JUNE 2007

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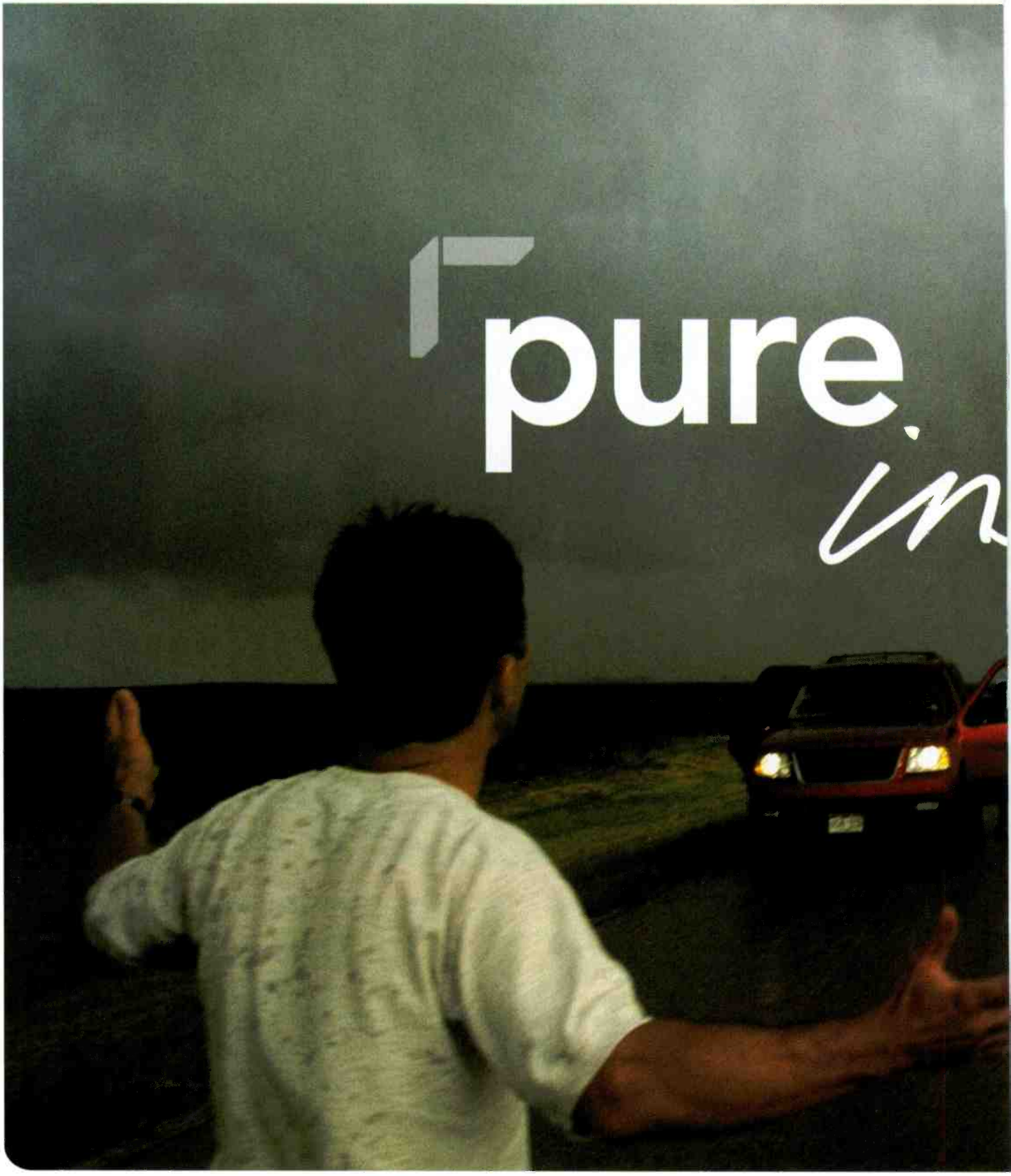

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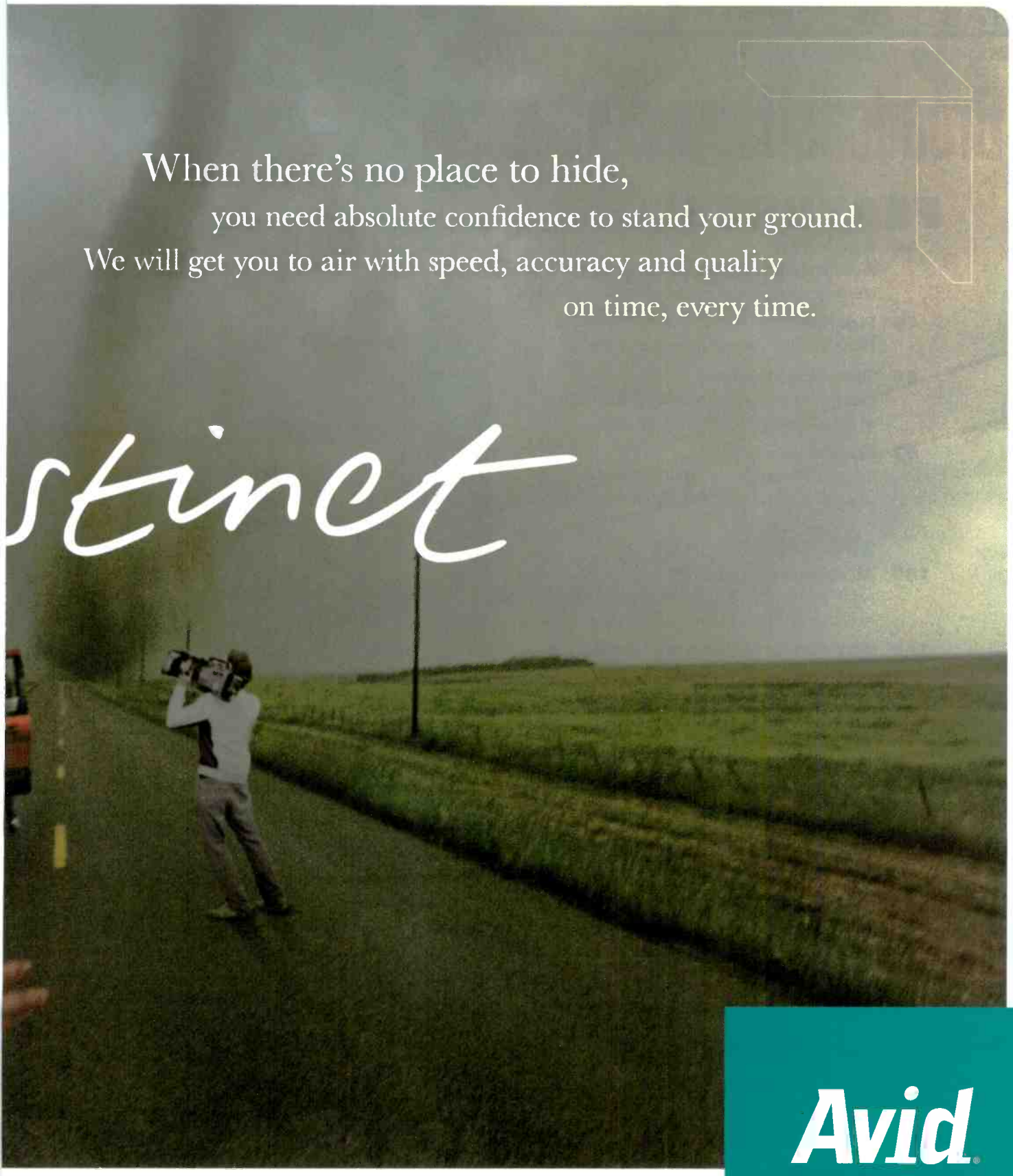
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Broadcast Engineering®

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BEYOND THE HEADLINES

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FCC UPDATE

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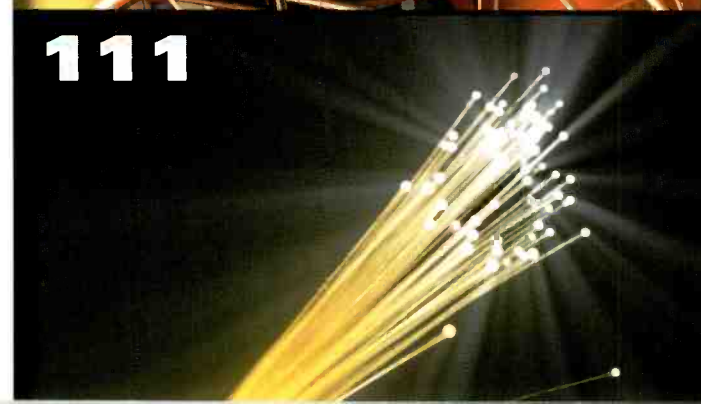
THIS MONTH'S FREEZEFRAME QUESTION

How's your IPTV quotient? Define the following acronyms as they relate to IPTV technology. Keep your answers short.

IPTV, CLEC, FTTP, FTTC, HDCP, EPON and DMIF

One correct entry will be selected to receive a copy of the new book "IPTV Crash Course" by Tom Newberry and Joseph Weber, Ph.D. This book is available from McGraw-Hill or your favorite book seller. Enter by e-mail. Title your entry "Freezeframe-June" in the subject field, and send it to: editor@broadcastengineering.com. Only those entries complete with a return mailing address will be eligible for the drawing. Entries must be received by Aug. 1, 2007.

ON THE COVER:
With more than 108,00[illegible] attendees, NAB2007 was a success. Photo by Doug Schwartz.



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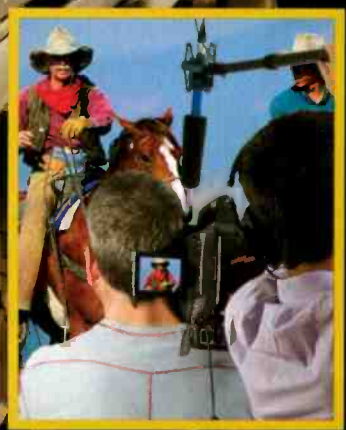

3.5" LCD monitor at rear facilitates audio monitoring

P2HD when it counts

Panasonic ideas for life

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DIGITAL HANDBOOK

TRANSITION TO DIGITAL

COMPUTERS & NETWORKS

PRODUCTION CLIPS

SYSTEMS INTEGRATION

TRANSMISSION & DISTRIBUTION

NEW PRODUCTS & REVIEWS

APPLIED TECHNOLOGY

TECHNOLOGY IN TRANSITION

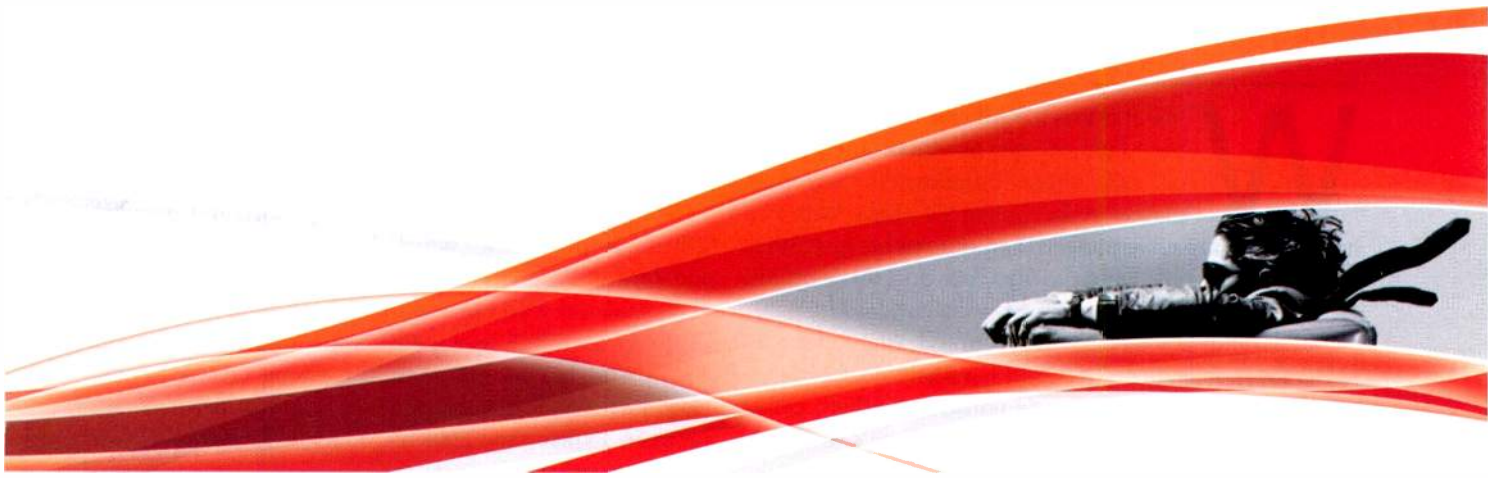
DEPARTMENTS

JANUARY'S FREEZEFRAME ANSWER

Match the RAID level with the correct definition. Answers can be found on page 237 of "Digital Asset Management" by David Austerberry, *Broadcast Engineering* world edition editor.

RAID LEVELS	DEFINITION
RAID 0	Nonredundant
RAID 1	Mirrored
RAID 2	ECC Hamming Code
RAID 3	Bit-interleaved Parity
RAID 4	Block-interleaved Parity
RAID 5	Block-interleaved Distributed Parity
RAID 6	P and Q Redundancy

JANUARY WINNERS:
David Amlen, Jim Barnes, Paul Huckeby, Al van Dinteren



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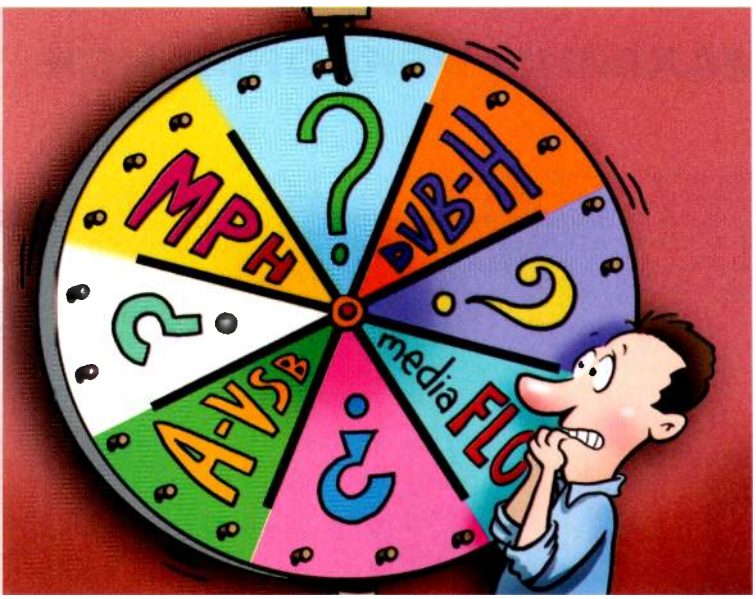
Broadcasters spin the wheel of fortune

While this year's NAB convention may have been light on new products, it was heavy on talk about broadcasters becoming players in the mobile TV arena. With two broadcast-compatible transmission systems being demonstrated off the show floor, the topic was on a lot of minds. Both systems use the VSB transmission standard.

Harris and LG Electronics proposed what they call MHP, for mobile, pedestrian and handheld devices. Samsung and Rohde & Schwarz demonstrated what's called Advanced-VSB (A-VSB). Both of the proposals would allow broadcasters to devote a portion of their 19.39Mb/s ATSC stream to sending images to mobile receivers.



While both systems claim to be compatible with ATSC, only A-VSB has reached the draft amendment stage for A/53. Proponents claim that no formal FCC rule changes would be required because the bit stream and coding changes would not change modulation characteristics or emitted bandwidth.

The A-VSB solution uses a supplementary reference signal (SRS) and turbo coding to enable mobile reception at speeds up to 150mph, theoretically. Turbo coding replaces the data protection and correction processing used in VSB and E-VSB.

At NAB2007, the A-VSB demonstration used Las Vegas station KVMY-TV and showed that at one-fourth rate coding (3Mb/s), the system could transmit a 750Kb/s media stream. An additional 2.8Mb/s is required for the SRS. This leaves approximately 13.5Mb/s to carry standard MPEG-2 programming.

The Harris/LG MPH signal is compressed and encoded differently than ATSC signals but does not change how standard VSB signals are received. The MPH data stream is multiplexed with the main ATSC program stream. The proposed standard uses 4.4Mb/s for MPH, which leaves 15Mb/s for MPEG programming. Using QVGA resolution, a station could transmit 30fps images with a data rate between 300Kb/s and 500Kb/s, which would support two or three program channels.

Lest we forget, there are two other heavy hitters in this space: Crown Castle and QUALCOMM. These companies are pushing hard for their propriety transmission standards, respectively called Modeo and MediaFLO, to be adopted. If either of these options is adopted by the cell phone makers, TV stations won't have to worry which of the VSB systems is better.

Even so, broadcasters are optimistic, and stations should consider supporting these industry proposals. To support the development of mobile digital broadcast TV, some of the nation's largest TV broadcasters have formed the Open Mobile Video Coalition. Members include Belo, FOX Tribune, Gannet, ION, NBC, Sinclair and Telemundo. These broadcasters represent 280 stations covering more than 96 million households, so the group could influence upcoming key decisions.

Even though some may think the odds are against broadcasters in this endeavor, just think of it as a Vegas bet. The million-dollar jackpot could be just one spin away.

Brad Dick
EDITORIAL DIRECTOR
Send comments to: editor@broadcastengineering.com

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Digital television for the masses

Dear editor:

Apparently, I must be missing something regarding the explanation of switching from analog to digital television. I'm on disability, and my wife and I can't afford to buy a new digital tuner television. From what I've read, the analog signal will stop broadcasting in February 2009 when it switches to a digital signal. So basically, anyone that's poor will no longer receive a TV signal. What are we supposed to do?

Chuck

Brad Dick responds:

Don't worry. The government's current plan for viewers without access to cable or satellite is to give them a coupon valued at $40. The coupon can be used to purchase a set-top converter box. That box will convert the new digital signals into analog ones your television can display. One benefit will be that you will be able to enjoy the extra channels that digital channels provide.

What's the big deal?

Dear editor:

I don't see what all the fuss is about regarding the digital transition. Today, if the four major networks started inserting public service information about the transition during prime-time viewing, and did that for one year, they would reach off-air, cable, DIRECTV and DISH viewers — about everyone who watches television.

Anybody at the end of one year who doesn't know about the digital transition must never watch television.

The broadcast industry does not need the help of Congress, the NAB or anybody else. The industry has the tools to educate the public. Could it be that broadcasters are too busy reporting news that the public doesn't care about?

George Spellman

SED displays

John Luff:

Where can I see an SED display? In your February 2006 column, "Quality-control monitors," you discussed the latency problems with LCD, but you never mentioned the video processing delays in LCD or plasma displays. The delays in plasma monitors are a big problem, even in home receivers.

Ted Dunn

John Luff responds:

Canon and Toshiba planned to have an SED on display at CES in January. Canon was, however, in violation of a licensing agreement with a company that provided carbon nanotubes, which are part of the manufactured product.

As a result, Toshiba transferred all ownership to a Canon subsidiary, pending resolution of the legal issues. It is unclear when an SED display will be available for viewing, despite its promise for both consumer and professional applications.

The latency in LCD and plasma monitors is in large measure due to the scaling engines they contain, along with addressing and other internal processing. It affects all monitors where image scaling is needed, which includes most multistandard monitors today and certainly all flat panels.

HDTV in Canada

Dear editor:

I've owned an HDTV-ready set since 2001, and I'm still telling people not to waste their money on HD for viewing television. My HD set is great for viewing movies, but there's far too much TV content appearing in a fuzzy 4 x 3 upconversion.

It's very disappointing. Will Canada ever see free-to-air HD?

Neil Mousseau

Test Your Knowledge!

See the Freezeframe question of the month on page 6.

Send answers to editor@broadcastengineering.com

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The Automat way

What if à la carte really is a better option than channel bundling?

BY CRAIG BIRKMAIER

As a boy growing up in the Long Island suburbs of New York City, there were many things I looked forward to when I would accompany my parents on a shopping or business adventure in the city. One vision that endures was a trip to the coin-operated, glass-and-chrome art deco wonder that was Horn & Hardart's Automat.

You could stick a few coins in a slot, open the door and feast on most anything you might want to eat. As if by magic, stuff just kept appearing behind those little doors. If you weren't in the mood for what was available, you could just wait a few minutes for something new to appear.

In the book "The Automat," authors Lorraine B. Diehl and Marianne Hardart write, "By the peak of its popularity — from the Great Depression to the post-war years — the Automat was more than an inexpensive place to buy a good meal; it was a culinary treasure, a technical marvel, and an emblem of the times." The Automat proved that à la carte dining did not need to be an expensive proposition.

There are some strong parallels (and major differences) between the Automat business model and the U.S. subscription multichannel TV business model employed by cable and DBS industries. It's not hard to imagine a monitor wall filled with 100 channels of content from which you could pick and choose. The proponents of à la carte TV channel selection would like to give consumers the ability to choose and pay for only the channels they want. The content conglomerates and the cable and DBS industries have other ideas.

Eat your spinach

One argument used in favor of à la carte selection is that it will allow consumers to control the content in the home, something the TV ratings system and the V-chip were supposed do.

The FCC just issued another report on the effects of TV violence on children, noting that children have more access to violent content than ever before, with both broadcast and subscription-based content sharing the blame. The report encourages Congress to give the FCC additional authority to regulate TV violence, and it encourages the multichannel services to give consumers the ability to select channels on an à la carte basis.

With à la carte channel selection, consumers could purchase only the TV channels they wanted, a similar concept to the Automat, pictured above.

In written remarks that accompany the report, FCC Chairman Kevin Martin suggests that requiring cable and satellite television providers to offer programming à la carte would be a more content-neutral means for Congress to regulate violent programming and therefore would raise fewer constitutional issues.

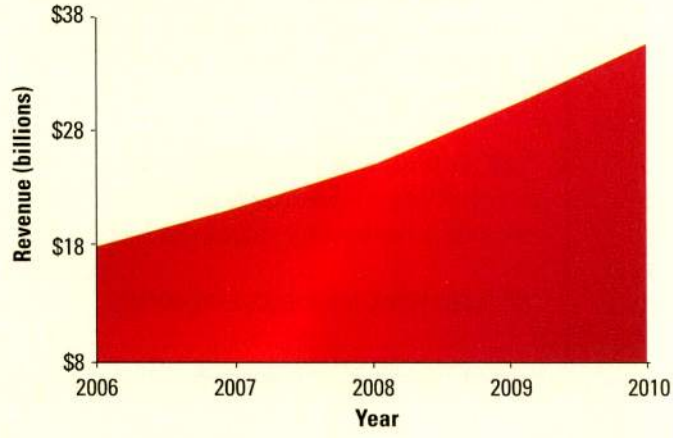
In a direct shot at the industry practice of promoting large bundles of channels, Martin suggests, "While the Constitution protects the right to speak, it certainly doesn't protect a right to get paid for that speech."

In essence, that is exactly what is happening today. U.S. consumers are accepting the notion that it is cheaper to buy a big bundle of channels — many of which they will not watch

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

IPTV equipment revenue increasing

The revenue is expected to double by 2010.



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and may not want their children to watch. It's like going to the Automat and putting coins into every slot and then eating just the stuff you want.

The cable industry warns that à la carte will cost even more and tells parents to block — but still pay for — the channels that they do not want the children to see.

We have a TV obesity problem in this country. Somebody's getting fat on all-you-can-eat TV, but it's not the children or their parents. It's the content owners, who now expect two revenue streams from the content they produce — one from all of the ads that are squeezed in and around the content and another from the subscriber fees that the multichannel services collect from unsuspecting consumers. Now broadcasters are getting fat too, using retransmission consent to force the multichannel services to collect millions in fees that go straight to the balance sheet bottom line.

Two scoops

How did we get into this mess, where double dipping is the blue-plate special? The cable industry started it, collecting small subscriber fees for fledgling cable networks, back when the broadcast networks still controlled 90 percent of the audience. Over the years, these fees have grown, some to gargantuan proportions. The average monthly subscriber fee for ESPN is between $2.70 and $3.00. (No one knows for certain, as these figures are negotiated with each cable and DBS system, and subscribers are never informed how much they are actually paying for each channel.) Subscriber fees are the main reason that cable and DBS rates have been increasing at three times the rate of inflation since the cable industry was reregulated in 1992.

