don't even consider wraplock or straps. Otherwise, the user is doomed to replacement of a very expensive piece of line. Finally, leave the hoisting grips on the cable to support it on the tower. Without their support, the line may work its way down until all of the weight is hanging on the top connector.

To touch quickly on the installation of rigid line sections, they are not wind chimes. That is, they should NOT be lifted in bunches and allowed to bang together on the way up. If several sections are to be lifted at one time, they must be tied off and held away from

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A look at the consumer side of DTV

Consumers embrace interactive TV

Enhanced TV is expected to take the lead in revenue generation

European interactive TV market forecast

Consumer revenues ($M)	2002	2008
TV messaging/e-mail	10	234
TV betting/gambling	10	64
Interactive TV games	36	448
Enhanced TV	35	712
Other iTV revenue	1	26
Total interactive TV	92	1484

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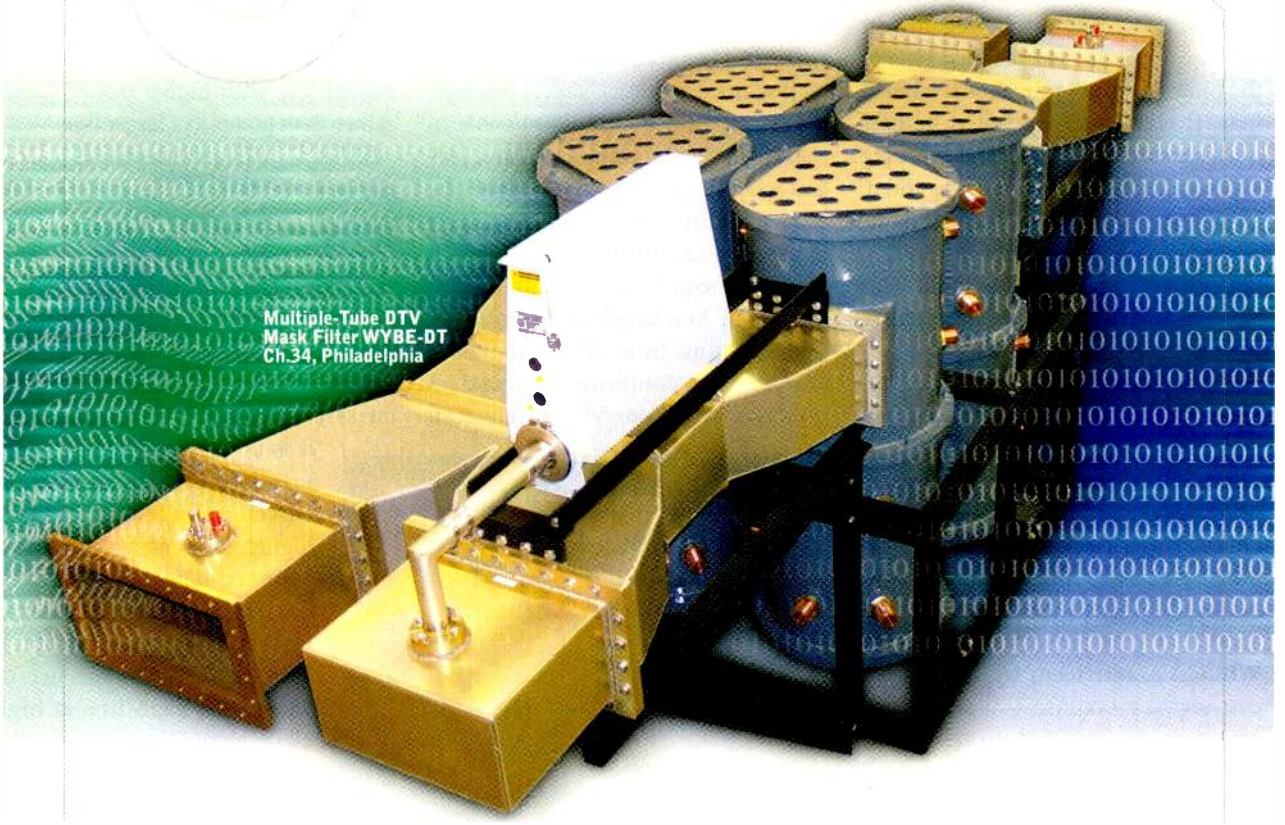

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the tower to prevent denting of the outer conductors. Every dent will show up when the line is tested and will serve only to increase the system VSWR.

Semi-flexible line can be repaired in the case of mechanical damage. One of the more common problems is a bullet hole. It seems that frustrated hunters must shoot at something, and those big lights must seem to be mocking them. In any case, localized mechanical damage can be repaired by simply cutting out the bad part and replacing it with either a "splice" from the manufacturer or with a pair of flanges.

Problems in air dielectric semi-flexible lines that cause burning are more of a problem. Trash that falls down into the line will cause burnouts in the future. Owners often want to cut out the burnt piece to some distance below the burn and replace only that part. Dumb idea. While it might seem to be a cost-saving procedure, you can count on coming back to replace the rest of the cable later. Just do it all the first time – it's cheaper that way.

For long runs of semi-flexible line, one solution to the burnout problem is to insert a pair of flanges into the lines to break it up into three or four sections. Then it will only be necessary to replace the bad section, rather than the whole line. It makes the line somewhat easier to install as well.

Semi-flexible line looks great when tested in both the time domain and the frequency domain. It is not sensitive to the channel in use, has no bullets to cause reflections, needs few if any elbows and should be essentially transparent to the RF signal. The attenuation numbers are slightly different than comparable rigid line, and it may be a little less tolerant to physical damage. If the power handling capability is reached, some additional margin can be gained by using one of the more exotic gases to pressurize the system. This can be a solution to the power limit when a bigger transmitter is installed but should not be used in a new installation. Remember, if you lose pressure you won't have to worry about moisture, you will have to worry about the line burning up.

Rigid transmission line offers the advantage of being able to replace a single section in case of mechanical damage. If there is a burnout, it is possible to remove the center conductor from several sections of line to mop out all the ashes and dirt. There is a disadvantage in that line lengths have to be chosen based on frequency. At certain combinations of line length and frequency, the reflections from all of the bullets and flanges combine in phase to present a very poor VSWR. This can be a problem if the lengths aren't proper for multiple channels diplexed on a common transmission line. Fortunately, the major manufacturers have developed lines with varying section lengths to eliminate that problem.

Rigid transmission line (shown above) is often the choice in North America, while semi-flexible line has traditionally been used in Europe and Asia. Photo courtesy Dielectric.

For high-power operation, the power handling capability of coaxial lines may become a problem, especially if more than one station is combined into a single line. The primary problem here is the temperature of the center conductor and the ability of the line to dissipate the heat from the center conductor to the outer conductor. Again, this can be helped by using some of the more exotic gases for pressurization. That should not be used in the design of a new line, as it is not the preferred avenue to gain more power handling ability. At least one manufacturer has developed a transmission line that will operate at higher temperature than standard copper. Therefore, if one reaches the limit of power handling for a given line, it may be possible to change to a coated line with higher power rating rather than go up to a larger line.

Efficiency of rigid lines varies primarily as a function of line size. The loss involved in a line is a function of the cross-sectional area available for current flow. The skin depth for current is a function of frequency, making the lines seem to have less cross section for current flow as the frequency increases. To counteract that problem, it is possible to go to a larger line, offering greater area for current flow and a resulting higher efficiency.

For very long runs of cable, efficiency may become the deciding factor. For example, on a 2000-foot tower, the use of three-inch rigid line at high UHF frequencies may cause the system to lose half or more of the power before reaching the antenna. Remember, you are not burning up 60Hz power, you are burning up RF, which has a much higher rate per kilowatt-hour. A simple analysis can be performed that can determine the real cost of a transmission line over a reasonable lifetime.

You won't make many points with the front office suits by saving some money on smaller transmission line if the power bill goes up 50 percent or if a larger transmitter has to be purchased to make up for the smaller coax. Then, of course, there is waveguide. Great power handling, unlimited lifetime, very high efficiency coupled with higher tower loading and increased cost. Let's save that for next month. BE

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

Send questions and comments to: don_markley@primediabusiness.com

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Distribution amplifiers like those shown here are integral to an efficient routing system. Often, the DAs will take up more rack space than a modern router.

Routing Technology

BY JOHN LUFF

During the last decade, a full range of technical solutions for digital broadcast and production has emerged, and it has materially changed our industry. But, while some digital technology offers cost savings or new features, much of the technology implemented during this revolutionary period simply replaced the analog versions, function by function. Perhaps the only type of technological progress that does not fit this mold is the substantial innovation in routing technology.

Then and now

Routing, in the first 50 or so years of the video industry, was confined to connecting analog signals in a variety of interconnect formats. Most important are the NTSC and PAL analog composite single-wire interconnects, though component analog signals have been important in many applications. But component analog was implemented to a lesser degree, and thus received less attention in the design of new and innovative routing systems. Standing out from that crowd are applications for high-quality graphics, high-end compositing and wide-bandwidth display for large venues. Those requirements are very much alive. Suppliers who traditionally have concentrated their efforts outside broadcast technology have a significant share of the market for wideband analog systems in these venues.

Today, the routing landscape includes those applications, as well as digital implementations in the more traditional television (i.e., broadcasting) space that span a wide range of needs. We have also seen a proliferation of both very large and very small systems for a panoply of applications.

The emergence of SMPTE 259M facilitated much of the explosion in routing technology. The ability of 259M to handle multiple standards, as well as to act as a high-speed data transmission path, are key dynamics in the changes in routing technology. Similarly, the development of AES facilitated the design and deployment of audio routing (though initially AES was closely focused on audio production and recording markets). There are other forces that are equally important — forces that shape the range of applications for which routing is used and the way it is implemented. They will shape future routing evolution as well.

Controlling and monitoring

One aspect of routing that has seen dramatic changes is the control system. Early analog routers used discrete wiring to enable crosspoint selection, which limited the control panels to short distances. By the '70s, serial communications over coax and twisted pair took over and allowed the control-panel distances to increase dramatically. RS-422 communication became the favorite of a number of manufacturers partly because of the balanced nature of the RS-422 signal and its ability to transmit over longer distances. SMPTE has provided groundbreaking work in control systems also, with ESBUS technology allowing chaining of control panels, further simplifying wiring. A number of manufacturers implemented coax schemes with similar results. But, recently, several of the largest routing manufacturers have begun to deliver complex and intricate control schemes that communicate using TCP/IP communications over Ethernet.

By choosing a data-communications approach, video manufacturers materially changed the way routing systems are implemented.

By choosing a data-communications approach, video manufacturers materially changed the way routing systems are implemented. Most facilities already have LAN connections in place. Allowing the routing system either to live on the facility LAN or bridge to it provides interesting architectural choices. For instance, companies that have a potential need for wide-area connections can use their company WAN to extend routing control and monitoring, along with machine control, to distant locations without establishing additional circuits for special purposes. As remote-monitoring capability has increased, this approach has become much more desirable.

One result of this movement has been to greatly simplify the interfaces operators use to program routing switchers and read diagnostic information. Until personal computers became an integral part of broadcast systems, routing switchers were programmed from "command line" interfaces, usually using dumb terminals. As a result, the operator could not modify a routing switcher's operating parameters offline and load the changes quickly. Instead, the process was tedious and time-consuming, and correcting errors was particularly unpleasant. By implementing advanced control schemes, routing manufacturers allow users to make offline decisions. And, with some systems, users can store and load multiple setups as needed.

Systems have evolved to allow users to create the configuration in general-purpose software (for instance, spreadsheets), and later convert them, and sometimes compile them, into compact files and transmit them to the control system. Several routing products can now be both monitored and

Large installations require careful attention to cabling plans.

controlled using Web browsers. This raises the very powerful graphics capabilities of HTML to the top of the list of features. For instance, diagnostic screens can show the system in schematic form. The screen shows all control nodes and controlled matrices and other devices, complete with status information relevant to the system, as graphic information instead of text error messages that the user must interpret. By showing the interconnection as it is physically wired, the system becomes easier to understand, reducing time to repair.

The substantial scripting capability of HTML also allows manufacturers to design custom controls without designing controls that all users might not want. As long as the manufacturer supports direct control from a Web browser, you may be able to use the design scheme. (Some only allow programming, and others provide a toolkit for designing screens and controls.) By custom-designing PC-based control panels, you could, for instance, have single-button selections to reset the monitor wall in a control room for each production while retaining the ability to use common language for naming these for a single mouse click. If the routing system can provide status back on active crosspoints to the Web page, you can even get tally information for satellite records, perhaps even including machine status if the router also can provide machine control (as many routers can).

These features can extend to very sophisticated monitoring capability. Envision a centralized (or distributed) broadcasting system with Web-enabled routing and machine control over a company WAN. From the remote station, you could return low-bit-rate, thumbnail-sized video signals to the same Web page that is controlling the bypass switcher remotely. By using the remote router as a probe, you could troubleshoot an unmanned facility quite effectively, and even route around failed items from a Web page set up to look like a block diagram of the facility, swapping in redundant receivers, for instance. By using commercial solutions developed for other industries to provide new functionality and leverage the growth in networking, routing manufacturers have shown a level of innovation and attention to customer needs that has materially changed the face of our industry.

By using the remote router as a probe, you could troubleshoot an unmanned facility quite effectively.

Cost vs. capability

In an analog router, it used to suffice for a manufacturer to provide a good control system and transparent video and audio paths. But digital routing systems have made other niche strategies necessary. For instance, some manufacturers concentrate on narrow markets, eschewing very large systems and instead design cost-effective smaller routers that can be used in niche applications, or connected in a web of small systems interconnected by trunks as necessary. This is an effective implementation strategy because the cost of routing increases roughly as the square of the number of I/O ports. Implementing four small 32x32 routers affords the same number of I/O ports as a single monolithic 128x128 matrix, though the latter has four times as many crosspoints.

Obviously, a routing system with the same number of I/O ports but four times the number of crosspoints will cost more. Logically, the cost of building one crosspoint should be vastly higher than building a large array. And, on a sliding scale, this is indeed true. The efficiency of manufacture is driven by packaging costs, power-supply cost, and intangibles like documentation and engineering costs. As Figure 1 shows, larger routers do provide a lower cost per crosspoint. Below 32x32, the trend does not repeat from manufacturer to manufacturer.

A score of signals

The range of signals that can be routed today is very important. The following list, though not exhaustive,

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shows the types of crosspoints and I/O channels that a manufacturer must consider supporting in a range of sizes:

- SMPTE 259M (143/177/270/360Mb)
- SMPTE 344M (540Mb)
- SMPTE 292M (1.485Gb HDTV)
- Analog NTSC/PAL (typically 10MHz bandwidth channels)
- Analog audio (typically 20kHz channels)
- Stereo analog audio
- AES PCM audio (balanced 75Ω and unbalanced 110Ω implementations)
- Timecode

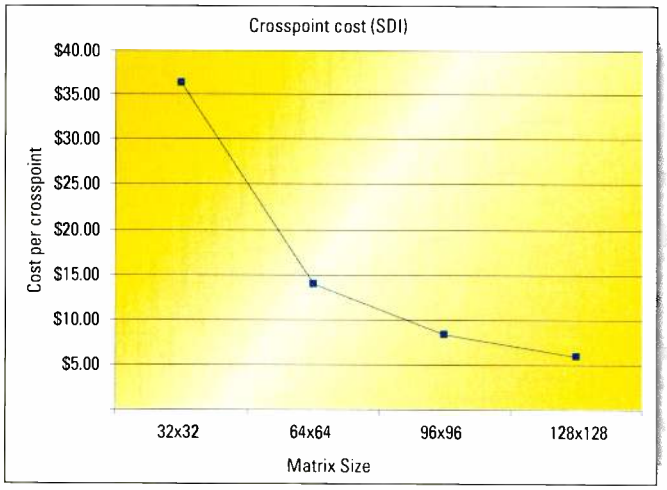

Figure 1. As routing systems get larger, manufacturing economies of scale reduce cost per crosspoint.

- RS-422 bi-directional ports
- SMPTE 305M (DTV MPEG interconnect, 19- and 38Mb)
- DVB ASI (270Mb NRZ MPEG interconnect)
- Single- and multi-mode fiber

This represents a substantial product-line choice, and a manufacturer who supports all of the above has indeed created a flexible and worthy product line. Economics being what they are in our industry, we are increasingly asking for "more and less," — that is, high-value features (like many signal types) at low cost. To the credit of the manufacturing community, it has responded to the challenge.

The core function of routing is to act as an electronic patch panel, connecting circuits on an ad hoc basis. A router is doing its best work when it is invisible to the user, who should only perceive the user interface. A router that is able to flexibly handle a range of signals will be "visible" less often and thus perceived as more important to an operation. Manufacturers have clearly understood this need and have developed wide-bandwidth routing solutions for video to partially accommodate this need. At the upper bounds of bandwidth is the SMPTE 292 HDTV interconnect (1.485Mb/s, 4:2:2 coded). Initially, HDTV routers were hugely expensive, with the first 32x32 routers costing upwards of $200,000. Today a router capable of HDTV rates and rates as low as 143Mb/s can cost as little as $16,500 (16x16). At the same time, the cost of larger routers with wide bandwidth has dropped significantly as the manufacturing volume has increased during the DTV/HDTV transition. One might logically expect that trend to continue, though the higher cost of designing and building high-bandwidth solutions will likely moderate that trend, slowing the drop in cost.

Router cooling and wiring must coexist.

Analog vs. digital

Analog is far from dead in this market. It is indeed a difficult decision when doing conceptual planning for a facility to decide if an all-digital plant is right. It is always possible, but it may not be appropriate when the facility must support a broad variety of signal types. Almost all video facilities have some analog requirement, if for nothing else than analog monitoring circuits. Since most source devices have both analog and digital interfaces, it is often convenient to implement a small analog "layer" to avoid growing the size of the digital matrix. If this can be controlled in a seamless control system, it will become an invisible distinction for operators.

It is not at all unusual for a broadcaster to choose to implement a fully digital video plant, but to use mostly, or all, analog audio. This subject is beyond the scope of this article. But we can say that the choice is often driven solely by economics. No one would dispute that you can build a higher-quality plant with AES signals than analog signals. But you must decide if the additional quality is worth the potential additional expense of upgrading the rest

A router is doing its best work when it is invisible to the user, who should only perceive the user interface.

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- Fluid cartridge drag system
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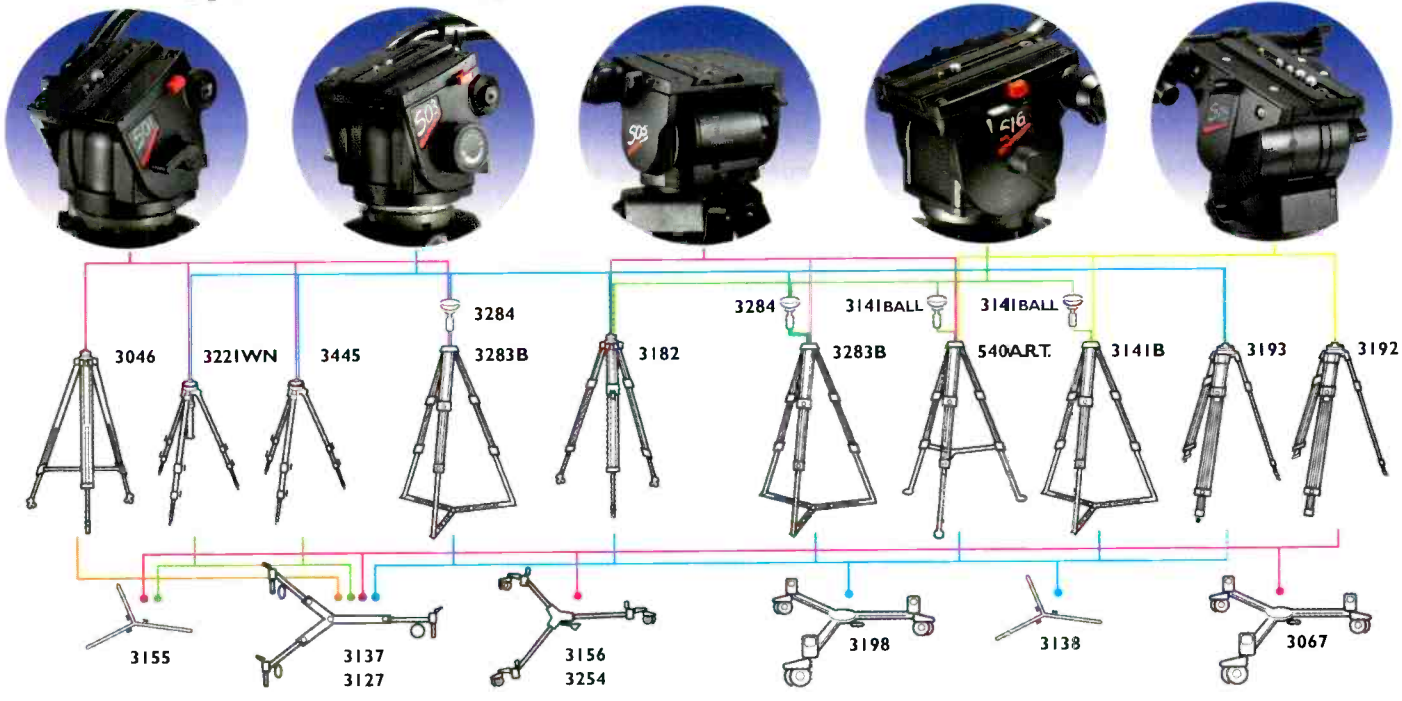

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of the audio system. Converting marginal audio signals to AES will not improve the sound in a facility, but it will have an impact on finances.

Additionally, one might consider embedded audio for the same reasons, perhaps resulting in more complex answers due to the technical complexity of a production facility where synchronization between audio and video is affected each time audio mux or demux operations are performed. Eliminating the audio levels of a matrix, however, may well swamp any cost disadvantage. It is a calculation worth doing with more than one manufacturer's hardware.

Echostar's Cheyenne, WY, facility employs a large-scale routing system.

There are defining differences between manufacturers' digital (and analog) routers. You must consider factors such as cost, size, power consumption, redundancy in power and signal electronics, control architecture, control-panel design, ease of programming, maintenance cost and ease, and technical specifications.

Crosspoint implementations

All manufacturers offer redundant control systems and redundant power supplies. One even offers redundant crosspoints in a strategy where two crosspoint cards are required to keep all signals flowing, but a third is installed and capable of taking over the work of a dead cousin. This allows you to make repairs without ever taking the router out of service when even a single crosspoint in a large system has failed. This kind of advanced thinking is not affordable in small systems, but is well worth having in a facility that must be online around the clock with no excuses.

Routing switcher designers and manufacturers are slowly moving to TDM technology for crosspoints. Though such a crosspoint system uses potentially fewer cards and less point-to-point wiring, failures could be harder to troubleshoot and repair quickly. One manufacturer designed an audio routing system using asynchronous transfer mode (ATM) data technology. Several manufacturers sell audio switchers that allow you to split and combine the audio channels in an AES pair freely between all pairs and outputs. Another offers a single-frame solution in which half of the crosspoints can be digital and half analog, yet all signals are available in both domains. Others allow you to connect matrices (audio, at least) over high-speed TDM links that can make a very large audio system distributed over a large area in a plant look like one monolithic frame with access to a potentially huge number of I/O channels.

What's next?