The media conglomerates used retransmission consent to rebuild their empires, threatening to withhold popular broadcast networks in order to get preferred placement and subscriber fees for new networks, like ESPN, FX and MSNBC. Then they went on a buying spree, gobbling up the most popular cable networks. The net result is that six companies now own 90 percent of what we watch; more than 85 percent of Americans pay monthly subscriber fees for ad-supported channels; and we have to watch more ads than ever.

So now some people are suggesting that buying programming on an à la carte basis is the solution. At the same time, the content owners are beginning to exploit new distribution channels, such as DVD sales, Internet streaming and downloads, and video-on-demand.

Cable industry leaders note that the changes taking place in the marketplace are happening so quickly that it is difficult to know what the TV viewing experience will be like in five years. If rates keep going up, one thing is clear: It may be cheaper to buy just the programs we want, rather than subscribing to a multichannel service.

In his remarks accompanying the FCC report on TV violence, Chairman Martin noted, "In Hong Kong, consumers can select and pay for only the channels they want. A family who wants to watch sports, movies, news and children's programming can receive 15 free channels plus a selection of 11 additional digital channels — including ESPN, HBO, CNN Headline News, National Geographic, Animal Planet and Discovery — for only $27.50 per month. To get the same channels in Washington, D.C., it would cost $82.00 per month."

In Canada, Rogers cable now offers à la carte channel selection. Clearly the double dipping is causing American consumers to pay significantly more for their TV fix, which isn't the case outside our borders.

A step in the right direction

It's time for Congress to do something about the situation, as Chairman Martin does not believe that the FCC has the authority to regulate violence on nonbroadcast TV or to force the multichannel services to offer à la carte services. I've got a simple suggestion that shouldn't be too disruptive. Let's start by requiring the cable, DBS and new telco TV services to inform us what we are paying for each channel. That's it. All we need is full disclosure. In all likelihood, the marketplace can work out the rest of the details.

We have a TV obesity problem in this country. Somebody's getting fat on all-you-can-eat TV. But it's not the kids, or their parents.

For example, somehow content providers in the UK can offer for free many of the channels we in the U.S. pay for. Why must we pay additional fees to watch ad-laden programming? If consumers were given the option to pay only for the channels they want to watch, would the fees increase to make up for the loss of subscribers? Or, would many of these channels just drop the fees so they could remain accessible to almost every home, as they are today? Learning the answers starts with informing people about the cost of free TV. BE

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

Send questions and comments to: craig.birkmaier@penton.com

Web links

- "The Automat" by Lorraine B. Diehl and Marianne Hardart
www.theautomat.net
- FCC Report 4/25/07 Violent Television Programming And Its Impact On Children
http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-07-50A2.pdf

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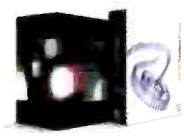

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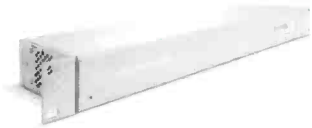

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The Drawn Together images are courtesy of Comedy Partners.

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Carriage proposals

Broadcasters support the plans; cable operators don't.

BY HARRY C. MARTIN

Two recent proposals by the FCC would open the door to significantly increased carriage obligations for cable operators as of the February 2009 DTV transition date. In addition, the proposals would increase carriage opportunities for broadcasters and independent programmers.

In one proposal, cable operators would be required to carry local TV stations in both analog and digital modes after the digital transition. In a second proposal, independent programmers would obtain must-carry rights on cable systems by leasing spare multicast digital streams from local TV stations. Both proposals have drawn widespread interest from broadcasters and condemnation from cable operators.

Under current rules, cable operators are required to carry only the analog signals of local TV broadcasters. TV stations' digital signals have no must-carry rights unless the station is already operating all-digital, and, even then, only a single, primary programming stream is entitled to mandatory carriage.

Digital viewing

The first proposal addresses the question of how digital-only TV stations will be made viewable by analog cable subscribers after the transition. The proposal would require cable systems that have not converted to an all-digital system to carry local TV signals on both their analog and digital tiers to ensure that analog cable subscribers can continue to receive service. Alternatively, the cable operator could carry the digital signal only, but provide analog customers the converters necessary to view the signals.

Supporters of the plan argue that without a dual-carriage requirement, cable subscribers that lack a digital cable box or a DTV cable-ready television could lose access to local broadcast stations.

Cable operators, however, oppose the plan, arguing that the proposed requirement would effectively force subscribers to rent digital set-top boxes they might not want. Smaller cable systems also expressed concern that they will not have the capacity to offer broadcast stations in both analog and digital formats without sacrificing other programming.

The dual-carriage proposal is advocated by FCC Chairman Kevin Martin, who has the reputation of being tough on the cable industry. Conversely, Commissioner Jonathan Adelstein noted that the FCC previously rejected dual-carriage proposals and called for a more complete public vetting before proceeding with the plan.

In addition, Commissioner Robert McDowell suggested that, at this stage in the process, building a more complete record regarding marketplace solutions would have been preferable to putting forward specific proposals. McDowell also questioned whether the FCC possesses the authority to require dual carriage. Commissioner Michael Copps' statements on the proposal were generally positive.

Carriage of leased digital channels

With respect to the multicast proposal, Martin wants independent programmers to be allowed to lease multicast digital streams from local TV stations. In return for complying with many of the same public interest obligations imposed on commercial TV stations, the independent programmers would have the right to require local cable operators to carry their programming.

Martin is promoting the plan as a way to increase media diversity by giving minorities, women and small business a way to obtain the exposure provided by cable carriage without the high costs of full TV ownership.

Martin suggested that programmers would need to meet certain eligibility criteria to quality. The other FCC commissioners have voiced tentative but positive reactions to the plan.

Let the debating begin

While neither the multicast proposal nor the dual carriage proposal is certain to be adopted, the debate the new proposals will engender will add a new dimension to the ongoing DTV transition. BE

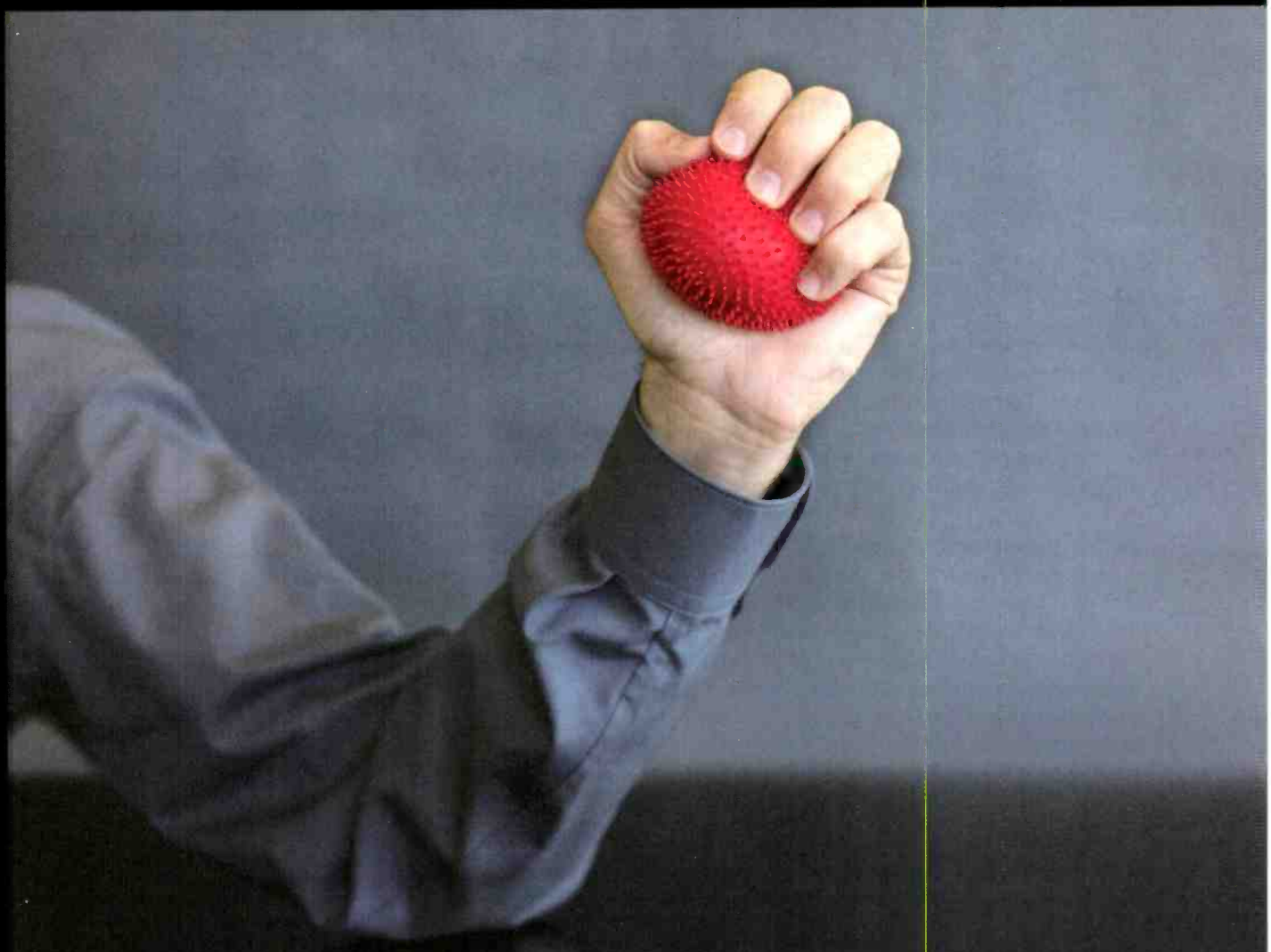
Harry C. Martin is a past president of the Federal Communications Bar Association and a member of Fletcher, Heald and Hildreth PLC.

? Send questions and comments to: harry.martin@penton.com

Dateline

- August 1 is the deadline for biennial ownership reports for TV stations in Illinois and Wisconsin.
- August 1 is the date by which TV, Class A and LPTV stations originating programming in the following states must place their annual EEO reports in their public files: California, Illinois, North Carolina, South Carolina and Wisconsin.
- July 10 is the deadline for all commercial and Class A TV stations to place their children's television programming reports (Form 398) in their public files and file them with the FCC.

SONY



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DRM keys

Managing content distribution is only as successful as the encryption method used.

BY ALDO CUGNINI

Content managers are worried that their content will be illegally pirated, and content users are worried that their content use will be unfairly restricted. For now, that's as far as we'll go into the debate. Meanwhile, let's look at the technology behind digital rights management (DRM).

Varying degrees of control

In order to control the distribution of copyrighted material, content must be encrypted. This control can constrain access of the content (conditional access) or can limit further copies of the material (copy protection). Encryption works by scrambling the symbols used to transfer a message.

Early scrambling methods were easy to break. The word scramble puzzle published in newspapers is an example of this type of encryption. It implements a simple letter substitution code. A further advance on this method is transposition, where the positions of the characters in a word are changed. Breaking this kind of code is relatively straightforward.

The sender and receiver of encrypted messages usually share another piece of information, called a key. Without this key, the message cannot be deciphered by conventional means. Modern encryption falls into two categories: private key algorithms and public key algorithms. (See Figure 1.)

With private key algorithms (also called symmetric key encryption), the sender and receiver both share a unique secret key. Such a system requires a separate key for each user. Using the Data Encryption Standard (DES) or the newer Advanced Encryption Standard (AES), this encryption offers unique one-to-one connections, such as for e-mail or private voice or video communications.

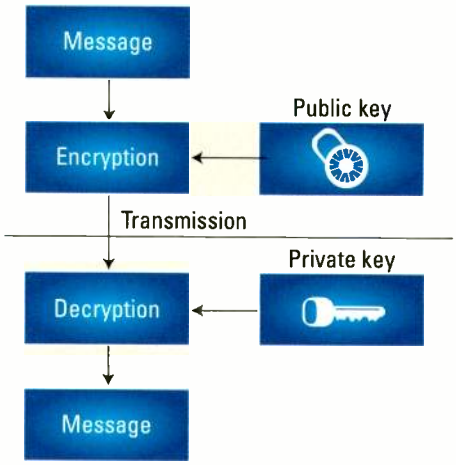

Figure 1. Public and private keys form the basis for the distribution of protected content.

With public key encryption (also called asymmetric key encryption), two keys are used. A public key allows anyone to encode the message, but each receiver uses a unique private decryption key. Public key encryption uses a form of the RSA algorithm (named for its inventors).

To understand how public key encryption works, imagine that the sender of a physical message locks the message by using a padlock on a box. The sender then publishes instructions on how to manufacture such a lock (or distributes such a lock, opened), but users cannot determine how to make a key that will unlock it. Anyone can thus use such a lock (called a public key) to send encrypted messages, but only the holder of a private key (the original sender) can unlock the box, or decrypt the message.

Theoretically, any encrypted message can be decrypted by brute force

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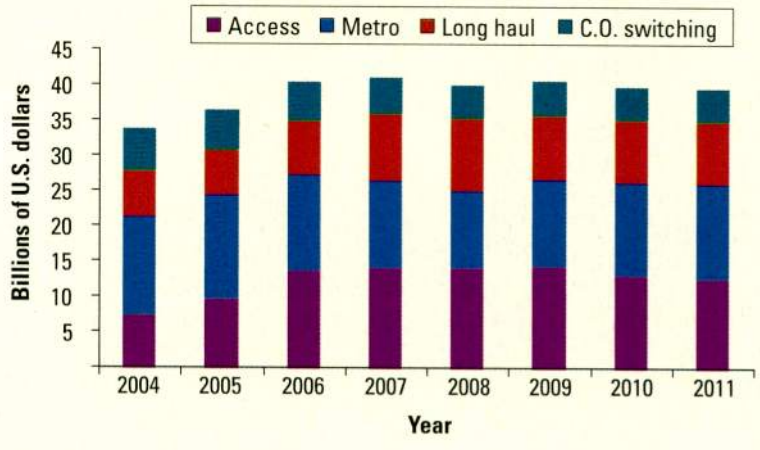

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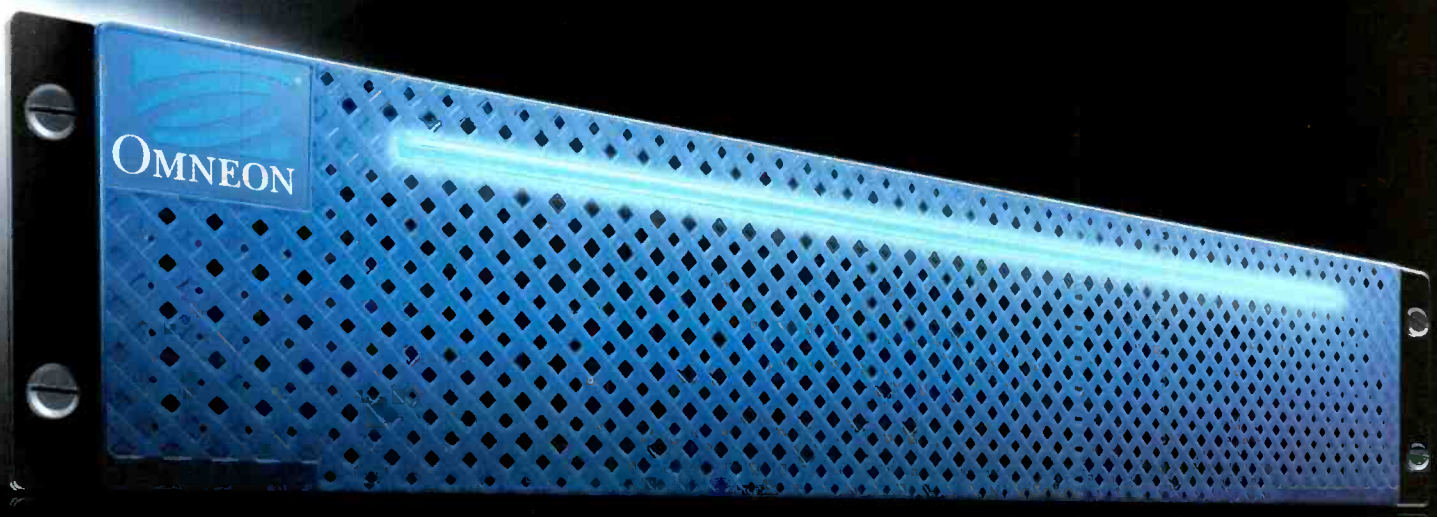

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without a key, such as by trying every possible combination. The deterrence is the time and effort required. A 128-bit key, for example, would take trillions of years to crack by brute force using current technology. DES originally used a 56-bit key, which has been broken in less than a day's time. It has been replaced by triple-DES (TDES), which cascades three DES encryptions, using three keys, and by the AES algorithm, which uses 128-, 192- or 256-bit keys. The equivalent key length of TDES is 112 bits.

Protecting different systems

In order to prevent unauthorized playback or copying of DVD content, an encryption scheme was developed to protect the disks. Using various encrypted keys stored on the disks, and encrypting the content itself, access is permitted only by compliant DVD players. With this system, access can also be limited to desired worldwide regions. Introduced in 1996, the disks use the proprietary Content Scrambling System (CSS), which uses a 40-bit private key algorithm. Unfortunately, using brute-force methods, the CSS system was broken shortly after its release. Nonetheless, it maintains its function of deterring piracy, because of the inconvenience (and litigation risk) required for its compromise.

A newer, similar system has been developed for Blu-ray and HD-DVD discs, using the Advanced Access Content System (AACS) encryption scheme. AACS differs from CSS in that the decryption keys are unique to each player, thus giving content providers the ability to individually revoke compromised keys. This said, AACS was cracked several months ago.

Direct broadcast satellite (DBS) systems use various proprietary encryption and access control systems,

During World War II, a machine that sent encrypted messages, called Enigma, was used for the first time. Even with a theoretical 3 × 10^{114} ciphering possibilities, the encryption was eventually compromised.

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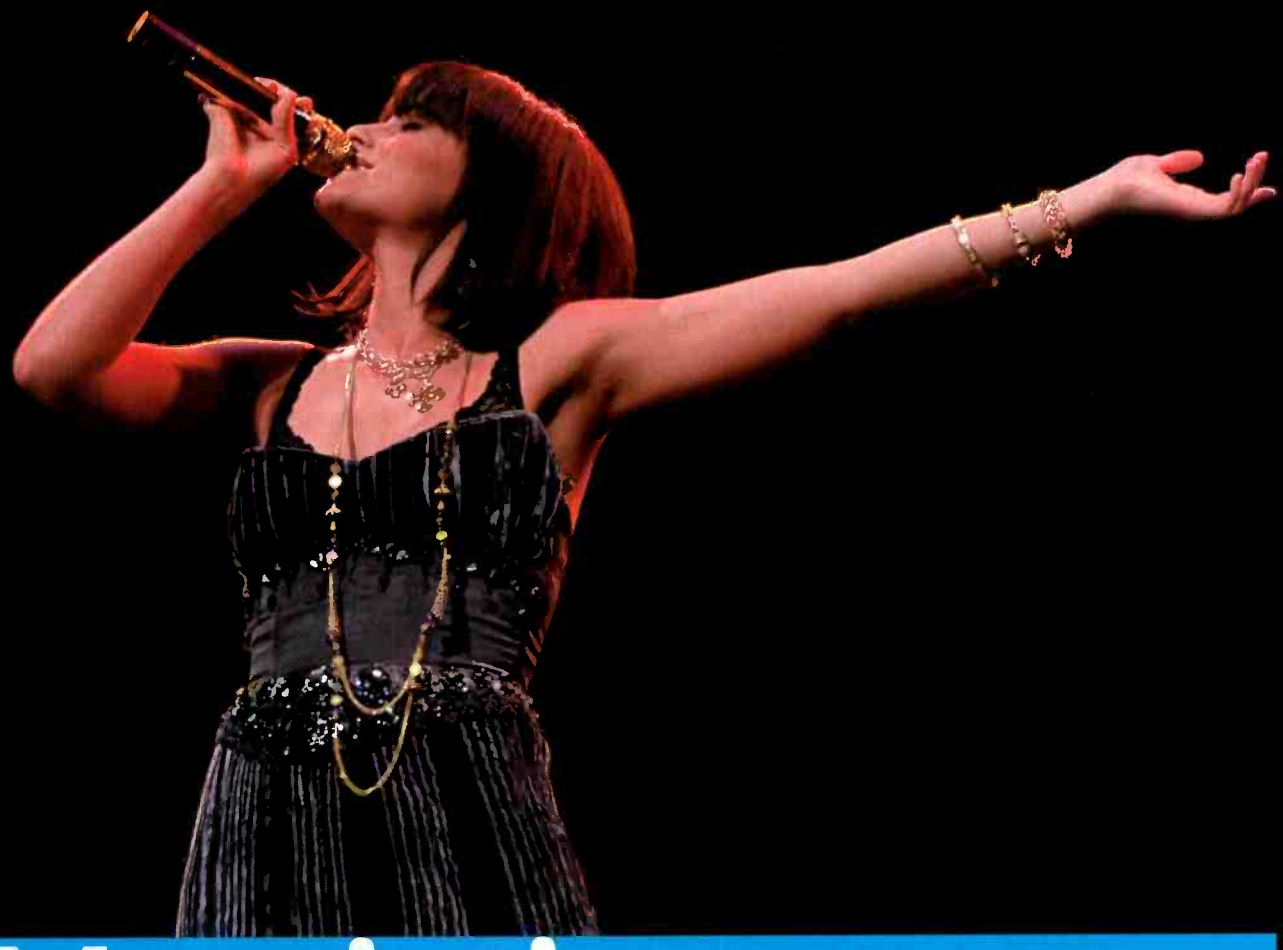

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essentially variants of TDES or AES schemes. (For obvious reasons, the operators do not describe the details of their encryption systems. The manufacturers of the various systems, however, are well-known.) Some of the keys used on these systems are usually contained within smart cards that are used in the consumers' set-top boxes. Other keys, usually called entitlement control messages (ECMs), are transmitted to the user as needed. Digital cable systems also use proprietary variants of these encryption methods. In many cable applications, different conditional-access methods can actually be used at the same time. For this reason, a specification called DVB Simulcrypt was developed and is now in use in the United States and abroad.

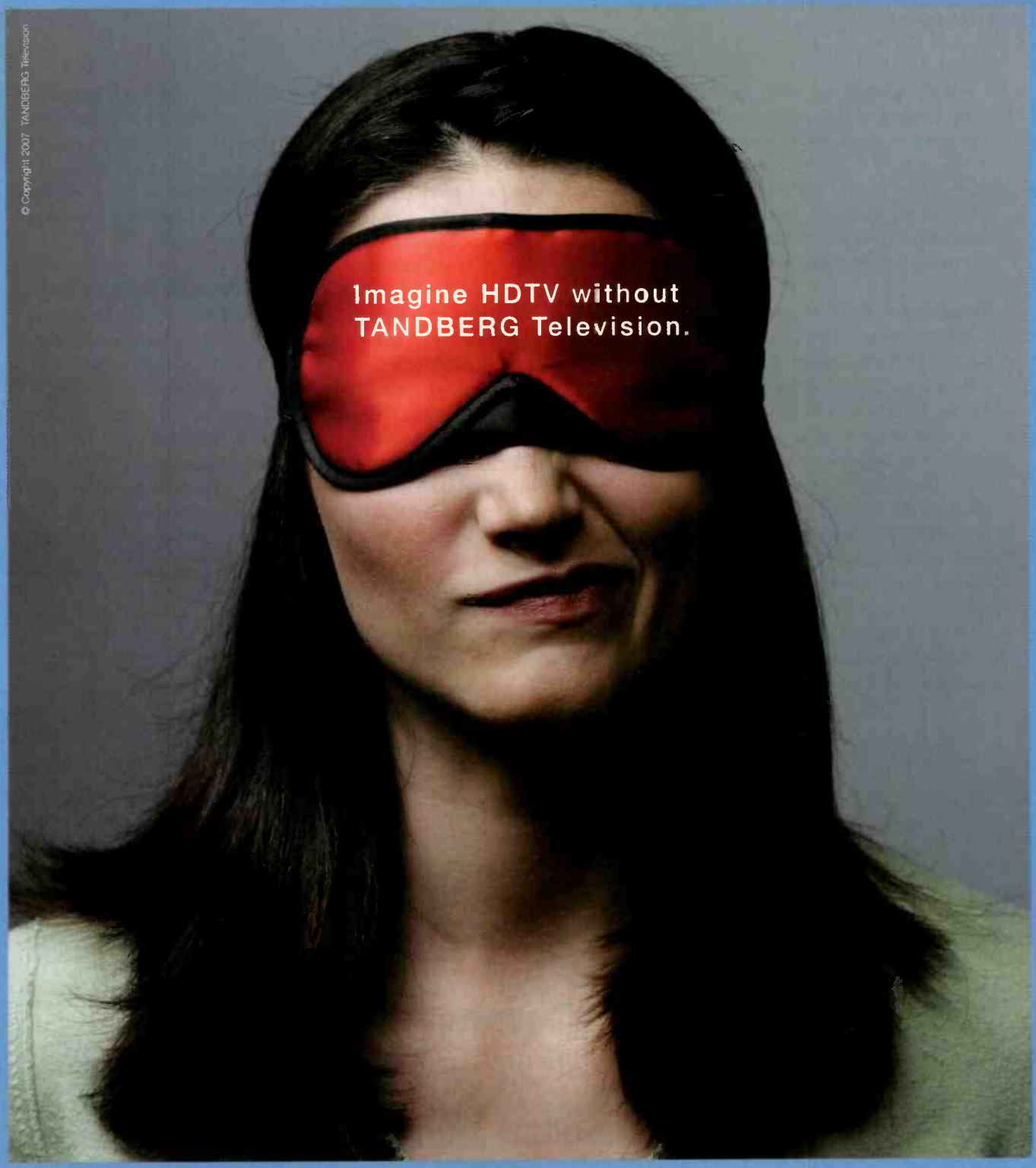
The analog hole

One way or another, a video signal must be presented to a display device. Until recently, this has been by way of an analog interface, using either composite video, S-video or modulated RF. With the advent of HDTV, this connection has evolved to a high-bandwidth component interface, usually called YP_bP_r. This signal is in the clear, so it is open to any use, including recording or retransmission. This leak in an otherwise secure system has been dubbed the analog hole. Various mechanisms have been employed to plug this hole, including intentional downconversion of the signal to limit its resolution, analog scrambling and watermarking.

Copy Generation Management System - Analog (CGMS-A) is a copy protection mechanism for analog television signals. In existence since 1995, it is used in devices such as PVRs and DVRs and DVD players and recorders, as well as in some television broadcasts. CGMS-A is signaled by

The HDMI interface provides HDCP-protected full bandwidth video.

two bits in the vertical blanking interval. By also adding a Rights Assertion Mark (RAM), copying is denied when the RAM is present but CGMS-A is not. Such a RAM can be encoded by using the proprietary VEIL watermarking technology that modifies the luminance values of pixels of selected frames of video. Equipment compliant with this technique can limit the number of copies.



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Macrovision is an older, proprietary form of analog content protection used on prerecorded videotapes, VCRs and DVD players. The system operates by inserting extra pulses in the vertical blanking interval, thus interfering with the automatic gain control in a subsequent recording.

Broadcast flag uncertainty

For digital television, the industry developed the broadcast flag, technically called Digital Broadcast Television Redistribution Control. The broadcast flag rule required all digital TV demodulators to recognize and give effect to a transmitted flag by blocking the recording or output of a high-definition digital signal if the flag were set. Originally implemented in the FCC rules, to be required in all receivers as of July 2005, a federal court struck down the rule before that date. Its further use remains controversial.

Digital output protection

Created by the Digital Display Working Group, the Digital Visual Interface (DVI) is an analog and/or digital interface that can carry HDTV video. However, the appeal of a combined interface carrying video and audio soon led to the development of an all-digital interface: HDMI. The ability to transmit full-bandwidth digital HDTV across these interfaces also led to the development of HDCP, or high-bandwidth digital content protection. Using stream cipher encryption, a set of 56-bit keys is used to protect the content. An authentication process blocks nonlicensed devices, and key revocation procedures ensure that illegal devices can be permanently blocked from receiving data.

Digital Transmission Content Protection (DTCP) is an older encryption standard that allowed a digital set-top box to send protected content over the IEEE 1394 (FireWire) standard. The DTCP specification is proprietary and is disseminated only to licensed manufacturers. The interface has not achieved widespread use for consumer video displays, so DTCP has essentially been overtaken by HDCP.

DRM and business models

As we transition to all-digital content distribution, consumers are eager to use more of it from content distributors. They, in turn, are challenged to work out new business models that balance access with fair use. The best of all possible worlds will be one where DRM tools facilitate rather than undermine these relationships. In the end, everyone will benefit. BE

Aldo Cugnini is a consultant in the digital television industry.

? Send questions and comments to: aldo.cugnini@penton.com

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Engineering The Broadcast Future

Core network protocols

UDP and RTP are critical when streaming video over IP.

BY BRAD GILMER

Computer engineers learn early on that a core set of protocols are critical to networks. Some of the most important protocols include Internet Protocol (IP), Transaction Control Protocol (TCP), Address Resolution Protocol (ARP) and Internet Control Message Protocol (ICMP). These protocols are critical to broadcasters as well because many broadcast facilities now rely on computer networks.

As broadcasters continue to expand their use of networking technology, another set of protocols — User Datagram Protocol (UDP) and Real-time Transfer Protocol (RTP) — are becoming important when streaming video over IP networks. Let's look at a typical protocol stack for the transmission of MPEG transport streams over Ethernet.

Ethernet

Ethernet is both a protocol and a hardware specification. The Ethernet specification details the electrical signals and voltages on the wire (or the RF transmission scheme in wireless applications), as well as defines the way Ethernet packets are built and what the Ethernet headers contain.

One important aspect of Ethernet is the description of how physical devices are addressed. Ethernet addresses, which are inserted into each Ethernet packet header, are different from IP addresses. An Ethernet address refers to a particular physical device. This is significantly different from IP addresses, where the end user can assign a particular IP address to any IP network device.

Internet Protocol

IP is a core protocol that moves datagrams from one device to another. A datagram is defined as a self-contained, independent entity of data carrying sufficient information to be routed from the source to the destination computer without reliance on earlier exchanges between this source and destination computer and the transporting network.

There are several possibilities for the layer below the IP layer (Ethernet and ATM are two examples), and these possibilities employ different addressing schemes. Therefore, it is the job of the IP layer to interface to these lower layers, while presenting a uniform network-addressing scheme to the layers above it. The IP layer prepares data sent to it by higher protocols for transmission across a specific network, taking into account things such as the packet length, hardware addressing structure and how data should be split across multiple packets.

Today, Ethernet is the dominant electrical and physical networking technology, but IP works just as well with token ring and ATM as it does with Ethernet.

User Datagram Protocol

UDP sends datagrams from one application running on a computer to an application running on another computer. UDP signals that the payload in a UDP packet is destined for a particular application by using port numbers. For example, port 80 is typically used for HTTP in Web applications. The UDP header includes a source and destination port number.

There is one particularly important thing to know about UDP. Nothing in the UDP guarantees that packets sent across the network will reach the other end. In fact, UDP explicitly does not check to see that packets have been received. The upside is that UDP is an extremely lightweight protocol to implement, and it is fast. Furthermore, it does not introduce delays by requesting and subsequently receiving lost packets.

There is one particularly important thing to know about UDP. Nothing in the UDP guarantees that packets sent across the network will reach the other end.

UDP was developed because there are some use cases where checking on the delivery of each packet is not practical. For example, in a multicast service, a server may send data to hundreds or thousands of clients. Checking with each client to see that every packet has been received would be prohibitive.

The size of UDP packets can vary, and in some cases, UDP packets can be large. This brings up the issue of fairness. Large UDP packets may hog bandwidth on a network, causing other traffic to suffer. For this reason, and for other security reasons, some system administrators do not permit UDP traffic to cross their firewalls. This can cause headaches for broadcasters that attempt to use UDP to distribute video over the Internet.

Real-time Transport Protocol

As the name implies, RTP is a protocol intended for the transmission of data in real time.

As with other protocols described in this article, RTP contains a payload and an associated header. The RTP header contains two significant items. The first is a sequence number. This number is

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incremented for each RTP packet that is transmitted during a session. If you are an RTP receiver and you miss a sequence number, you know that a packet has been dropped. It is then up to the receiving application to decide what to do. RTP includes a retransmission mechanism within a sub-part called the RTP Control Protocol (RTCP), but in many video applications, retransmission is not an option. By the time a receiver notices that a packet has been dropped, requests a replacement packet, and decodes and prepares the content for display, it is too late. In this case, forward error correction or concealment may be reasonable alternatives, because neither of these require retransmission of lost packets.

RTP provides one other facility that is critical for the reconstruction of real-time data: a timestamp field. Clearly, when a video feed is presented to a computer for streaming, that feed is isochronous. It comes in at a fixed rate, but when these packets are sent over the Internet, the interpacket arrival time can vary tremendously depending on congestion, routing and many other factors. The RTP timestamp allows a receiving application with sufficient buffering to recreate the stream with the same pacing as was present at the transmitter.

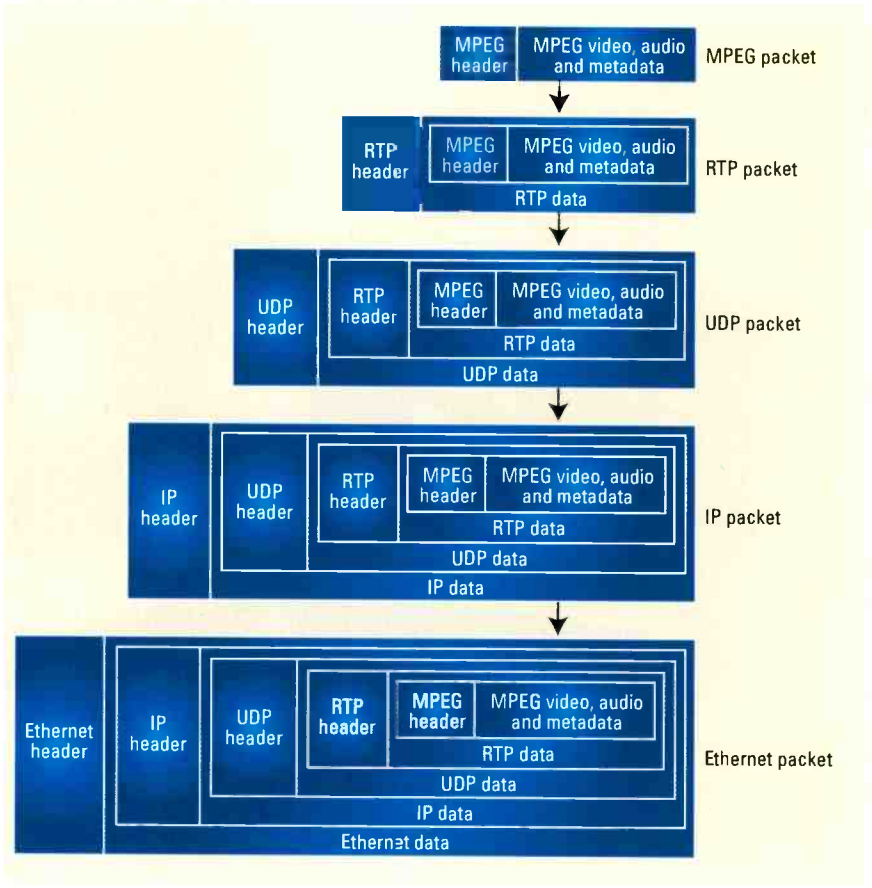

Figure 1. Encapsulation of an MPEG video stream over Ethernet

Encapsulation

Many computer protocols build on one another. The process starts with an application passing data to a network protocol stack. The top protocol in the stack takes this data and puts it into the payload section of a packet. It then adds a header to the packet. The header typically contains information about the payload, information about the source and destination of the packet, or both.

Figure 1 shows how this encapsu-

lation process works. Starting with a streaming application, video and audio is MPEG-compressed and put into MPEG transport stream packets. As part of the process of creating the MPEG transport stream packets, headers are created which, among other things, describe the video and audio contained within the MPEG transport stream packets. These MPEG transport stream packets are placed in the payload portion of RTP packets.

All of the MPEG content, including the MPEG headers, is enclosed in the payload section of the RTP packets. The RTP packets, including headers, are then encapsulated in the payload section of a UDP packet, and UDP headers are added. The UDP headers are simple and include information about the source port, the destination port, packet length and a checksum. The process continues.

UDP packets are inserted into the payload section of IP packets, and IP headers are added. The IP headers, among other things, contain the sender and receiver's IP addresses. Finally, the IP packets are inserted into Ethernet packets, and Ethernet headers are added. The Ethernet headers contain the source and destination MAC addresses.

This may seem like an inefficient way of getting an MPEG stream from one place to another, but each layer has a job to do. In a well-designed system, it should be possible to replace one layer with another that performs a similar function without having to rebuild the entire system.

As broadcasters build more IT-based facilities, certain core protocols are emerging as the critical protocols for our industry. Encapsulation is the key that will allow us to change and adapt these protocols as our industry matures in this area. BE

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

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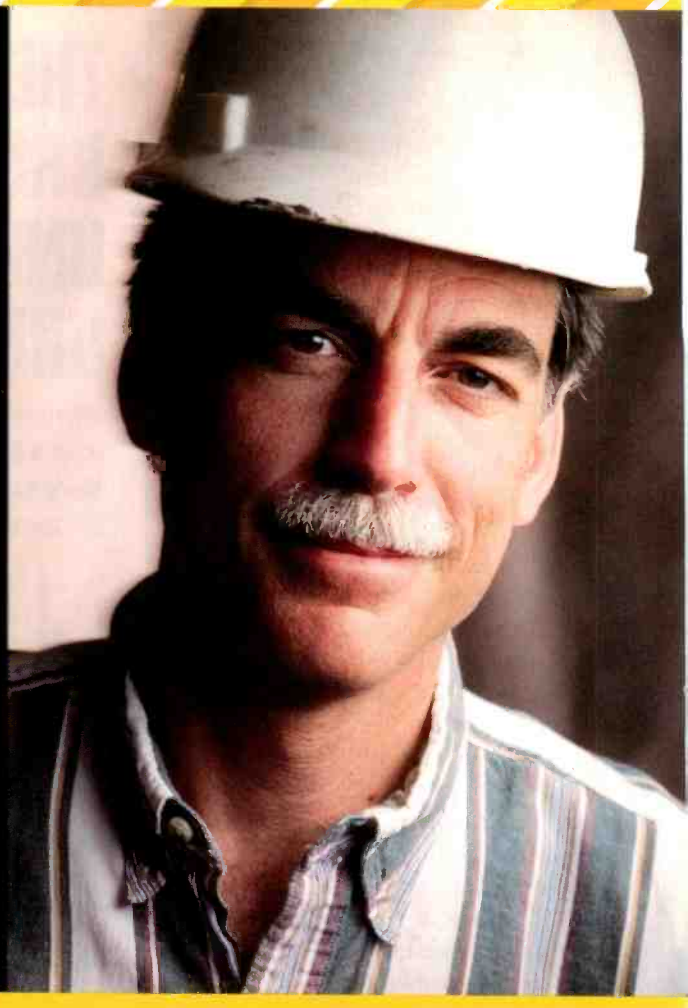

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HD editing storage

Selecting an HD editing storage platform requires broadcasters to do a little homework.

BY SARAH STANFIELD

Studios and post-production facilities are finding it increasingly commonplace to edit several terabytes of HD material each day. If a storage solution doesn't have the bandwidth and capacity to handle such file loads, chances are good that there will be bottlenecking and delays, because the server simply cannot keep up with the demands placed on it. Multiple HD editing systems require more.

If you find this situation at your facility, it's probably a good idea to start looking into one of the many shared storage solutions available for HD editing applications. While this may seem like a daunting proposition, take heart: Building an HD storage system, or even adding a new system to your existing storage platform, is not as complex as it seems.

A good storage vendor can work with you to create a solution that fits your facility's needs. Your job is to know enough about your storage requirements to present an accurate picture of your situation to the vendor.

Bruce Motyer, Technicolor lead editor, uses Facilis Technology's TerraBlock Manager to control access to uncompressed HD video files on the Avid DS Nitris.

Capacity calculations

The first order of business is to determine how much storage your facility will actually need. Which shared storage system you choose will ultimately depend on how efficiently and quickly it can manage the millions of bits of media data required for real-time HD editing projects, so it's important to know how much capacity it must handle. A general rule of thumb is to assume you will need about five times the amount of storage for HD as you currently use for SD.

To come up with this number, first determine how many workstations in your facility will need to be connected to the storage system. Take into account any new systems that you may add as part of the storage system installation. Then think about the specific projects typically performed on an application basis on each station:

- Which applications require (or will require) the management of uncompressed versus compressed HD files?
- Which ones perform the most complex functions (such as special effects), require editors to add handles or perform cross fades, or may need extra bandwidth and capacity for other items?
- Which ones require the playback of more than one track on a particular timeline?

A thorough understanding of these issues — down to the application level — will give you the best estimate of the amount of HD storage capacity you will need.

As you look at your editing systems, remember to take into account bandwidth as well as capacity. Real-time HD playback requires a lot of bandwidth. For example, about 1TB of HD storage capacity for every hour on the timeline requires 277MB/s bandwidth just to be able to play an HD file back in real time. Most facilities have more than one editing application trying to access the storage system at the same time, so it may be necessary to multiply this number by the number of editing systems in the facility.

Design decisions

After determining the overall bandwidth and capacity required by the facility, the next step is to research the particular type of storage architecture that works best for your facility. The four main types of storage architecture available today include three storage area networks (SANs) — server-assisted, direct-to-storage and server-direct — and a server-based network attached storage (NAS). Of these four storage architectures, you will likely want to choose a server-assisted or server-direct SAN, as these systems are generally the best at handling large amounts of HD material.

Server-assisted SANs

Server-assisted SAN solutions have been on the market for quite some time. They can support many clients and are cross platform, meaning

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different clients can write to the system at the same time. Sharing is done on the file level, with the workstation client requesting access to files from the server's processing system.

While the fact that the system only processes requests and not actual data makes it fast, bottlenecks can arise when too many workstations are trying to read and write files through the system. This can also be a problem when several applications requiring high bandwidth are making requests. In addition, the file system is custom, so it is necessary to install software on each client to make its operating systems compatible with the server.

Server-assisted SANs are a good choice for facilities that handle fast-turnaround media, such as live feeds for broadcast news or reality programming. They generally work well with media traveling in and out of the facility quickly. They aren't the best solution for facilities specializing in high-end editing projects, such as episodic television or film work. This kind of work generally requires the media to be available on the server for a longer period of time, and bottlenecks may become a problem. It is possible to work on HD projects with these systems, but it often requires a complex IT infrastructure.

Server-direct SANs

Server-direct SANs are the latest incarnation of shared storage architecture. Sharing is done by the block level, and the storage is made available to clients via a virtual volume scheme, allowing the client to format pools of storage from different portions of the physical volumes. Each virtual volume will appear on all the clients connected to the SAN, allowing for collaborative editing. In addition, the virtual volumes can be created on a project basis and deleted without affecting another portion of the storage pool. The file system is native, so no client software is required to make client operating systems compatible with the SAN.

Facilis Technology's TerraBlock 24D can scale to 18TB in a single server. Technicolor uses multiple servers for more than 50TB of online storage.

The main limitation of this system is that it doesn't have multiwrite, so users cannot write to the same virtual volumes from different locations. However, this aspect can likely be worked around through good project management.

Server-direct SANs are especially adept at handling episodic television or film work, as the virtual volume feature allows the media to stay on the

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Powering Hi-Def I·D·X

server for long periods of time with minimal bottlenecks. Not surprisingly, if most of your projects involve quick turnaround edit times, the fact that the system cannot support multiwrite might mean it is not the right solution for you.

Vender venture

The next step is talking with specific storage vendors. Look for companies that specialize in media (as opposed to data) storage systems. This may seem like an obvious point, but there are some vendors that may try to sell you a system that is better optimized for data storage. While these systems can be extremely fast (and therefore appear to be ideal for quickly moving media around your facility), the physical hardware has been designed for data — not media backup.

The vendor should also be familiar with the specific editing applications you need to tie to the SAN. The vendor doesn't need to know the ins and outs of these applications but should have good understanding of how they interface and talk with the SAN. While many SAN systems on the market are plug and play, you will likely need to tweak the system so it interfaces smoothly with all the editing systems connected to it. It's also important for the vendor to understand the editing applications if you plan to add its solution to an existing SAN or NAS system, as the vendor may need to add another layer of software to allow the various systems to interface with one another.

Hardware honing

In terms of the actual hardware for your SAN, most vendors offer expensive Fibre Channel drives or a more cost-effective alternative called Serial ATA (SATA). SATA disks have become increasingly sophisticated over the years and now offer almost the same amount of speed as Fibre Channel and can pack a lot of capacity into a small space. It's not uncommon today to see SATA-based servers that have a capacity of 18TB in 5RUs.

Need to know

In the end, choosing an HD editing storage platform comes down to truly understanding the unique needs of your facility. If you know the bandwidth and capacity needed overall, have a basic understanding of the workings of server-assisted and server-direct SAN systems, and know the alternatives to Fibre Channel disk drives, you will be in a solid position for choosing the right vendor for you facility. Good luck, and remember to ask about the warranty! BE

Sarah Stanfield is a technical writer and the author of Broadcast Engineering's Mobile TV Update *e-newsletter.*

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Identifying hot spots

New sensing devices enable safe temperature testing.

BY DON MARKLEY

The development of new sensing devices has made temperature-testing tools extremely useful for broadcasters. The devices permit testing under power — a technique that simply isn't possible with conventional instrumentation.

Temperature testing equipment ranges from little handheld sensors to complex camera systems. It is the latter of those two systems that offers the greatest amount of information. This method of failure prediction should be performed on a regularly scheduled basis.

Network analyzers

For antenna systems, the use of a network analyzer has essentially become the norm. Whether for routine system evaluation or to locate failures, the vector network analyzer, with its inverse Fourier transform capabilities, permits operators to spot many system irregularities, up to complete burnouts. It also allows users to identify the location of those problems to within a small distance on the tower. Problems can usually be located to within a couple of feet or less.

This ability to locate and identify minor mismatches in the system impedance allows broadcasters to find a component going bad so it can be replaced when that station wants to do the work. The alternative is to proceed with normal operation until the transmission line fails, taking the station off the air. As a rule, waiting to fix the problem until the burnout occurs is much more expensive, causes the station to spend several hours off the air and greatly upsets the suits in the front office.

Thermography equipment

The network analyzer cannot be used for testing at full power, which is where thermography comes into use. Figure 1 shows three coaxial lines, all 3in rigid, operating at three different power levels. The elbows are operating at a higher temperature than the straight-line segments, which is normal. The horizontal run is also warmer than the vertical run, as the heat can dissipate away from the elbows up the line. The components shown in Figure 1 are operating normally. A hot spot would show up as brighter than the rest of the lines. The temperatures can be scaled so that a hotter area will stand out from the remainder of the components.

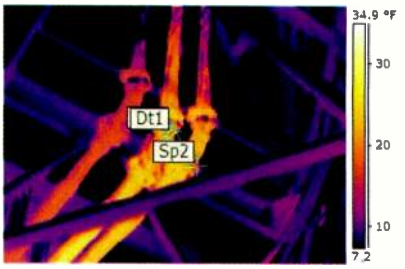


Figure 1. An example of three coaxial lines operating at three different power levels

The idea here is to scan the transmission line looking for components that are running unusually hot. As a rule, that signifies either damage or wear that may lead to a total failure.

An example of this occurred at WALA-TV in Mobile, AL, some years ago. Two 3in lines were feeding a batwing antenna. Ghosts were appearing in some directions and not in others. The station was taken off the air and immediately tested for voltage standing wave ratio (VSWR). One line showed a 1.04:1, while the other showed 1.4:1. After some discussion about what might be causing the problem, an engineer noticed that both lines read 1.04:1.