Though no prediction of the future is possible with assurance that it really will evolve in a particular direction, it seems clear that the convergence of data-communications techniques and discrete audio and video routing systems will continue. As our signals move increasingly towards compressed signals where the essence is simply data, it is hard not to see such a movement being a logical extension of the injection of data techniques in the signal path. Video devices are emerging with Ethernet connections as common ports, and other data connections cannot be far behind. Most devices have both inputs and outputs, so bi-directional data circuits with sufficient bandwidth, isochronous throughput and frame-accurate switching almost certainly will begin to nibble at the edge of the traditional video-routing business. BE

John Luff is senior vice president of business development at AZCAR. To reach him, visit www.azcar.com.

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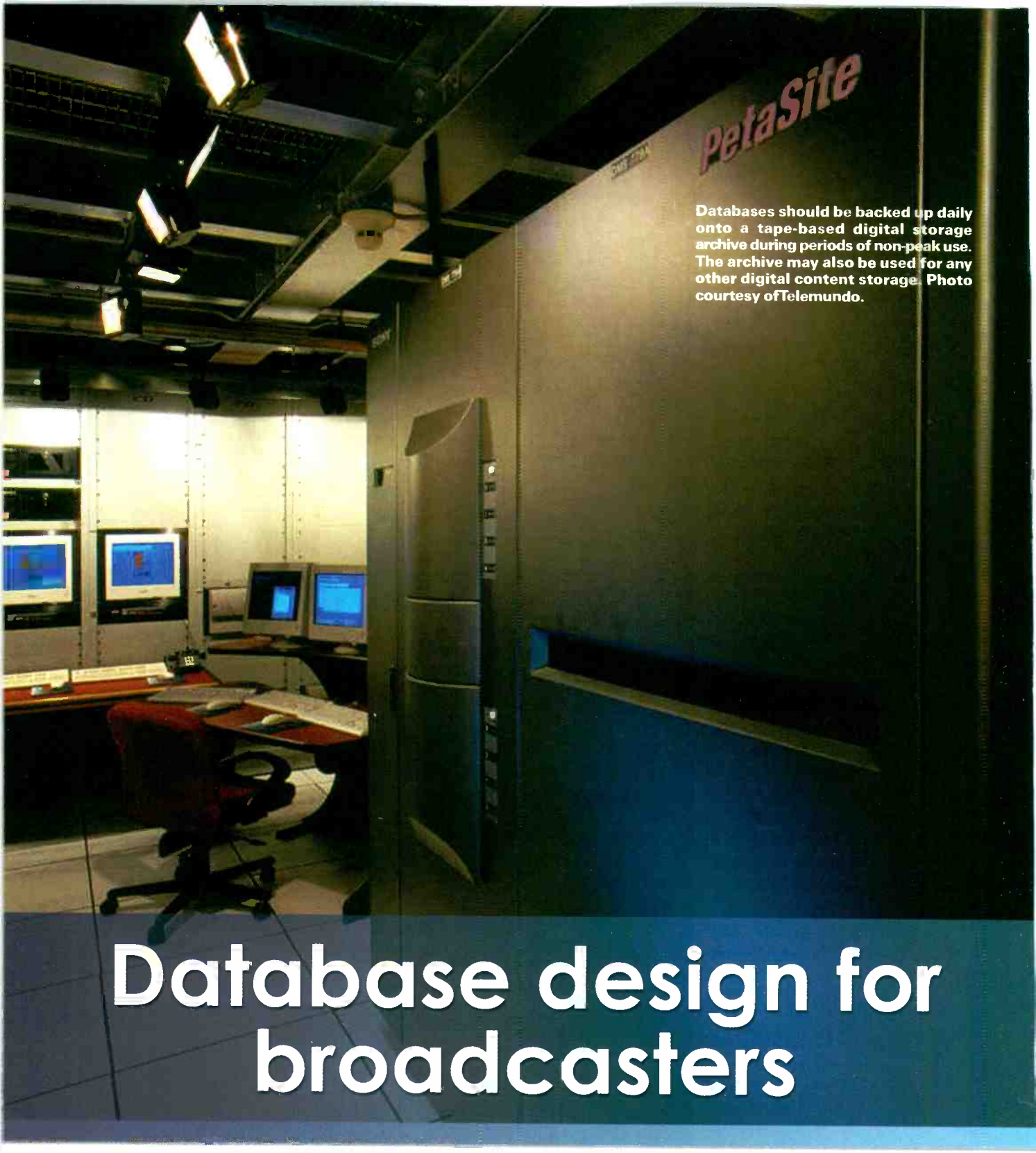


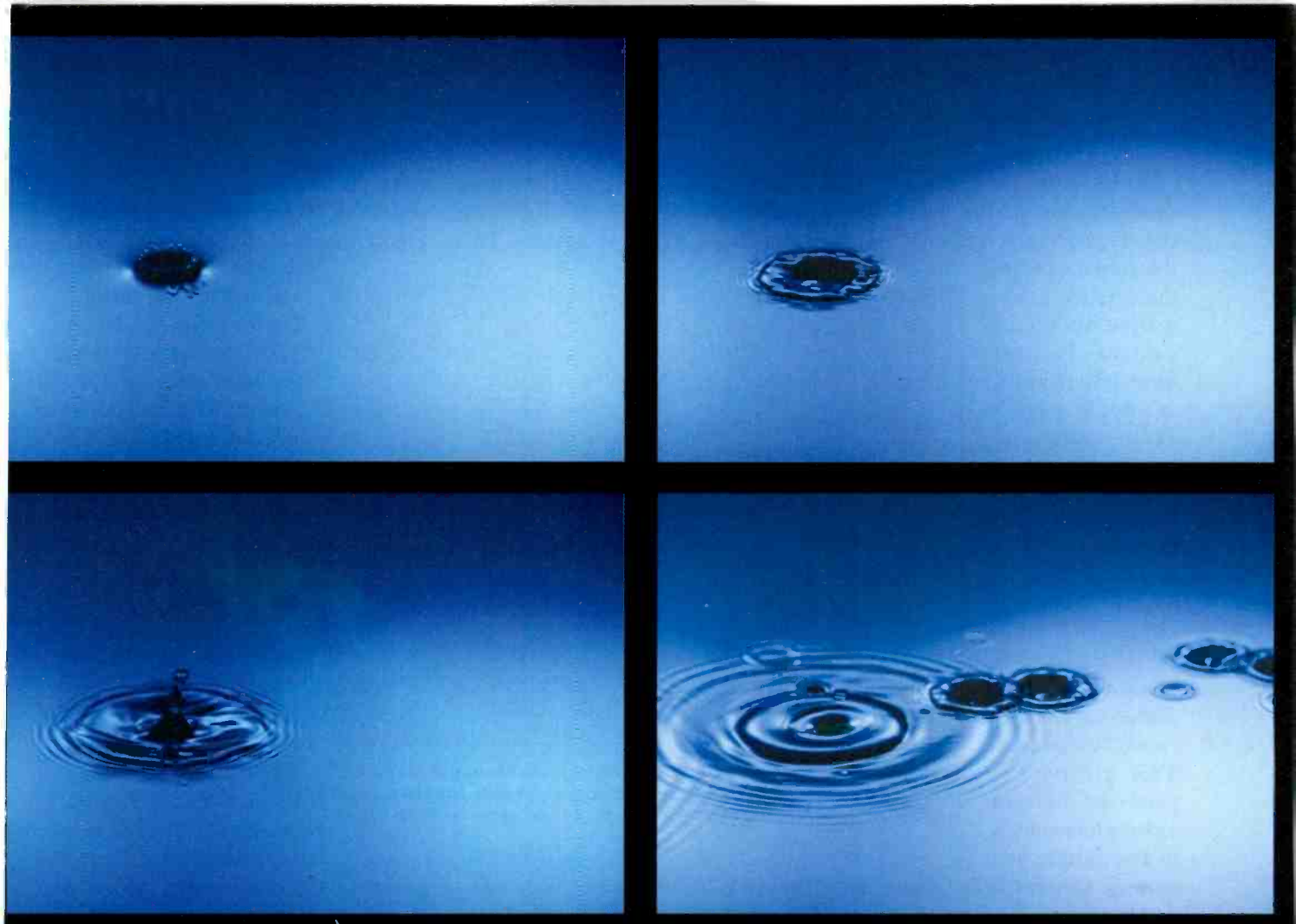
Databases should be backed up daily onto a tape-based digital storage archive during periods of non-peak use. The archive may also be used for any other digital content storage. Photo courtesy ofTelemundo.

Database design for broadcasters

BY PATRICK TURNER

In the world of nonlinear editing, PC-based DVEs and CGs, and server-based play-to-air, the VPs of engineering at broadcast stations are now responsible for managing data and metadata.

All engineers should recognize the terms "essence," "metadata" and "package" and adopt them as part of their vernacular. Most engineers are already familiar with the terms "essence" (a video file, information on a videotape or a graphics image) and "metadata" (which refers to a wealth of information associated with the essence). For instance, metadata can include information about closed captioning, shot markers, rights management, talent and production staffs, and details about associated audio tracks.



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The newest term, "package," is the sum of the essence file and the associated metadata. It refers not only to the content but to the detailed information about the content. Perhaps most importantly, in a world in which audio-visual and information-technology networks increasingly share the same infrastructure, the "package" concept ensures that metadata is seamlessly integrated into structured databases. This greatly expands the ability of video professionals to find, locate and manage content throughout their organizations.

Every step of the production process — acquisition, production, distribution and transmission — depends on the accessibility of metadata to easily and accurately track essence.

The current library management system employed at most stations around the country can serve as the basis for a new type of asset management structure — one that expands beyond videotapes with bar codes to encompass entire packages, including essence and metadata. This new, sophisticated architecture, which VPs of engineering should now recognize and acknowledge, will be built around a relational database.

The relational database has become the world standard.

There are many types of databases, but only two are widely used in broadcast applications. The less common of the two is called a flat-file database, and is mainly intended for small quantities of information. This model is based on using one or several files, usually with comma- or tab-delimited entries. Generally, the flat-file design is not scalable, nor is it extensible enough for complex data types.

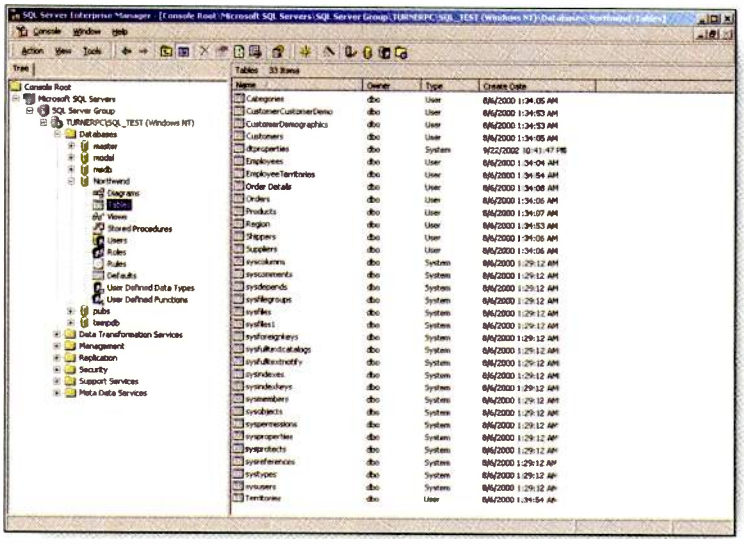


Figure 1. The Microsoft SQL Server Enterprise Manager is used to manipulate an SQL database. The interface shows graphical representations of tables, stored procedures and specific data types.

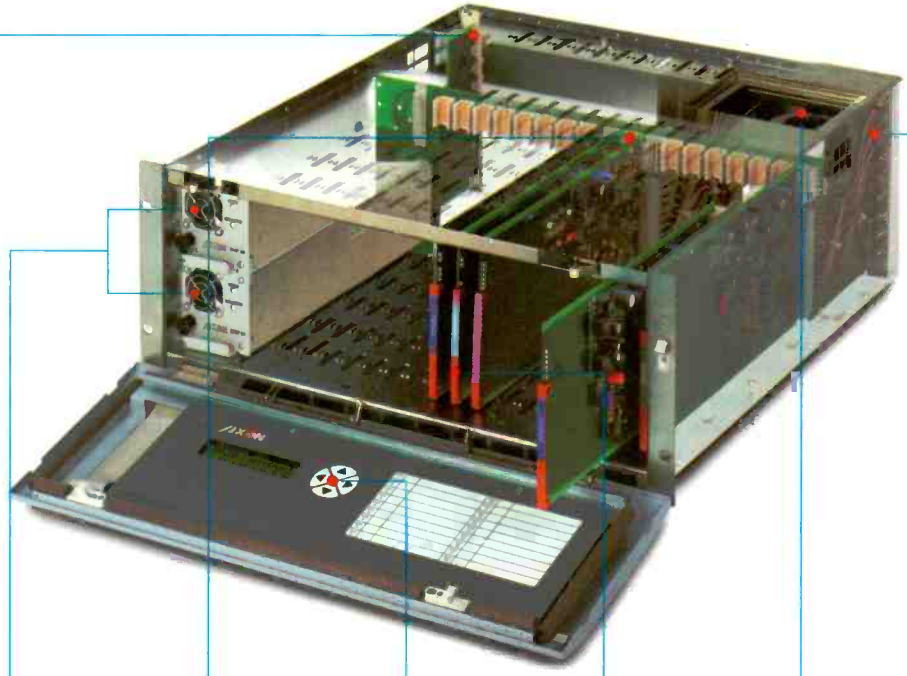
The relational database

The second and more common type of database found in broadcast environments — and the focus of this article — is the relational database. Most major databases used for tape library management software and asset management systems are relational. Several companies, such as IBM, Microsoft and Oracle, produce relational databases. In spite of this variety, most of these databases have the same basic functionality; they differ only in how they process entries and searches. The high-level term that describes the overall operating environment is "relational-database management system" or RDBMS. An example of such a system, the Microsoft SQL Database Enterprise Manager, is shown in Figure 1.

During the early '80s, big, proprietary databases on mainframe computers were the accepted norm. At that time, the IT user community was highly skeptical that the relational database would ever amount to anything. But the relational database has become the world standard, for several reasons. By design, it has a fast and efficient architecture that allows for specific searches on targeted groups of data. It has a set of common cross-vendor rules that affords developers a very quick learning curve. The structured-query language, or SQL, is a simple, natural-language, data-manipulation tool that all major relational databases support. Lastly, and perhaps most importantly, early efforts by a group of nascent software vendors to develop open and cheap (or free) database software instead of expensive proprietary systems spawned widespread development support for the relational model. In fact, for years, Oracle has allowed free downloads of some of its relational-database products — a tradition that continues to this day.

Modern broadcast facilities incorporate databases for a variety of applications. For example, any modern automation system relies on a database. Databases can also be found in the tape library management software, the traffic system, the graphics library tracking software, the news production system, the rights management engine, and perhaps a facility scheduling application. Now add metadata stored in the networked nonlinear editing system, or within graphics files. The combination of these databases supports a wide variety of programming types such as sports, news, weather, graphics, audio, commercials, promos and all long-form content.

THE FUTURE



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Content management

A big challenge in modern American broadcasting is content management. The industry is striving to curtail its dependence on the physical movement of tape by introducing file-based storage with advanced searching and possibly desktop browsing. So far, between the tape library management system and automation, about 60 percent of the solution is in place. Some type of digital asset management system will inevitably become a part of the infrastructure. The architecture will center on a hybrid management of physical (shelf-based) and logical (file-based) assets. Initially, this system will rely on existing data from other databases that currently perform only specialized tasks.

Modern broadcast facilities incorporate databases for a variety of applications.

To institute any type of digital asset management (DAM) architecture, you must create a "data model." Once a data model has been put into production, it's commonly called a database "schema." If a facility has an existing tape library management system, this process of creating a schema has been performed to a limited degree already, probably by the software vendor. But you must consider a wider variety of assets (including tape). To deal with these new content types, you need to provide a database that understands the necessary defining attributes. You also need to institute a framework based on the existence of two top-level asset types. "Content assets" are those with an essence file, such as clips on a video server, and "metadata-only assets," such as a performance, with pointers to the related video, audio, graphics and contracts. The data model must reflect the relationship between the content asset and the metadata-only asset. A database schema will define the relationships between all the assets. For example, a search on President Bush (metadata-only asset) may include pointers to video clips (content assets) of Air Force One.

There are two main approaches to defining a data model for an environment. The first is to find an existing data model provided by a standards body or DAM vendor and modify it to fit your individual needs. The second is to create a data model from scratch and force a software vendor to support it. Most vendors obviously prefer the former. However, for the purpose of understanding this process, let's explore the latter method.

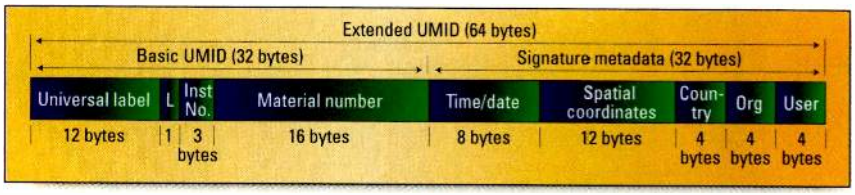

Figure 2. The SMPTE 330M UMID consists of an ordered set of components, each providing a key aspect to the identification of material, be it picture, audio or data.

Creating a data model

The first step is to consider what content you must store, and gather a complete list of the attributes. A series of discussions with department heads may provide the best insight into the specific information that is needed along the production chain. The necessary fields will come from existing databases, spreadsheets, a whiteboard or perhaps papers in a book sitting on someone's desk. The key is to gather all relevant data sources to determine what information is valuable, which of it is repetitive and how much of it is consistent between departments. Chances are that users have a very good idea of what metadata they need. If there are existing databases, you should obtain a copy of the schema. Fortunately, fields that you might miss initially are very simple to add after the fact in a relational database model.

The process of designing a database is commonly referred to as "entity-relationship modeling." It identifies information and describes its layout in the database. A relational database defines entities by using a group of tables, each of which contains a number of fields (columns). Within the table, some of the fields are called keys. A table may have one or several keys. The key(s) that uniquely define(s) an entry, or row, in a table is (are) called the primary key(s). The primary key of a central defining table usually contains a unique material identifier (UMID), sometimes referred to as a global unique identifier (GUID). Most systems assign psuedo-random UMIDs using computer-based clock random-number generators. SMPTE 330M defines a UMID standard, with support for an extended structure that may be used to ensure a unique identifier when moving material between facilities or companies. Figure 2 shows the SMPTE 330M UMID.

Each field in a table is described according to the data type (such as a character, integer or long integer) that dimensions the data storage. During table creation, each field must

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reserve a place for null (empty) entries as well as entries that require a value. This helps organize and sort the database. Tables relate to each other through a series of relationships, which may be mandatory or optional. Frequently, a data-modeling tool will be used to check the integrity of relationships between tables for correctness during the process.

The simplest type of a database model would have one table with all possible descriptive attributes of any type of asset. But this would not be efficient for broadcasters because the fields necessary for audio, video and graphics may be remarkably different. In this scenario, for each audio asset, none of the graphics attributes would be populated, which would result in many empty fields in the database. Each of these vacant entries still reserves space, and is included during searches, which together lower the overall performance. In designing a data model, you can use a series of data "normalization" rules to remove redundancy and inconsistent dependency of entities, and create efficient relationships. This reduces disk storage and simplifies data management.

The accepted standard rules of normalization are called "normal forms." A series of normal forms has been defined to create a proper data model for a relational database. These rules instruct the user to perform operations on sets of data to improve the structure. In 1972, Dr. E.F. Codd, author of "Further Normalization of the Data Base Relational Model," defined the first three normal forms, referred to as 1NF, 2NF and 3NF. Dr. Boyce later proposed an additional normal form, commonly referred to as the Boyce-Codd normal form (BCNF), for further data normalization. A data model in BCNF is generally considered sufficiently normalized for any environment.

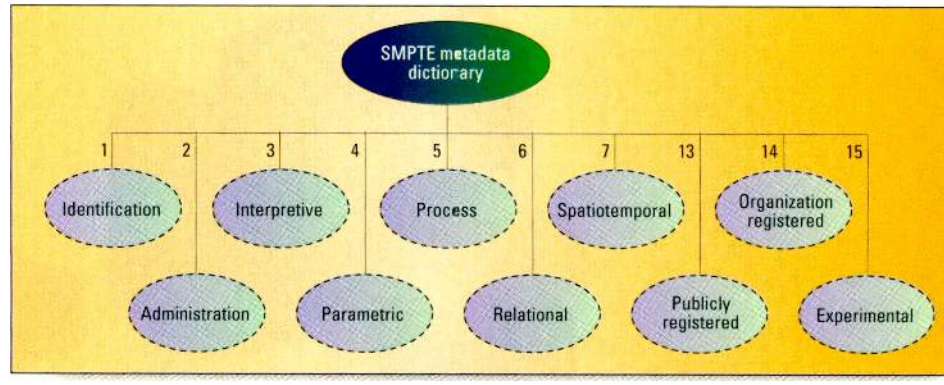

Figure 3. The metadata dictionary structure defined in the SMPTE 335M standard covers the use of metadata for all types of essence (video, audio and data in their various forms). The structure provides flexibility in capturing metadata and exchanging it among applications through a standardized hierarchy.

Need help?

You don't have to go back to school for a Masters in Library Sciences to understand all of this. A knowledgeable architecture-design consultant can greatly enhance and expedite the process for broadcasters.

There are also efforts underway by industry groups and manufacturers to assist in defining data models for the broadcast industry. The BBC (SMEF data model), the Dublin Core Metadata Initiative, the Motion Pictures Experts Group (MPEG-7), and SMPTE (335M metadata structure/RP210) are all providing structures upon which to build databases in an effort to foster industrywide uniformity. Since databases are always unique, these working groups have correctly foreseen the difficulties that media aggregators will face in defining their content libraries. The use of a standards-based data model will be of great help when moving content through the many companies involved in production, post and replication/duplication. Figure 3 shows an overview of the SMPTE 335M metadata structure.

Proper database design will be an important task in the evolution of the broadcast business. To accommodate the multitude of media formats, a good data model is essential. Furthermore, with the addition of a digital storage archive and asset management system to complement the existing tape library, the broadcast industry will gain unprecedented control over content management. This model is fundamentally critical to the future of their business. BE

Patrick Turner is a systems architect for Concadia Solutions LLC.

To institute any type of digital asset management (DAM) architecture, you must create a "data model."

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PSIP and data

Keys to making the

BY RICHARD CHERNOCK AND JERRY WHITAKER

Unlike NTSC VBI-based data services, DTV data services are an integral part of the broadcast signal. DTV data shares the same multiplex with the video and audio, and DTV uses the same fundamental MPEG-2 acquisition mechanisms to acquire data, video and audio signals. It also allows data services such as video/audio programming to be announced in a program guide.

The ATSC data broadcast standard, described in ATSC document A/90, specifies the following key elements:

- Data services announcement
- Data delivery models
- Application signaling
- MPEG-2 systems tools
- Protocols

The data broadcast standard can be used for a number of applications, including:

- Delivering declarative data such as HTML code
- Delivering procedural data such as Java code
- Delivering software, images and graphics
- MPEG-4 or H.263 video streams, and MPEG-4 audio streams
- Carouselling MPEG-2 video files
- Carouselling MP3 audio files

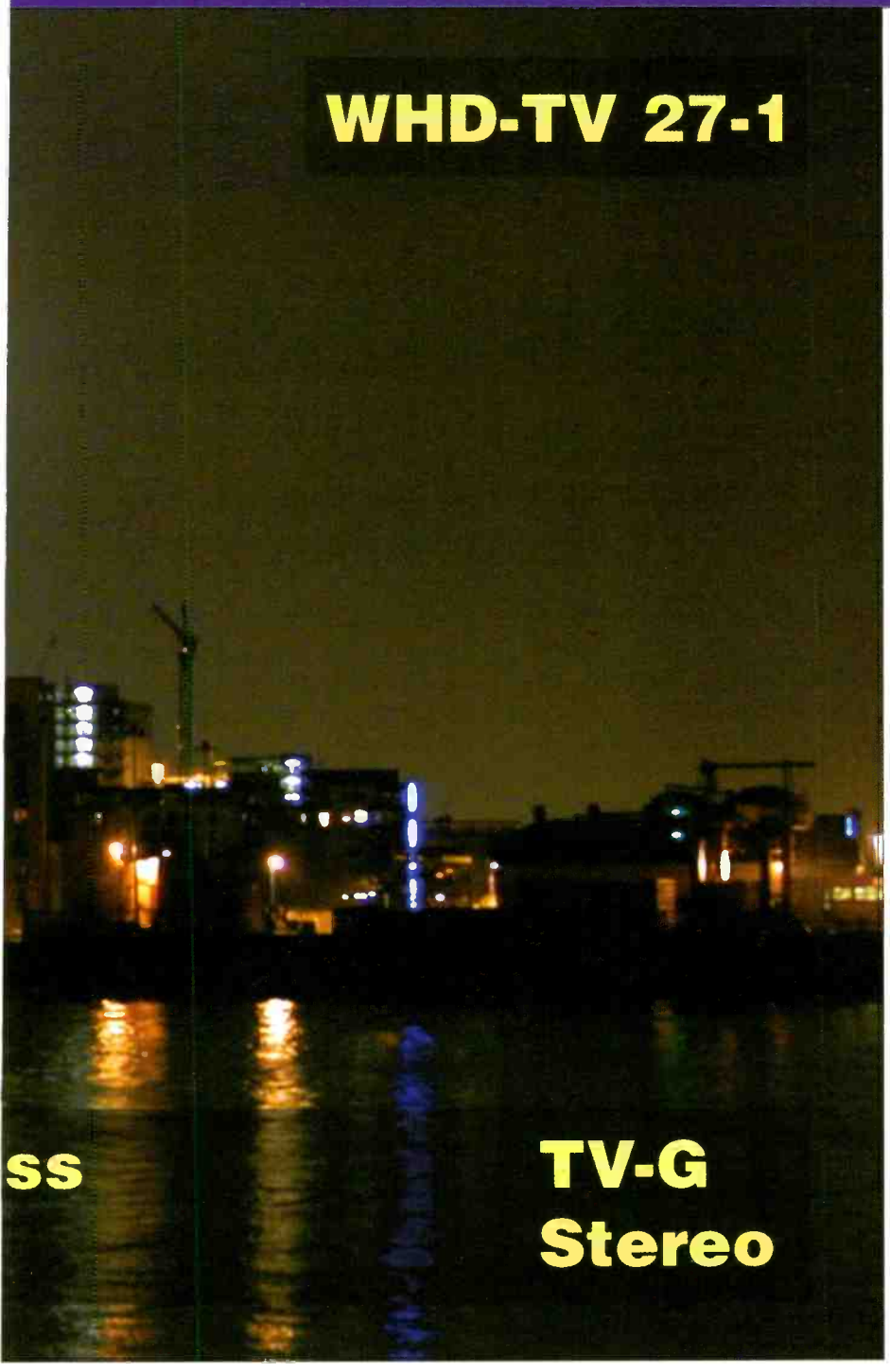
Figure 1 shows the ATSC data broadcast system. The standard covers the delivery of data from the last part of the distribution chain (multiplexer/emission transmitter) to a receiver.

The data broadcast system

The ATSC data broadcast standard assumes that receivers vary greatly in the number of services they can present and in their ability to store data or process that data in some meaningful way. Some receivers may decode and present several audio/video broadcasts along with multiple data services. Others may perform a single function (such as delivering a stock ticker) as inexpensively as possible.

The A/90 standard supports the carriage of data objects using the non-flow-controlled scenario and the

broadcasting:
ATSC A/90 standard work



This composite photo gives an example of the on-screen information made possible by the data broadcasting system. Photo courtesyTriveni Digital.

data-carousel scenario of the digital-storage-media command and control (DSM-CC) user-to-network download protocol. ATSC use of the DSM-CC download protocol supports the transmission of the following elements:

- Asynchronous data modules
- Asynchronous data streaming
- Non-streaming synchronized data

The protocol can detect transmission errors in the data it carries, since the DSM-CC sections employed include a CRC/checksum field for that purpose.

The data carousel sends (and repeats) data at intervals to obviate a flow-control system, as well as repetitions for error protection. Figure 2 illustrates the headend infrastructure. The non-flow-control scenario embodies the unidirectional, one-time transmission of a bounded data image to a data receiver. The data carousel cyclically repeats the contents of the carousel one or more times. If a data decoder wants to access a particular module from the data carousel, it can simply wait for the next time that the data for the requested module is broadcast. Figure 3 illustrates a data-carousel implementation of the download protocol.

The ATSC data broadcast standard assumes that receivers vary greatly in . . . their ability to . . . process data in some meaningful way.

The A/90 standard defines transmission of datagrams (such as IP) in the payload of MPEG-2 transport stream (TS) packets by encapsulating the datagrams in DSM-CC addressable sections. This mechanism is used to

PSIP and data broadcasting:
Keys to making the ATSC A/90 standard work

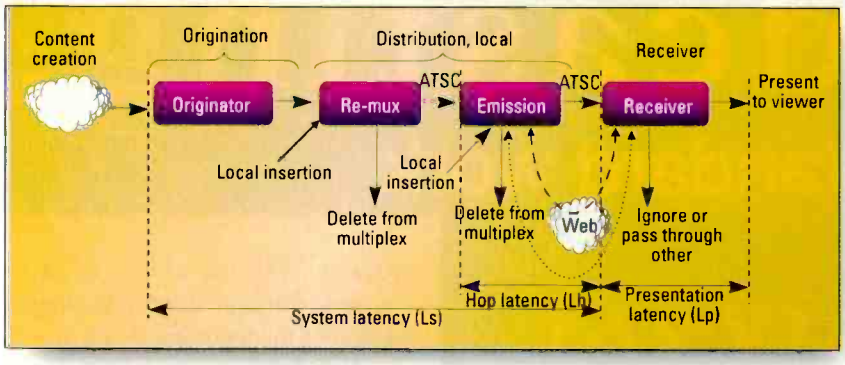


Figure 1. This diagram illustrates the overall structure of the ATSC data broadcast standard.

asynchronously deliver datagrams having the following characteristics:

- No MPEG-2 systems timing is associated with the delivery of data.
- The smoothing buffer can go empty for indeterminate periods of time.

The A/90 standard supports synchronous and synchronized data streaming using the packetized elementary stream (PES). Synchronous data streaming is defined as the streaming of data with timing requirements in the sense that the data and clock can be regenerated at the receiver into a synchronous data stream. Synchronous data streams have no strong timing association with other data streams and are carried in PES packets.

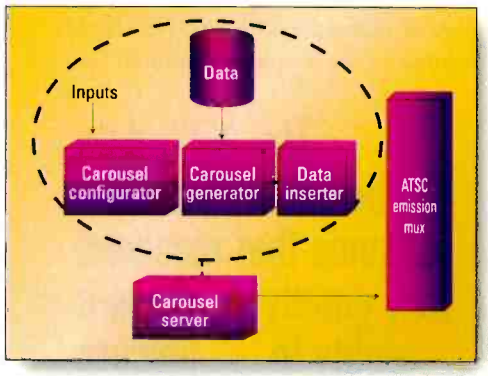


Figure 2. This figure illustrates the headend infrastructure of the data carousel server.

Synchronized data streaming implies a strong timing association between PES streams referenced by different packet identifiers (PIDs). PES packets carry synchronized streaming data. An example is application data associated with time instances in a video stream.

The standard defines data piping as a mechanism to deliver arbitrary, user-defined data inside an MPEG-2 TS. Data piping inserts data directly into the payload of MPEG-2 TS packets.

While the instantaneous bandwidth required to carry the video program will vary, the bandwidth of the transport pipe is constant.

The standard does not specify methods for fragmentation or reassembly of data sent in this manner.

A data service, as defined in document A/90, is a collection of one or more data broadcast types. For example, a data service may include streaming synchronized data and asynchronous multiprotocol encapsulated data.

Operational details

The basis of the data broadcast standard is formed by the MPEG-2 transport stream as defined in ISO/IEC 13818-1 (MPEG-2 systems) and Amendments 1 and 2 specifying registration procedures for the copyright identifier and the format identifier, respectively. Figure 4 identifies what is standardized and by which body, specifically:

- ISO has standardized the MPEG-2 TS in ISO/IEC 13818-1 and the DSM-CC framework in ISO/IEC 13818-6.
- IETF has standardized the Internet Protocol (IP) in RFC 791.
- ATSC has specified within the data broadcast standard the ATSC data-piping protocol, the data-streaming encapsulation, the DSM-CC addressable-section encapsulation, and the download protocol.

Within Figure 4, the encapsulation of IP is just an example. Other network protocols can also be encapsulated. As shown, the data broadcast standard specifies different encapsulation protocols for different application areas.

As specified in the data broadcast standard, each data service may be composed of one or more applications integrated to the remaining ATSC infrastructure by means of announcement, discovery and binding functions. The announcement and discovery specification is part of the A/65

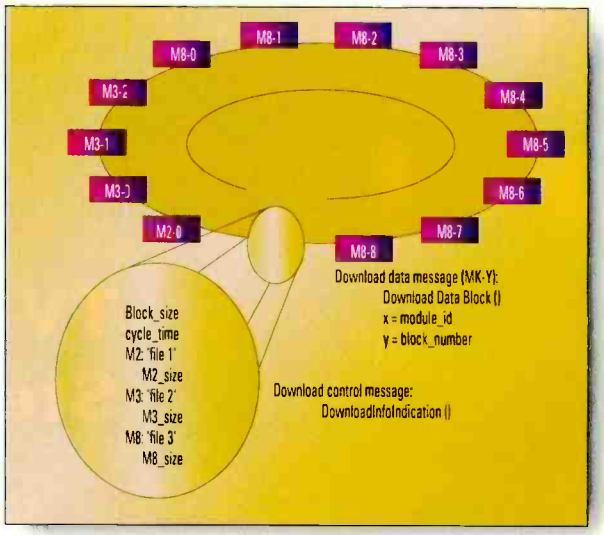


Figure 3. In the data-carousel scenario of the DSM-CC download protocol, information is repeated cyclically so that a data decoder has several opportunities to obtain the data requested.

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PSIP and data broadcasting:
Keys to making the ATSC A/90 standard work

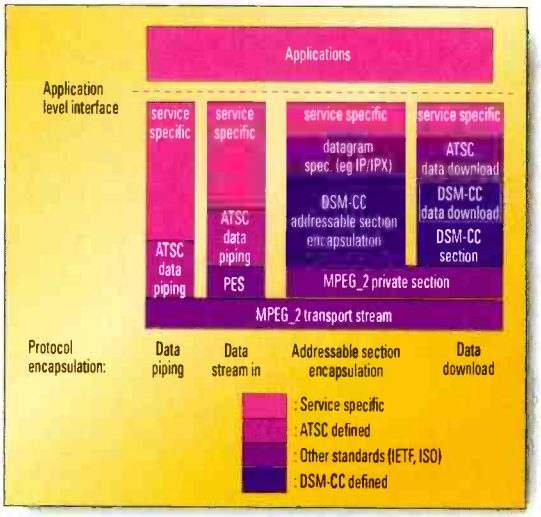

Figure 4. The data broadcast standard specifies different encapsulation protocols for different application areas. The figure also shows the relation of the data broadcast standard to other standards.

standard (Program and System Information Protocol), along with additional elements documented in A/90. Additionally, further discovery definition and application binding are part of the service description framework (SDF) that is described in A/90.

Figure 5 illustrates the packetization, synchronization and protection layers of the ATSC data broadcast protocols.

PSIP and SDF for data broadcasting

The PSIP and SDF are integral elements of the data broadcasting system. These structures provide two main functions:

- Announcement of the available services
- Detailed instructions for assembling all the components of the data services as they are delivered

Generally, data of any protocol type is divided and subdivided into packets before transmission. PES packets are up to 64kB long, sections are up to 4kB, and transport-stream packets are 188 bytes. Protocol standards document the rules for this orderly subdivision (and reassembly). All information is transmitted in 188-byte TS packets. The receiver sees the packets and, by using the PID in the header of each packet, routes each packet to the appropriate location within the receiver so that the information can be recovered by reversing the subdivision process.

A data service can be announced in either an event-information table (EIT) or a data-event table (DET) in conjunction with additional entries in the virtual-channel table (VCT) of the PSIP standard. These tables use the MPEG section structure. Single data services associated with a video program are announced in the EIT. The DET is used to support direct announcement of data services that are either stand-alone or are associated with a video program, but start and stop at different times within that program. Like the EIT, there are four required DETs that are used for separately announced data services. DETs contain the start time and duration of each event, the data-ID number, and a data-broadcast descriptor. This descriptor contains information about the type of service profile, the necessary buffer sizes and synchronization information.

There are three profiles for services that need constant or guaranteed delivery rates:

- G1—up to 384kb/s
- G2—up to 3.84Mb/s
- G3—up to the full 19.4Mb/s transport stream

While the instantaneous bandwidth required to carry the video program will vary, the bandwidth of the transport pipe is constant. Rather than transmit null packets, opportunistic data packets may be sent instead. For services that are delivered opportunistically, at up to the full transport data rate, the profile is called A1. Figure 6 illustrates the concept of opportunistic bandwidth for transmitting data.

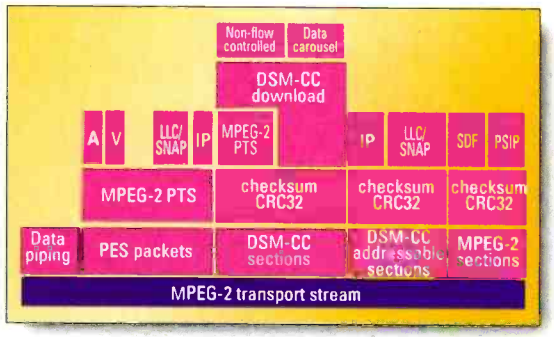

Figure 5. The ATSC data broadcast protocol contains packetization, synchronization and protection layers.

As with other ATSC standards, harmonization of the data broadcast standard with DVB and cable efforts has been a high priority.

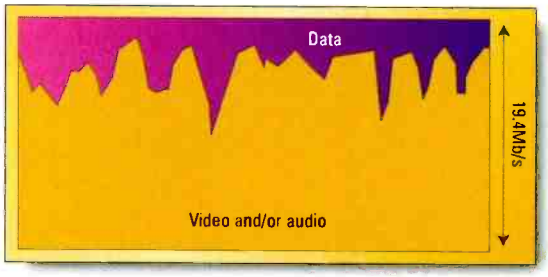

Figure 6. Video programs do not always take the full bandwidth of the transport pipe. In these cases, opportunistic data packets can be sent rather than transmit null packets.

The VCT contains the virtual channel information for each data service. The ATSC PSIP data service is intended to facilitate human interaction through a program guide that contains a linkage to the service-description framework (SDF), which provides the actual road map for reassembly of the

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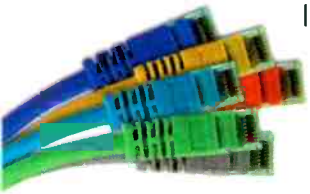

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fragmented information. The process of following this roadmap is known as discovery and binding. The SDF information is part of the bandwidth of the data service, not part of the broadcaster's overhead bandwidth (PSIP is in the overhead).

This photo shows the two-part channel number and other on-screen information made possible by PSIP. Photo courtesy Triveni Digital.

The SDF contains two distinct structures, the data-services table (DST) and the network-resources table (NRT). (Each use MPEG-2 private sections.) The MPEG-2 transport-stream packets conveying the DST and the NRT for each data service are referenced by the same PID, which is different from the PID value used for the SDF of any other data service. The DST provides the information necessary to bind components within the current transport stream, while the NRT provides the information for components in other locations (including the Internet). The DST must be sent at least once during the delivery of the data service. Key elements in the DST include the following:

- A descriptor defining compatibility and the requirements of an application
- The name of the application
- Method of data encapsulation
- List of author-created associations and application data structure parameters
- Association tags, which allow binding to MPEG-2 program elements carrying data components

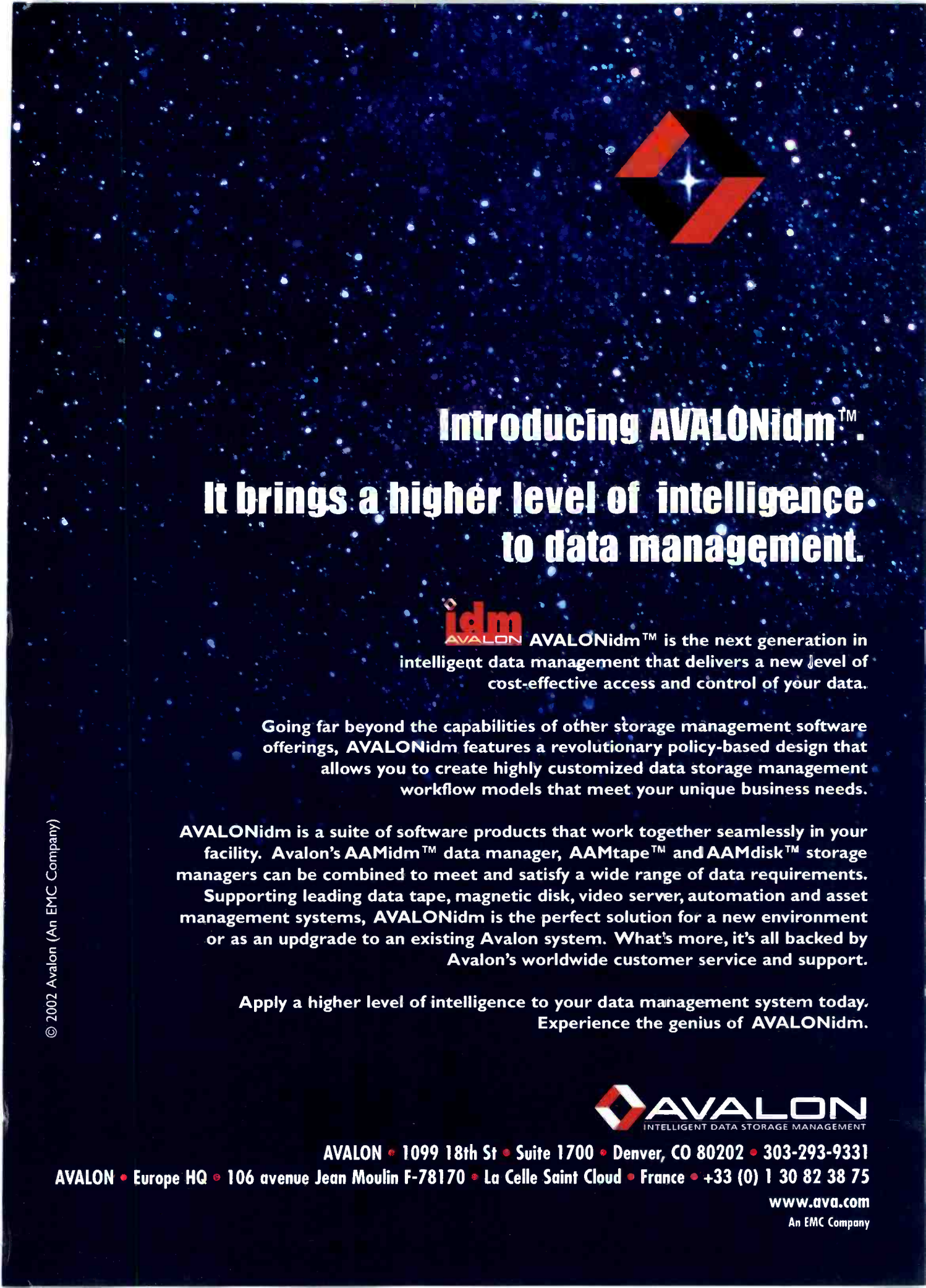
Some services will not need the NRT because it contains information to link to data services outside the TS.

New services and capabilities

The ATSC data broadcast standard provides a rich set of protocols and functionalities that allow progressive deployment of increasingly sophisticated services. The A/90 standard specifies delivery of data for broadcast and pseudo-interactive services and, at the same time, lays the ground for interactive services. As with other ATSC standards, harmonization of the data broadcast standard with DVB and cable efforts has been a high priority.

All of the elements are now in place to make DTV data broadcasting a reality. A number of possible commercial applications have been proposed, and more will emerge as broadcasters learn by doing. One thing is certain: Data broadcasting will be an integral part of the television station of the future. BE

Richard Chernock, Ph.D., is a senior member of the technical staff at Triveni Digital. Jerry Whitaker is technical director of the ATSC.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Media 100's 844/X

BY DAN HOLMES

Producers and editors are increasingly faced with editing projects that require compositing of multiple layers of video, graphics and text information, which make programs more attractive and more valuable. Because editing has traditionally been a real-time operation while compositing often requires significant rendering time, these workflows have remained separate. Slow rendering time also makes editors reluctant to experiment creatively, and last-minute changes are often costly or impractical.

Media 100 offers a solution to these problems with 844/X, a new editing system designed specifically for fast compositing of unlimited layers.

A media supercomputer

To solve the issue of rendering performance when compositing layers, Media 100 developed a media supercomputer called the GenesisEngine that provides the bandwidth to precisely manage an avalanche of video, graphic, key and audio data. The system offers real-time image processing that delivers greater than 420MB/s sustained throughput using a signal architecture that is 10 bits throughout. To meet the system's processing and performance specifications, Media 100 designed three ASICs containing a total of 33 million transistors and used seven times in each 844/X.

Media 100's 844/X utilizes a proprietary media supercomputer called the GenesisEngine to improve rendering performance on multilayer content.

Compositing unlimited layers introduces potential quality issues including banding errors endemic to eight-bit systems. The editing system was developed to uphold picture quality through millions of recursive operations. Ten-bit, 4:2:2:4, uncompressed video data and keys enter the processing pipeline and are de-interlaced and upsampled so that the processing pipeline operates on progressive 4:4:4:4 RGB and alpha data at 60 fps. This is important to avoid temporal artifacts when processing interlaced video data. After the compositing stage, the data is re-interlaced and stored to disk as 10-bit 4:2:2:4, 30 fps data.

Facility integration

The editing system provides full SMPTE 259M compliance for integration within a facility. There is an active loopthrough on the input and there are two SDI outputs. Audio support includes four channel pairs of digital audio I/O that can be acquired from, or played out as, embedded data in the serial digital video stream or as 24-bit AES/EBU. The GenesisEngine also includes V-LAN and Genlock that is strictly compliant with television requirements, so that the system can operate as the master reference for a studio, post-production or television broadcasting facility.

Application software

Tightly integrated application software enables the processing power of the GenesisEngine; together they enable a new way of processing layer-intensive designs. The software's Intelligent Layering Architecture (ILA) enables efficient processing of any number of composite layers, recursively processing data when the layer count moves beyond eight. The ILA applies intelligence in the automated management of intermediate (rendered) media, optimizing the speed of the recursive layering process. As an example, a 10-second segment consisting of 10 video and 10 key layers will take just 20 seconds to process, and the layers can contain any or all of the system's in-stream effects.