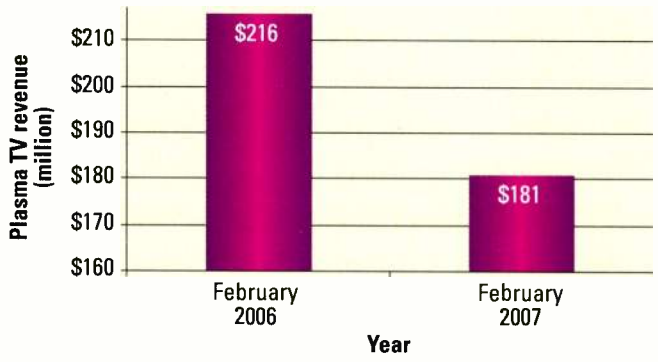
The high VSWR condition only occurred after the station ran at power for some time to warm up the lines. A climber felt all the elbows under the antenna and noticed that one was noticeably warmer than the others. The watchbands in the bullets at the elbow were replaced, and the problem was solved. When cold, the connections were good, but they went bad under full-power operation.

FRAME GRAB

A look at the consumer side of DTV

Plasma TV revenue drops

Revenue in February 2007 was $35 million less than February 2006.



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That particular project occurred before the FCC's Office of Science and Technology (OST) determined that climbers shouldn't be that close to the antenna. Under today's rules, that testing would be much more difficult to do. With modern thermography equipment, a technician can climb up the tower close to the antenna and then check all the components with the camera. The hot spots can be located, the picture and data can be recorded on the device, and evaluation can occur on the ground.

Figure 2 shows a 600-amp disconnect switch with problems occurring on the center phase. The switch is in significant trouble. Finding this problem before the switch totally burns out allows the station to install a replacement component before a major burnout occurs with accompanying arc flash damage.

Annual testing

Broadcasters are recommended to visit the transmitting site on an annual basis with both thermographic equipment and with a vector network analyzer. The analyzer should be used to sweep the antenna system from the output of the transmitter both through and after all combiners, filters and traps. Then the entire plant should be checked with the thermographic equipment from the incoming power connection to the antenna.

Figure 2. An example of a 600-amp disconnect switch with problems on the center phase.

If either the thermographic or the network analyzer detects an improper condition on the tower, further testing can be done. In this case, an engineer will climb the tower with thermographic equipment. It isn't necessary to open the line to find hot spots. The interior components show up clearly, even in a closed transmission line system.

Besides just transmission line problems, a thermographic camera can pick up power line irregularities, disconnect and circuit breaker problems, transfer switch problems, and other irregularities that generate heat.

Regular annual testing can help a station avoid failures and burnouts that might take it off the air. Those failures cause a lot of heat from the front office. BE

Don Markley is president of D.L. Markley and Associates.

? Send questions and comments to: don.markley@penton.com

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NAB2007 REPLAY

Welcome!

NAB2007 has come and gone, but never fear: The coverage continues. Each year, the *Broadcast Engineering* staff provides a comprehensive recap of the show.

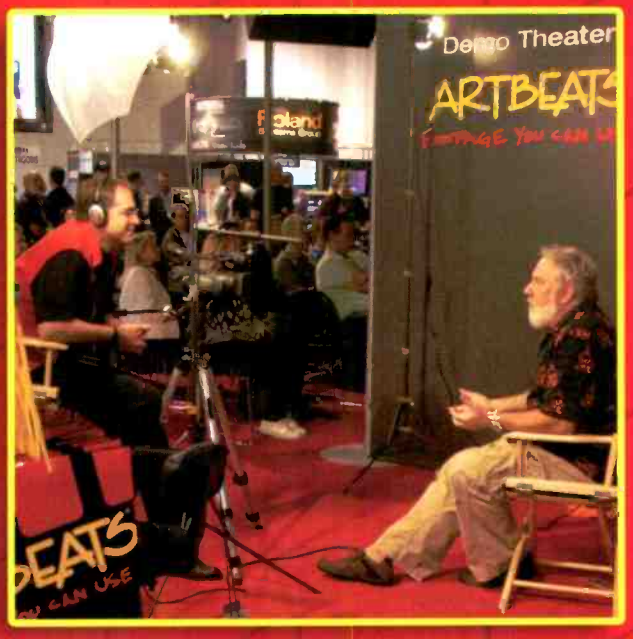
First, we announce the winners of our 23rd annual Pick Hit Awards. Our panel of independent judges recognizes 40 of the most innovative products shown at NAB2007.

Next, in our Technology Seminar, our writers and engineers recap notable products and trends from NAB. From audio to storage, we've got it covered.

Finally, our Product Jackpot provides a sampling of some of the hottest products on display at the show. Want more? See the *NAB Special Report* packaged with this issue.

The 2007 Pick Hit judges:

Steven Blumenfeld, Current TV
Jim Boston, DTV Engineering
David Danto, Lehman Brothers
Perry Drogo, TECADS
Sue Farrell, Red Bee Media
Sid Guel, consultant
Glenn Hall, Bakewell House
Doug Jackson, Technicolor
Dennis Keeling, Columbia College Chicago
Phil Keeling, Finalé Editworks
Shipley Landiss, MTV Networks
Sean McFarland, LDS Church
Jim Radmann, Time Warner Cable
Jeremy Rack, D.L. Markley & Associates
Henry Rahwiedel, Lakeshore Public Television
Steve Snyder, consultant
Dan Stark, Stark Raving Solutions



Photos courtesy Doug Schwartz

PICKHITS

Welcome to *Broadcast Engineering's* Pick Hit awards, the industry's longest-running product technology awards for broadcast and production. With a 23-year history, Pick Hits are the most prestigious technical awards given at NAB.

At NAB2007, a panel of independent judges toured the exhibition floor for three days, looking for innovative technology. They then met to make their selections based on multiple criteria, including the technical and financial improvements the products can bring to a facility's operation. Our editors and publishers have no vote in the selection process.

Congratulations to the following 40 manufacturers for their creative technology solutions!

Io HD
AJA
530-274-2048
www.aja.com

Portable plug-in solution enables working in HD and SD in Apple's Final Cut Studio 2; via FireWire 800 interface, the Io HD supports Apple's ProRes 422 codec in hardware, enabling 10-bit video editing on a MacPro desktop or MacBook Pro laptop; offers SD/HD analog I/O, SD/HD digital I/O (including HD-SDI and HDMI), balanced analog and digital AES audio, RS-422, genlock with loopthrough, and LTC timecode connections.

Model 230
Aphex Systems
818-767-929
www.aphex.com

Analog, single-channel preamplifier and voice processor features RPA tube preamplification, Easyrider compression, Logic Assisted gating, split band de-essing, parametric EQ and Aphex's Aural Exciter and Big Bottom psychacoustic effects; the 1RU, rackmountable processor implements an XLR mic input and +4dBu output, a 1/4in TRS -10dBv output, 1/4in TRS send and receive insert, AES3, S/PDIF and optical digital outputs up to 96kHz, as well as Word Clock I/O on BNCs.

Final Cut Studio 2
Apple
408-974-1492
www.apple.com

Editing suite includes Final Cut Pro 6, which features Apple's ProRes 422 format for uncompressed HD quality at SD file sizes; Motion 3 enables the creation of 2-D and 3-D motion graphics in real time; Soundtrack Pro 2 allows multitrack editing, surround mixing and conforming sound to picture; Color ensures consistent color and allows the creation of signature looks; Compressor 3 enables the creation of pristine-quality output for a range of delivery formats.

Synergy HD
Archion
818-840-0777
www.archion.com

SATA II to FC RAID storage array designed for networking digital video systems in an Avid Unity environment; the system is certified with all versions of Avid Unity, from 3.3 through 4.2, without requiring software and hardware replacements; hardware RAID protection eliminates the need for storage mirroring for protection; units come preconfigured from 4TB to 8TB with two ports of 2GB FC; compatible with Windows, Mac OS 9 and X, Linux and most Unix systems.

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AJA
VIDEO SYSTEMS

PICKHITS

When a suitable tally input is applied, the LED SMPTE/EBU time-code display changes instantaneously from green (standby) to red (live or recording); features easy-to-read 2.25in digits that display HH:MM:SS A/P in 12-hour mode or HH:MM:SS in 24-hour mode; time-code input is taken from either vertical interval time code embedded in the video input or from linear time code; when a time-code source is connected, the clock will instantly set itself to the input time.

+ClockPlus+
Autoscript
203-338-8356
www.autoscript.tv

Multidefinition video switchers provide full-function keyers on each M/E, downstream keyers, frame synchronizers and buffers, and options for partner product control; provide 2-D and 3-D DVE functionality for creating picture-in-picture perspectives and transition effects; configured with up to 16 analog or digital inputs and up to 16 simultaneous analog and digital outputs in HD or SD; switchers are built on a reconfigurable platform.

Ovation MD 4000 series
Echolab
978-715-1020
www.echolab.com

Editing system features built-in 3Gb/s SDI connections, enabling twice the SDI data range than normal HD-SDI; connects to SDI, HDMI, component analog, NTSC/PAL and S-Video for capture and playback, with instant switching between SD, HD and 2K; offers 12 channels of XLR AES/EBU audio in and out, as well as four channels of XLR professional analog audio in and out; includes color management via built-in 3-D lookup tables.

Multibridge Eclipse
Blackmagic Design
408-954-0500
www.blackmagic-design.com

Compressed transport stream automatic start switch offers signal providers the capability to design automatic redundancy into a system and alarm the operator when a problem arises; by constantly monitoring the incoming signal, the switch knows when the signal is no longer suitable for broadcast and automatically switches to the backup feed; fully integrated with the VistaLINK PRO NMS system; features two ASI inputs and one ASI output, as well as smart configuration of error threshold and switching rules to avoid false switching.

7780R2x1-ASI-CS
Evertz
905-335-3700
www.evertz.com

Program optimizer provides faster-than-real-time file-based encoding, decoding and transcoding of Dolby Digital, Dolby Digital Plus and Dolby E bit streams, as well as MPEG-1 LII audio files; offers a single-step Dolby Digital to Dolby Digital Plus transcoder that preserves the metadata and minimizes tandem coding losses; allows the audio from existing media archives to be converted to next-generation broadcast formats.

DP600-C
Dolby
415-645-5000
www.dolby.com

Video stabilizer electrically corrects video shaking that occurs in cameras, as well as unsteadiness on prerecorded VCR tapes; corrects unsteady images in real time; automatically recognizes panning and zooming; can correct up to 40 percent in vertical or horizontal directions in relation to the screen; provides sub-pixel level correction precision; works by connecting video cables without the aid of special connections; its compact size makes it ideal for field applications.

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PICKHITS

PICK HIT BroadcastEngineering 2007

Nonlinear editor uses PCI Express acceleration and an interface board to deliver uncompromised editing quality on a standard PC platform; the base software is EDIUS Broadcast NLE 4.0, which supports multiple layers and multiple formats in real time; supports embedded audio; a breakout box is available for analog audio I/O, component video I/O and frame-accurate RS-422 VTR control.

EDIUS SP SDI
Grass Valley
530-478-3075
www.grassvalley.com

Holographic storage drive records 300GB on a single disk with a transfer rate of 20MB/s; enables broadcasters to record 35 hours of broadcast-quality (19Mb/s) video on a single disk in 250 minutes (160Mb/s transfer rate); offers a 50-year media life for archiving valuable video assets; uses write once, read many (WORM) media format, which eliminates accidental erasure or over-writing.

tapestry 300r
InPhase Technologies
720-494-7420
www.inphase-tech.com

With a high-res card installed, the A/V mixer simultaneously processes 15 sources: 12 SD, one scaled up from SD to HD, and two selected from HD video or computer inputs; upconverts to HD and downconverts to HD — even simulcast live SD and HD output; manages the mixing and timing of audio sources, ranging from unbalanced analog to AES/EBU signals; provides phantom power for four mics; ensures lip sync in live productions.

Indigo
Grass Valley
530-478-3075
www.grassvalley.com

Clustered storage system is powered by OneFS operating system software, creating a single file system and a single, seamlessly expandable shared pool of storage; each 1RU storage node provides 2TB of storage capacity, as well as processing power and memory that adds to a global coherent cache; can scale from 6TB to 48TB in a single file system.

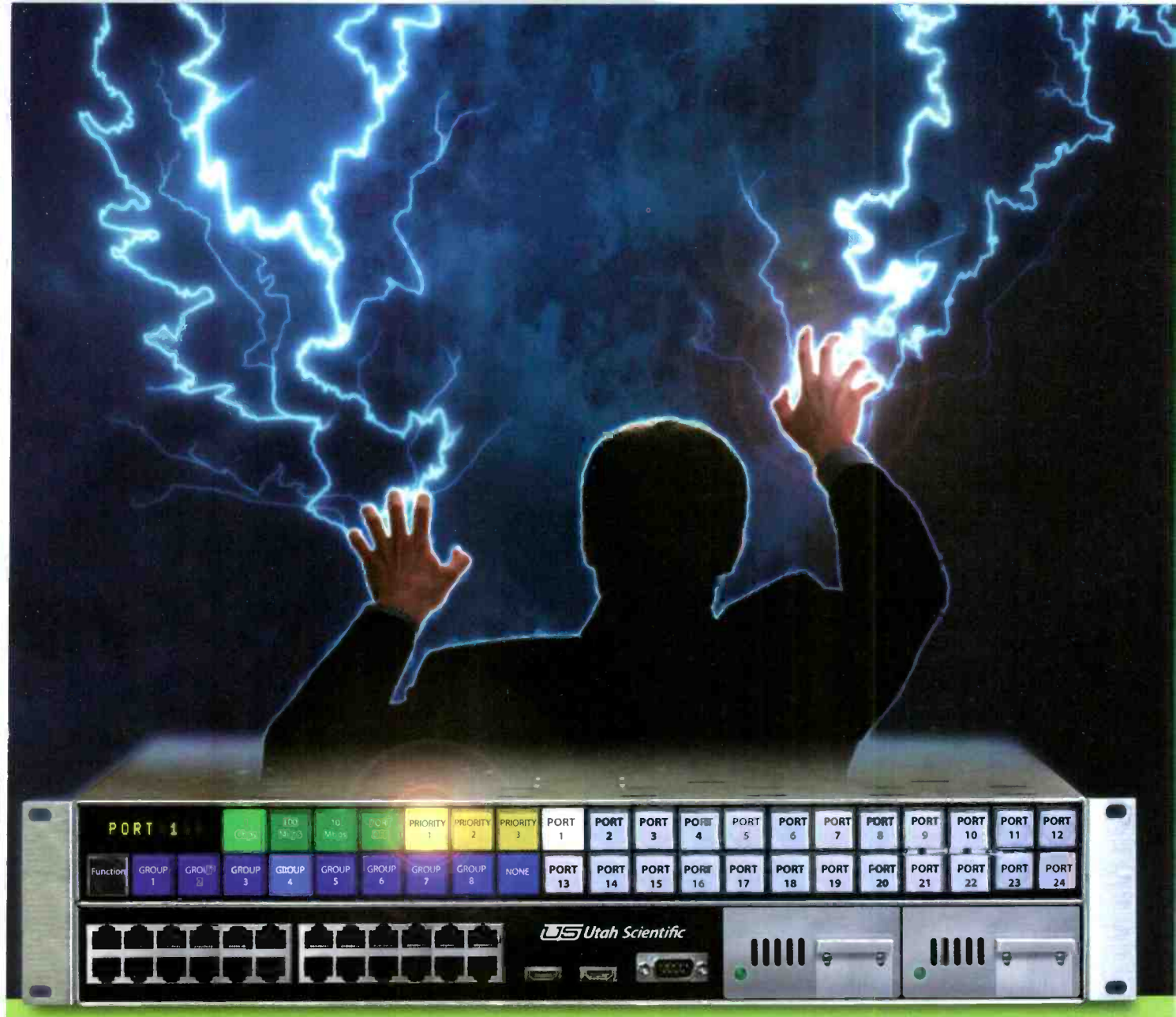
IQ 200
Isilon Systems
206-315-7602
www.isilon.com

Graphics playout server provides a one-stop system for creating, scheduling and airing complete television channels in HD or SD; integrates a playout server, graphics, animation, video, audio and real-time external data feeds, and master control functionality in a single chassis; allows the creation of professional graphics, video titles, custom animations, motion effects and 3-D text.

Channel ONE
Harris
513-459-3400
www.broadcast.harris.com

Allows access to either the antenna or coax system without the need for a tuned elbow complex; available for Band I (Low Band TV), Band II (FM), Band III (Hi Band TV) and Band IV (UHF TV); can be used for termination or test equipment hook-up; includes fixed bullets for input and output, one flange O ring, hardware, pass through connection and test turn; port closure maintains impedance in normal mode.

JTS Test Section
Jampro Antennas
916-383-1177
www.jampro.com



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PICK HIT BroadcastEngineering 2007

Camera system features a JVC ProHD 200 series camera with a built-in Super Encoder that generates a high-quality MPEG-2 stream; also features the HD Mini-Coder, a camera-back transmitter from Broadcast Microwave Services that accepts the camera's compressed signal at 20Mb/s via IEEE 1394 connection, modulates it at 64-QAM and then transmits COFDM with an 8MHz bandwidth in the 2GHz channel.

ProHD Libre
JVC
973-317-5000
www.jvc.com/pro

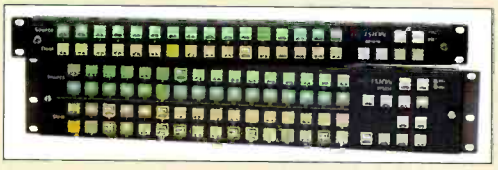
High-performance 40-channel DWDM multiplexer and demultiplexer has back-to-back insertion loss of 5.5dB, including connector losses; features C-band 100GHz channel spacing according to ITU-T G.694.1, ensuring interoperability with other standards-based DWDM systems; fits in a standard Flashlink frame; signals can be unidirectional or bidirectional; signal- and bit-rate transparent; 1.5dB channel uniformity makes the system ideal for unidirectional use with Erbium Doped Fibre Amplifiers.

DWDM-40C
Network Electronics
801-495-1635
www.network-electronics.com

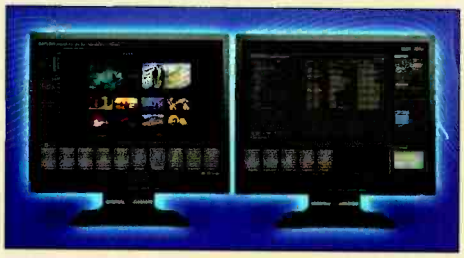
A 20in-wide HD monitor; features a completely digital TFT-MegaPixel active matrix LCD platform; digital signal processing features 10-bit A/D conversion of all analog signals, with 4X oversampling and five-line super-adaptive 2-D comb filtering of composite signals; multi-format compatibility accommodates virtually all video formats; advanced features include aspect ratio settings, a variety of screen markers and H/V delay.

V-R201P-AFHD
Marshall Electronics
310-333-0606
www.lcdracks.com

Compact Router family supports HD, SD, AES, AV, AA and data formats; available in 16 x 16 (1RU), 32 x 32 (2RU) and other sizes; 3Gb/s-enabled for future high-bandwidth requirements; routers and control panels are compatible with all NVISION control systems; routers operate via remote panel or local panel, or they can be controlled by an NV9000 or NV910 control system for integration into large routing systems; offers error-free signal switching and distribution in a space-saving package.



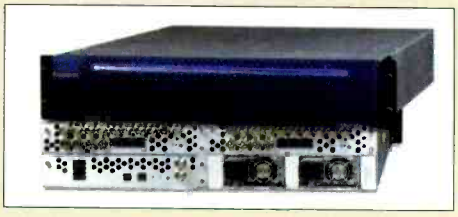
Compact Router series
NVISION
530-265-1000
www.nvision.tv



Remote station monitoring system allows broadcast operators to monitor hundreds of signals across remote locations, over an IP network; combines the flexibility of iControl Web and the advanced processing and alarming capabilities of Kaleido multi-image processors; comprehensive signal probing alerts operators to multiple types of faults, including video signal loss, video freeze, video black, video luminance and audio silence.

iControl RSM
Miranda
514-333-1772
www.miranda.com

Multichannel video server built on the same technology as the company's Spectrum media server; supports both HD and SD; supports up to six simultaneous video channels; contains 4TB of disk storage, enough for more than 200 content hours at 25Mb/s; all disk storage and I/O modules are contained within a single 2RU chasses; a standard configuration includes eight enterprise-class SATA disk drives featuring dual-parity RAID for added protection.



MediaDeck
Omneon Video Networks
408-585-5000
www.omneon.com

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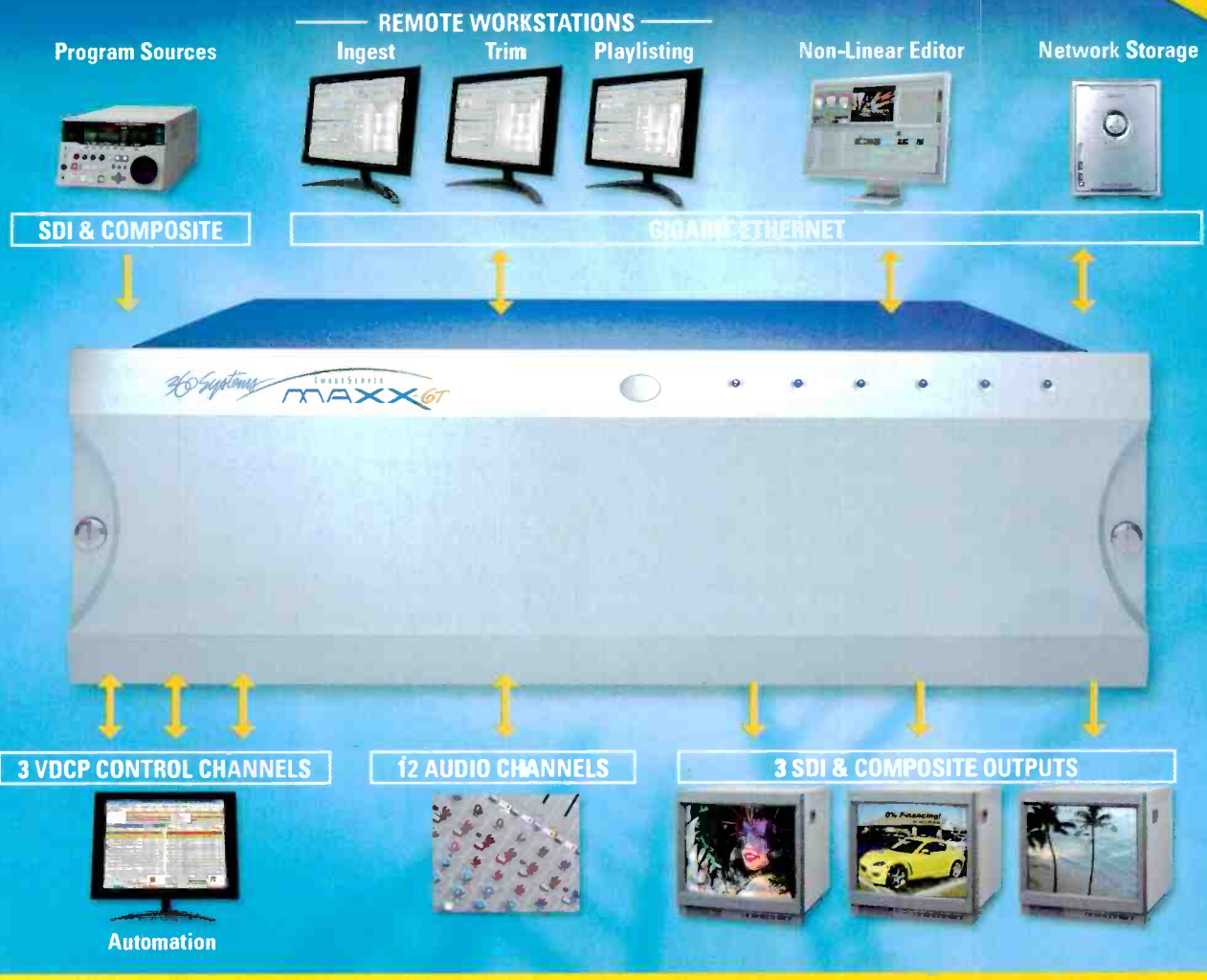

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E-mail: MAXX@360systems.com

PICKHITS

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www.on-air-systems.com

playKast is a master control system for automated playout and live news production; infoKast is an automated playout system for the delivery of graphic information and live video; the combination of the two systems increases broadcasters' options for their info channels; users can control the information streams and time-based events using infoKast, while playKast can play out their media, including graphics and overlays, and can control infoKast switching.

VALID8
Pro-Bel
631-549-5159
www.pro-bel.com

Video/audio lip-sync and identification system is an enhanced version of the VALID system; allows A/V sync problems to be quickly and accurately diagnosed and rectified; new system now supports any HD or SD standard; the number of audio channels (inputs and outputs) has been increased from four to eight (four stereo); the output format/standard automatically switches to the same as that of the program input; the default format is user-selectable when the generator is in standalone or free-run mode.

AG-HPX500
Panasonic
201-348-7000
www.panasonic.com/broadcast

Shoulder-mounted P2 HD camcorder features progressive 2/3in 3-CCDs; records in 32 HD and SD formats, including 1080i and 720p in 100Mb/s DVCPRO HD; records on removable P2 memory cards in 1080/60i, 50i, 30p, 25p and 24p; also records in 720/60p, 50p, 30p, 25p and 24p, as well as in DVCPRO50, DVCPRO and DV; uses a digital signal processor with 14-bit A/D conversion and 19-bit inner processing that handles HD/SD format conversion simultaneously.

Mission
Quantel
703-448-3199
www.quantel.com

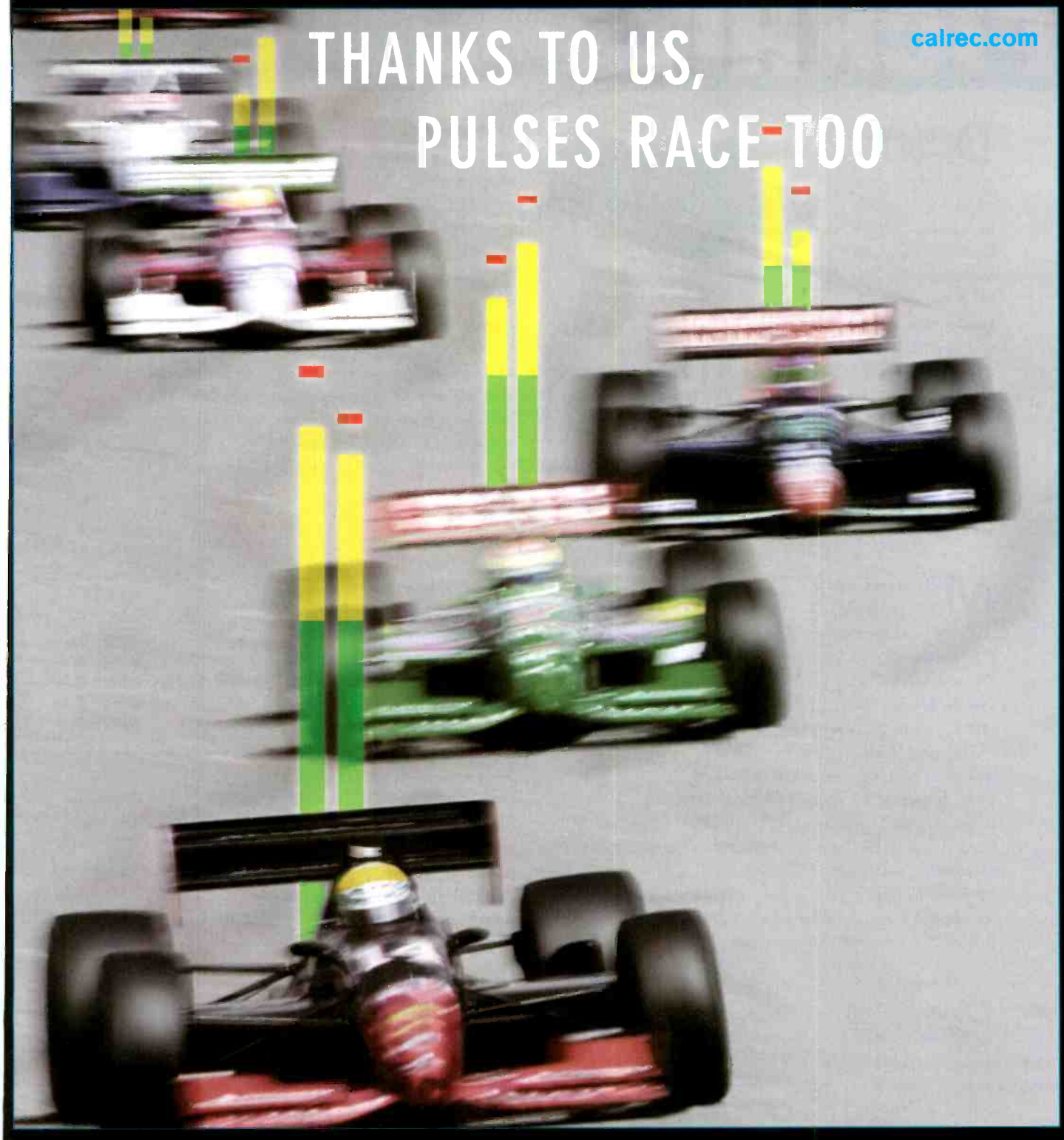
Media asset management system designed for Enterprise sQ and Newsbox HD systems; tightly integrated into the Quantel ISA database environment; a key component is Mission Central, which provides the core MAM database, keyframe shot generations, user log-on and production access; users have instant access into it via Mission Tracker, which uses familiar Quantel menus to search and display media assets and associated metadata.

LipTracker
Pixel Instruments
408-871-1975
www.pixelinstruments.tv

Line of lip sync analyzers detects a face in the video and then correlates selected sounds with their matching mouth shapes to produce a measurement of the lip sync error; the measured audio offset is displayed and updated periodically, and a history graph charts the most recent error profile; event logging provides a permanent record for scene-by-scene analysis; includes the LipTracker-SD[101]; LipTracker-SD[102] and LipTracker-SD[lite].

The Talon
Ravensclaw
541-488-5271
www.ravensclaw.us

Midsize, rugged and lightweight remote head designed for HD, film and broadcast camera systems; is precise, quiet and capable of smoothly controlling cameras with extreme zoom lenses; the motion is repeatable and frame accurate; features joystick control for pan, tilt and zoom; can record and playback up to 34 minutes and up to 2000 takes; offers programmable maximum speeds and smoothing for each axis, and programmable motion limits.



Sound gives pictures an emotional dimension that movement alone can't convey. The increasing use of surround sound adds even greater impact to the viewing experience. But it calls for much greater console capacity.

At Calrec we've been meeting the changing needs of broadcasters for over thirty years. And as you'd expect from a company dedicated exclusively to live production and on-air broadcast audio mixing, we've developed an innovative surround sound solution that's as economical as it is practical.

New Bluefin technology provides twice the signal processing capacity in a fraction of the space of conventional systems and with 100% redundancy.

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CALREC

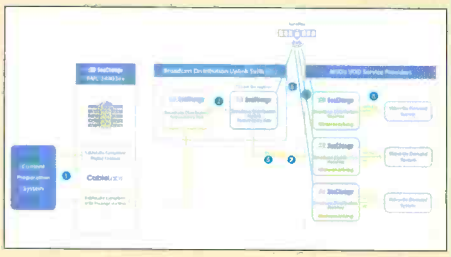
Putting Sound in the Picture

PICKHITS

PICK HIT BroadcastEngineering 2007

Digital cinema camera delivers 12 megapixels at up to 60fps; records in 12-bit native RAW format, 2X oversampled HD in 4:4:4 or 4:2:2; weighs 9lbs; camera is modular and upgradable; onboard or external high-res RED monitors come equipped with advanced tools for framing, exposure and focus; stainless steel mounting points on the body allow for hundreds of optional RED and third-party accessories.

RED ONE
RED Digital Cinema
949-206-7900
www.red.com

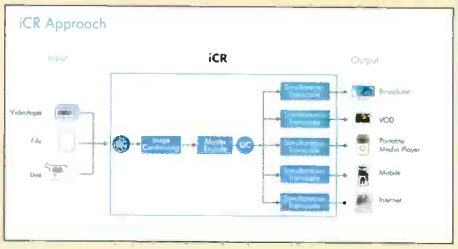


VOD distribution system enables film studios, TV networks and content aggregators to streamline VOD content delivery schemes with satellite transmission cost-efficiency and end-to-end fault-resilience; gives content providers full control of their asset libraries in cable headends; provides reports on content use and system performance; 128-bit encryption algorithms provide content protection throught the distribution process.

VODcast
SeaChange International
978-897-0100
www.schange.com

Multistandard TV signal analyzer combines the functionality of a TV test receiver and spectrum analyzer; offers real-time demodulation; allows new television standards to be implemented on a software and hardware basis; suitable for commissioning, installing and servicing TV transmitters, as well as coverage measurements for terrestrial TV and measurements on CATV head stations; has a frequency range of 500kHz to 3GHz.

R&S ETL
Rohde & Schwarz
410-910-7800
www.rohde-schwarz.com/usa



Automated content repurposing workstation enables broadcasters and content owners to master content once and concurrently repurpose it for multiple distribution platforms; combines image conditioning tools, content matering, quality control and content repurposing functionality to deliver high-quality images while reducing the time required for repurposing content for multiple media platforms.

iCR
Snell & Wilcox
818-556-2616
www.snellwilcox.com

Production switchers handle SD and HD formats; all models share a common platform and common set of modules; the use of RGB buttons allows personalization of the control panel; a Dual-Display color touch screen allows the operator to view and control two menus simultaneously; features include built-in manuals, Linux-based OS and integration with the OverDrive control system; series includes five models, ranging from one to four M/Es.

Vision series
Ross Video
613-652-4886
www.rossvideo.com

Storage systems feature fast Enterprise/RAID hard drives; for added convenience and security, the swappable drive modules are compatible across the Fusion line; are compatible with Apple Final Cut Pro and Adobe Premiere Pro CS3 video editing software, and with video capture cards from AJA, Blackmagic Design, Bluefish444 and Matrox; systems range from the 2TB quad-interface Fusion 400Q to the uncompressed-HD-1080i-4:4:4-capable 6TB Fusion D800RAID.

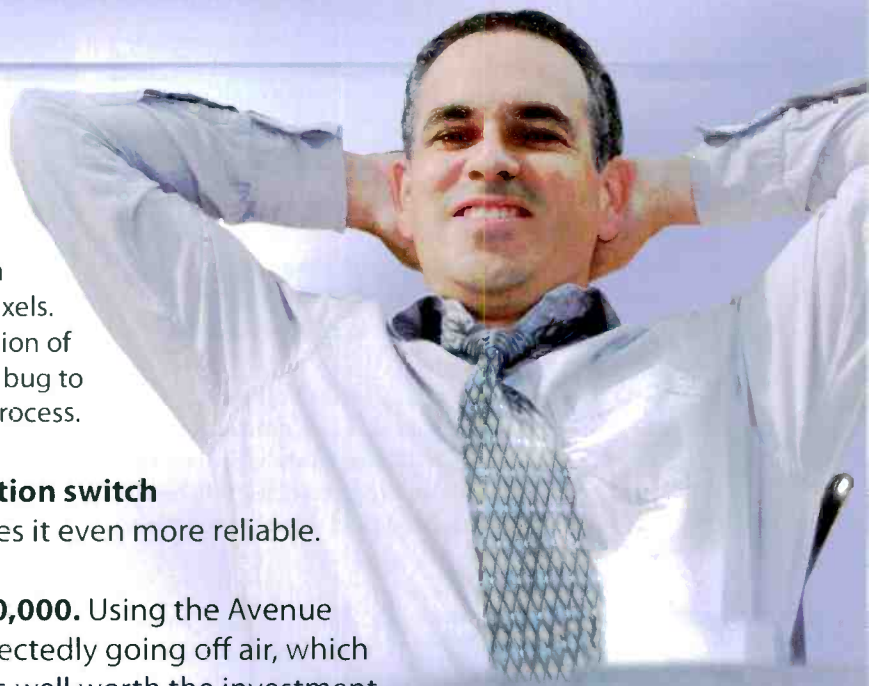
Fusion
Sonnet Technologies
949-587-3513
www.sonnettech.com

TV Broadcast and Satellite

Engineers: How to Avoid Going Off Air Unexpectedly

You can easily protect your on-air feed and be sure to be on-air at all times with an Avenue Protection Switch. Simply feed your primary on-air feed and your secondary, back up signal into the Avenue protection switch. If the primary should fail, the secondary signal will take over.

Superior circuitry detects black levels, TRS, audio presence, freeze and EDH for HD or SD signals. For ASI signals PIDs are evaluated. You set the parameters for when a switch occurs. You might decide 10 seconds of signal below 12 IRE or 14 seconds of no embedded audio should cause a switch to the secondary feed.



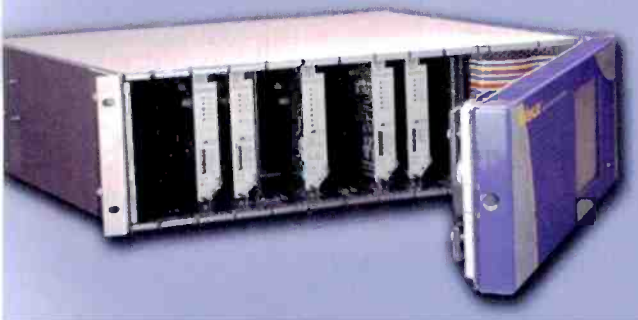
You can use the **sophisticated detection system** to your advantage by adjusting the switch's parameters for *your* facility's needs. For example, the black detection system allows you to set both the threshold and the percentage of non-black pixels. But that's not all, you can also determine the portion of the picture to be considered. This allows a corner bug to be either included or excluded in the detection process.

This is the smartest, most reliable protection switch on the market today. And relay bypass makes it even more reliable.

So consider spending $3000 to save $300,000. Using the Avenue Protection Switch can save you from unexpectedly going off air, which can cost thousands. This kind of insurance is well worth the investment.

No more worries.

Try it 10 days for free. Satisfaction guaranteed.



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PICKHITS

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Sony
201-930-1000
www.sony.com/professional

Monitor consists of a 23in full HD LCD panel, a high-precision backlight system and a professional display engine used exclusively in this monitor; offers accurate color reproduction, precision imaging and quality picture consistency; features a newly developed color space selection function, a picture-and-picture display and an interlace display mode; can accept almost any SD or HD video format, both analog and digital.

End-to-end platform delivers real-time graphics and video content to Internet browsers and mobile devices; compositing of video and graphics happens directly on the viewer's display, with real-time, 3-D grahics rendered locally by each platform (phone or PC); this creates the highest quality graphic resolution and content that is both platform- and user-specific; is fully integrated within the Vizrt product suite, so a station's production workflow is unchanged.

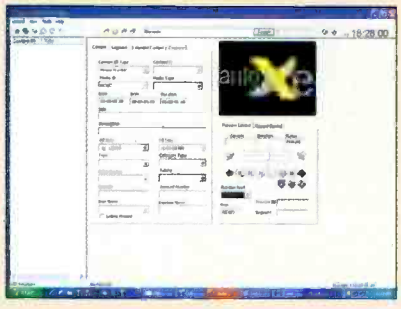
VizMulti Platform Suite
Vizrt
212-560-0708
www.vizrt.com

HD and SD decoder supports all common HD and SD video formats; video is processed at either 4:2:2 or 4:2:0; decodes up to eight audio channels (four pairs) with analog and digital outputs, and embbed in SDI or HD-SDI; in its basic configuration, the decoder supports two independently programmable auxiliary data channels, asynchronous or synchronous; features an embedded Web browser interface to allow for easy command and control programming.

HD4040
Tiernan
602-437-9620
www.tiernan.com

Touch-It Plus
Wohler
510-870-0810
www.wohler.com

Provides professional AV monitoring on a dual 7in wide-screen format using high-res LCD monitor panels with up/down tilt features; 3RU package pairs 12 composite video inputs with 12 thumbnail images, which appear on the left LCD monitor; selecting a thumbnail displays a full-size version on the target screen located to the right and switches the video to be the selected video output BNC; video inputs on BNCs have active loop outputs on BNCs.



autoXe
VCI Solutions
413-272-7200
www.vcisolutions.com

Multichannel automation system is a suite of tools built on the Xe software platform; enables the scheduling, monitoring and playback of one, 25, 50 or more channel streams; provides the tools necessary to automate workflow and manage content throughout the digital supply chain, from point of sale to point of air; its scalability allows more channel streams to be added easily; uses off-the-shelf hardware and standard networking.

Digital Recording Wireless
Zaxcom
973-835-5000
www.zaxcom.com

Internal 12-hour, 24-bit loop-recording is an optional feature on the body-pack style TRX900 and TRX900AA, the TRX700 plug-on or the TRX800 handheld digital wireless transmitter; comes standard on the TRX990; audio is time-code referenced, recorded and played back on a removable mini SD memory card via commands from the IFB900 transmitter; the mini SD card is instantly removable and can be used in any standard SD card reader.

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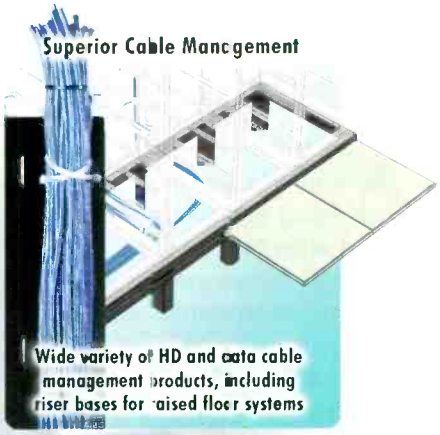

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Storage

IT takes center stage.

BY MICHAEL GROTTICELLI

At this year's NAB, it was clear that commodity technology borrowed from the computer IT world is changing the storage world of audio and video data. It has helped reduce prices of storage systems and led to some sophisticated, smart storage implementations that allow broadcasters easy access and reliable delivery programs to a variety of media platforms.

Specifically, this new trend in the use of IT storage has meant new camcorders (from such companies as Grass Valley, Ikegami, Panasonic and Sony). They record onto flash memory and large (and small) storage systems using dual-core Intel Xeon processors linked to parallel ATA and Sata ATA (SATA) storage drives. (The difference between them is in how the data is stored and accessed across the drives.)

SATA was shunned by broadcasters only a few years ago. Now RAID 5 and RAID 6 technology has the added fault tolerance required by IT managers at stations and large content delivery facilities. RAID-enabled SATA storage is now seen as more than adequate, and it costs less than heretofore more commonly used SCSI technology.

At the end of the day, however, it is not enough to simply store audio and video content. It must also always be online and instantly accessible.

Of course, this can be tricky when handling large HD files and multiple file formats in a single system. Broadcasters also need ultra-high throughput rates to enable real-time collaborative workflows.

On the show floor, there were a variety of options to fit virtually every production and content delivery application.

Small workgroup storage

For the single workstation and small workgroup user, Avid Technology now offers its Unity MediaNetwork 5.0 system, designed for real-time shared storage, with a new system architecture. By consolidating several hardware components into a single, integrated file management system and storage server, it delivers twice the performance of previous Unity systems, while maintaining data resiliency.

The system is available in scalable SD and HD configurations, both of which offer GigE connectivity and 4Gb Fibre Channel connectivity, PC and Mac compatibility, as well as storage capacity that can scale from 4TB to 40TB.

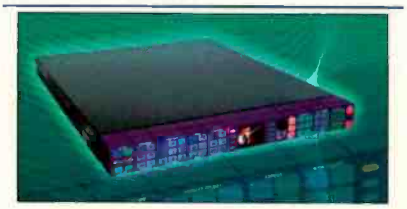
Archion Synergy

Archion Technologies' Synergy HD4 is a SATA II to Fibre Channel RAID storage system designed for networking digital video systems. It is

PRODUCTJACKPOT

SIGNAL PROCESSOR

Miranda JAZZ-800



Single/dual-channel, up/down/cross/ standards conversion plus A to D / D to A; all in 1RU; provides high-quality conversion using pixel motion de-interlacing; offers HD/SD motion adaptive noise reduction; provides flexible aspect ratio conversion using the common presets, as well as nonlinear anemographic conversion, with control by AFD, WSS, and VLI; integral audio processing with eight AES pairs, 16 channels of embedded audio and eight analog audio channels.

514-333-1772; www.miranda.com

PAN AND TILT HEAD

Vinten Protouch Pro-6HDV

Supports camera systems up to 13.2lbs; features continuously variable pan and tilt drag, side load camera attachment system, three-step counterbalance system, illuminated level bubble, multiposition pan bar and +90 to -60-degree tilt range.

845-268-0100; www.vinten.com

IP-BASED PROMPTER

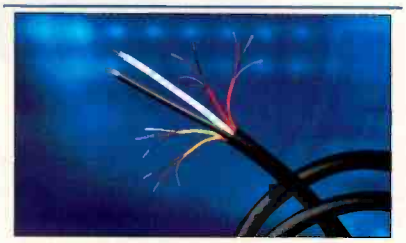
QTV QMaster

Part of the QNxt product suite; uses IP architecture; comprises a software application on the control PC, which communicates over an Ethernet link with a highly compact QBox unit to scroll the script; enables operation of remote prompters from a central location.

203-406-1400; www.qtv.com

CAMERA CABLE

Belden Brilliance Composite Camera Cable



Uses two Belden A/V coaxial cables and four audio pairs; ideal for the interconnection of digital remote field cameras in SDI/HDTV applications; the coaxes are sweep tested from 5MHz to 1600MHz, achieving minimum return loss values of 23dB and 21dB, respectively.

800-235-3361; www.belden.com

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available in units from 4TB to 12TB with two ports of 4Gb Fibre Channel storage. The storage array is fully compatible with Avid Unity versions 3.3 through 4.2.2.

The HD4 extends Archion's original Synergy HD abilities from 400MB/s to 800MB/s bandwidth with its dual 4Gb Fibre Channel ports and has increased its capacity from 8TB to 12TB in the same 3RU space.

Ciprico's rack-mountable MediaVault U320RX uses parallel ATA drive technology to provide up to 5TB of cost-effective, video-tuned storage that can be configured for RAID 0 or RAID 3 operation. It can be configured with up to 10 removable drives, two removable 300W power supplies and a dual-channel Ultra 320 interface to provide throughput speeds in excess of 400MB/s. That's enough to support the real-time, 10-bit HD applications commonly used in editing applications.

Ciprico also unveiled a direct attached storage (DAS) system using the new PCI Express external cabling standard, which is also used by Sony's new XDCAM EX camcorder. The system, based on the company's RAIDCore software RAID stack, allows users to add capacity within a single cell, creating a storage pod of up to 64TB. The combination of a performance switched DAS cell with a more scalable SAN-based network provides a cost-effective, secure, two-tier scalable storage environment.

DataDirect S2A9550

DataDirect Networks offers NAS, SAN and tiered storage solutions as part of its Silicon Storage Appliance (S2A) product family.

At the NAB convention, the company showed a NAS solution, a high-performance computing storage solution, an active archive and nearline solution, and the S2A9550 system, which uses a CXFS SAN file system. All of the systems are designed to fit the requirements of broadcast operations that need fast access to the data among multiple users on a network.

Networked production communities

Large broadcasters with multiple locations and hundreds of users are also beginning to embrace these new levels of automatically managed storage.

The Isilon IQ provides multiple broadcast and production units with instant access to vast libraries of media programming regardless of physical location, enabling enhanced live broadcasts and the creation of new workflows for the delivery of programming through media distribution networks.

Powered by highly specialized OneFS software, Isilon's single-file system unifies and provides instant access to digital content via a clustered storage architecture. The company also provides a suite of software applications that leverage OneFS and clustered storage for data protection and automated data management.

Isilon IQ

SeaChange introduced its Broadcast MediaLibrary BML6000ex and

PRODUCT JACKPOT

FORMAT CONVERTER/FRAME SYNCHRONIZER

Teranex VC100

The 1RU sync features the company's PixelMotion Deinterlacing and Multidirectional Diagonal Filtering (MDDF) algorithms, which drastically reduce jaggies on diagonal lines; the company's Per-Pixel algorithm minimizes HD and SD video noise; correct cadence is assured through Per-Pixel Video/Film detection; the sync can handle any signal at its inputs and outputs in either SD or HD formats; uses two Silicon Optix Realta image processing engines, reducing overall size while maximizing image processing capability.