A useful tool in the ILA is Visual Voicing, which lets the user select any four of the composited layers (or subcomps) to be previewed in real time. With this feature, users can easily check layer relationships when working with complex composites that consist of high layer counts.

Today's editors need to quickly turn around high-quality video content that consists of highly complex and compute-intensive imagery. The challenge is to maintain high levels of creativity, while minimizing render downtimes and breaks in the creative flow.

844/X addresses this problem by using technological innovations to enable an integrated workflow that combines editing and fast, multiple-layer compositing with 10-bit image quality throughout – all integrated into an industry-standard PC platform. BE

Dan Holmes is the director of hardware engineering at Media 100.

IN ADDITION

For an expanded discussion of the applications for Media 100's 844/X, visit our Web site, www.broadcastengineering.com.

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LETTER FROM THE PUBLISHERS

Dear Reader

As it has from its beginning a half century ago, TV news will continue to benefit from technological developments. New technology brings competitive advantages and operating efficiencies.

One of the primary editorial missions of both ***Broadcasting & Cable*** *and* ***Broadcast Engineering*** *magazines has been to provide television executives with the information they need to incorporate these developments into their operations. It is clear that today, choosing the right technology is crucial to the success of a station or network news operation.*

This News Technology Supplement is a special project focused on educating television station and network owners, management and engineering talent on the opportunities and challenges presented by the latest technological developments.

Operating efficiencies can improve news coverage, enrich program content, gain viewership through more effective news programming, and bring a greater return to the bottom line.

This supplement reflects a News Technology Summit held October 16th and 17th in Atlanta. More than 80 television executives joined 12 leading equipment providers to discuss, explore and find solutions which will improve their news products.

We hope this special effort provides insight that is helpful to the readers of both magazines, as they strive for more compelling coverage coupled with operating efficiencies.

Regards,

Dennis Triola
Publisher
Broadcast Engineering

Lawrence Oliver
VP/ Group Publisher
Broadcasting & Cable

CONTENTS

Newsroom promise meets newsroom reality

Just how far has newsroom technology progressed? Consider this. Five years ago a top network news executive was interested in tapping into the speed of nonlinear editing for news operations. But he found himself confronted with internal cultural resistance. Despite his plea that the time savings in nonlinear editing was worth waiting for the realtime transfer of material from tape to server the editors weren't listening. They just were not interested in waiting before editing.

A lot has changed since then. Material acquired on professional video formats can now be downloaded into video servers at faster-than-realtime speeds. The result is that today's news editors have quickly adapted to nonlinear editing systems. Not only that, but the propogation of high-speed connectivity has turned the newsroom into a place where nearly all staff members—journalists, producers, directors and editors—can access at least proxy copies of video material for review, script writing and even editing.

Digital technology has fundamentally changed newsroom operations.

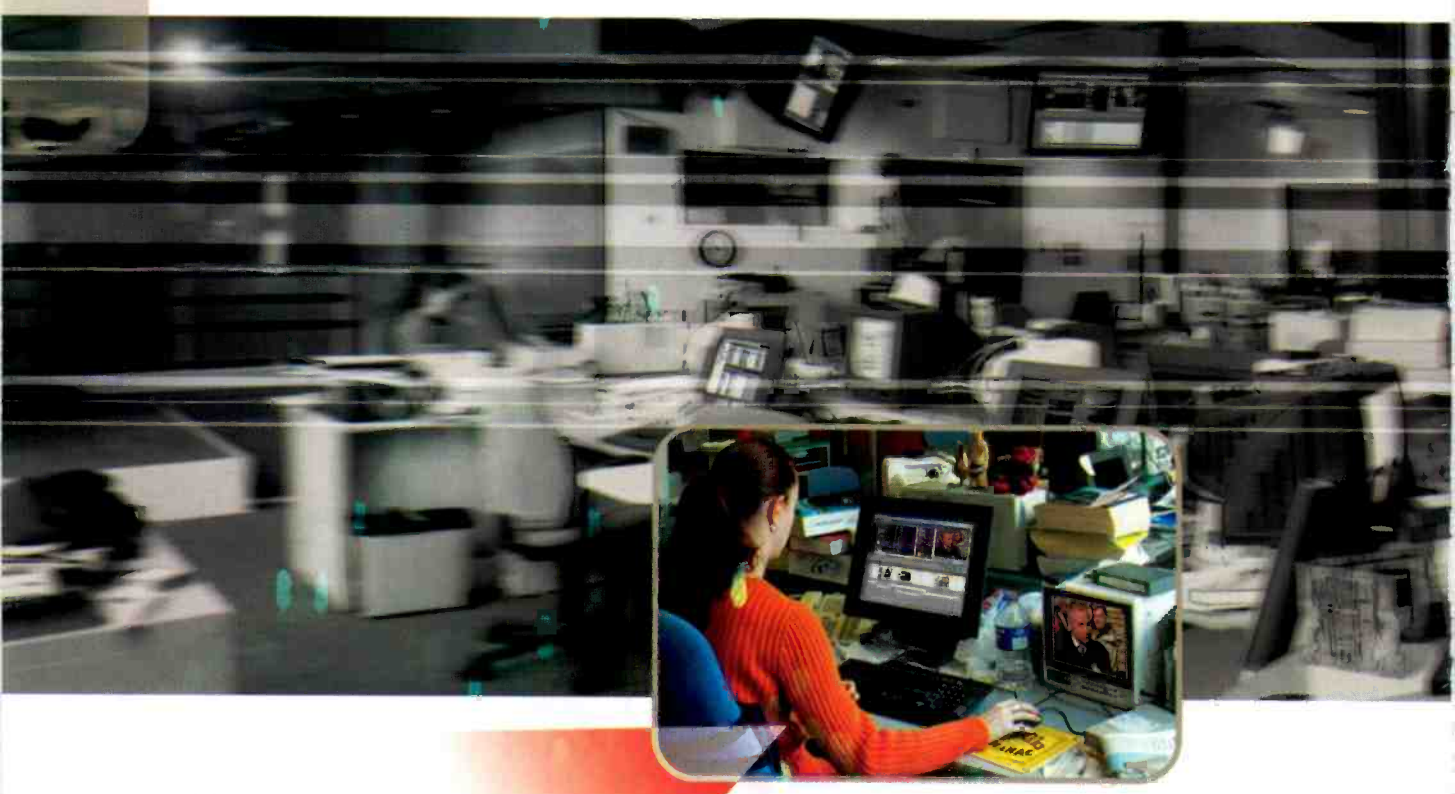
The key to all the changes has been the integration of video servers into the newsroom. And those changes will only continue to grow as the capabilities of servers grow. For example, news organizations are increasinly turning to IP satellite delivery for sending of news material to clients and affiliates. The days of having scheduled satellite feeds and needing to roll tape could become a thing of the past, much like the days of having production assistants sprinting from one end of the newsroom to another with videotapes.

There is, no doubt, plenty of potential in the digital newsroom. But there are also plenty of new challenges. For one thing, equipment from different manufacturers works much more closely than it did in the past—or at least more intimately. The best newsroom, editing or graphic system can be rendered useless if asset management and automation systems can't communicate properly. With numerous personnel pulling and pushing assets from the servers and other devices, the automation system needs to deal with a constant crunch of traffic and be capable of constantly updating files and program rundowns without crippling the system. This is not always an easy task, despite the use of standards like the MOS, AAF or MXF protocols.

Graphics systems have also undergone fundamental shifts in both capabilities and requirements. The ability for broadcasters to tap into massive computing power for reasonable prices has had the greatest impact, opening up new levels of graphic capabilities across the board. Proprietary and "black box" graphic systems have given way to open platforms and interoperability. And the use of template-based graphic systems promises to change the landscape again, as nearly everyone within the facility can "create" graphics. More importantly, the use of templates will allow for a more unified look across an entire station group.

It's that last aspect, a unified look across an entire station group, which holds the most potential. Recent news technologies can do a great job of improving operations but the bottom line is still return on investment. And that means streamlining operations—both in terms of amount of personnel and speed to air. The relaxation of ownership caps by the FCC promises more consolidation, consolidation that will give smaller broadcasters the chance to be part of an organization that offers scale. And scale can provide a chance for the on-air look of a small-market station to have a large-market look. Template graphics, easier sharing of news resources, and the ability to buy equipment in quantities that result in cheaper prices are just a few of the ways a news operation can look bigger than it really is.

Connecting Creativity



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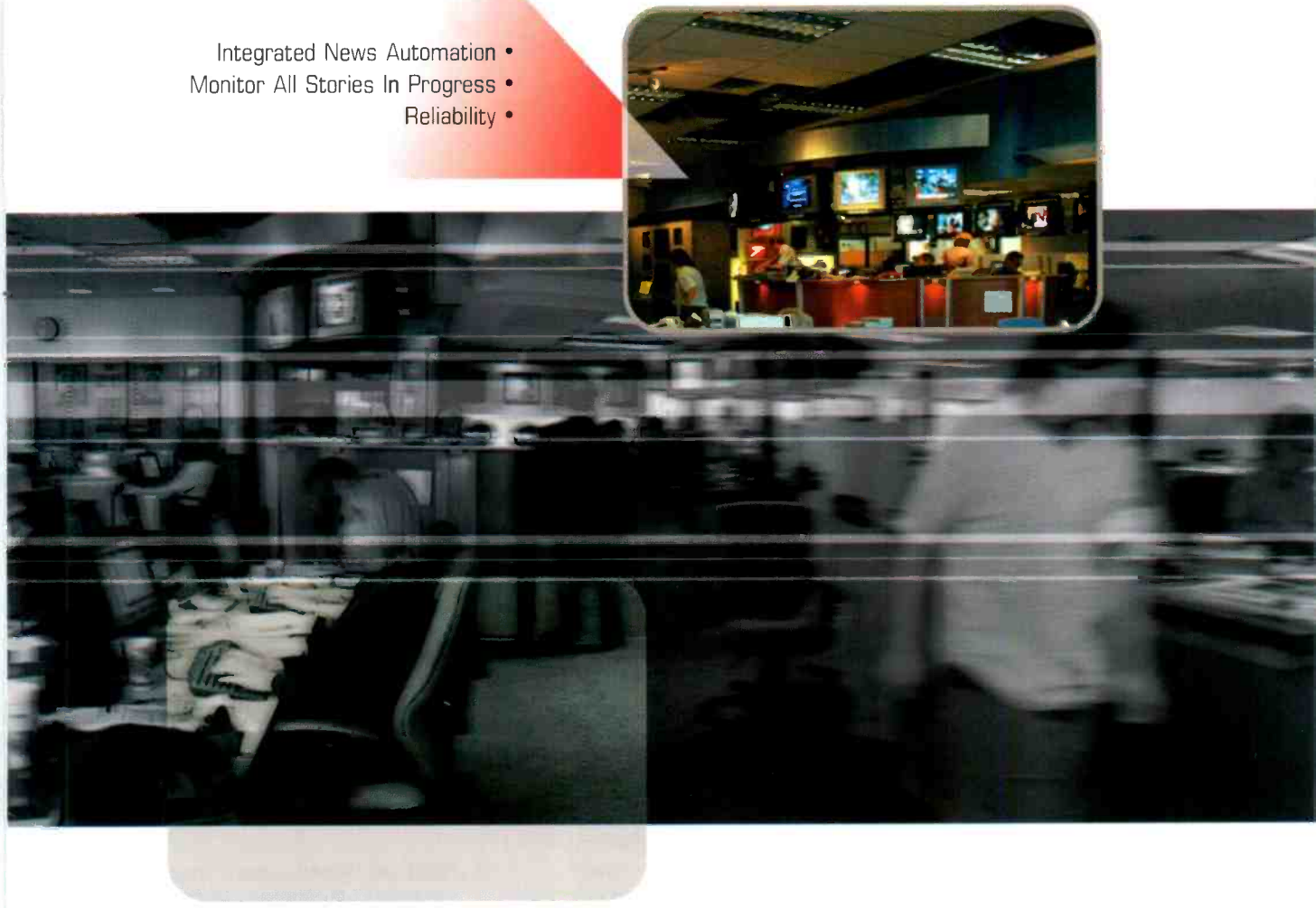

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Newsroom Spotlight

CBS NEWS

Frank Governale, vice president of news operations for CBS News, compares the learning curve for new technology to turning an aircraft carrier in the ocean on a moment's notice.

"As we implement new technologies, we have to allow for the old workflow so we can slowly turn the ship," he says. "We have to allow for savings and operational improvement as planned. We can't be everywhere at the same time."

For all its technical innovation, Governale says some things are still done manually in the CBS news operation. CBS is currently reviewing vendor bids to evaluate new technology for systems such as automation, nonlinear editing, archiving and asset management.

CBS News uses three Onyx 3400 visualization systems for on-air graphics.

In the meantime, CBS is making its own foray into digital workflow. Operations rely on a mix of bureau and field reports to create each evening's news program. Back in New York producers attach assets to each story in the newsroom system, which might range from names of the camera crew to a script.

"With our hard news center project we are looking to have some of those elements be audio and video assets," comments Governale. "A producer will be able to click on all the assets associated with a story, as well as the audio and video that may be acquired to be edited."

Howell Mette, vice president of CBS operations and engineering, adds, "We are finding asset management to be the holy grail of digital. You can have all these files flying back and forth, but if you can't find a piece or archive it, it's a moot issue."

Governale indicates that CBS currently uses some servers in its operations, "but not for hard news editing."

Many of the pieces that come in from various bureaus need graphics integrated into the story, and they are taken into the graphics department where an SGI Onyx visualization system is put to use. Switchers and effects systems with DVEs and the graphics devices are all tied to a 12 I/O video server. The server allows the video to be pushed along to the various video rooms.

"It's technically possible for the control room to start playing out a piece while the graphics system is still working on it," notes Governale.

Chris Golson
SGI
Senior Director of Media Industries

What are some recent developments in news technology from SGI?

We recently announced support for Sony MPEG IMX on our media servers and also support of the MXF (Material eXchange Format) open file format.

Our technology is aimed at getting the news on-air faster with greater capabilities to aggregate information. It's designed to help broadcasters access assets and content coming in from multiple sources simultaneously and use them as they come in. In addition, we're working with a variety of partners to integrate applications such as ingest, editing and archiving.

What do broadcasters expect from newsroom technology today?

They want total integration into the archive system. A producer wants video, metadata, audio and effects on his desk quickly, efficiently and at a low cost.

How has the move to video servers and digital storage impacted the newsroom?

The greatest impact is the change in the way we look at these assets. In the past they were treated as video assets and kept separate with audio and scripts. By treating all the pieces as data, content is manipulated more easily and retrieved much faster.

What is SGI doing to address its customers' interoperability needs?

We're working with best-of-breed partners and focusing on standards to make sure our systems are totally interoperable. Because we use an open standard file system called XFS, it makes it very easy to integrate with other products.

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Working at networked PCs, reporters, producers, and editors can use the NewsBrowse system to monitor incoming feeds, mark clips on the fly, and select media for editing. They can log footage independently, trim clips, and even assemble a cuts-only sequence that can be saved as an edit decision list (EDL) for finishing or playback.

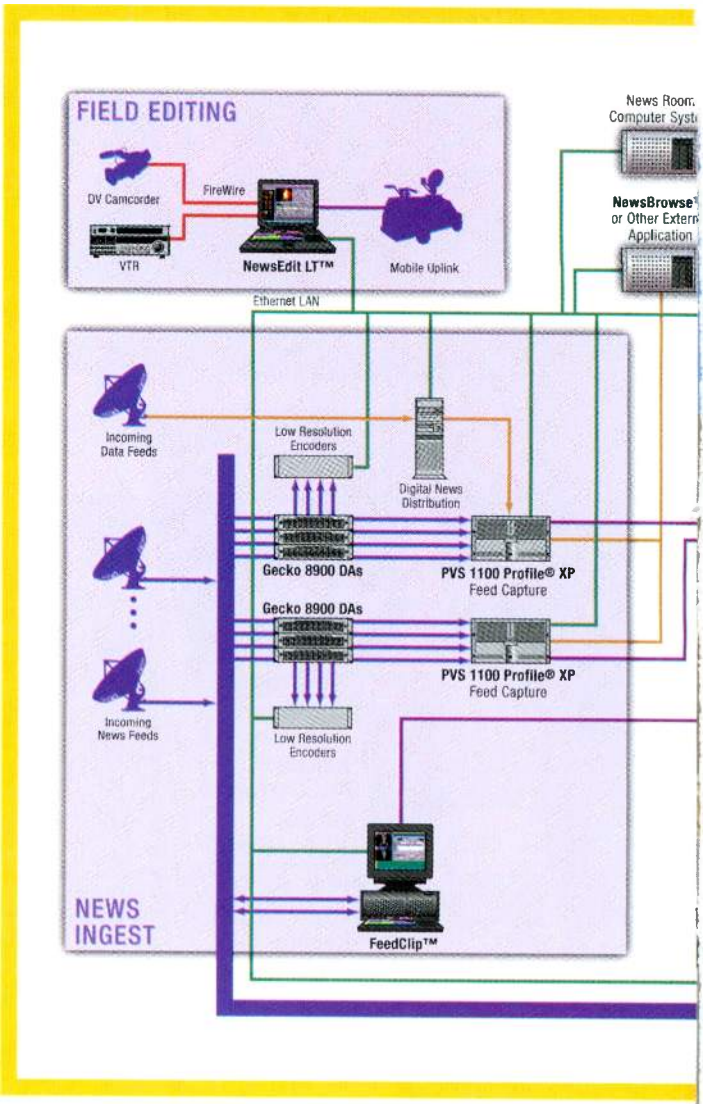
For facilities where networked browsing isn't feasible or cost effective, the Digital News Production Solution includes the FeedClip™ integrated feed capture system.

Address the entire news production process, from ingest and triage through editing and playout.

Making Assets Available for Anyone, Anytime

In an era of cost-conscious news production, Storage Area Network (SAN) technology provides fast, unfettered access to news assets for fast story creation and re-purposing.

The NewsShare™ real-time video SAN makes all media accessible to anyone, anytime. Using it, journalists



can ingest media, share it simultaneously while it is being recorded, and play finished packages directly to air. It also features comprehensive media search capabilities, making video clips easy to find.

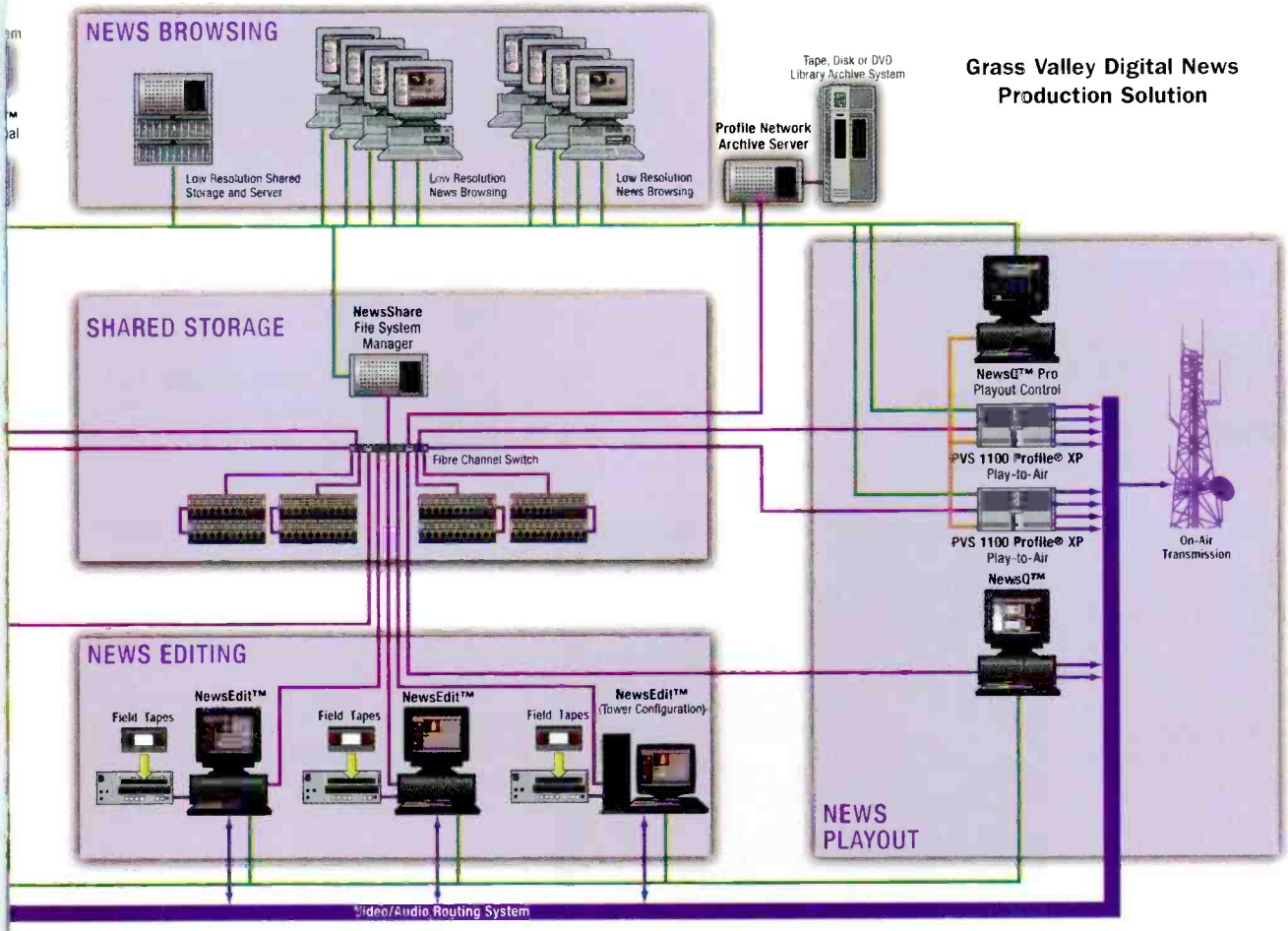
For high reliability, the scalable NewsShare system features designs that include no-single-point-of-failure capabilities.

Two Fast, NLE Choices

For editing, the Digital News Production Solution includes the standard PC-based NewsEdit™ nonlinear editor, and the laptop PC-based NewsEdit LT system.

The NewsEdit system wraps the full functionality of a tape-based editing environment in an intuitive nonlinear editing interface that changes dynamically with the task at hand.

With no pre-digitization requirement, NewsEdit users can edit immediately from tape to disk. And they can see their edits as they're made, so there's no need to go back and review. This functionality makes NewsEdit twice as fast as other nonlinear editors.



Grass Valley Digital News Production Solution

NewsEdit combines speed with a powerful set of options that include integration with your newsroom computer system, 2D DVE, video and audio effects, and titling tools.

For mobile journalists, the new NewsEdit LT system offers the same interface, color-coded keyboard, and many of the same powerful editing features in a turnkey, laptop PC package. It also features a Firewire-based video audio I/O option for quickly converting field materials for ingest, playback, and uplink.

Play to Air Power, Flexibility

For powerful playback and manual assist, the NewsQ™ Pro system and the Profile XP Media Platform enable automated creation and adjustment of playlists and direct server control for live news play to air applications.

The NewsQ Pro system generates a representative thumbnail for each story, its duration, and its status on the channel. It also offers integration with an under monitor display to provide second-by-second playback status for each channel.

Supporting the industry-standard Media Object Server (MOS) protocol, the ability of the NewsQ system to integrate with a newsroom computer system means every producer change or update is immediately reflected in its playlist.