407-858-6000; www.teranex.com

HD H.264 ENCODER

NVISION NV2020-HD

Uses video processing technology based on the H.264 compression standard to deliver low-latency, high-quality, artifact-free HD video at bit rates of 6Mb/s to 12Mb/s for building cost-effective HDTV services; these low bit rates enable more HD channels to be squeezed within the defined bandwidth.

530-265-1119; www.nvision.tv

NEWS SYSTEM

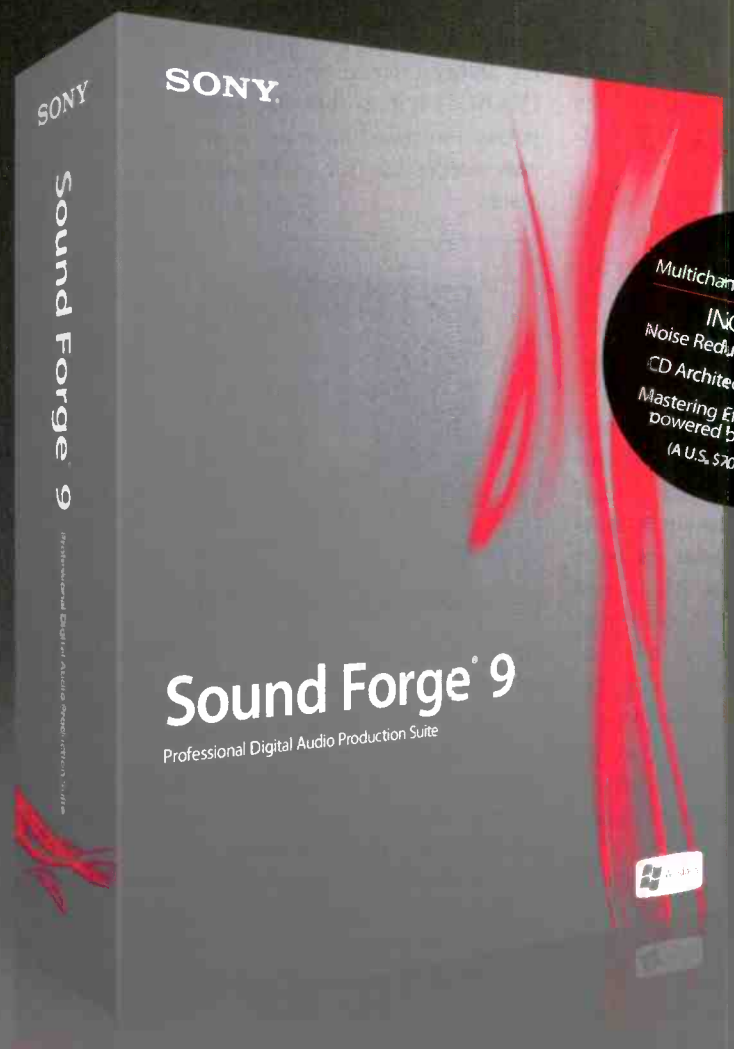
Quantel Newsbox HD

The self-contained news system arrives ready to go on-air straight out of the box; is available in both HD now and HD upgradable configurations, allowing broadcasters to manage their HD investments; works with all the latest HD acquisition formats; comes with all that is needed to ingest material, view rushes, choose shots, edit stories, review finished pieces and play them out to air.

+44 1635 48 222; www.quantel.com

like.no.other™

SONY



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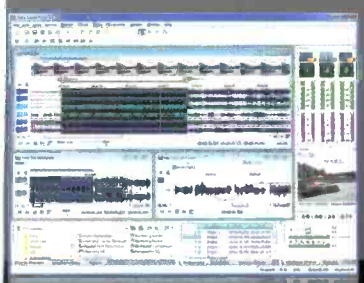
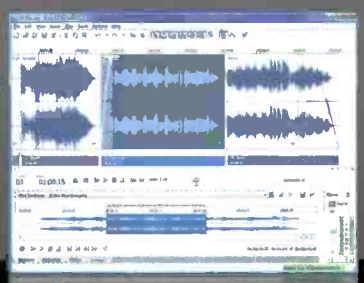

Sound Forge® 9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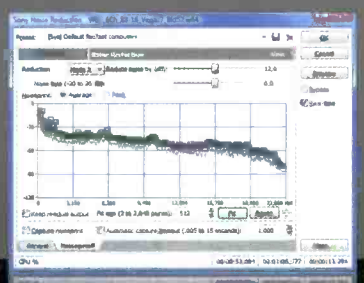
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Sound Forge software is the go-to tool for audio production professionals, and has been since the dawn of digital audio editing. Why? Because it's fast, it's precise, and it's rock-solid dependable. New version 9 is now a full-on audio production suite with included software for CD design, effects processing, and mastering. The Sound Forge 9 suite also has a long list of new features including multichannel audio recording and editing, and Dolby Digital AC-3 encoding. Put it to work in your studio and see why after more than a decade, Sound Forge is still the most comprehensive and efficient audio editing platform you can buy.

sony.com/soundforge9

Works with Windows Vista™

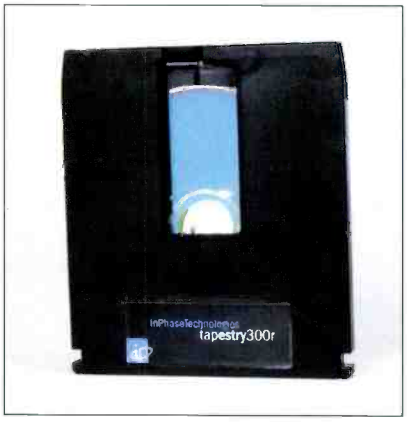
BML24000ex transmission storage systems, which provide centralized online access to any A/V file on any device on a network. I/O bandwidth is guaranteed via specialized IP accelerator GigE ports.

Both systems can be expanded by adding nodes for incremental increases in bandwidth and storage. Based on the company's MediaCluster single-copy technology, the BML systems provide fault-resilience without mirroring.

Then there's the new MediaLibrary 1G (ML1G), which features a combination of low-cost media storage and high-quality play-to-air streaming capabilities for disaster recovery and backup applications. Also based on the Xeon processor 5100 series, the system's clustered NAS technology provides up to 500TB of open, shared file storage and backup broadcast-quality streaming from a single platform, eclipsing the constrained, traditional SAN and other NAS approaches to bulk storage.

Getting holographic

InPhase Technologies continues to pioneer holographic storage, which is gaining momentum across the industry. At NAB, InPhase showed the tapestry300r commercial holographic storage system for broadcasters. It is an archival write once, read many (WORM) system that offers high capacity, file-based data access and 50-year media life for archiving video assets.



InPhase Technologies tapestry300r

The drive offers 300GB of storage capacity on a single disk with a transfer rate of 20MB/s, or 160Mb/s. The tapestry300r allows broadcasters to record 35 hours of broadcast-quality (19Mb/s) video on a single disk in 250 minutes (at 160Mb/s transfer rate).

Both Ikegami and Panasonic announced support for the format, whereby Ikegami will deliver archival holographic storage systems for the Editcam and Editcam HD professional camcorders. Panasonic said it will support the tapestry300r drive as the archive solution for the P2 solid-state camcorders and displayed the drive in its booth.

The first holographic video archive solution — from DSM, a jukebox systems developer — will store 1560 hours of HD (at 100Mb/s) or more than 6240 hours of SD (at 25Mb/s) on 234 pieces of Maxell holographic media in one library. DSM library systems can hold up to 2250 cartridges, capable of archiving 15,000 hours of HD material.

The 300GB drive and cartridge will ship later this year, and Rorke Data said it will resell it to broadcast and digital media customers.

The future on hold

The cost has never been lower and the capacity never higher. IT storage has arrived. It's reliable and powerful. And it is literally holding the future of program production and distribution, no matter what type of data you've got. BE

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

PRODUCTJACKPOT

FLUID HEAD
OConnor 120EX

Extended capacity fluid head for camera systems provides support to 120lbs in standard mode and up to 240lbs in EX mode; delivers counterbalance through the full +/-90 degrees forward/backward range for camera packages from 30lbs-120lbs; limits the tilt range automatically for packages greater than 120lbs.

714-979-3993; www.ocon.com

AUDIO/VIDEO TEST GENERATOR
Wohler Touchstone

Hand-held, battery powered HD/SD-SDI audio and video test signal generator with embedded AES/EBU, Dolby Digital and Dolby E stream monitoring; color LCD screen and 16 channels of embedded audio; 32 video test patterns.

510-870-0810; www.wohler.com

EDITING CARD
Blackmagic Design Intensity Pro

An HD editing card with HDMI and analog component, NTSC, PAL and S-Video capture and playback; enables users to capture directly from the HD camera's image sensor, bypassing the video compression chip for true uncompressed video quality.

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

NETWORK ENCODER
Telestream Pipeline

Provides real-time, frame-accurate video capture and encoding to multiple formats; offers SDI ingest to the company's FlipFactory and Episode applications, as well as such third-party products as Apple Final Cut Pro; is comprised of a series of network-accessible video capture products that provide hardware encoding and decoding of serial digital audio and video; digitizes tapes into online libraries for an end-to-end solution; available as a single-channel or multichannel units.

877-257-6245; www.telestream.net

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Editing

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BY L.T. MARTIN

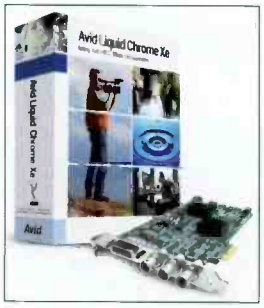
For the first time at NAB, the Avid and Apple exhibits were in widely separated areas of the Lower South Hall. It seemed that the two no longer vied for attention on opposing sides of the aisle, as the companies are both moving in different directions.

In addition, several other edit system options are becoming viable alternatives. Here is a look at the highlights in mainstream production editing from the NAB2007 show floor.

Come together

This year, Avid wanted to emphasize its broad interoperability with third-party systems. The company invited 27 hardware and software companies to demonstrate their ability to work with Avid tools. To prove its Open Storage Initiative (OSI), Avid had systems from Adobe, Apple and Digital Vision all running off an Avid Unity MediaNetwork 5.0 shared storage system. The company announced it was collaborating with more than 50 manufacturers to promote open workflows.

The company also released version 2.7 software, which includes support for its new DNxHD 36 codec that can compress a 1080P file down to only 50 percent more than DV25. The company also showed the ScriptSync, a phonetic indexing system powered by technology from Nexidia. The system automatically links shots to their corresponding lines in a script. Avid Liquid Chrome Xe version 7.2 software was shown with support for AJA Video's XENA LHe board, providing a low-cost SDI I/O option for uncompressed SD and HD editing. Both of these NLE software versions can finally edit JVC's ProHD format. Avid Xpress Pro was upgraded to 5.7 software, and Avid Symphony Nitris now features version 1.7 software.



Avid Liquid Chrome Xe

Creative juice

Apple created quite a buzz with its release of Final Cut Studio 2, and it's not just because this significant upgrade is at the same price point as the original version. The new Final Cut 6 editing software has an Open Format Timeline that allows users to mix and match video formats as well as frame rates. It supports the company's new ProRes 422 intermediate format codec, which offers either 145Mb/s or 220Mb/s bit rates to compress HD material down to SD file sizes. The software works well with Apple's new color grading software called Color, which provides up to eight layers of secondary color correction.

Adobe Systems' Creative Suite 3 is the company's biggest software release and features Macromedia product innovations. The suite includes InDesign CS3, Photoshop CS3, Illustrator CS3, Flash

PRODUCT JACKPOT

TWO-WAY DIVERSITY RECEIVER

Broadcast Microwave Services DR2100

Offers easy field operation with its compact size and DC power capabilities; includes two RF diversity inputs for external downconversion when needed; uses the FFT-MRC diversity method; is suitable for repeater applications.

858-391-3050; www.bms-inc.com

AUDIO MONITOR

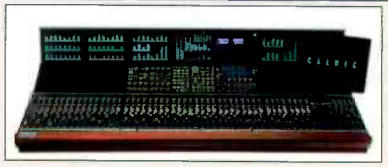
Tektronix AMM768

Advanced, multiformat, high-performance audio monitor for demanding applications and environments; features set and calibration tools; optional SDI video picture display; supports Dolby formats.

800-833-9200; www.tektronix.com

COMPACT DIGITAL CONSOLE

Calrec Audio Omega with Bluefin



Small digital console with high-density signal processing and 160 mono DSP paths; features 8 × 5.1 surround, stereo or audio groups, and 20 auxiliary outputs (20 mono or 10 stereo) and 48 outputs for multitrack or general-purpose feeds; comes in three frame sizes with 24, 32 or 48 faders.

+44 142 284 2159; www.calrec.com

CS3 Professional, Dreamweaver CS3, Acrobat 8 Professional, and, for video editors, Adobe Premiere Pro CS3, offering improved slo-mo with time remapping, nested real-time audio sequences, and output to DVD and Blu-ray Discs with Adobe Encore CS3 software.

Editing speed

DVS presented real-time 4K editing with the latest version of its CLIPSTER now boosted by a Linux-based data manager Spycer. Digital

DVS CLIPSTER

Vision's systems were seen working with DVS gear, and the company announced that all of its products are now Digital Cinema Initiatives (DCI) compliant, including Film Master version 3.5 now with C-mode list event order and support for the DVS Centaurus video card including 2K HSDL I/O at 15fps.

Grass Valley showed version 4.5 of its nonlinear editor EDIUS with a revamped GUI and multiformat support, including JPEG2000 as used for HD recording in the Grass Valley Infinity digital media camcorder.

Matrox Video Products Group showcased a full range of productivity enhancing solutions for Adobe Premiere Pro CS3 and Apple Final Cut Pro 6 editing software along with the Matrox MXO for inexpensive, portable HD monitoring of Final Cut Pro systems.

Media 100, a division of Boris FX, presented its "Field to Finish" editing and effects workflow on Intel-based Macs with new version 11.6 software for the Media 100 NLEs. The Media 100 product family now includes Media 100 HD Suite, Media 100 HDe, Media 100 SDe, Media 100 Producer Suite and Media 100 Producer.

NewTek returned with SpeedEDIT, a video editor that gets its speed by linking timeline and storyboard views, eliminating transcoding steps.

New work

Quantel came to NAB2007 with a new asset management system called Mission, but its real thunderclap was Genetic Engineering. It provides open network access to managed media on other systems, working with the metadata in its GenePool rather than its content, thereby letting users perform tasks such as streaming multiple 4K files simultaneously.

Sony Creative Software (formerly Sony Media Software) brought out its new Vegas+DVD Production Suite that combines Vegas 7, DVD Architect 4 and Dolby Digital AC-3 encoding software into a new nonlinear post-production

Matrox MXO

package that is ready for prime-time DV, HDV, SD/HD-SDI and all XDCAM editing. It supports editing files from Sony's new AVCHD camcorders.

Finally, in a move with implications still to be determined, Cineform proved it has overcome the challenge of cross-platform file encoding. Its new NEO software, available in both Mac and Windows versions, creates files that can move seamlessly between either workstations running either operating system. BE

L.T. Martin is a freelance writer and post-production consultant.

PRODUCTJACKPOT

HIGH-RES DISPLAYS

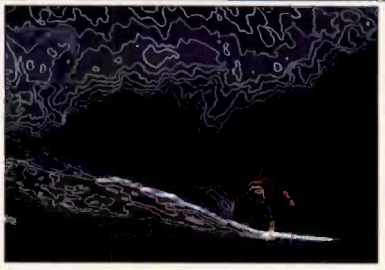
Zandar Technologies Predator HD MultiViewers

HD4, HD8, HD12 and HD16 offer HD images, driving high-res displays up to 1080p with auto-detect of SDI and HD-SDI signals; include audio and video monitoring, UMD and tallies, clock display, and LAN control; offer control options, such as the Z-Configurator layout editing software, on-screen display, GPI and ZRP remote pane; can output dual HD across two displays at various 50Hz resolutions using the ZdHT Zandar dual-head display feature.

+353 1 450 0901; www.zandar.com

CREATIVE EFFECTS PLUG-INS

Digital Anarchy PlasmaFX

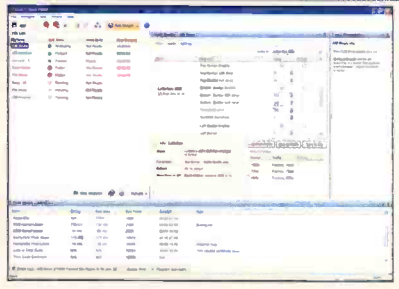


Allow users to create a variety of custom effects ranging from image processing to film looks and particle systems; are based on Apple's Core Image system and FxPlug architecture; take advantage of new multicore CPUs and enhanced graphics cards; the filters run and render quickly within Apple native applications, such as Final Cut Pro and Motion.

415-462-5872
www.digitalanarchy.com

MEDIA ANALSIS SERVER

Harris Videotek QuiC



Error correction and file control; provides more than 30 file-analysis parameters; automatic fault repair; assists in loudness monitoring; MXF-compliant server compatibility and support for Avid DNxHD codecs.

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

ECLIPSE V-SERIES PANELS. TAKE CONTROL AND LOOK GOOD.

Transforming the maelstrom of lightning fast changes and unforeseen events into quality live programming requires quick intercommunication and complete control. The new Eclipse V-Series panels give production professionals the ultimate in features for maximum control of their communication. Individual mix level controls let users adjust personal audio levels for varying workflows. Digital Signal Processing (DSP) and Supervisor Functionality maintain centralized control of any remote panel. Source and destination are more distinct and easily identified through 10-character graphic displays and multiple language support. When everything's happening at once, digital memory can replay the last 10 seconds of any message.

But if that weren't enough, panels now have color-lit LEDs, making controls easy to see in darkened rooms. With its bold new contemporary design and ultimate functionality, the V-Series puts total control at your fingertips. Clear-Com is raising performance.

M A T R I X

www.clearcom.com

Clear-Com
RAISING PERFORMANCE

Automation

New technologies speed development and lower costs.

BY JIM BOSTON

This year's NAB reiterated two constants :

1. On the nondelta side, broadcasters continue to look for ways to save money but still look good.

2. On the delta side, new technologies allow new content delivery providers to start up operations more quickly and less expensively than in the past.

Two major aspects of automation are workflow and interoperability. The roll-out of automation components in a service-oriented architecture is allowing multiple applications, plug-ins and services to access, share and exchange data and media.

Many see broadcast-specific equipment pushed to the edge of the workflow chain. IT-based technologies, lower storage costs, decreased installation and training expenses, smaller footprints and energy savings are driving automation development. In the larger television universe, it's the actual delivery of content to mobile devices that has vendors' interest. Vendors see increased markets because whether streamed to the Internet, a cell phone or your living room TiVo, some form of automation will be required to manage the stored content and play it to the transmission devices for distribution to the viewer.

One vendor noted that some broadcasters have reversed their attitudes on centralcasting and are now scrambling to get back some local presence. They feel they can centralize traffic but distribute control.

The convergence of traffic and automation through SMPTE S-22 Broadcast Exchange Format (BXF), which standardizes near real-time XML exchanges, promises to accelerate the power and functionality of the broadcast business workflow. This allows the ability to add a last-minute event to an on-air playlist in near real time from the traffic department or to update the as-run as a spot airs and bill the client for it immediately.

There also seems to be a trend toward customers installing systems that use large nearline storage and confine traditional video server technology to edge servers for ingest and transmission. This creates a larger demand for media management in conjunction with traditional automation.

What is newly shippable?

Aveco introduced the Astra Light, a compact master control system designed for low-power or smaller regional stations automated with a 2RU Aveco automation server. This is a scaled down version of Astra, the company's full automation system.

NVerzion's NControl Elite application, unveiled at the show, provides facilities with the control and functionality of a Linux-based master control software suite paired with a Windows-based interface ensuring an easy user interface.

Digital Broadcast featured MediaVault, an archive system with blue laser technology that provides up to 50TB of media storage with a searchable index based on file metadata.

PRODUCTJACKPOT

MOBILE DELIVERY DEVICE

V4x Sequencer

Allow users to quickly repackage media from standard editing and automation systems for optimal viewing on mobile devices; applies an overlay process to render crisp, clean logos and graphics on mobile devices; includes special features for tagging content for Web 2.0 and autostreaming in a variety of formats and exporting for podcasts.

617-418-3477; www.v-4-x.com

MULTIFORMAT CONVERTERS

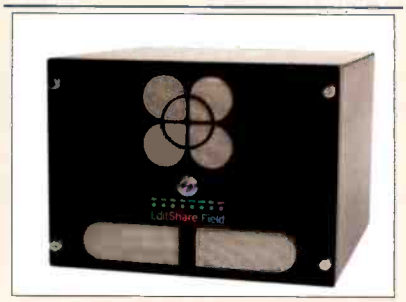
Edirol VC-200HD and VC-300HD

Can scale any input to multiple SD and HD resolutions, including 1080p; now also support full DVI-I (analog and digital) input and output; offer bi-directional conversion and scaling between component SD/HD, HDV/DV, DVI and with the VC-300HD model, SD/HD-SDI; embed accompanying audio into the DV/HDV stream and embed up to four channels of audio into the SDI/HD-SDI stream.

800-380-2580
www.rolandsystemsgroup.com

SHARED STORAGE

EditShare Version 5.0



Offers a cross platform collaborative editing and shared media storage system; new release includes improved ergonomics, simplified administration and expanded capabilities; allows administrators to synchronize multiple servers regardless of location, receive daily reports of server activity and minimize deployment time with a plug-and-play configuration.

617-782-0479; www.editshare.com

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- Superb frame synchronization
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- Standard redundant power supply unit
- Optional functions available;
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  - Color corrector
  - 3D comb filter
  - HDV/DV interfaces
  - Dolby E encoder/decoder
  - Logo generator (will be available)

www.for-a.com

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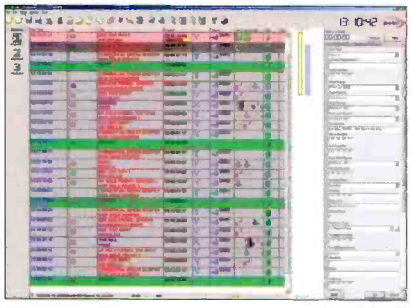
KOREA (Seoul)	Tel: +82 (0)2-2637-0761

Archived material can be played at any access-granted desktop computer. The company also showed MediaView, a server system that provides ongoing verification of off-air feeds.

Showcased for the first time, Dalet Enterprise Edition is a workflow engine designed for open broadcast systems. It offers a set of media ingest, production and distribution tools for



Pro-Bel Morpheus

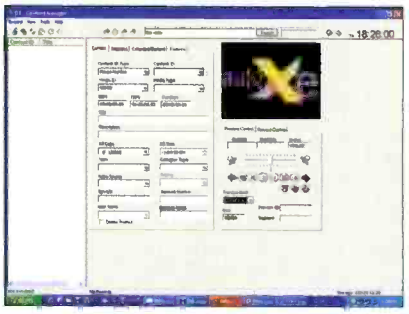
radio, TV and interactive media. This product is codec-independent, and its Web services-based API allows it to be integrated into services-oriented architectures, which enables embedded digital media services into corporate-wide applications.

Florical introduced its Web-based gateway into all parts of the automation system with S.M.A.R.T. The company also extended its reporting Decision Maker software suite. These products now have the added capability of e-mailing reports on deviations and the state of the system.

MicroFirst showed further development of its XML near real-time bidirectional interface for data exchange, furthering the bridge to the BXF pending standard for traffic system interfaces. The company's Digital Automation System (DAS) automation protocol allows all data — static (i.e. database), real time and command/control — to be accessed and modified by third parties. MicroFirst also introduced its hierarchical Near Line Storage (NLS) control option for moving content between NAS and video file servers.

Pro-Bel demonstrated Morpheus Foundation, an entry-level automation system that provides essential functionality with an out-of-the-box approach to installation and commissioning. Based on format and device-independent platforms, it provides a self-contained environment to control one to six delivery channels. The company also highlighted developments with its Media Object Server (MOS) Gateway for Morpheus. MOS — which provides an open access interface between newsroom computer systems and third-party devices — can now provide real-time two-way communication between any suitably equipped scheduling system and Morpheus.