The NewsQ Pro system incorporates four-channel playout control of a Profile XP Media Platform system, plus four more backup channels so that last-minute changes are virtually mistake-proof. These channels can be manually played out in order via remote control.

Also available is the NewsQ system, which provides manual two-channel playlist management—or a back-up to a primary playback system.

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Newsroom Spotlight

WWSB

Kay Miller, News Director
Sarasota, FL

Last November, Kay Miller, news director for WWSB Sarasota, Fla., helped move the station's news operations to a new, all-digital plant. Station owners Calkins Media had built a state-of-the-art facility that allowed WWSB to incorporate some cutting edge technology into its operations. The idea was to grow and adapt to new technology as the industry changes.

WWSD uses Pathfire to help produce 17 hours of news per week.

To help produce 17 hours of news per week, WWSB subscribes to NewsOne, ABC's affiliate news service. When NewsOne first offered its service via Pathfire's Digital Media Gateway, Miller volunteered to be first. "As quickly as NewsOne cut the analog feed, we migrated. We started using the material immediately," she says.

Before installing the Pathfire system, producers were scanning the wires every day. With the Pathfire icon loaded on every desktop, a producer specifies what item he or she wants. Then the editor pulls it off, transfers it onto a local nonlinear editing system and edits the item down to the specifications of the producer (time constraints, etc.).

WWSB also has access to the NewsOne archives. "We make a call to New York or a regional bureau to specify what we're looking for, then wait for it to appear on Pathfire," she says. "We used to have to wait for two feeds per day. This is definitely more on demand."

Gone are concerns about re-feeds or misfeeds, which is "music to my ears," adds Miller.

WWSB also purchased the Pathfire's Auto View application, which Miller says allows the station to view the material from different desktops as it's coming in off the server.

Miller explains that WWSB receives two news feeds – one for desktop browsing and another broadcast quality file for air.

As for storage? "We and other stations are trying to learn how to store," says Miller. "We're all used to saving everything and now we can just have it fed on demand. We have the system set up to purge after a set amount of time."

John Wilson
Pathfire
General Manager, Broadcast

What are some of Pathfire's recent developments in news technology?

We're rolling out a new version of the Digital Media Gateway (DMG) to our existing customers and have added a new MOS interface, which provides a direct link between Sony NewsBase products and the DMG. We're also in the process of getting CNN Newsource up and running with DMG for delivery of syndicated news and other content.

What do broadcasters expect from newsroom technology today?

They want a system that interfaces efficiently with their existing workflow. Customers want access to metadata and previews of real-time feeds from their desktops.

How has the move to video servers and digital storage impacted the newsroom?

It's changing the way individual stations produce news and improving news coverage. For example, producers can focus on a topic rather than a feed and real-time delivery of digital content speeds time to air for hot stories. Digital technologies have also reduced costs at the station because content doesn't have to be processed in a linear, tape-based format.

What is Pathfire doing to address interoperability needs?

We've formed advisory committees focusing on larger station groups and those committees are working on the different interoperability needs of different stations. We're also looking to interface with station's existing systems. This allows them to focus on the quality of the content, regardless of what system they're using.

NEWSROOM SPOTLIGHT

KVEA-TV CHANNEL 52
KWHY-TV CHANNEL 22

Los Angeles, California

Two years ago, KVEA-TV Los Angeles was an analog facility that produced five hours of news a week. Then Telemundo decided to remodel its regional stations, beginning with KVEA-TV, and the move to digital began.

A few months later the challenge was upped again when the station jumped to 17 hours of news production per week and Telemundo purchased KWHY-TV Los Angeles. Richard Lahti, director of engineering and production for Telemundo, directed moving KWHY-TV operations to the same location as KVEA-TV.

A variety of Grass Valley gear is used at KVEA-TV and KWHY-TV.

After incorporating the newly acquired station into the master plant, the team kicked off the remodeling project. With a new master control room, Lahti began systematically moving the station's equipment to digital, starting with a pair of Thomson Grass Valley M2100 master control switchers, one for each station.

KVEA-TV brings in several newsfeeds, including AP, Reuters, and NBC News, and other incoming material, all of which is fed into three Thomson Grass Valley Profile XP MPEG-2 ingest servers. The servers are mirrored with 90 hours of storage and allow news producers to tag clips that interest them and transfer the files instantaneously via fibre channel to six Thomson Grass Valley NewsEdit nonlinear workstations.

The stations also use the Grass Valley NewsQPro playout system controlled by AP's ENPS newsroom computer system. A pair of Profile XP playout servers are tied in with the M2100 master control servers for on-air playback.

"Our news product is completely tapeless to air," says Lahti.

The key to the system is the speed it affords. KVEA editors can take a two-minute video clip, use the NewsEdit system to mark the in and out points, and then give the clip a slug. The editor then downloads the clip directly to a workstation. The editor only has to look at the rundown, slug the piece with a new title, and push it over Fibre Channel to the NewsQ Pro playback system. Each edited piece is then deposited to a Profile XP playout server.

Lahti chose the Thomson Grass Valley production because it conforms to present ITU-T 601 needs and is upgradeable for future HDTV needs. He's not ready to say what the station's plans are for broadcasting in HD—but it will be ready.

Mike Cronk
Thomson Grass Valley
General Manager and
VP of News Production
Business Unit

What are some recent developments in news technology from Thomson Grass Valley?

We recently introduced a shared editing environment with the Profile Open SAN Architecture and Grass Valley NewsEdit from Thomson. We've also introduced an entirely web-based, frame-accurate browse system, NewsBrowse and a new software codec technology for file editing on a laptop or studio system. That codec is implemented in NewsEdit LT and NewsEdit SC, a version for a rackmount or tower unit.

What do broadcasters expect from newsroom technology today?

Broadcasters are looking to streamline their workflow, save costs and have a better on-air look. A handful of companies have addressed the broader workflow, beyond the chain of ingest to playout for material that airs within a given day. Broadcasters want processes integrated for material that comes in that day as well as an integrated approach to their entire archive and library.

What is driving improvements in graphics technologies?

The key driver is the ability to buy computing power at incredible prices. In the 90s editing and graphics required a large dedicated system or black box with powerful processors. Prices have really made graphics affordable and the algorithms are essentially the same. You just have more computer power to deal with them in a more cost-effective manner.

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The SGI Media SAN solution enables you to share media content files and the metadata about those files between

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the various workstations, servers. and archives in the news production workflow, without copying files. Using the latest in 2Gb Fibre Channel technology, SGI Media SAN provides sustained bandwidth of more than 350MB per second and can store more than a thousand hours of 50Mb-per-second content in a single system rack. It's all you need for concurrent access to media files from operating system clients including IRIX®, Windows®, and Solaris™. SGI Media SAN increases your productivity and reduces costs by eliminating the movement of large files over your network and the need for multiple file copies.
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CNN NEWSOURCE
Produce news they can't ignore.

Jack Underwood
CNN Newsource
Executive Producer

Jack Womack
CNN Newsource
Executive Vice President

Serving more than 680 station customers no doubt keeps CNN Newsource busy. And for its customers, using CNN Newsource's material no doubt keeps them busy as well. And in an age where "too busy" is a mantra heard too often, anything to offer time savings is a great thing. That's part of the reason CNN Newsource recently tapped Pathfire and will utilize their technology by the end of the year to improve efficiency at both CNN Newsource and their clients.

"It's been very interesting," says Jack Underwood, CNN Newsource executive producer. "Whenever you have a changeover like this there's always a certain level of wonderment about what it will be like to switch."

CNN Newsource will use Pathfire's Digital Media Gateway to deliver content via satellite-delivered IP directly onto video servers sitting at CNN Newsource client stations.

What that means for the stations is they no longer need to roll tape in order to record scheduled feeds. Instead the content will exist as different files on the server, with each file containing different video and audio content as well as related metadata information. More importantly, users throughout a facility will be able to access the content from their desktops. Live feeds will continue to be delivered the way they are presently.

Adds Underwood, "If you can get something off your desktop rather than running down the hall and grabbing an edit tape, that's a big time savings."

Todd Fantz, director of technology for CNN Newsource, says that the technology will use the same bandwidth CNN Newsource uses to transmit video.

CNN Newsource is installing Pathfire's Digital Media Gateway this fall.

"It opportunistically takes transponder space that we are not using to transmit live signals and transmit data," he says. "The data is then stripped off at the station and the content is turned into files."

Underwood says the workflow process within CNN Newsource will begin to change in the next few weeks. He believes it will be a highly successful change and hopes to have all stations up and running by the end of the year. And, because 82% of all news producing stations in the country are CNN Newsource clients, that highly successful change should result in some collective exhaling in feed ingest areas from coast to coast.

Jack Womack, CNN News Group executive vice president, says that CNN Newsource has access to all of the CNN material that is gathered in the field as well as content from affiliates.

"The rule is simple," says Womack. "The second we get our hands on content we want to turn it around to our affiliate stations. We think it's important that they get it fast."

Getting breaking-news material turned around quickly is typically not a problem. The problem comes with the scheduled feeds. Working with tapes can be a cumbersome process, bombarding the station with a lot of material. The use of the Pathfire system means that there will no longer be scheduled feeds. Material will come in, get processed, and then sent out via the Gateway.

"It's much like a video newswire," says Womack. "Pathfire allows for a continuous flow."

Womack says CNN Newsource spent about three years deciding what technology to use. "We always felt like we had so much material and we needed to really investigate the options," he adds. "Pathfire was the best one because it already had the system in place to manage the content. We didn't have to reinvent it because it already works and it's proven."

The system itself is not an inexpensive proposition but Womack doesn't mind, as it will make for better service for CNN Newsource customers.

LEITCH

Newsroom Spotlight

FOX23 KOKI-TV

KOKI · TULSA Tulsa, Okla.

KOKI-TV Tulsa uses Leitch nonlinear editing systems to keep its news timely and fast paced.

One year ago Clear Channel TV station KOKI-TV Tulsa, Okla. was in the middle of getting its news operations up and running. Mike DeClue, vice president of engineering for Clear Channel, is located at KOKI-TV, so there was little doubt that Clear Channel's best engineering personnel would be on site to drive the project.

"It's been a very successful news operation that puts out a first-class product," says DeClue of the station's news programming, which officially took to the air on February 3, 2002. The Fox affiliate currently broadcasts a 5:30p.m. newscast and a 9 p.m. newscast.

"The station is a very strong advocate of news and localism," he adds. It also knows how to build a news operation the right way.

The station has nine news crews that are equipped with Panasonic DVCPRO ENG cameras. News is captured in the field and then brought into the station where it is ingested into a Leitch VR shared storage server system with Leitch NEWSFlash-II and NEWSFlash-II FX newsroom nonlinear production systems.

"We very much wanted to implement something that was conventional in that it came from a broadcast equipment manufacturer," says DeClue. "But we also wanted something less conventional than the traditional 'Go get the video, bring it back, make cuts edits and then slap a tape in the machine and play it back on the air,' approach."

Enter Leitch and its lineup. There are five NEWSFlash edit booths tied together via Fibre Channel to the Leitch servers. DeClue says the system allows the editor to ingest just the content they need, allowing them to put together a story with very high production values in a very short period of time.

"The single most convincing piece of evidence that the installation was done right was the fact that there has been zero, and I repeat, zero, complaints about the news system from the news user," says DeClue. "And honestly, that's a remarkable statement."

After a negative experience in dealing with nonlinear editing in the newsroom at a previous installation (it involved problems in getting the editing system to talk to the automation system) DeClue says he and Clear Channel's head of IT Deion Rigby retreated a bit from the bleeding edge.

John Edwards
Leitch Technology Corporation
Vice President and General Manager for Video Servers

What are some recent developments in news technology from Leitch?

At IBC, Leitch introduced VRNewsNet, a newsroom solution that consists of scheduled recording, browsing, craft editing, transmission and media management based on VRNet, Leitch's multipurpose server platform. Recent innovations include VRMediaNet, a media management tool; BrowseCutter-II, for browsing and editing video server content at the desktop and new interfaces for interoperability.

What do broadcasters expect from newsroom technology today?

Technology is expected to provide tools that allow more work to be completed in the field, faster "finishing" in the studio, and immediate transmission when required.

How has the move to video servers and digital storage impacted the newsroom?

Server technology is revolutionizing the newsroom. The ability to work with low-resolution media at the desktop reduces costs and improves productivity. Media management automates labor-intensive processes. The challenge in new technology is transitioning a workforce to new skills and processes involved in a digital newsroom.

What is Leitch doing to address its customers' interoperability needs?

Leitch is a member of the MPEG-2 Interoperability Forum which develops and promotes the Media Exchange Format, also known as MXF. MXF is in the final rounds of ratification with SMPTE and EBU. We've also demonstrated the ability to exchange MXF-compliant files with other manufacturers and we'll implement this standard as it is introduced to the industry.

Digital Transition One Step at a Time

Pathfire's digital store-and-forward platform improves distribution efficiency, brings immediate benefits to news professionals and enables stations to set their own pace for digital transition

When broadcast stations are connected by a nationwide distribution network and content management platform, benefits are realized by the content distributors, station satellite receive operators, chief engineers and station news professionals.

Pathfire's Digital Media Gateway (DMG) platform is connecting networks, studios and other content providers to broadcasters throughout the country such that news and syndicated content can be received and integrated into the station workflow in an efficient and standardized manner.

Pathfire's DMG has already been adopted by many news organizations and syndicators. Pathfire content customers include ABC, NBC, CNN, and Warner Bros., as well as numerous short form content providers including; DWJ Television, Image Bank Film, National Geographic Film Library, MultiVu (a PR Newswire company), News Broadcast Network (NBN), UMTV (an initiative of United Methodist Communications), and West Glen Communications.

Pathfire's Digital Media Gateway network is growing daily with servers now installed at more than 75% of broadcast stations across the country. By the end of 2002 most stations will have DMG servers installed and will be able to access a variety of content from a growing number of content providers – all through a single platform.

Before stations began using Pathfire's DMG, video content arrived in a variety of ways. News directors were besieged with faxes, phone calls, express package deliveries and stacks of videotapes. Every broadcast station had to have someone to monitor satellite feeds and point the station's receive dish to the right satellite at just the right time to receive content or the content was lost. Deadlines were pushed and time and money were wasted on satellite re-feeds or rushed backup tape shipments. Now, with the Pathfire DMG installed at broadcast stations across the country, multiple types of content are being delivered across the same platform used to access network news feeds and news directors can search and browse through video clips on their desktops, as easily as they read e-mail.

Navigation among the numerous content providers and access to the video they supply is convenient and easy with the Pathfire's DMG desktop application. The Content Provider Panel appears on the left side of the DMG application enabling users to simply select video clips organized and categorized by specific content providers.

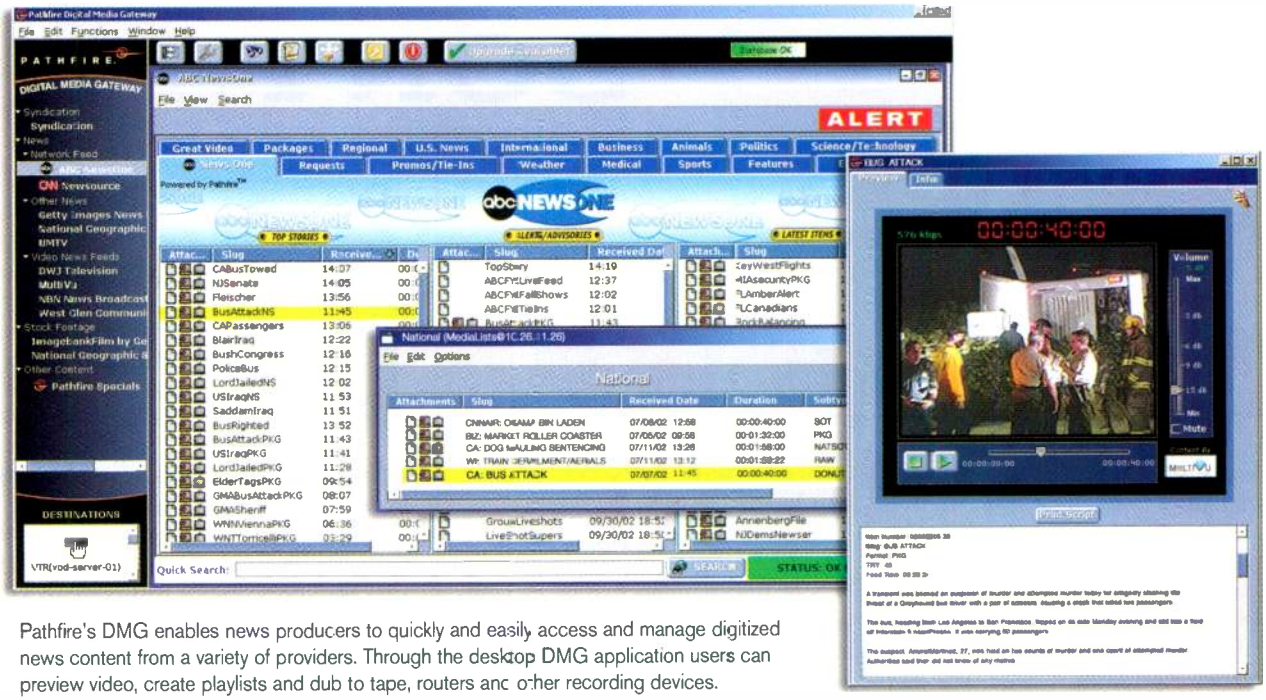
"With DMG installed, people at broadcast stations are spending more time editorially and less time in the logistics of collecting the content," said John Wilson, GM, Broadcast for Pathfire. ***"Now they can focus on the quality of the content and editorial decisions."***

Many stations are migrating to digital gradually. The basic Pathfire DMG platform brings these stations immediate efficiency by automating content aggregation and eliminating the need to monitor satellite feeds. Content arrives automatically on Pathfire servers and the DMG desktop application allows multiple users to preview, browse and select content at the same time – no more searching for lost tape or scrolling to find clips. For tape-based stations, the DMG application allows drag and drop simplicity to dub to tape, routers or other recording devices and for the more digitally advanced stations, Pathfire has introduced a variety of peripherals to enhance digital efficiency.

Expanding Digital Efficiency throughout the Station

Pathfire has been working closely with numerous stations to ensure the Digital Media Gateway (DMG) system fits into a variety of station's workflow schemes. In response to station input, Pathfire has developed several peripherals and interfaces for the DMG to integrate into a variety of station environments.

For a tour of the Digital Media Gateway visit http://dmg.pathfire.com



Pathfire's DMG enables news producers to quickly and easily access and manage digitized news content from a variety of providers. Through the desktop DMG application users can preview video, create playlists and dub to tape, routers anc other recording devices.

Additional workflow improvement software and equipment that complement the basic Pathfire Digital Media Gateway have been introduced.

For example, although news directors and producers like the easy desktop access to content, many want the ability to constantly monitor the news feeds as they come in. Pathfire introduced the DMG Autoview system, which allows stations to have news stories automatically decoded and played to their in-house video system as they arrive and providing the continual visual prompt of the individual stories with their slug ID.

"Now, broadcasters can transfer files seamlessly and integrate with their play-to-air and newsroom editing systems without experiencing the delays associated with real-time analog file transfer – with even better quality than before," said Wilson

Many tape-based stations are enthusiastic about the increasing variety of content that will be delivered through the DMG and they'd like to be able to dub more content faster. Pathfire has introduced additional dubbing stations that can enable simultaneous dubbing at multiple locations within the station.

Although Pathfire and the content providers have many backup systems in place, high volume stations have been interested in local backup and more storage capability

Pathfire sells additional servers to DMG stations which provide a backup for redundancy in the unlikely event of an equipment failure on the Pathfire provided primary server.

Once content arrives at the station, interoperability is key for maximum digital efficiency. With the addition of the DMG News Connect Module, broadcasters can now select a single clip or a media list and add it to the play-to-air server or the newsroom editing system with a digital file transfer directly from their DMG desktop client interface.

The basic DMG Platform brings immediate digital efficiency to broadcast stations and provides significant workflow improvements and advantages for news production. Pathfire optional enhancements enable stations to set their own pace in the digital transition. The technology is also well suited for long form content distribution. Later this year, Pathfire will also begin delivery of syndicated programs to television stations.

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SONY

Newsroom Spotlight

ktla5 KTLA
Los Angeles, CA

With an aging base of tape machines, and a market that is about as competitive as it can get when it comes to news, it's little surprise that KTLA Los Angeles would make the jump to a server-based newsroom sooner rather than later.

Camera control supports four DVW-500 studio cameras.

Sooner meant a little over a year ago, with the addition of a Sony NewsBase system with 64 hours of storage. And it's been a successful move—so much so that the station is expanding storage to 120 hours by the end of the year and adding in Sony's ClipEdit system, bringing desktop editing to the station's writers and producers.

"Server technology certainly brings us to the point where we can do some great new things and turn video around quickly as opposed to the old-fashioned way," says Dave Cox, KTLA news operations technical manager. "We also had very old linear edit systems that had a lot of maintenance issues, so the combination of needing new edit systems really drove our decision to proceed with a server-based, nonlinear solution."

The station's news department has 120 employees that produce 4.5 hours of news a day as well as breaking news like the occasional car chase and celebrity murder trial verdict. Sony's Betacam SX is used in the field, with 80% of the material microwaved directly onto the NewsBase system. That bypasses the ingest part of the nonlinear editing process, speeding editing and getting final product on the air faster. Seven Sony edit bays are tied into the system, with nearly all outfitted with DNE-2000 editing systems.

It's when the system ties in with AP's ENPS newsroom production system that the true benefits of nonlinear are realized.

"The newsroom system talks through the MOS protocol to the NewsBase and it really gives the producers in the booth the ultimate flexibility to move stories around," said Cox.

The Digital Betacam control room supports feeds from other stages on the lot.

Gene Savoie
Sony Electronics
Broadcast and
Professional Products
General Manager, News
and Network Operations

What are some recent developments in news technology from Sony?

We now offer a variety of ENG formats designed for the economics and quality that each job requires within ENG. For instance, a customer may look at DVCAM for news and ENG, and our SX product line provides a couple of options within the MPEG world that can easily address the legacy of Betacam SP. And for higher-quality assignments (such as long form magazines or prime time) our IMX line of MPEG recorders and camcorders offer the sophistication for that kind of job.

What do broadcasters expect from newsroom technology today?

Certainly, flexibility is a requirement. That often means putting the right technology solution within the right economic perspective. For example, a broadcaster might choose the SP format in some markets, DV in other markets, and for stations in top 20 markets, SX. Even within that group, they may move to IMX for news magazine shows. And HD production is beginning to appear on some radar screens as well.

What recent developments in the DV format will help improve newsgathering?

Broadcasters are finding new efficiencies. Around the country, the PD 150 DV camcorder is becoming a standard piece of equipment in DV-based digital newsrooms. The economies are driving downward, while the quality of the equipment is moving upward.

PINNACLE SYSTEMS

Newsroom Spotlight

CNN
Atlanta, GA

With bureaus around the world and six to seven CNN entities hungry for content the attitude taken by Gordon Castle, CNN technology senior vice president, is a simple one: feed it, edit it.

Working with editing systems and servers from Pinnacle Systems, CNN is tackling the challenge of long GOP compressed video editing. The reason for long GOP?

"For about one-third the data rate of what everyone else is talking about using we can get very acceptable video quality for our needs," says Castle. It requires between 5 and 15 Mbps to send video around the system and get it in front of viewers.

The Vortex networked news solution has an interface to the iNews desktop newsroom system that is used throughout CNN's plant. Pinnacle's Liquid Blue is used for higher-end work, particularly projects that require color correction or effects. Typically that means promos or bumpers. But it also includes long-form projects for Connie Chung, Aaron Brown or Lou Dobbs.

"We ingest using Vortex network server and within a few seconds we can begin using a high-quality editor," he says. "For just cuts the Vortex editor is fine. But for promos or effects the higher-end editor is more useful."

Videotape is still playing a big role in CNN's operations. But the move to a more tapeless facility is well underway. The Pinnacle server system being installed in Atlanta has 48 ingest ports where it records all the incoming feeds.

"Atlanta is like our large clearing house, where about 1,700 hours of material is stored online," says Castle. "It's directly accessible by the editing client. Once editing is done it will be moved to the Leitch playback system as an MXF file." The use of MXF allows for the inclusion of metadata information.

CNN uses Pinnacle's Vortex and Liquid Blue systems.

The key, however, is the ingest server. Using tapes makes creating b-roll and sound bites more difficult. But working digitally allows for the port on the server to make material available to all editing clients.

Castle's advice to those contemplating a digital newsroom is to never underestimate the power and importance of well thought out workflow changes.

"Put good base systems in, integrate them and couple them with workflow changes," he says. "That is the key point."

Bob Wilson
Pinnacle Systems, Inc.
President
Broadcast Solutions Division

What are some recent developments in news technology from Pinnacle Systems?

There are essentially two places where Pinnacle Systems connects to our customers. The first is the Vortex Networked News System that can support several hundred users on the same architecture for local, regional and national news. Vortex 200 gives journalists control over what a story looks like – not just the content. The second is our Deko CG, which is much more than a CG. Using a template, DEKOCast allows a station to keep its on-air look fresh by incorporating live data streams.

What do broadcasters expect from newsroom technology today?

They're looking for a networked solution as well as improved efficiencies.

What is driving improvements in graphics technologies?

We believe graphics are much further along than many of the other functions in news, in terms of embracing multiple formats and compatibility. For example, we've created a bridge between our PC tools and our Mac tools so producers can now export Mac content using QuickTime. There is no longer a barrier between the traditional desktop graphics world (driven by Macs) and a live, mission critical world.

What is Pinnacle Systems doing to address it's customer interoperability needs?

We embrace the MOS protocol, which is the key to connecting many vendors' products. MXF is important, too, as the realization of the merging of video and data in the same stream. MXF is just as profound as SDI was in the 80s.

NEWS. Sony has it down

The future of the newsroom is digital, nonlinear and server based. This revolution in workflow enables you to produce more while spending less. And it is appearing nightly at the many stations that have stepped up to Sony's NewsBase™ system. No newsroom system offers better hooks to acquisition and ingest. No system better anticipates the nonlinear and high definition future. And certainly none is more comprehensive than what you see here: Sony's NewsBase system.

CONTENT INGEST AND FILING

MPEG IMX™ ACQUISITION. Perfect for long form ENG, EFP and news magazines, the new MSW-900 MPEG IMX camcorder actually costs less than the BVW-D600 it replaces. Yet it delivers breathtaking 4:2:2 picture quality and a rich 50 Mbps, widescreen picture that's more than ready for DTV!

BETACAM SX® ACQUISITION. Sony's family of Betacam SX camcorders are ideally suited to news. They offer 4:2:2 digital quality at a cost-effective 18 Mbps in MPEG compression.

DVCAM® ACQUISITION. For investigative reporting, Sony handheld DVCAM camcorders deliver broadcast-quality images from camcorders small enough to fit in the palm of your hand.

BETACAM SP® ACQUISITION. If you're currently shooting on Betacam SP camcorders, you'll be happy to know that both Betacam SX and MPEG IMX studio VTRs will play your analog footage. So you can migrate to digital at your own pace.

AUTOMATED INGEST. For maximum workflow efficiency, the NewsBase system uses the same Media Object Server (MOS) protocol as today's newsroom computer and production automation systems. For super-efficient recording of network feeds, every Sony NewsBase newsroom system can work directly with the Pathfire™ Digital Media Gateway™ platform. Sony's NewsBlast software enables remote crews to file stories without human intervention at the station.

CONTENT PROCESSING

INTEROPERATES WITH NEWSROOM COMPUTER SYSTEMS (NRCS). If you have an NRCS or you're considering one, you'll be glad to know that Sony's NewsBase system works beautifully with third party systems. You get all the control of your NRCS together with all the production efficiency of Sony's NewsBase system.

MAV-2000 NEWSROOM SERVER. Sony's NewsBase system streamlines news production, helping you get on air first, with the best-looking packages. The Sony MAV-2000 newsroom server enables multiple, simultaneous and instantaneous access to the day's news footage

SIMULTANEOUS ACCESS AND WORKFLOW IMPROVEMENT. Thanks to the MAV-2000 server, one person can cut a story for the 5 o'clock news while another cuts the story for the 11 o'clock while a third cuts the tease. There's no contention for tapes, no need to make copies.

CLIPEDIT™ JOURNALIST SOFTWARE. Sony software enables journalists to sit at their own PCs, viewing and even cutting the story's footage on the same screen they use for wire service feeds and scriptwriting!

DNE-2000 NONLINEAR EDITING SYSTEM. After the rough cut, finish your package with the very fast, very powerful DNE-2000. You can edit from local tapes, central servers — or any combination of both. Material and EDL are easily transferred between the DNE-2000 and ClipEdit Systems.

SHARED RESOURCES. The NewsBase system enables you to share assets and storage capacity among several locations — a decided cost savings for networks and station groups.

CONTENT DELIVERY

NEWSBASE SYSTEM AND PLAY-TO-AIR WORKFLOW. Thanks to the MOS interface, stories completed on the NewsBase system can appear immediately on your director's rundown. There's no need to rush with tapes from the edit bay to the on-air system.

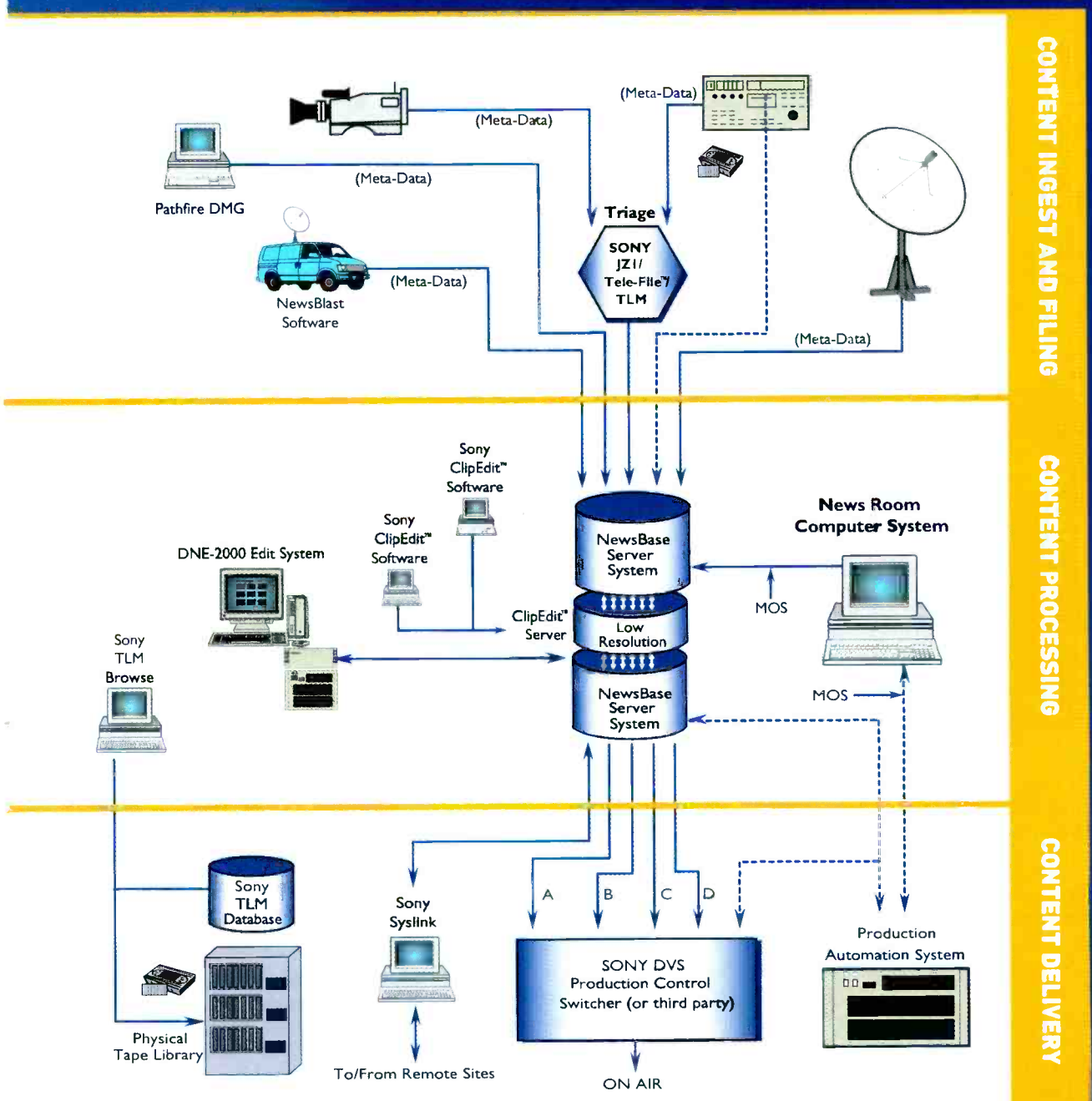
OFFLOADING THE NEWSBASE SERVER FOR NEARLINE ACCESS. You can offload the MAV-2000 newsroom server onto a Sony digital content management system, which stores your content on data tapes. Or choose Sony's affordable Tape Library Management. It lets producers browse your videotape library from the comfort of their own PCs!

SONY'S PROFESSIONAL SERVICES ORGANIZATION. For everything from initial consulting to the industry's leading system integration to award-winning after-sale service, you can depend on the experts at Sony's Professional Services Organization.

For more information on Sony's Newsroom Solutions,

to a system.

SONY



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Avid®

Newsroom Spotlight

KLAS
Las Vegas, CA

For years, Natalie Pitcher, producer of the 6 p.m. newscast at CBS affiliate KLAS-TV Las Vegas, had been using a newsroom computer system that didn't offer the functions she wanted most. "It was becoming difficult to do the kind of news text editing we wanted to do unless we went to Avid iNEWS," says Pitcher. "The old editor was not going to take us as far as we could go."

Avid's iNews has sped up the news production process at KLAS.

As part of its overall growth plan, KLAS recently made the transition to Avid iNEWS, and what a difference that has made, explains Pitcher. "Switching to Avid iNEWS was a dramatic change. As far as I can tell, everyone is happy with it."

But they can be happier. KLAS will be adding Avid's desktop editing component of the iNEWS system. At that point, the changeover will be complete.

News is about change, says Pitcher, and Avid iNEWS reflects that. In the past, a producer would dread having to make even the slightest change. Now, with Avid iNEWS, it is easy and intuitive. "The system is very flexible, and that is important," says Pitcher, who found out just how essential flexibility is not long ago when a major story broke in Las Vegas. There was a huge fire. Every few minutes, Pitcher was being fed new and updated information. "I was able to update the information into the prompters for the anchors. I wrote it, typed it in, and it was in."

From the archive to the rundown filler to the system manager, everything is now much easier to use and faster, says Pitcher. "It is incredibly fast. That is what I love about it," she says. Her other favorite feature is the archive system. "It's really easy to find stories in Avid iNEWS when you know the date because everything is still in a rundown format."

For Pitcher, Avid iNEWS' ability to auto-save has been its saving grace. "Instead of having to remember to file, you get out of a script, and it automatically saves it for you."

In the past, says Pitcher, it would often turn out that it hadn't been filed, that it wasn't quite done, and it had been erased before someone had a chance to file it. "I don't have to worry anymore."

Jim Frantzreb
Avid Broadcasting
Sr. Product
Marketing Manager

What are some recent developments in news technology from Avid?
We have several new developments, including large-scale, full-resolution nonlinear news production system and browser-based media asset management systems. Others include high-speed media transfer over standard networks, low-cost nonlinear news production systems, laptop-based news editing, news editing and newsroom computer system integration, and automated video linkage and script conversion to web content.

What do broadcasters expect from newsroom technology today?
The market has shifted from an early adopter phase to a more pragmatic phase. Broadcasters are less interested in experimenting with new technology, and more interested in systems that work, and which have the potential to improve the top and/or bottom line.

How has the move to video servers and digital storage impacted the newsroom?
Servers and (shared) storage help improve workflow and productivity. The opportunities include the ability to complete more new programming, create better looking programming, work more efficiently, and serve multiple media outlets simultaneously.

What is Avid doing to address its customers' interoperability needs?
Several things, such as standardizing on AAF and MXF, development of 16 APIs and plug-in programs, and bringing interoperability within Avid products to a new level.

How popular is laptop editing?
It's still a new concept, but it 's catching on rapidly, especially as the journalist-editor becomes more common.

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For Breaking News

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vizrt

Newsroom Spotlight

CNN

When CNN International's Bob Hesskamp, senior vice president of technical operations for the CNN Newsgroup was taking a look at how to get high-end looking graphics without requiring the high-end budget (and high-end staff) it found one solution: VizRT. VizRT's graphics lineup is based on the Viz engine, a product that allows for the rendering of 2D and 3D graphics on Windows, Linux and Irix-based operating systems. In CNN International's case it runs on the SGI Onyx workstation.

CNN International uses VizRT for graphics creation.

Hesskamp, while working at CNN Plus in Madrid and as an advisor for CNN Turkey in Istanbul, was found another challenge: because a large part of the audience speaks English as a second language (if at all) graphics are an important part of the international story.

"Graphics are a great way to help tell a story, increase the quality, and speed up getting information to air," says Hesskamp.

But getting graphics completed at the operations was not an easy task. Producers had to fill out graphics request forms, a time-consuming process.

"If the producers could put that information into a template in a VizRT information system those graphics could be played out to air in a third of the time," says Hesskamp. "The VizRT system helps us achieve all those goals."

VizRT caught on at CNN International, and with each successive installation the requirements grew. Regional feeds and simultaneous newscasts throughout Europe and Asia upped the ante.

"We wanted high-end looking graphics with animations and we wanted to do it without creating a giant graphics department," he says. "Any producer could do them at their desktop and then have them rendered in the control room from the playlist."

The VizRT system was also integrated into the iNews newsroom system via MOS and ActiveX.

"When a graphic is made it's associated with a script so a playlist is generated automatically," says Hesskamp.

That's helpful as CNN International is always changing run orders and updating breaking news.

"If the order changes we simply change the rundown and the graphic playlist reflects those changes," he adds. "That same change in the rundown is also reflected in the video playback information, the teleprompter and the font integration. All these systems work together off our news rundown."

Isaac Hersly
VizRT Americas President

What are some recent developments in news technology from VizRT?
The VizlContent Pilot management system with Active X component provides for direct integration to MOS-capable electronic newsroom systems. Journalists can now quickly create graphical assets as they prepare their content. In the control room, the graphics play list is built by the electronic newsroom system and any changes to the story lineup are immediately reflected in the play list.

What do broadcasters expect from newsroom technology today?
They not only want cost efficiency but also workflow efficiency. They want graphics that will hold the audience's attention. Most importantly, they're looking to repurpose news. For example, our system will let you create a graphic of the top gainers on the NYSE. It will also let you easily give the same graphics content for the 6 and 11 show totally different looks.

What is driving improvements in graphics technologies?
We're finding that many graphical applications work with Windows 2000. Those applications give increased performance at ever-lower prices and many are portable from platform to platform, allowing easy upgrades.

What is VizRT doing to address its customers' interoperability needs?
Our product can be used with many newsroom products available today. The Active X component complies with the MOS protocol, helping us work with other manufacturers. We believe open protocols give our customers more choices because systems from different manufacturers can be easily integrated.

Automating the News Control Room

Stations in small to large markets are finding that automating the control room delivers significant gains in terms of efficiency and refinement of the overall process of bringing a newscast to air.

ParkerVision, the leader in production automation technologies for news control rooms, has assembled a list of considerations for station management to contemplate prior to undertaking the steps required to implement a control room automation solution such as PVTV NEWS™.

Topic 1 - Is My Station a Good Candidate for Automating the Control Room?

The fact is, technically, any station's control room could benefit from automation. Aside from the obvious benefit of consolidating production tasks to a single operator console, an automated production environment eliminates multiple conduits for error and provides for a very deep level of operational efficiency when combined with newsroom computer systems. In spite of these enormous and far-reaching advantages, stations that have trouble with organizational change will have a harder time implementing this beneficial, though temporarily disruptive technology. A caveat for these stations: Ultimately, once any station in a given market undertakes control room automation, it will be very difficult for competitors to match its on-air capabilities and financial results.

Topic 2 - What is the Relationship Between Control Room Automation and Newsroom Computer Systems?

Control room automation is the next logical extension of newsroom computer device control. Most newsroom computers deliver tangible efficiencies controlling servers, cg's, and other devices that could be linked to a story slug in the producer rundown. PVTV NEWS takes the state of the art to the next level by controlling events that cut across stories at a much finer level of granularity – specifically audio, video and digital effects switching.

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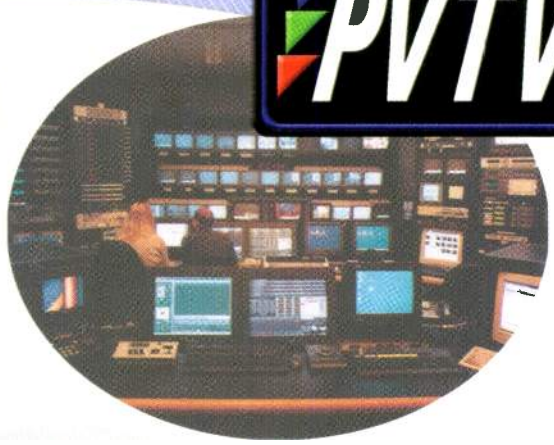
www.PVTV.com



Topic 3 - With Respect to Legacy Equipment, will I Need to Replace Multiple Devices as Part of the Move to an Automated Control Room?

Not all legacy devices will lend themselves to the level of automation necessary to implement control room automation. The devices requiring replacement will be defined by the results of ParkerVision's "needs analysis", which is a consultative service that is part of the initial evaluation process. For example, PVTV NEWS can automate playback of most videotape machines. An additional person will be required, however, to load the tapes. By moving to a server, through which playback is completely automated, the additional equipment cost is more than offset by the operational savings. Be advised that a PVTV NEWS system replaces your existing video and audio boards, as well as your existing DVE and Chroma keyer, and teleprompting system. PVTV NEWS is an integrated solution to the challenges of directing a newscast to air, no matter the length.

Topic 4 - What is the ROI Impact of Automating the Control Room?

Traditionally, the purchase of broadcast production control room equipment was intended to improve the on-air look, or to simply replace ageing devices. Return on investment did not factor heavily into the equation. Today, ROI is perhaps the most critical basis for equipment purchases, and we believe that no other purchase brings a level of return comparable to PVTV NEWS. Add to this the ability to improve the on-air look and consistency, and it becomes apparent that control room automation is an investment that simply cannot be overlooked. Protection of investment (POI) is another important factor. ParkerVision has taken a leadership position in developing PVTV NEWS for today's requirements, and looks to the future needs of the control room as well.


NEWS 10
NEWS 10

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NEWSROOM SPOTLIGHT

WRAL-TV

Raleigh, N.C.

As if being a HDTV pioneer isn't enough, WRAL-TV Raleigh-Durham seems to like showing off, with graphics capability well beyond the norm.

"We're arranged like a traditional news outlet, except when it comes to video and graphics," says William S. Reeves, design director at WRAL-TV. "We produce our news product in native 1080i whenever we can."

Reeves manages the execution and creation of the aesthetic needs for WRAL-TV, WRAL NewsChannel, WRAL.com, WRAL-DT, WRAL-FM and Capitol Broadcasting Company.

WRAL-TV Raleigh completes HD-resolution graphics with Chyron gear.

In place at each of the WRAL stations are a Chyron Aprisa 100 still store and an Aprisa 200 clip server tied together to combine still imagery over animated backgrounds. Controlled by the news directors, the combined graphics system is responsible for animated over-the-shoulder shots, 2x3 boxes, full-screen images, chroma key backgrounds, news bumps and more.

"Since the systems are digital, and use a 32-bit system to handle color, the alpha channels are perfect every time," says Reeves. The alpha channel can also be animated along with the fill, which is ideal."

Reeves says the station chose Chyron for two primary reasons. First, it made sense to have a fully integrated system that took the station from creation to execution on air. Reeves says the equipment offers speed and ease of communication between the hardware, and information is transferred seamlessly. Second, the art staff was already familiar with the flexibility and power of Liberty Paint.

"We have enjoyed a history of reliability with our Infinit platform, so we knew that Chyron would stand behind their equipment," says Reeves. "Even if it meant that we would push it way beyond its operating parameters, even in the HD world."

He adds that the main advantage of the system is speed, as the station can concentrate on improving the "look" and responding to the needs of the news department.

Aside from traditional "monitoring" of equipment outputs Reeves says he can go in and view graphics at the source and make changes if needed.

What does WRAL like best about the Chyron graphics systems? "What you can do with them and how fast you can do it," explains Reeves. "The flexibility is fabulous."

Bill Hendler
Chyron
Vice President of Key Accounts

What are some recent developments in news technology from Chyron?

Lyric now runs on a range of hardware, from board level to higher-end systems. We have taken some of our graphics applications and made them available as plug-ins to popular news editing systems from Avid and Thomson Grass Valley.

We are also taking advantage of newer newsroom architectures such as MOS. And Camio is a software suite that lets Chyron systems manage network graphics, asset management and network distribution.

What do broadcasters expect from newsroom technology today?

Broadcasters are not looking so much for black box solutions as much as integrated solutions, those that help them attain a more efficient and more economic workflow. They are also looking for a much more collaborative relationship with vendors.

What is driving the improvements in news graphics?

The primary factor is the availability of more off-the-shelf components from the computer industry and economies of scale. Graphics require less proprietary hardware than in the past. Development is becoming increasingly focused on graphics software, with hardware development evolving to more niche systems particular to video. Proprietary hardware is the biggest cost driver in this market.

How important is interoperability?

Chyron is working to stay standards-based relative to graphics and video file formats and to provide a broad range of tools for converting between file formats.

Quantel

NEWSROOM SPOTLIGHT

KOMO-TV

Seattle, WA.

As a digital broadcast trailblazer, KOMO Seattle was the first television station west of the Mississippi to transmit HDTV signals. In February 2000, it became the first station in the United States to shoot, edit and broadcast local news in digital widescreen format. Later that same year, KOMO launched its new all-digital facility with the Quantel/OmniBus Inspiration.

Komo has benefitted from Quantel's inspiration.

Many months prior to launch, KOMO began planning a move to its new facility at Fisher Plaza.

"The fact that we were building an all new digital, 16:9 facility really freed us in a lot of ways," says Mark Simonson, director of engineering for KOMO 4 Television. "It allowed us to create the best possible technology solution for our viewers starting from the ground up. Many broadcasters don't have the opportunity to do that."

KOMO found the search for the right technology solution to be a challenge. "We spent a lot of time looking at disparate products to see how well they would fit together," explains Simonson. "What was always missing was a fully integrated product."