Sundance released version 3 of Titan automation. The company's FastBreak NXT series features a streamlined GUI to enhance status monitoring and situational awareness for the operator, which is especially important in the multichannel



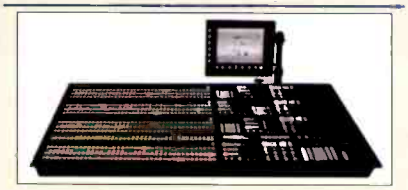
VCI autoXe

environment. The company featured two emerging technology demonstrations. The first was the BXF Gateway, which is Sundance's implementation of the soon-to-be adopted SMPTE standard for real-time data exchange between station traffic, content management and automation. The second was Publish to Sundance, an idea that enables media migration — with metadata intact — between Avid's content creation tools and the play-

PRODUCT JACKPOT

PRODUCTION SWITCHERS

Ross Vision



Five highly modular models; all share a common platform; RGB buttons allow personalization of control panel; Dual-Display color touch screen allows operator to view and control two menus simultaneously; up to 96 inputs and 46 outputs; SmartConversion SD/HD signal conversion system.

613-652-4886; www.rossvideo.com

UP-/DOWN-/CROSSCONVERTERS

Ensemble Designs
BrightEye 90 series

For use in broadcast, sports and mobile applications; the nine new units encompass a variety of feature sets, including up-, down-, cross- and aspect ratio-conversion; each is equipped with HDMI connectors, which interface with most LCD monitors for monitoring of signal feeds; can be controlled through either front panel, or Mac and PC software access.

530-478-1830
www.ensembledesigns.com

MULTI-IMAGE PROCESSOR

Miranda Kaleido-X

Multi-room, multi-image processor allows unlimited sizing and repetition over eight monitors; displays any of its 96 HD/SD/analog inputs, any number of times, at different resolutions and sizes up to full screen; over eight high-resolution displays without blocking or grouping restrictions; integral routing capability, with switching of 96 unprocessed inputs to 48 HD/SD outputs.

514-333-1772; www.miranda.com

to-air environment under Sundance automation control.

Pebble Beach rebranded Anemone as Neptune Lite. Neptune Lite has the same core code as Neptune, making the upgrade path straightforward. Also, Archive Manager has been renamed Anchor Media Manager. It controls a wider range of tape robotic systems and drive formats but also interfaces and manages nearline disk-based storage. A new redundancy option, ListSync, allows playlists on two independent device controllers to be mirrored automatically. To accompany this capability, Neptune also supports improved SQL database mirroring and automatic changeover between backup servers. Neptune's library of file formats supported by the Neptune Transcode engine has been increased to include QuickTime 7 wrapped MPEG long-GOP and IMX in self-contained and complex movie formats. Neptune's integrated transcode engine can handle files created by Omneon and Harris NEXIO servers.

VCI Solutions, which acquired Digital Transaction Group (DTG) last year, introduced several new products. autoXe MC is the company's new automation software release. The software provides multiple views of the channel stream's schedule, including Icon View for high-level, supervisory view, and management by exception; Timeline View to show the progress of multiple channels across time; and Grid View, with fully configurable schedule and event details. It allows a single operator to manage 10, 20 or 50 channels on one screen. The standard, professional and premium editions support 16, 32 and 64 or more device connections. And users can add, delete or modify device drivers anytime. The software also integrates the SMPTE BXF protocol to exchange data with other systems. Its Virtual Metadata Display extends its management by exception capability to multi-image monitors such as Miranda K2. Metadata identifying

HIGH-DENSITY ROUTER

PESA Cheetah 864XR

Multi-rate video router provides 864x864 switching in 41RU; handles both HD and SDI on either copper or fiber in the same frame; offers internal redundant power and frame controllers; uses full-size BNC connectors; standard Cheetah I/O, fiber and matrix cards, frame controllers, system controllers and power supplies. mix copper, fiber and CWDM fiber all in the same frame.

631-912-1301
www.qustream.com

the channel stream, the on-air event, source device and notifications are sent to the display.

OmniBus continues to refine its iTX system, a product intended to handle all of the functions of a broadcast master control and playout chain in a single software application. Geared for both SD and HD environments, the system combines standard IT hardware and software to reduce the investment required to launch and operate a channel.

Also featured was OPUS 2.0, which is designed to move the content process from specialized hardware to standard IT platforms. It includes soft-XML support for customized logging and annotation, frame-accurate proxy generation and viewing, full-text indexing and searching, seamless integration with production editing systems like Avid and Final Cut Pro, and standardized Web services data exchange with adjacent systems.

The OPUS 2 Smart Client provides access to content within a Web browser environment from Windows and Mac desktops, allowing unlimited users on an enterprise or global scale to access media and metadata for picture research and shot selection without the need for specialized software.

Crispin has implemented a BXF interface between traffic and automation, based on the emerging SMPTE protocol standard. The system provides a dynamic and automated exchange of the traffic program schedule from ProTrack to Crispin automation, allowing RapidPlayX to automatically load the program schedule for fully automated, on-air presentation.

The company also introduced a new version of Supervisory View, which now incorporates a complete 90-minute timeline view of each channel's playlist. The timeline view highlights potential errors and warnings with specific events related to missing or incorrect material, device errors or warnings when manual intervention is needed.

In addition, Crispin announced a partnership with Rhozet. The partnership resulted in a transcoding server that offers transcoding of broadcast, Web and mobile formats, including MXF, GXF, LXF, Panasonic P2, Sony XDCAM and H.264. The transcoding server handles automatic transcoding between formats for editing, distribution and archival purposes. Additionally, the transcoding server supports playout devices from companies like Avid, Harris Leitch, Omneon, Quantel and Thomson Grass Valley.

Harris highlighted Invenio, an automated metadata system that allows cataloging, search and automated content movement to help unlock content value. Likewise, the company showed D-Series IP device control, which provides support for new content delivery streams, and D-Series remote schedule sync, which ensures coherence of schedules and content between primary and secondary (or backup) sites. The company introduced D-Series and ADC H-Class BXF interoperability. Finally, Harris has shifted to XP across internal operations client user interfaces in the ADC line of products.

Conclusion

Feature consolidation and overlap will continue to occur. In terms of consolidation, there are new products that deliver more functionality in a single box. One vendor noted that encoding, decoding, graphics and automation in a single box might limit the flexibility to choose best of breed products for the various functions. But with processing power increasing as it is and the drive to minimize the workforce, required change does indeed occur in tandem with some nonchanging constants. BE

Jim Boston is a West Coast consultant.

PRODUCTJACKPOT

ENG/EFP LENSES

Thales Angenieux 19 x 7.3 AIF series

Feature a focal range of 7.3mm to 139mm, a rectangular sunshade, weather-resistant construction, 19X zoom range and wide-angle capability; are available in SD, HD or HD-E versions; digital features include Assisted Internal Focus technology, memorized focus/zoom positions, anti-backlash system, auto cruise zoom and serial communication.

973-812-3858; www.angenieux.com

SIGNAL PROCESSOR

FOR-A FA-9100 HD/SD,

An affordable HD-based super signal processor; powerful video delay of up to four frames; useful for applications such as introducing delay to adjust for Dolby E signals; options include; HDV/DV stream conversion, Dolby E encoder/decoder, HD/SD up-/down- and cross-conversion, cross-conversion between 1080i and 720p HD, and adjustable aspect ratio conversion.

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

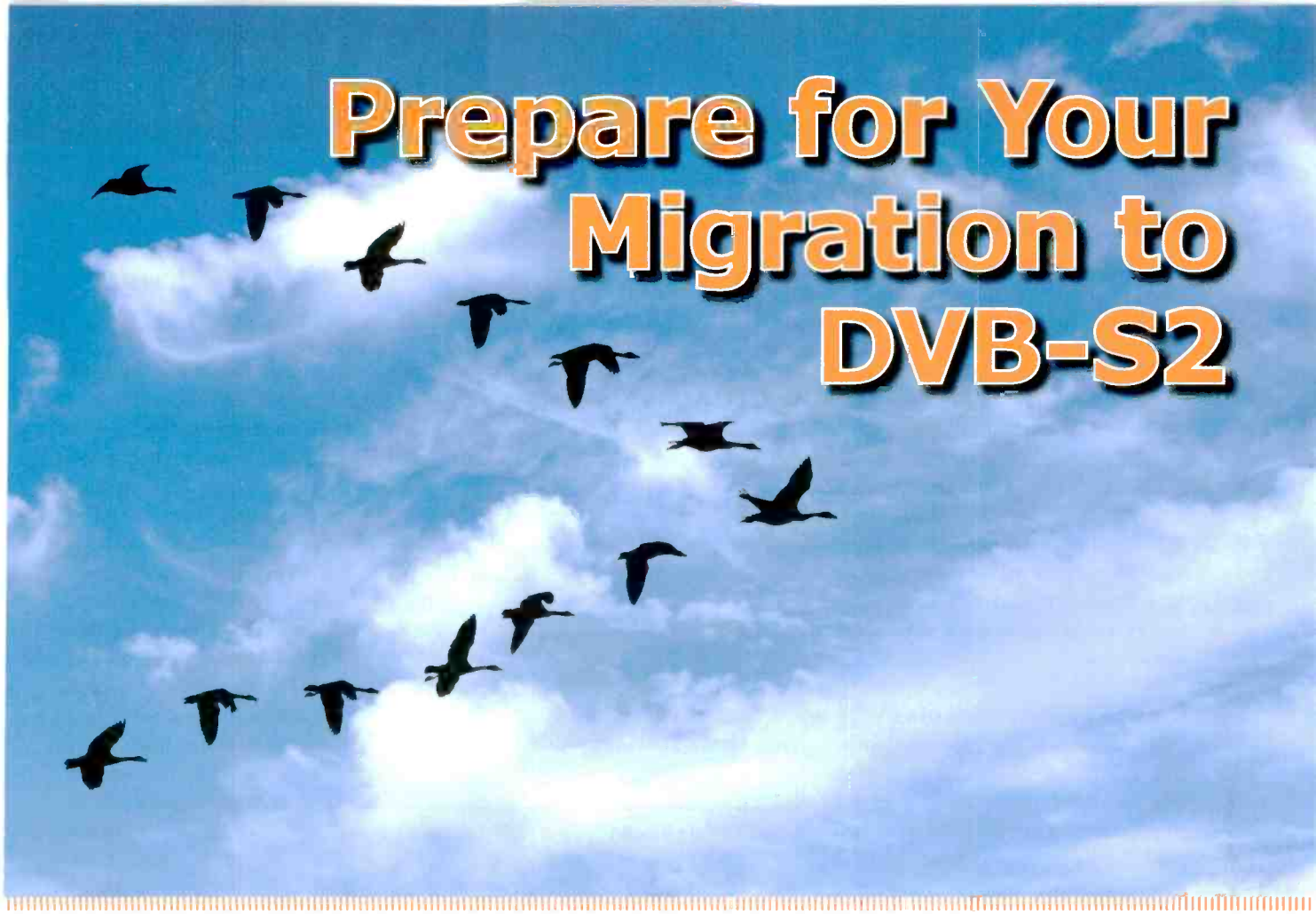
DUAL FORMAT STUDIO CAMERA

Sony HDC-1400

Dual-format HD studio camera; lower-cost entry into HD for broadcasters; operates in either 1080/59.94i or 720/59.94P mode; optional 3.5-in LCD color viewfinder available; shares most of the image-making capabilities of the existing HDC-1500 system, including three-skin detail control, multi matrix color control and high-quality SD downconversion capability.

800-686-SONY
www.sony.com/professional

Jackpot continues on page 78



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- Receivers – Enabling DVB-S and DVB-S2 transport stream and IP-based multimedia content to be delivered over satellite or ASI links and distributed to remote devices; Supporting MPE & MPEG-2 TS, standard data broadcasts and the transport of MPEG-2 video service over IP are facilitated

Compliant with DVB-S2 and DVB-S, our products interoperate with major satellite service providers and key encoding device vendors. Leveraging the bandwidth efficiencies of DVB-S2, the Comtech solution can increase throughput by up to 30%. Contact us today to learn how operating expenses to deliver your IP-based broadcast connectivity can be significantly reduced.

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Audio

Super sound is back in style.

BY JACK KONTNEY

The inevitable move to HD broadcasting requires a near-universal need for a new audio infrastructure. Fortunately, manufacturers are armed with a slew of new products aimed at making the transition as painless as possible. The recurring themes at audio displays were consistent and comforting: future-proofing, ease of use and awesome sound quality.

Digital mixing consoles

It's clear that, like broadcasting itself, the future of mixing is digital. The channel-hungry appetite of 5.1 surround with metadata demands a platform-based approach, with lots of processing power, a fast learning curve and seamless integration. The good news for broadcasters is that the console makers are ahead of the curve.

Calrec used its new console, the Bluefin-powered Omega, as a centerpiece to explain the secret behind its Bluefin engine. By using field-programmable gate arrays (FPGAs), the desks provide complete mixing control, including 480 processing paths and 19 minutes of delay, on a single card. The efficiency of this design is ideal for mixing consoles, particularly in an HD environment.

Calrec Omega Bluefin

Euphonix introduced the S5 Fusion console. This hybrid desk combines the DSP power of a large film console with the DAW control of the System 5-MC control surface. Using the EuCon protocol, the S5 Fusion offers full simultaneous control of several DAWs and applications, while still offering 24 independent channels with full DSP, making system expansion a simple matter of adding new workstations.

Solid State Logic (SSL) announced the HD upgrade of its C300 master studio system, a scalable design that also offers DAW control. The company has also re-engineered its 100 series consoles, including the C100 HD-S, a slim-line design offering 64 faders in a 92in frame, plus new version 4 software and a compact front-loading processor option.

Germany-based Lawo now offers its mc²90 large-format and mc²66 post-production desks in North America. Lawo practices a holistic approach,

using third-party control software to unify the audio and video chains.

Building on the success of the Vista 5 console, Studer has announced the release of a larger version that includes 42 faders and enables two-man operation. The company also announced the availability of an optional Dolby E I/O card for seamless decoding of 5.1 and metadata en route to the board.

Best known for powerful control surfaces, Fairlight also offers its Crystal Core technology in the form of the CC-1 plug-in card, a system on a chip that converts a computer into a multiprocessing media center. Yamaha announced version 2.0 of its PM5D consoles, including a rack-mount version, the DSP5D, and 30 new features.

Microphones

While the entire signal chain may have gone digital, there's no denying that actual audio is analog. There was no shortage of new input devices on the show floor, many of them keyed to capturing surround sound without the need for time-consuming multi-mic setups.

Holophone announced it has licensed Dolby Pro Logic decoding into its H4 SuperMINI camera-mount surround mic. The company also introduced the SideWinder-6, designed to encode a 5.1 signal into stereo when using any of the company's surround mics.

Soundfield's DSF-2

Soundfield's DSF-2 system combines a multicapsule microphone with a rack-mount controller to allow decoding of its proprietary B-format output into any required format from 7.1 down to mono simultaneously. The company also now offers a Surround Zone decoding plug-in for use with most common DAWs.

Schoeps' approach adds an additional rear-facing capsule to the traditional midside stereo mic. The Double M/S Set uses three capsules to create five discrete channels using its MDMS U decoder.

Another microphone of note is the Neumann KM D miniature digital series, which takes audio into the digital domain immediately after it reaches the diaphragm. At the other end of the spectrum, Heil Sound introduced the stylish Deco Fin microphone,

Zaxcom TRX700

based on a 1.5in dynamic diaphragm that rivals the fidelity of condensers.

Wireless and digital recorders

These disparate categories have been slowly merging in the digital world, creating new functionality for field crews. The Zaxcom digital wireless line has added two transmitters, the TRX700 plug-on and ZFR800 handheld, both of which offer onboard recording of the transmitted audio with time code. The company also previewed the Deva 5.8 hard disk recorder, featuring 10 channels of recording to hard disk, DVD-RAM or CompactFlash.

Korg has entered the digital recorder sweepstakes, introducing the iPod-sized MR-1 and tabletop MR-1000 hard drive recorders. Both employ 1-bit recording for easy conversion to formats up to 24-bit and 192kHz without degradation.

Lectrosonics introduced the UM450, a digital hybrid wireless transmitter with extended range and interference resistance. Field producers will appreciate the updated SM miniature transmitters, which now include a GORE-TEX membrane to lock out moisture.

Audio-Technica unveiled the ATW-R1820 dual-channel wireless receiver with camera mount and outputs that can be used independently or mixed live. The company also introduced two stereo shotgun mics (9in and 15in) with onboard Mid-Side matrixing and switch-selectable stereo outputs.

Digidesign RM1 and RM2

Loudspeakers

Ultimately, after capture, encoding, processing and mixing, the audio must be heard. Digital ears remain a pipe dream, so we will always have loudspeakers. Digidesign announced its new RM1 and RM2 reference monitors.

JBL showed its LSR4300 series compact 5.1 monitor system, which incorporates HiQnet networking and a new version of its RMC technology, allowing one-touch compensation for low-frequency room anomalies.

Finally, for those who live in cans, Beyerdynamic offers its Headzone 5.1 monitoring system, which uses binaural environment modeling and ultrasonic head-tracking to recreate a 5.1 field within an enclosed headphone listening environment. BE

Jack Kontney is president of Kontney Communications, a Chicago-based content creation and marketing consultancy specializing in professional audio.

PRODUCT JACKPOT

Jackpot continues from page 74

BROADCAST MULTIVIEWER
Harris CENTRIO

Multi-image processor enables customizable, image layouts including scrolling PIPs and integrated T&M applications; based on Harris Platinum router architecture, system is capable of accessing up to 512 inputs and driving 32 independent DVI or 64 independent HD-SDI monitors from a single chassis.

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www.broadcast.harris.com

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Sennheiser EK 3241

Uses a 36MHz switching bandwidth that is tunable in 5kHz increments to generate 7200 frequency options; features new user interface; ships with 32 custom frequencies preprogrammed, and allows users to store an additional 20; offers a command channel function that opens up a second audio channel to the mixer.

860-434-9190
www.sennheiserusa.com

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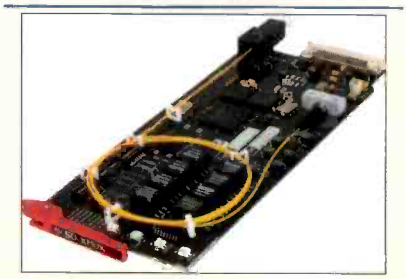
Network Electronics AV-HD-XMUX



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Monitors

LCD makes a speedy assent in TV broadcast.

BY ALDO CUGNINI

The venerable CRT monitor is coming to the end of its lifespan. The shock is how quickly this seems to be happening. Most experts are steadfast in their support of the CRT as the best possible picture quality assessment tool. But its near disappearance from the floor of NAB2007 seems to align with the reality that a growing number of eyes prefer the look of LCD displays over CRT monitors. LCD monitors have come a long way in providing performance that can be called satisfactory or even fully acceptable, thanks to advances in liquid crystal and processing technologies. Add to this the 2002 EU directive on eliminating heavy metals in new electrical and electronic equipment after July 2006, and the stage is set for the LCD transition.

Widening the gamut

Sony showed its BVM-L230 monitor series based on the company's TRIMASTER technology, which seeks to duplicate CRT performance with LCD technology. The 23in monitor incorporates a newly developed wide color gamut panel, color management system, full HD resolution, high gray-scale gradation, motion picture response, precision signal processing and a built-in calibration system.

The monitor's LED backlighting system offers a wider color gamut than that found in any CRT. The backlight system also incorporates a uniformity control function and a color feedback system that constantly monitors and compensates for color shifts, maintaining accurate luminance uniformity equal to the BVM CRTs. At a stated peak screen brightness of 100cd/m², the monitor will mostly be used in the slightly darkened viewing areas common to professional video evaluation and monitoring.

The monitor includes several features designed for professional monitoring requirements, including a new color space selection function, advanced picture-and-picture display and a true interlace display mode, which helps to accurately reproduce interlaced signals. In this mode, each interlaced field is displayed using alternating lines of black, simulating the appearance of an interlaced CRT. Separately, a black frame insertion mode significantly reduces motion blur by combining a 120Hz frame rate and black frame insertion between image frames.

The LCD panel has a 10-bit driver and can produce 1024 levels of gray scale, making the monitor ideal for high-end monitoring applications, including digital cinema, digital intermediate, telecine and post production, as well as program and preview monitoring in broadcast master control rooms or in OB trucks.

It displays SD and HD formats up to 1080/60P, 2048 x 1080/24P for digital cinema applications and VGA-WUXGA (1920 x 1200) PC signals. It offers a direct pixel-to-pixel mode that precludes any conversion process. The monitor connectivity options include a standard DVI-D input. Optional inputs include HD-SDI/SDI (4:2:2 10 bit and

PRODUCTJACKPOT

CAMERA
Hitachi HV-HD30

HDTV digital color camera incorporates three HDTV 1/3in, 1.3-megapixel CMOS sensors; provides both 1080i and 720p camera outputs; the camera is a compact box type head, weighing 600 grams; a wide range of adjustments can be made remotely, providing versatility that makes the camera usable as a studio subcamera, in remote observation applications, as a point-of-view camera and in industrial applications.

516-921-7200
www.hitachikokusai.us

TAPELESS CAMERA
Ikegami HDN-X10 EditcamHD

Tapeless camera uses 2.1 megapixel CMOS sensors to capture at full HD 1920 x 1080; recorded with DNxHD compression without down sampling; RetroLoop and Time-Lapse recording; users have choice of recording media — FieldPak2 hard disk or solid-state RAMPak cartridge.

201-368-9171; www.ikegami.com

ROUTING SYSTEM
Pro-Bel Cygnus

A 1080p 3Gb/s native routing system with 3G cards; the card set is SD-, HD- and 3G-capable; all cards are hot-swappable on a card-by-card basis, which allows users to expand a system simply by inserting a card; the series consists of three frame sizes and configurations.

888-847-7623; www.pro-bel.com

POV HD CAMERA
Iconix Video HD-RH1

HD POV 3-CCD remote camera system features a 1/3in progressive 16:9 image sensor, backed by a 1/3in 3-CCD prism system for optics, using 14-bit quantization at the A/D conversion and processing steps; prism leverages an asynchronous signal processing architecture that runs the CCD imagers at a different clock rate from the output signal; captures and outputs video in NTSC and PAL formats in all HD resolutions, while supporting frame rates of 24fps, 25fps, 30fps, 50fps and 60fps.

800-783-1080; www.iconixvideo.com

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4:4:4 10 or 12 bit), composite, Y/C, RGB/YPBPR/XYZ, and dual-link HD-SDI. A 42in version is planned for next year.

Fast focus

Panasonic debuted its BT-LH80W 7.9in 16:9 HD/SD LCD monitor for studio and field applications. The monitor features low processing delay and converts interlaced signals to progressive signals within one field time.

Boland DayBrite

The 800 x 450 pixel resolution monitor is compatible with multiple HD/SD formats, including 1080/24PsF, 1080i, 720p, 480p and 480i. A Focus-in-Red function displays the edges of the focused area in red when sharp focus is achieved. Pixel-to-Pixel mode allows the user to see an input signal pixel by pixel without any resizing, effectively confirming an image in a size equivalent to a 19in wide-screen display (with a 1080/60i input signal). Both functions can be used at the same time.

Picture perfect

Ikegami showed its HLM-1710WR, a 17in HD/SD multiformat color monitor that integrates an LCD panel with a significantly improved total angle of view of 170 degrees. The monitor also provides improved rendition of flesh tones and other visuals that demand critical viewing in broadcast TV and professional video studios.

Multiple vision

JVC introduced the DT-V9L1D 9in and DT-V17L2D 17in HD flat-panel professional monitors designed for broadcast, studio and field applications. These monitors incorporate JVC's digital 1080p 10-bit image processor for scaling, deinterlacing and color processing. The rack-mountable studio monitors feature 16:9 aspect ratios, wide viewing angles, high-speed LCDs and advanced color reproduction. In addition, the monitors accept full range HDTV and SDTV input signals through their built-in HD-SDI, component and composite inputs, and feature professional functions, such as area markers, tally lights, AC/DC power supply and rotary image controls.

In daylight

Daylight-viewable LCD monitors from several manufacturers are available in small camera-mounted units, as well as full-sized 20in displays. Boland's

NHK ultra high-definition television

DayBrite monitor provides a screen brightness of up to 1800cd/m² and contrast ratio of 480:1, while Marshall's SunBrite incorporates a proprietary optical design that boosts the efficiency of the backlight's light use and minimizes the surface reflection of ambient light.