The Quantel/OmniBus Inspiration met KOMO's requirements. "We were looking for a fully integrated solution that would take our content from gathering it to editing, to distributing it," says Simonson. "The combined solution of OmniBus control, Quantel Clipbox Power server and storage (and editing and graphics), combined with AP's ENPS made it a tremendously powerful tool."

Journalists can browse incoming material and make preliminary edit decisions or story selections, which are then accessible to any one of the 12 edit seats for craft editing. Clipnet helps speed clips across all servers, even at times of heavy use. Rundowns are created on ENPS and downloaded to the OmniBus automation system for playout and can be changed right up to air time. Once edited and ready for transmission, a clip will be dubbed to the Cachebox in time for playout. A clip can also be played to air from any server.

"One of the benefits of the Inspiration was the increased horsepower of the storage and editing platforms," notes Simonson. "Now we have the power of a full post production suite at our fingertips. It gives our people the tools to deliver a super-

Trevor Francis
Quantel
Business Manager, News

What are some recent developments in news technology from Quantel?

That would be Generation Q, which includes completely new hardware and software systems. We've been known for hardware, but now we're offering software. And the software is all PC-based, which is a major departure for Quantel. And what that means is a range of editing and graphics products, which scale for capabilities, speed and power.

What do broadcasters expect from newsroom technology today?

Their number one concern is scalability, and the ability to address all markets with the same technology. They're also looking for standard platforms, interconnectivity, and standard file formats such as AAF, MXF and MOS. Another recurring theme is archiving—interconnectivity and compatibility between video, archiving and live productions systems are all very important.

How has the move to video servers and digital storage impacted the newsroom?

It has streamlined operations and reduced headcount. In terms of editing, the skill base to perform most of the editing for news broadcasting is now very accessible to most broadcast professionals, whether they're producers, journalists or even managers. All of these factors lead to dramatic cost reductions. Servers have also made news more immediate. News, by definition, is only relevant when it's new.

What is Quantel doing to address its customers' interoperability needs?

Like most manufacturers, we support standards such as MXF, because of overwhelming demand by our customers.

THE CNN NEWSOURCE USER'S GUIDE TO FITNESS

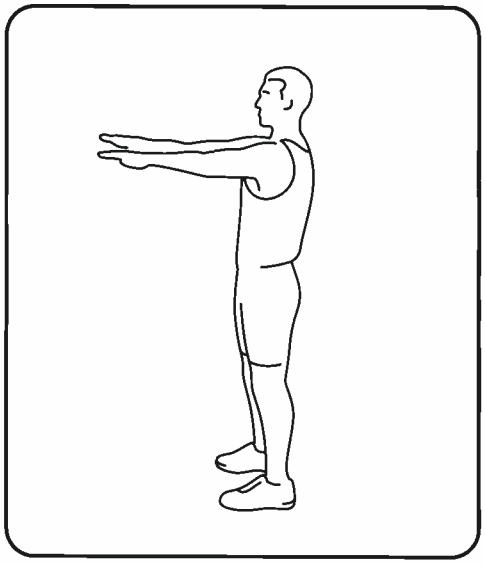

Figure 1

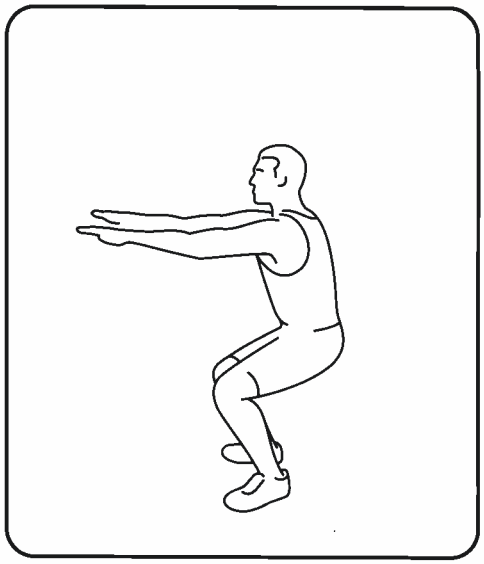

Figure 2

EXERCISE #1 – THE SQUAT

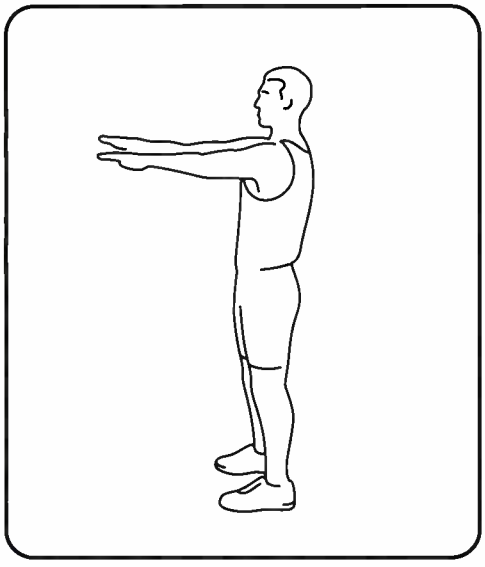

Figure 3

This simple diagram illustrates an important technique in preventing the inevitable side-effects of using Pathfire™ to access your CNN Newsource material.

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CNN NEWSOURCE

PVTV
By ParkerVision

Newsroom Spotlight

WAWS-TV, WTEV-TV

Jacksonville, FL.

Two is better than one for Clear Channel, as two of its stations, WAWS-TV and WTEV-TV Jacksonville, Fla. recently added a ParkerVision Dual PVTV NEWS 24 Plus! production automation system to expand and streamline operations.

"Our overall objective at Clear Channel Television Jacksonville was to expand our news operations to include more local news within a faster-paced environment," says Susan Adams-Loyd, vice president and general manager, WTEV-TV and WAWS-TV.

The stations' conventional setup was limited by legacy equipment, staff size and operating budgets. Adams-Loyd says the most logical choice was to automate the control room to enhance the quality and quantity of the news, while simultaneously reducing operational costs. With PVTV NEWS in place, news production has expanded from 22 hours per week to 32 hours between the two stations.

PVTV NEWS system allowed the stations to automate the playout-to-air and control of all MC room devices used in traditional news broadcasts. The system completes a digital rollout that began several years ago with the installation of a Philips automation system for master control, DVCPRO tape machines, and a digital router.

"Our newly branded newscast, is a much faster-paced newscast with a higher story count and improved content, says Adams-Loyd. The reallocation of production personnel to an emphasis on content creation has had a tremendous effect on this news hour.

"PVTV NEWS has infinite possibilities, and we want to utilize as much of those capabilities as we can," she says.

Andy Quinn, Director at WAWS and WTEV, prepares a newscast using PVTV NEWS 24 Plus!.

Thomas F. McGowan
ParkerVision
Vice President of
Sales & Marketing
Video Business Unit

What are some recent developments in news technology from ParkerVision?

Recent developments include enhanced audio under full automation control with the ability to take manual control at any time and a rundown converter, which allows automated conversion of the rundown into PVTV NEWS. Other developments include enhanced late breaking news ability and scalable systems from 8 to 56 inputs, with multiple layers of keys in the double digits.

What do broadcasters expect from newsroom technology today?

Broadcasters expect more from their control room technology in terms of measurable ROI. Their desire to promote or brand their station, while ensuring the quality of the content delivered to the viewer, is paramount. Additionally, they expect to be able to add newscasts to their schedule without increasing costs.

How has the move to video servers and digital storage impacted the newsroom?

Servers allow the broadcaster to access content reliably, and, in most cases, increase the story count. Spooling tapes add complexity and unreliability to that process. Digital storage offers tremendous benefits in terms of access.

What is ParkerVision doing to address its customers' interoperability needs?

Interoperability is the key to success for any vendor. ParkerVision has and will continue to foster relationships with other equipment manufacturers that supply equipment to our customers and prospects, some of who blend the line between the end-to-end workflow of the newsroom.

Before you sign the check, check the list.

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Totally scalable Integrated digital broadcast production, from a local studio to an international production center. The technology expands as your business develops, with no limits on ports, storage or workstations.	✓
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Industry-wide partnerships Strategic relationships with broadcast manufacturers across the industry: newsrooms, automation, asset management, acquisition, archiving, system integration.	✓
Broadcast experience More installed systems than anyone else, operating 24/7 around the world. Total involvement throughout the project: from consultation, to planning, installation, training and implementation.	✓

generationQ > the future of news, live production, editing and graphics

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Tektronix
MTM400 MPEG transport stream monitor

BY MARK BARNES

As the number of services being distributed around the world increases, the need to monitor the MPEG transport streams being transmitted becomes ever more important.

The current trend in digital broadcast network architecture is toward a highly centralized model, with content scheduled and played out from one or more main hubs and distributed over contribution network feeds to regional or local stations. These sites are typically manned by a skeleton staff who very often do not have the time or the expertise necessary to monitor and diagnose faults in the transmission chain. In addition, transmitter sites are often completely unmanned. A centralized, Web-based monitoring solution enables the playout center or hub to monitor the entire transmission network from content generation and encoding to final modulation and transmission.

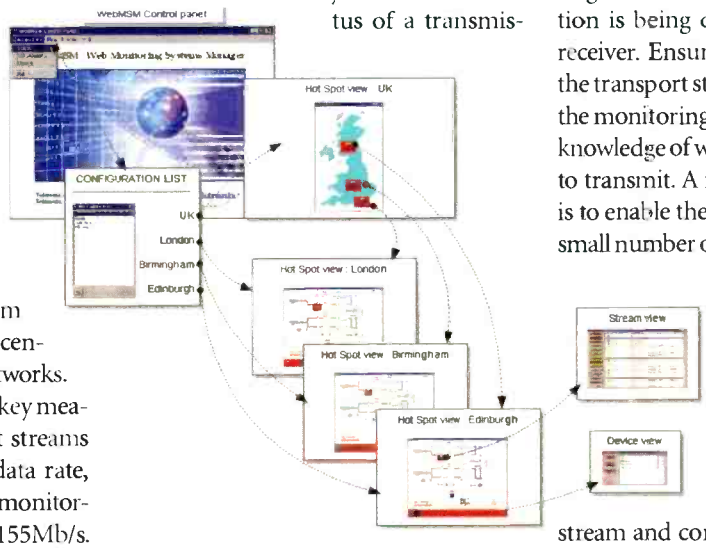
Monitoring instruments are needed that can detect impairments before they impact quality. The Tektronix MTM400 is a real-time MPEG transport stream monitor designed for use in centralized digital transmission networks. One rack unit high, it provides key measurements to ensure transport streams are error free, provides high data rate, and provides full TR101 290 monitoring of a single stream at up to 155Mb/s.

As a confidence monitor, the MTM provides the key MPEG tests. Diagnostic monitoring software options provide more in-depth analysis of the MPEG transport stream including recording capability; PSI, SI, PSIP and ARIB analysis and graphing; in-depth PCR timing analysis and graphing; bit rate testing; service logging; and service plan or template tests. Deployed at key network nodes, the system equipped as a diagnostic monitor can pinpoint the cause of faults and solve them from the central hub.

Together with WebMSM MPEG measurement manager remote control and monitoring software, the MTM400 provides a complete solution for transmission monitoring of MPEG transport streams. The WebMSM monitoring manager is an installable Java application that enables complete visibility of the error status of a transmission network from a standard Web browser. A network manager is able to build up geographical maps showing the location and status of his monitoring network, as well as mimic diagrams of the transmission network. When a fault occurs, the corresponding monitoring point is highlighted in red, enabling the network manager to drill down to the individual monitor and determine the nature of the fault. The management software can be used to manage a mixed network of confidence and diagnostic monitors.

The MTM400 ensures right content at the right place at the right time.

However, simply monitoring the syntax of an MPEG transport stream according to test standards is not enough to guarantee that the correct information is being delivered to the viewer's receiver. Ensuring that the contents of the transport stream are correct requires the monitoring equipment to have prior knowledge of what the broadcaster plans to transmit. A method of achieving this is to enable the broadcaster to identify a small number of key parameters that can be used to verify the contents of the transport stream. These parameters form a service plan template. The monitoring equipment extracts the actual values from the transport stream and compares them against this template, indicating when a discrepancy occurs. This user-defined checking option enables verification that the correct content is being transmitted. BE



Tektronix WebMSM monitoring software shows a geographical overview of potential problem spots, as well as providing the ability to drill down to the details of the problem.

Mark Barnes is an MPEG product manager at Tektronix.

NEW PRODUCTS & REVIEWS

Television on demand from Sun Microsystems

BY ROB GLIDDEN

TV, as we know it, is rapidly evolving in countries worldwide and in your very own neighborhood. Indeed, there is a global transformation of television underway toward an on-demand, interactive services model. This model comprises several elements:

Interactive TV: Already, tens of millions of households worldwide are receiving interactive TV services, and interactive services have become a near-universal component in new television network infrastructures around the world.

Video on demand: Rapidly moving from a multi-year trial period, video-on-demand services have progressed to a deployment phase in the United States and elsewhere. Driven by price-per-stream economics and internetwork competition between cable, satellite and even broadband IP networks, VOD services are finally seeing their day.

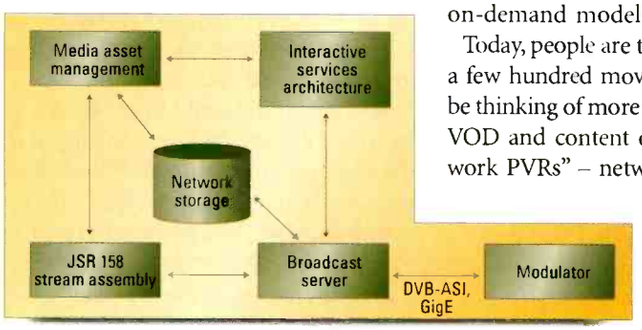


Figure 1. To implement a services architecture that will enable deployment of an on-demand infrastructure, it is essential to examine how the basic system functionalities will best interconnect as components.

Video networking: Video itself is becoming a service, with the ability to build, transform and splice the digital video signal in the network itself.

Three fundamentals point the way to realizing the potential of TV services:

- a foundation that addresses the core on-demand value proposition with the dynamics of volume computing
- an infrastructure based on an open systems environment of multi-vendor standards
- an ecosystem leveraging a services-on-demand architecture

VOD services are finally seeing their day.

The on-demand value proposition

Price-per-stream economics is the underlying deployment driver of the on-demand model.

Today, people are thinking in terms of a few hundred movies; soon, they will be thinking of more varied subscription VOD and content offerings and "network PVRs" – network-based services that record TV once on the backend for all subscribers on the network, rather than requiring each to separately record locally.

Core drivers for the dynamics of price-per-stream economics are volume network interfaces like Gigabit Ethernet, which is rapidly becoming the input interface for a new generation of GigE QAMs for on-demand video delivery.

Building the open systems environment

Just as the dynamics of volume computing provide the foundation for on-demand opportunity, the philosophy and practice of open systems provides the infrastructure. (See Figure 1.)

An open systems environment encompasses layers of standards, each addressing different functional aspects of the distribution and business process value chains. A few of the standards-related activities of particular relevance to building out open, multi-vendor on-demand opportunities include:

- DVB-MHP and Java technology-based ITV
- Interactive Services Architecture (ISA)
- Java Specification Request 158

Finally, upon a volume foundation and an open-systems infrastructure, an ecosystem can emerge of service providers, content providers, equipment vendors and operators. It will likely have elements of appliantization, i.e., productized solutions with open interfaces that are ready to deploy and minimize systems integration and deployment risk, and services on demand, like the Web services enabled by the Sun ONE architecture. BE

Rob Glidden is market development manager of broadband and digital media for Sun Microsystems.

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FOX Sports
covers NASCAR with Chyron

BY CLARK PIERCE

The broadcast production requirements for NASCAR coverage are almost as grueling as what the drivers themselves have to go through. Remote crews cover and produce nearly 80 races and shows over the first half of the season, hop from venue to venue, and provide viewers with on-air graphics that match the fast pace and excitement of the actual races.

In preparation for the 2001 season, research showed that fans identify with the car number and paint scheme of their favorite driver. With this in mind, FOX Sports set out to brand each driver and crew member with the colors and car number of their team, resulting in the on-air look that viewers now see. The need to brand these teams created a lot of graphic challenges, since the iNFiNiT! used for character generation is limited in key caps and font memory. With nearly 100 races to cover, a reliable, fast and flexible system was needed.

That's why FOX Sports recently upgraded its character generation capabilities for NASCAR coverage with the addition of two Duet graphics and animation systems from Chyron, each loaded with Lyric software. The systems were installed in a FOX remote truck used to cover the NASCAR circuit.

Overall, about 90 percent of FOX's NASCAR remote programming is done on a Duet. The one exception is on the few weekends throughout the year when Winston and Busch races are held at separate tracks. In those cases, the iNFiNiT! will be used for Busch races, so the new animation systems are available for the bigger TV draw.

The images being used to build pages are assets of a database, not images from a font load.

The network has already begun to realize benefits since the systems' installation in February. Moving to the Duet has streamlined workflow from concept and design to air. With the new system, operators are able to animate pages back-to-back while working on other pages, go from one network look to another, attach audio files to clips, and seamlessly interface with pages from outside data sources. The system combines the power of Lyric — which gives the operator more flexibility in building, manipulating, and updating text and object animations — with an internal clip player using a dynamic timeline-controlled mixer.

Another benefit of the system is that it provides much simpler asset management because it's a Windows-based machine. The images being used to build pages are assets of a database, not images from a font load. Graphics can now be organized in a logical folder system, which is virtually unlimited, unlike the limiting font load/key cap system traditionally used.

Operators have found that, during a broadcast, the operation of the new system is very similar to the iNFiNiT!, making the transition an easy one. In pre-production the new animation system has given the operator many more tools to work with to quickly satisfy a lot of production needs onsite. The system saves time, and has saved the network a significant amount of money usually spent on media. In addition, we have utilized a T1 network between our studios and the remote site each weekend, transferring Lyric messages and driver/team assets to the remote on an as-needed basis, even when on the air.

Looking down the road, we will keep giving the system more responsibilities, and take the asset and database functions to the next level by automating more graphics and replacing a data download with a database living within Lyric. We are also excited about the recent addition of Lyric plug-ins and have plans to utilize this architecture in the near future. BE

FOX Sports has moved to Chyron's Duet with Lyric software to create animations like the one shown above for about 90 percent of its NASCAR coverage.

Clark Pierce is director of remote graphic production at FOX SportsGraphics.

WALA-TV gets creative with digital microwave

BY JOHNNY REECE

WALA-TV, located in Mobile, AL, has been in the midst of a digital upgrade, as well as managing the logistics of moving the studio to a new location.

RF link

The upgrade presented a unique set of challenges. WALA had existing STL antennas, but had to make adjustments for the new location. This required a complete path study on the new location. All the path profile and system reliability calculations were done by the Microwave Radio Communications systems engineering group.

Today, WALA's STL/TSL includes hot standby and space diversity features. The single STL now uses a dual waveguide switch arrangement through the addition of a second STL transmit antenna and two hot standby transmitters each going into a different antenna. The primary STL antenna is connected to the "A" TwinStream transmitter, and the second STL transmit antenna is connected to the "B", or backup TwinStream transmitter. The A transmitter remains online during normal operation with the B transmitter feeding a dummy load. In the event of an alarm on transmitter A, the A transmitter will switch to a dummy load and the B transmitter will become active through the secondary STL antenna.

The righthand rack was customized by Microwave Radio Communications to provide WALA's STL/TSL with hot standby and space diversity features.

MRC recommended a space diversity receive system at WALA's tall tower STL receive site. This system provides both antenna and transmission line redundancy. The space diversity configuration also provides "five 9s" (99.999%) of digital system reliability.

Making adjustments to WALA's existing STL antennas required a complete path study on the new location.

System components

The STL consists of a dual RF carrier system with the NTSC analog and ATSC digital signals fed to their respective transmitters, but using the same 25MHz channel. The digital signal is a direct SMPTE 310M connection from the receiver to the digital 8-VSB exciter. Two backhaul microwaves on separate frequencies are used to bring ENG feeds back to the studio and to monitor the signal from the transmitters.

As an added benefit, MRC's TwinStream incorporates T1 onto the microwave. WALA is using part of the T1 capacity for eight channels of four-wire telemetry to and from the transmitter. This provides for off-premises telephone service and Internet connectivity through a LAN/WAN Ethernet connection. The transmitter site can become a hub for monitoring other equipment over the LAN.

ENG backhaul and inter-city relay

WALA uses MRC 13GHz equipment for ENG feeds. One IRC camera feeds a short-haul microwave mounted atop the mast of the USS Alabama battleship, 196 feet above the water. The other camera is on the roof of a hotel, along an ENG pickup. The ENG system can backhaul to the studio using two channels at 13GHz. This enables us to bring back video from the cameras and the ENG feed on the MRC 13GHz radios. **BE**

Johnny Reece is chief engineer at WALA-TV.

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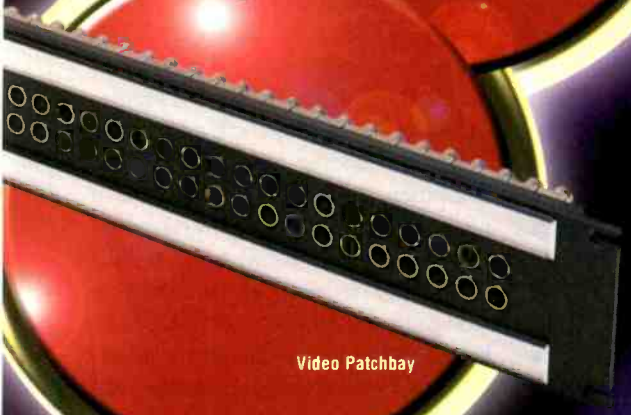

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Embedded audio interfaces

BY JOHN LUFF

Most consumers don't think of television as separate pictures and sound. Until the advent of home recording, few had any experience with either audio or video cabling. When hooking up a new TV set, all they had to do was use simple RF connections. If only things were that simple today, either at home or in the professional domain.

Today, consumers are fortunate enough to have an interface for home camcorders (at least when using DV devices) that is shared with professionals. But there are a number of methodologies involved in interconnecting other devices, like VHS recorders and DTV receivers.

Fortunately, in the professional arena we have a small universe of general-use interconnection standards. We have good old analog composite video on coax and with it analog audio on twisted pair. In the digital domain we usually see SMPTE 259M-1997 (most commonly 270Mb/s), and AES3 (coax and twisted-pair bearers). Though SMPTE 259M was extended many years ago to allow the addition of audio and data carriage along with the picture, for many years the equipment was simply too expensive and the savings too elusive for embedded audio to catch on in general use.

The standard for embedded audio is contained in SMPTE 272M-1994. The standard supports sampling rates from 32kHz to 48kHz (and the NTSC variants at 0.1 percent lower sampling rates). Multiple pairs can be embedded. For component video, the standard allows data rates up to 270Mb/s. Thus, a single component-video connection can carry up to eight channel pairs, or 16 audio signals. The standard can embed the entire AES stream, allowing for the use of data over AES. An example is compressed audio like Dolby AC3 and Dolby E. Using Dolby E, one could construct a single service with up to 64 channels of audio. This has practical, real-world applications in international work, where multiple languages might be required on one program.

For many years the equipment was simply too expensive and the savings too elusive for embedded audio to catch on in general use.

Embedded audio products ranging from a basic, modular analog audio multiplexer/embedder to a sophisticated, standalone digital processing synchronizer can be seen in this photo of the demo master control room at Leitch's European office in Bracknell, England.

But, anything elegant comes with some degree of difficulty. The process of multiplexing the audio, presenting it to the SMPTE 259M encoder, formatting it as H-ANC data, and outputting the composited signal takes more time than a process without modification to the stream. If one were to strip audio, process it and try to replace it, the delay in the de-embed/re-embed process would make the audio data no longer synchronous with the original picture.

If you add any additional delay to the audio signal, the problem accumulates. For instance, if the audio demuxed is Dolby E, you must add the delay of the decompression, and presumably re-compression, before adding the audio back into the completed video/audio signal. The picture will also be early, and will need to be delayed by a matching amount. If the delay was less than a line it might not be much of an issue, but it can easily accumulate to a field, making synchronization a major issue. If the extracted AES is Dolby E, the process adds at least a frame for each cycle.

Generally, muxing and demuxing audio requires AES audio infrastructure. If the facility contains analog signals as well, supporting embedded audio may offer little economic advantage since all three types of audio (analog, AES and embedded) might be required. Fortunately, some manufacturers recognize the serious nature of the problem and design embedding and disembedding equipment with analog-audio (and, of course, digital-video) interfaces.

So why use embedded audio at all if the costs and technical complications are so significant? Some types of facilities lend themselves to simultaneous audio and video routing decisions. One

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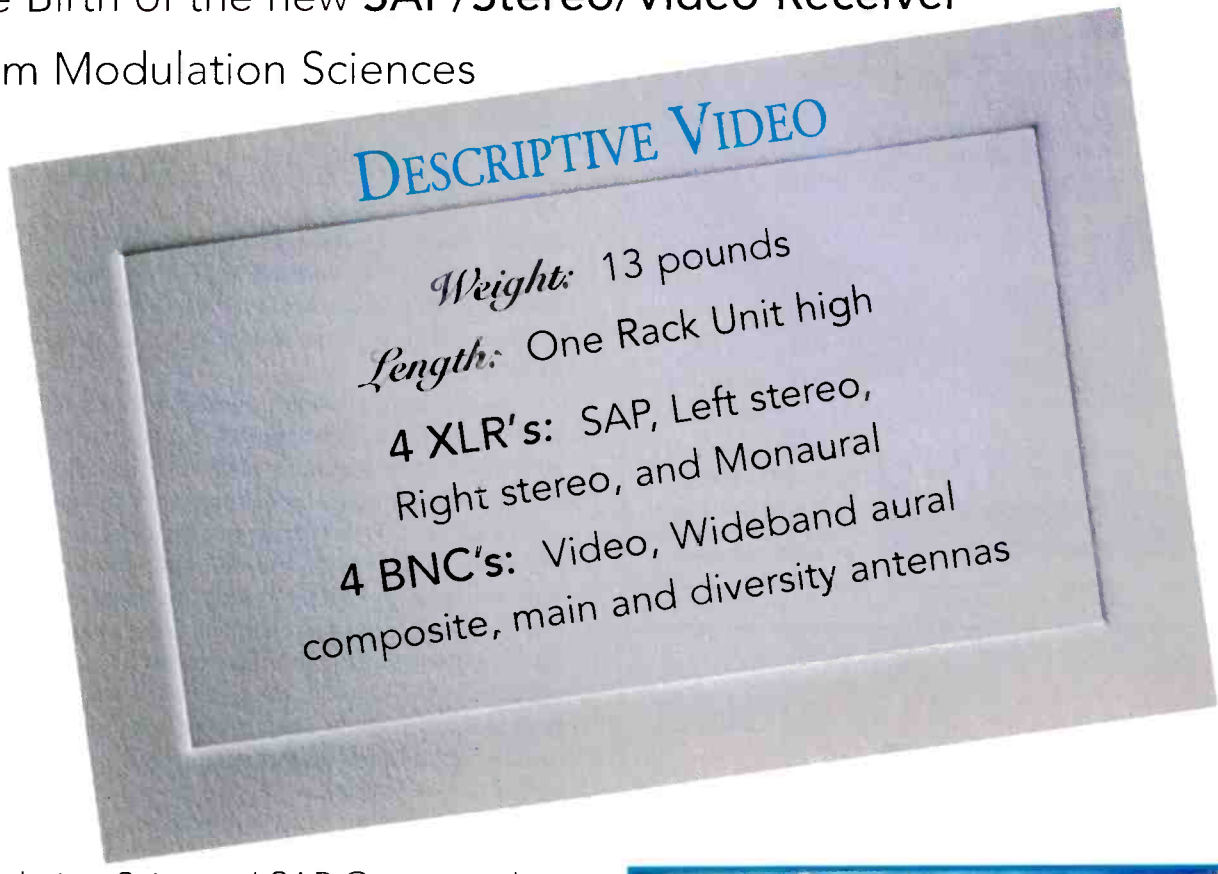

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example is a distribution facility where most of the processes handle audio and video at the same time. An example might be an MPEG encoder used to backhaul programming over long distances. In a case like this, having a single interface ensures that all program elements are delivered at the destination without having to switch on multiple levels. In such a

Why use embedded audio at all if the costs and technical complications are so significant?

facility, the digital-video router can handle most, if not all, distribution without an audio level at all. This reduces the cost of a modest facility by at least five figures, and perhaps as much as six figures. At the same time, it reduces the complexity of the facility.

In such a case, a modest number of mux and demux channels might be interconnected in a small AES matrix with the minimum number of processing devices. A path-finding system would allow simple operator-interface design, with virtual matrices appearing to be discrete levels of routing. The operator may not even know that there is only one primary level of routing, even when making decisions about rerouting channels (pair swaps, and left/right swaps within a pair). The key to making this work effectively is to map out the potential delays required to keep video and audio synchronous, and then set up the routing tables to put appropriate delay in when each potential path is selected.

A facility that is primarily a production plant, especially one where the audio is highly likely to be processed separately from picture, seems an unlikely candidate for embedded audio. A satellite record area within a station may be quite the opposite, with most digital VTRs designed to accept digital audio at the input. In an HDTV facility, embedding all three AES tracks necessary to produce in 5.1 surround sound will ensure that differential delay between tracks does not accumulate when signals are routed between functional parts of the facility.

The case for embedded audio is complex. A decision to implement must be carefully researched and engineered. There are significant operational advantages in some cases, and disadvantages in others, that must be vetted and understood. Once you have decided which road to take, be thorough in evaluating all manufacturers' hardware. The number of options has grown significantly in the last five years, and a full spectrum of choices is now available. BE

John Luff is senior vice president of business development at AZCAR. To reach him, visit www.azcar.com.

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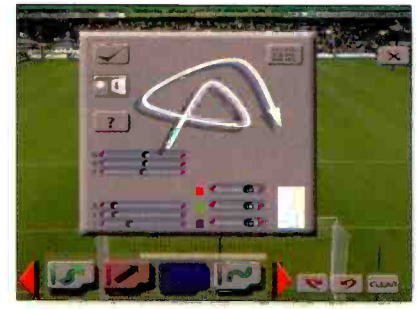

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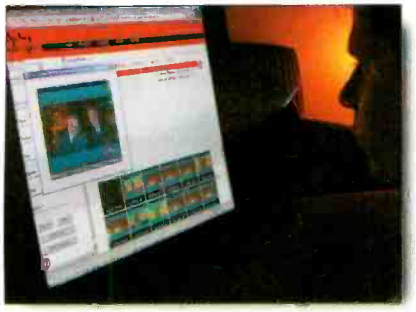
www.e-mediavision.com

DIGITAL ASSET MANAGEMENT SYSTEM



Ancept Media Server: provides centralized repository for high-res video; allows TV editors to search, browse, and instantly view and edit video frame-accurately from a Web-based interface; allows exchange of content between repository and NLE, playout and automation systems; is integrated with encoding, transcoding and indexing tools such as Telestream and Virage; is integrated with storage and file system technology to handle extremely high volume and simultaneous access to content from multiple systems.

612-677-1385; www.Ancept.com

PREVENTATIVE MONITORING SOLUTION

Pixelmetrix DV-Station Pod-Remote: smaller version of the flagship DVStation; consists of from one to four book-sized Pod modules and a single 1U rack-mounted remote controller; operated through a LAN or dial-up telephone.

954-472-5445; www.pixelmetrix.com

MODULATOR

TANDBERG Television integrated L-Band output: is offered within the TANDBERG Voyager E5740 DSNG unit; allows integration of communications within the main satellite link; saves rack space; uses low-cost block upconverters; simplifies control; Voyager E5740 DSNG includes a low symbol rate option.

407-380-7055; www.tandbergtv.com

MASTER CONTROL PANEL

Quartz FS panel: buttons display dynamic text and graphics information; high-resolution shaft encoders allow for adjustment of all analog parameters and a leer-arm permits true manual operation for live events; panel may be combined with the existing modular range of panels and can mix dedicated and delegated panels to be used in multichannel systems; allows QMC to scale from single-channel analog replacement situations, all the way up to complex multichannel digital networks.

888-638-8745; www.quartzus.com

BACKUP SWITCHER

Axon PBS02: two-channel backup switcher prevents transmission interruption by sending out a warning signal and automatically switching over to the backup channel; has two digital serial component inputs and two SDI outputs; monitors passively; card includes different switch options.

888-919-9379; www.axon.tv

INTEGRATED NEWS PRODUCTION SYSTEM

Panasonic, Dalet network DV: system integrates Panasonic DV camcorders with Dalet's newsroom and asset management system; video is stored centrally and shared across a Gigabit Ethernet network for simultaneous recording, editing and playback without disruption; a central server gives access to all video material from any workstation; browse, make shot selections and edit footage from any computer.

Panasonic: 800-528-8601; www.panasonic.com/broadcast
Dalet: 212-825-3322; www.dalet.com

ENHANCED MULTIPLEXER

Harmonic MN20: MN20 can now multiplex MPEG-2 content and data for transport/distribution across an IP network; the new Ethernet Output Module encapsulates the MPEG-2 stream into IP packets, which are then transmitted via IP unicast or IP multicast; supports a wide range of input and output network interfaces, allowing integration with transports such as ASI, ATM and IP/Ethernet.

972-348-5100; www.harmonic.com

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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

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5 Which of the following types of equipment will you be evaluating for purchase in the next 12 months? (Check ALL that apply.)

1. Audio Products
1A ❑ Audio consoles/mixers
1B ❑ Digital audio workstations
1C ❑ Distribution amplifiers
1D ❑ Headphones, headsets, intercoms
1E ❑ Telephone interface systems
1F ❑ Magnetic tape, audio
1G ❑ Microphones
1L ❑ Monitors (speakers)
1J ❑ Recorders, players
1K ❑ Switchers, routing
1N ❑ Audio Processing

2. Video Products
2A ❑ Camera heads, tripods, pedestals, booms, dollies
2B ❑ Cameras; lenses
2C ❑ Graphics, titling, effects
2D ❑ Nonlinear editing systems
2F ❑ Editing controllers, systems
2G ❑ Frame synchronizers, time base correctors
2H ❑ Lighting systems
2T ❑ Magnetic tape, video
2J ❑ Monitors (picture, studio quality)
2K ❑ Recorders, players
2L ❑ Robotic camera controls
2M ❑ Signal processing
2N ❑ Signal routing, distribution
2W ❑ Standards, format & scan converters
2P ❑ Still store systems
2Q ❑ Switchers, production/master control
2R ❑ Storage/video servers
2S ❑ HDTV Equipment
2V ❑ Virtual Sets
2X ❑ MPEG compression/encoding systems
2Y ❑ Projection systems
2Z ❑ DVD systems

3. Test & Measurement Products
3A ❑ Analyzers, audio, video, RF
3B ❑ Audio, video signal generators
3C ❑ Waveform, vectorscope monitors
3D ❑ Digital signal testing

4. Miscellaneous Products
4A ❑ Battery packs, chargers
4B ❑ Cabinets, racks, consoles
4C ❑ Cables, connectors
4D ❑ Carts, cases (equipment, shipping), tools

5. RF Products
5B ❑ Exciters
5C ❑ Fiber optics
5E ❑ Power amplifiers, cavities
5F ❑ Receivers
5G ❑ Remote production vehicles, program relays
5H ❑ Satellite T/R components, electronics
5P ❑ STL/ENG components, electronics
5J ❑ Switches, RF coaxial
5K ❑ Transmitters
5L ❑ Antenna systems, towers
5M ❑ Transmitter, remote controls
5N ❑ Tubes
5Q ❑ Weather, radar RF products
5R ❑ Cable/set top/CA systems

6. Automation & Computer Products
6A ❑ Accessories/peripherals
6E ❑ Automation systems
6H ❑ Business automation
6T ❑ Commercial insertion systems
6K ❑ Machine control
6L ❑ Newsroom automation
6P ❑ Record/playback automation
6Q ❑ Software, engineering
6R ❑ Software, production, planning
6X ❑ Video interface cards
6Y ❑ Networking products
6Z ❑ Digital asset management

7. New Media/Internet
7A ❑ Encoding products
7B ❑ Internet service providers
7C ❑ ecommerce technology
7D ❑ Content creation systems

8. ❑ System integration/engineering services

9. ❑ 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.)

1 ☐ Less than $24,999
3 ☐ $25,000 - $99,999
5 ☐ $100,000 - $299,999
6 ☐ $300,000 - $499,999
7 ☐ $500,000 - $999,999
8 ☐ $1,000,000 - $1,999,999
9 ☐ $2,000,000 and up

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Lectrosonics Digital Hybrid Wireless: combines digital audio with an analog-type radio link; includes full bandwidth audio frequency responses up to 20kHz with the absence of a compandor and its artifacts; special analog type of modulation is used for the RF link to lower the spectral noise and improve compatibility when multiple systems are operated simultaneously.

505-892-4501; www.lectrosonics.com

DIGITAL WAVEFORM MONITOR

OmniTek OmniView: operates in the RGB or YUV domain; has a built-in test generator for comparison of output image data with internally generated reference images; pixel data can be analyzed against a reference signal and/or displayed in graphical or tabular format; enables checking of input color gamut and the display of illegal value areas; provides CRC, TRS and EDH error checking; supports multichannel embedded audio level and status display.

+44 1256 881 110; www.omnitek.tv

ZOOM LENS

Canon Digi Super 100xs: incorporates Canon's Image Stabilizer technology; includes a speed of F/1.7, weighs 50.18 lbs.; provides viewers with shake-free images; zoom range is from wide angle to telephoto; focal length is 9.3~930mm.

516-328-5000; www.canonbroadcast.com

MONITOR AND MEASUREMENT TOOL FOR WINDOWS

Hamlet VidScope: provides a mean to waveform monitor and vectorscope, but displayed on the PC's monitor screen; looks and behaves like a conventional CRT scope; displays from one line to full frame in real-time; runs on desktop or laptop; has a preview monitor window.

+44 (0)1202 653 016; www.hamlet.co.uk

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ARE YOU RETIRING YOUR REMOTE PRODUCTION VEHICLE? The Broadcast Media Department at San Juan Basin Technical School needs your help! We currently operate a low power TV station and are looking to expand our curriculum to offer multi-camera live remote production. We've got the equipment, but not the vehicle. If you are interested in donating one, please contact Chris Bartch at: cbartch@sjbts.cortez.co.us

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Small, family owned company seeks to buy used ENG van or smaller production truck (<20 ft). Prefer vehicle equipment with a mast and genset, no electronics wanted. All vehicles and conditions considered. (847) 530-8238.

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The flashing cookies

BY PAUL MCGOLDRICK

Corporate messages are an important way of developing a brand. A consistent story makes the company believable and gives potential customers a positive feeling for the survival strengths of the company they are about to hand money over to. I once worked for a company that had a 24-hour phone support system. Many a time we got calls about problems on other people's equipment simply because we were providing one of the only telephone numbers where a near-desperate operator could talk to a broadcast engineer. None of our customers doubted our survivability.

Maybe you don't think you have a 24-hour service support operation, but I would bet you do. It's called your Web site. It does more to tell a customer about your company than most of the collateral material you provide, and it does so quietly – and with no opportunity for an employee to correct any mistaken impressions that a customer might make.

I recently spent a few quiet hours visiting the Web sites of many of the equipment manufacturers in the broadcast business and, quite frankly, it is not that pretty of a picture. The Internet is a marvelous medium for getting information out, and many companies provide that information in impressive ways. But the Web should be no different from any other medium used by a company: It should be there to sell product. Selling is a very emotional process and it is people who buy things, not companies. You, therefore, provoke a customer at your peril, and if you provide enough emotional negatives, your salespeople don't stand a chance at converting an inquiry into a purchase order.

People understand that on a personal sales level, but those people are not the ones who put the company's Web site together. Too often the people who do are after glitz and technology just for the sake of technology. The Web is a wonderfully flat playing field, unless you make mistakes.

The simplest and most important starting point is loading time. If a site takes more than a couple of seconds to load on a DSL connection, I am generally out of there. If it takes more than 45 seconds to load – and we have them in the industry – the site is out of control.

Well over a third of the companies in our space are using Flash on the front page of their sites. Apart from being garish, it says that the company has an ego that it wants to bare to the world to show how wonderful technology is; it also means that the customer has to "Enter" the site beyond the annoying opener. What the customer wants is to get product information as quickly as possible. If you want me to register to get to the meat then you better have software clever enough to determine that I didn't sign in as "Mickey@Mouse.com" again.

You also need your Web people to understand the nature of the customer that the company deals with. Most engineers are pretty careful about their personal information and we are mostly lurkers, unless we are talking to other engineers. If a survey were taken, I would expect to find that the majority of us have cookies disabled on our browsers – but about half of the sites I went to wanted to set at least one cookie, with some wanting to set more. The winner was a major company that asked me twenty-three times to accept cookies before allowing me to browse its product portfolio. Why?

I found a company with a non-operational navigation bar, another that had an invalid URL in a product advertisement, one that capitalized a URL leading to a "page not found" message, and one that had a front page of 253K! If you like being greeted with credit card logos, there is one of those, too – or maybe you would prefer the rather obvious message, "You have found us."

The Web is a wonderfully flat playing field, unless you make mistakes.

Finally, many denizens of cyberspace do use Internet Explorer as their browser, but I have found that engineers as a class prefer Netscape, often simply because it's not produced by Bill. So what do you think of a major Japanese supplier whose front page loads empty in Netscape? The real gem is a test and measurement company that doesn't bring up the usual blank page when a site is incompatible with Netscape, but instead (on DSL, yet) takes over two painful minutes to load a page occupied by broken graphics.

I know what kind of corporate brand/message that leaves me with. How about you? E-mail and point me toward the broadcast industry sites you love...or love to hate. Either I'll give the good ones equal time, or there may be a Part II "under construction." BE

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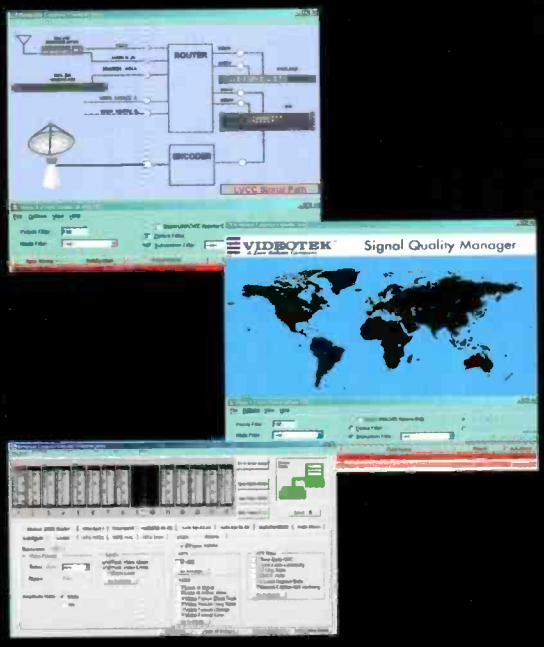

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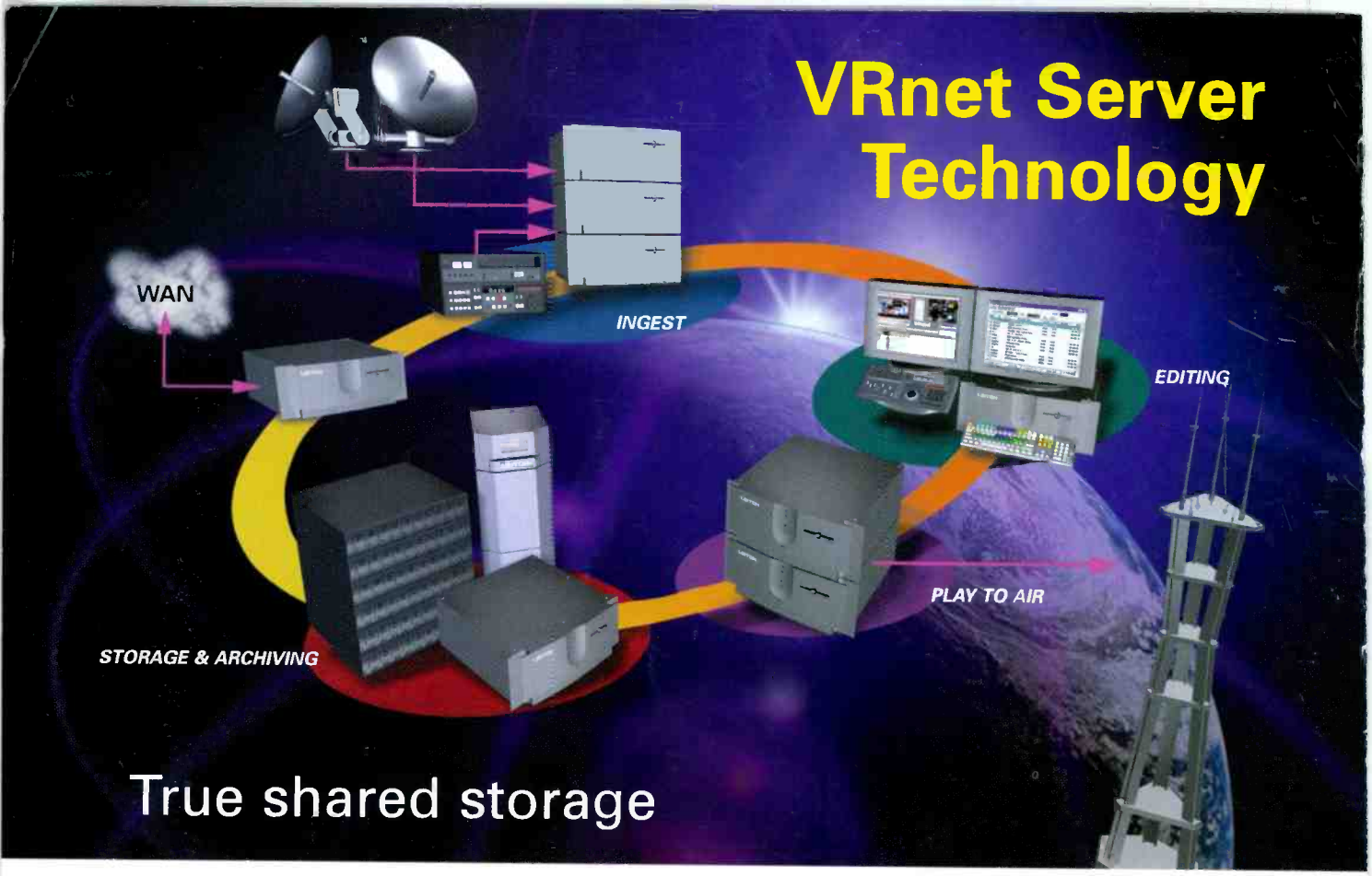

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