What's next? We've already seen ultra high definition from NHK, but the consensus is that any practical use of such a system is years away. Still, that's what they said about HDTV just a few years ago. BE

Aldo Cugnini is a consultant in the digital television industry.

PRODUCTJACKPOT

DATA MANAGEMENT SOFTWARE
Quantum StorNext 3.0

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www.quantum.com

CAMERA STABILIZATION SYSTEM
Sachtler artemis DV Pro FX

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845-268-0100; www.sachtler.us

INTERCOM SYSTEM
Riedel Performer CR-4

A 19in, four-channel, 1RU master station; any combination of beltpacks, split boxes or desktop panels can simply be plugged to the master station using XLR microphone cables; provides noise- and hum-free, high-quality digital audio with side-tone nulling; features integrated power supplies to power up to four beltpack lines.

818-563-4100; www.riedel.net

MASTER CONTROL
Media 3 BureauCam BCS-3500

A redesigned audio board digitizes all incoming signals at the point they enter the system and keeps them in the digital domain until the point they leave, resulting in dramatic improvement of the sound quality; a new monitor panel features two 8in, high-res SD 16:9 aspect ratio LCD monitors; the GUI has been reconfigured for simpler operation.

212-983-5200; www.liveshots.com

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ENG

The show became a hotbed for new developments.

BY PHIL KURZ

Developments in electronic newsgathering proceeded in a predictable direction at NAB2007. They included new urgency regarding the 2GHz BAS relocation, the commercial availability of systems that blend computer file transfer protocol (FTP) with point-to-point microwave technology, HD ENG solutions and greater visibility of diversity receive systems that remove the need for live trucks in some instances.

Sprint Nextel came to NAB2007 with a simple message to broadcasters: Don't slow down. In March, the company filed a progress report with the FCC on the status of the 2GHz relocation project. In it, the company told the commission it would require a 12- to 24-month extension of the September 2007 deadline to complete the project.

According to Mike Degitz, the company's vice president of global development and spectrum management, the report and the company's plan to make a formal extension request this summer may give broadcasters the false impression that they have additional time to complete their microwave equipment inventories and negotiate frequency relocation agreements.

During an interview at NAB2007, Degitz said nothing could be further from the truth. The duration of the sought-after extension is based on work continuing without interruption. Any delay now would make it necessary to seek further extensions, something the telecommunications company does not want to do.

As of NAB2007, 26 percent of eligible TV BAS licensees had completed frequency relocation agreements. At its current pace, Sprint Nextel wants most broadcasters' deal packages submitted by the end of the year. So far, 3 percent of BAS licensees covered by the plan have installed all of their new

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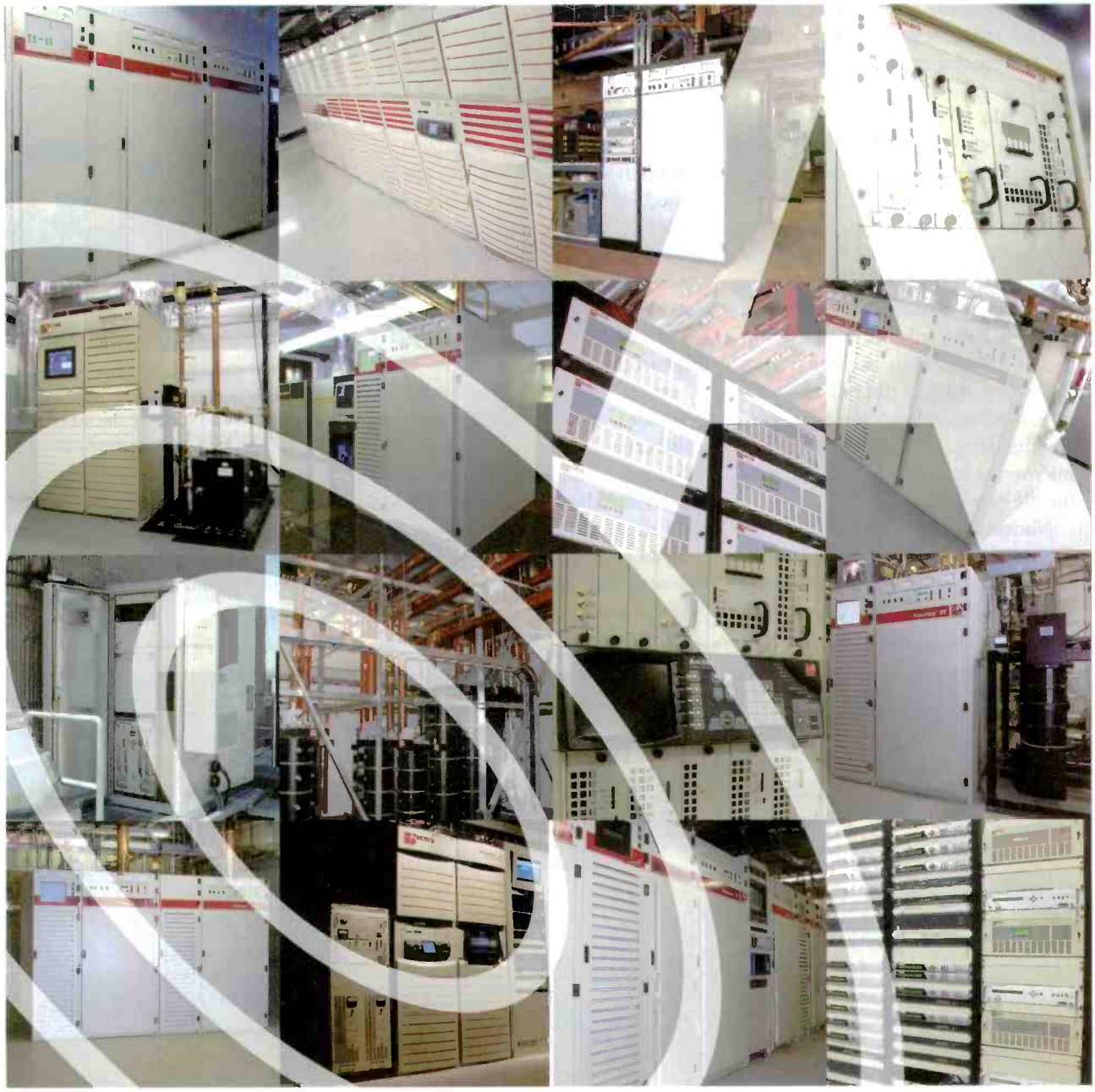

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digital equipment.

The company has spent $212 million on transmitters, receivers, antennas and control equipment.

ENG via IP

While the 2GHz BAS relocation project currently dominates the ENG landscape, it wasn't the only noteworthy development in electronic newsgathering at NAB2007. FTP file transfer from the field via microwave transmission advanced with broader commercial availability. With the rise of ENG formats like Panasonic's P2 that record files directly to a solid state medium, workflows in the field are changing. FTP transfer via ENG microwave is a natural extension of the file-based workflow.

Nucomm unveiled its Messenger IP encapsulator and decapsulator system to support remote file-based ENG workflows. The system offers IP transport in trickle and broadband modes. Trickle mode, which supports bit rates from 100kb/s to 1Mb/s, is used when live video is being transmitted concurrently. In broadband mode, almost all available bandwidth is devoted to IP traffic.

With the system, IP traffic is encapsulated into the MPEG stream from the MPEG encoder in the ENG transmitter so the resulting ASI stream consists of IP and video data. The system can use a station's ATSC signal to close the loop back to the ENG truck where data received by an ATSC receiver is fed to the Messenger IP decapsulator, which routes IP data from its Ethernet port.

Microwave Radio Communications (MRC) introduced the MTX5000 ENG edge access transmission system that adds an IP encapsulation and return system to a multimode modulator supporting DVB-T-COFDM, DVB-S and S2, single carrier, LMS-T, FM and VSB. The system can use a wireless broadband telecommunications service for a data return link from the TV station to the field or a data return link channel when it becomes available. The system supports simultaneous transmission of HD or SD and streaming of video files via IP.

Broadcast Microwave Services' HD Mini-Coder camera-backed transmitter is the RF component of the new JVC Libre HD wireless camera package.

Broadcast Microwave Services (BMS) showed the TCII Media Router System, which can create a virtual IP network for ENG news vehicles using a Truck-Coder II digital microwave system. The media router, with the company's Media Router Gateway, allows reporters in the field to interface with news servers back at the studio via a LAN connection. File transfer speeds vary to a maximum of 4Mb/s.

N Systems (NSI) added another twist to the IP/ENG connection with the introduction of 1 Touch. The system allows news desks to establish an IP connection with moving or stationary ENG vehicles via an EvDO broadband connection to manage field resources and share data. When an ENG vehicle is parked and its mast extended, 1 Touch makes it easy for the studio to take control of its ENG transmitter, antenna positioning and any other piece of equipment, like a tape deck or router, with an IP connection.

Diversity receive and HD ENG

Imagine covering a story live without sending out an ENG truck — maybe even putting a news videographer on the back of a motorcycle as a driver scoots through congested urban streets to the scene of a story. Once on-site, the news photographer transmits to a pre-established network of pickup antennas — much like cells in a cellular phone network — and the contribution is turned around to the station. That's one of the ideas behind new HD and SD diversity receive systems shown at NAB2007.

Nucomm introduced the NewsHub cellular diversity receive system. Each system comes with four ASI inputs with loop-through packet switching of as many as four cellular receive sites. Multiple systems can be cascaded to expand coverage areas.

MRC's solution was the new DRS4000 central receive diversity system, which supports single- and multiple-site architectures. With multiple receive antennas, the system relies on an advanced maximal ratio combining technology to add signals from each antenna and automatically balance gain. These sites can be combined to extend diversity reception coverage to an entire metropolitan area.

At NAB2007, there were also several significant developments in camera-mounted HD transmitters and systems. JVC teamed with BMS to offer an ENG HD camera, lens, camera-back microwave transmitter and receiver. Called the ProHD Libre, the system provides native 60P HD capture via JVC ProHD 200 series camera with built-in MPEG-2 Super Encoder.

The BMS HD Mini-Coder camera-

back transmitter accepts the camera's compressed signal at 20Mb/s via the IEEE-1394 connection and modulates it at 64-QAM. It then transmits COFDM on an 8MHz pedestal.

Global Microwave Systems unveiled its answer to HD ENG on the go in the form of the Messenger 2 Transmitter (M2T), an MPEG-4 AVC H.264 wireless camera-mount transmitter. The transmitter supports video resolutions from SD to 1080p HD. The M2T offers selectable system latency as low as 44mS or less, and maximum bit-rate throughput of 50Mb/s. It supports COFDM with QPSK, 16-QAM or 64-QAM modulation. Additionally, the transmitter is available as a rack kit and a standalone digital transmitter.

RF Central showed its new RFX-CMT-HD, an HD camera-mounted transmitter, in action in the Central Hall. The wireless HD transmitter relies on MPEG-2 video encoding and offers adjustable latency to 50ms. The HD transmitter mounts between the battery and the camera interface plate. It uses COFDM DVB-T modulation and QPSK, 16-QAM and 64-QAM modulation modes. The RFX-CMT-HD supports 1/2, 2/3, 3/4, 5/6 and 7/8 FEC modes.

Link Research introduced its L1500 wireless camera transmitter. The base unit is an SD wireless camera transmitter that can be converted to support HD operation with a simple software upgrade. The L1500 replaces the company's existing range of 2GHz, 3.5GHz and 7GHz wireless camera systems.

Fade to black

For the next few years, the 2GHz TV BAS relocation project is likely to remain the biggest ENG issue because so much rides on its successful completion. With only 3 percent of eligible licensees having all of their equipment, it's difficult to imagine that the commission will not extend the September 2007 deadline, which means the process will go on.

However, even as the industry's 2GHz analog equipment is swapped out for digital systems to support the new 12MHz channel scheme, other developments in the broadband and satellite market may ultimately overshadow this transition. For example, transmission of video files via broadband network is in no way inextricably tied to ENG microwave technology as shown by BMS, MRC and Nucomm.

In the long run, field acquisition via WiMAX and BAGAN may make future broadcast engineers wonder what all the fuss was about regarding the 2GHz BAS relocation. BE

Phil Kurz writes several Broadcast Engineering *e-newsletters, including* ENG Update.

IPTV

The medium grows up.

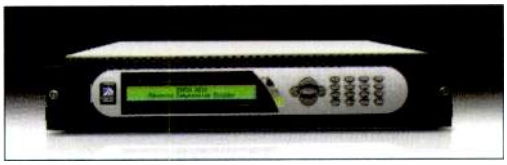
BY PHIL KURZ

Since NAB2006, IPTV has become significantly more prominent in the industry and at the convention. This year, NAB featured three related conferences: IPTV World, Telecom@NAB2007 and the MoTV (Mobile Video @ TV Forum). Even putting these gatherings aside, the number of papers, presentations and speakers addressing the technology and business case for sending video data packets over a private, closed IP network — in the case of IPTV — or the public Internet — in the case of broadband TV — dwarfed any similar effort the year before.

The same was true on the exhibition floor, where a variety of vendors — from companies with well-established roots in the market to relative newcomers — offered IPTV solutions ranging from set-top boxes for the home to encoders and test measurement and monitoring solutions for headends.

Microsoft came to NAB with news of additional support for its TV IPTV Edition software platform. It includes Grass Valley MPEG-4 AVC/H.264 SD encoders; set-top boxes from Pirelli Broadband Solutions; and server and storage solutions in the form of Sun Microsystems' Sun Fire x64 carrier class servers. Additionally, AMD and Intel continue to support the Microsoft platform with chipsets for server and storage infrastructures for IPTV Edition ecosystems.

For the Internet TV arena, Microsoft rolled out a new cross-platform, cross-browser media player to deliver full-screen, next-generation video playback. Called Silverlight, the player



Scientifc-Atlanta D9054

can run on both Mac and Windows with a variety of browsers, including Internet Explorer, Firefox and Safari.

TANDBERG Television made announcements on both the IPTV and Internet TV fronts at NAB2007. TANDBERG and Intel said they would collaborate to bridge the chasm between TVs and computers with a broadband TV programming solution that gives programmers an easy way to develop broadcast-quality content to PCs using Intel Core 2 Duo processors. For the IPTV market, TANDBERG introduced the iPlex UltraCompression HD/SD video processor, which delivers as much as 50 percent better bandwidth use over previous MPEG-4 AVC units.

Kasenna came to NAB2007 with the results of IPTV benchmark tests done with Hewlett Packard and Intel. The company demonstrated that its PortalTV product suite of IPTV software is capable of scaling to more than 1 million subscribers. The software leverages open standards-based servers and the company's middleware for IPTV service delivery. The company also highlighted its new LivingRoom 2.0 DHTML-based middleware, as well as strategic partnerships with ANT Software and IPTV set-top box provider Amino.

Amino previewed the AmiNET530 HD IPTV set-top box with PVR capability, MPEG-2 and MPEG-4 (H.264) video codecs, alpha blending and international fonts. Additonally, the company announced it was porting its IntAct IPTV software stack to the Intel CE 2110 System on Chip (SoC) media processor.

Snell & Wilcox Protus Ph. C

Adtec presented its Middleware Application Server (MAS) for IPTV and broadband TV applications. There are two major components of MAS: a hardware platform running optimized Linux and Web-based open standards modules.

Optibase showed how it — along with other companies offering "best of breed" components — could make it easier for IP service providers and enterprises to deploy IPTV servers. In a theater presentation, the company laid out a step-by-step explanation of what's needed to build an integrated IPTV headend. New products included the MGW HD, an H.264 HD encoding and streaming platform, and the MGW 1000, a carrier-grade encoding and streaming solution.

Cisco and Scientific-Atlanta came to NAB with a variety of products to create next-generation IPTV networks, including the Model D9054 MPEG-4 AVC HD/SD encoder, the new Model D9845 HD AVC decoder, and digital content management support for the company's next stat mux architecture. The D9845 AVC decoder supports the company's PowerVu and third-party conditional-access systems.

Headends

Harris showed IPTV products spanning video processing and management at the headend to subscriber preference for local, targeted programming and advertising. At NAB2007, the company launched the NetVX ENC-A21 HD/SD encoder with MPEG-4 H.264 support. The company also featured the DTP-300 digital turnaround processor that lets users add local branding, insert commercials and rate shape MPEG-2 and MPEG-4 program streams with-

out having to decode and re-encode streams.

Harmonic emphasized its position as a headend solution provider for Microsoft TV IPTV environments. The company's MPEG-4 AVC H.264 Electra 7000 HD encoder and Electra 5400 SD encoder are the third generation of products to be deployed with the Mircrosoft platform. Both encoders can deliver up to four channels from a 1RU form factor.

Modulus Video unveiled its MRE2000 family of video receiver/encoders at NAB2007. Aimed at IPTV and DBS headends, the encoders offer direct RF signal input, demodulation, decoding and signal processing with an MPEG-4 AVC HD/SD encoder. The company also addressed video on demand with the VODxchange, a real-time HD/SD MPEG-4 AVC video encoder.

Snell & Wilcox spotlighted Protus Ph.C, a video image conditioning system that lets mobile TV and Internet TV providers improve the quality of their images or reduce bandwidth needs for content delivery to wireless, IPTV and Internet platforms. It has the potential to offer operators a double-digit percentage bandwidth savings.

At Pixelmetrix, the theme was IPTV forensics. To that end, the company unveiled its EndGame IPTV network surveillance system, an end-to-end QoS monitoring solution. With the system, operators can track QoS problems across the content delivery chain so they can track backwards from a customer with a problem through the network and to the IPTV headend. The company also rolled out the DVagent set-top box monitor that checks the integrity of individual subscriber STBs and the EndGame Subscriber Status dashboard software.

Tektronix came to NAB2007 with new features and enhancements for the MTS400 series MPEG test system. Designed for the IPTV, video over IP and DTV markets, the MTS400 delivers first-line diagnostics with integrated cross layer fault analysis and error logging. At the convention, the company unveiled an optical and electrical GigE interface for the MTS400 that provides line rate IP connectivity and analysis. This allows for the analysis of packet loss, sequence errors, MDI statistics, packet inter-arrival time and histograms. BE

Phil Kurz writes several Broadcast Engineering *e-newsletters, including* IPTV Update.

Routers

Systems adapt to take the 3Gb route.

BY JOHN LUFF

At NAB, routing switched to a new track in more ways than one. Many companies introduced new products, some of which are quite intriguing.

Mixed environments

Utah Scientific showed several new products, including a GigE IP switch that can be controlled by Utah's SC-4 routing control system. It allows setting traffic priorities and assigning ports to VLANs, and it has a front

Utah Scientific UTAH 400

panel status display and redundant power supplies. It enables dynamic changes to a broadcast LAN instantly without reprogramming from a GUI.

The company also announced that the UTAH 400 supports 3Gb serial interfaces (SMPTE 424M-2006), including in mixed environments, because I/O cards can be supplied with 1.485Gb capability as well. The company showed larger frames (up to 288 x 288) with redundant cross point capability, and a TDM audio router. Utah now offers a software package for creating and deploying virtual panels over a network and showed some of the new control panels, notably the UCP-DT with touch-screen interface.

QuStream (formerly PESA) showed a large-frame Cheetah router that permits a single rack to hold an 864 x 864 system. The company announced it could provide CWDM optical interfaces in 16 I/O channels at a time. By late summer, 3Gb capability will be available.

The company demonstrated a rather unique capability to route DVI signals in the same frame as baseband video. Its latest audio routing offering, Cheetah DRS, based on a GigE backbone, allows the physical layer of an audio routing system to be distributed to points near sources and destinations in 1RU boxes. The audio is networked over GigE to all other frames, with matrix sizes available from 64 x 64 to 2048 x 2048 (mono). Audio I/O is either digital (110Ω or 75Ω unbalanced) or analog with breakouts from multipin connectors. Time code and RS-422 are also possible.

Harmony

Since Thomson acquired Grass Valley, there has been speculation that the routing products would be consolidated. So far, that does not appear to be the case. This year, the company began to harmonize control panels across the entire line of control systems (Jupiter, Encore and Prelude). The panels will work with any of the control systems, over Ethernet or RS-422 cabling, as appropriate.

Grass Valley also introduced 3Gb (SMPTE 424) capability for its largest routing switchers in the Trinix line. The I/O will require 3Gb cards, which will allow for mixed capabili-

ties transparently in one frame. Trinix also features a new cross-point card that offers redundant cross points on one board. The architecture will allow self-healing capabilities without the complexity of a second card by automatically swapping over to the redundant circuit in the event of a failure.

Life saving

This year, Evertz showed the fruits of the integration of Quartz' routers into the company"s product lines. The EQX router is the most obvious demonstration. It scales from 16 x 16 frames to 1152 x 1152, with 576 x 576 in 26RU. All I/Os are 3Gb-capable and reclock at rates from 19.4Mb to 3Gb. In a move to compatibility with high-end IT gear, the power supplies are 48V units. The attention to detail has the fans running at 80-percent speed unless one fails, which should prolong the life of each fan. The internal monitoring channel allows sample points throughout the signal path for complete analysis. EQX offers redundant cross points with one path at a time replaceable in the event of a failure. The new control panels allow 64 character mnemonics.

The company also introduced the XRF6 series L Band and IF routing system. It is scalable from 64 x 64 to 512 x 512. It offers internal AGC and has 60dB isolation between paths.

Incorporating enhancements

Harris introduced enhancements to its Platinum series of large-frame routing switchers. It now offers 3Gb I/O, as well as an audio demux card, which allows embedded audio to feed to a TDM audio board for remux and switching. The matching output card makes a full system, which allows swapping and remapping of audio inputs from embedded audio sources.

The company introduced the CENTRIO option module for the Platinum, which brings multi-image display processing to routers. In the past, a display processor contained internal routing. In this case, the display processing is an option for a router. Multiple displays can be driven from one module, which has access to the full set of inputs available on the router. CENTRIO features waveform monitoring developed by the Harris Videotek group.

Harris introduced a new control panel, NUCLEUS, which works with the complete router line as well as many Harris processing and distribution solutions. It features relegendable buttons and a software-defined display, which changes with the functions of the panel. The company also highlighted new control panels for its routers, the RCP-IDe series,

featuring LCD display buttons that can contain graphics images in sizes, including 16 x 1, 16 x 16, 32 x 32 and 64 x 1.

Taking control

As with others, the 3Gb buzz was present in the NVISION booth. The company supports SMPTE 424 across the full range of products. The company introduced a series of small routers in sizes from 16 x 16 to 32 x 32 (CR1616 and CR3232) with either local or remote control panels. Up to four routers from the series can be controlled from one switcher without an external control system, making cost-effective small systems practical. The routers support HD, SD, AES, analog audio and video. The systems also support embedded audio and Dolby E. In addition, there is a new port router for control systems with a new GUI. The system can be controlled by the company's Envy control system.

Harris Nucleus

NVISION showed new control panels with LCD relegendable buttons (up to eight characters). The NV9640 (2RU, 32 buttons) and NV9641 (1RU, 16 buttons) allow the buttons to be used for source selection or as part of a menu tree to expand the functionality of the panels and permit more options in less space. Virtual versions of both panels are available for deployment on desktop computers.

Seamless control

Pro-Bel celebrated its 30th anniversary at NAB by introducing a family of routing switchers: the Cygnus line. Three frame sizes are possible: 576 x 576 in 26RU, 288 x 576 in 10RU, and 288 x 288 with redundant cross points in 10RU. Larger systems can be configured by combining frames. All switchers are 3Gb SMPTE 424 capable. The company's backplane BNC connectors are specially manufactured for 3GHz. The company offers a new version of Morpheus for control of Cygnus. Control panels featuring LCD legends are available. Comprehensive monitoring of the frame is done, and four monitor busses allow monitoring of multiple inputs or outputs. The system permits a redundant cross-point card to be installed, which is updated on cross-point status at all times to allow seamless changeover should the need arise.

Evertz EQX

Essential transmissions

Lawo introduced the Nova73 HD high-capacity audio matrix, designed for mission-critical signal transmission. The system supports matrix sizes of up to 8192 x 8192, with MADI, ATM and AES3 interfaces. Additional interfacing possibilities include the DALLIS interface system, which integrates other formats and creates decentralized, fiber-optic connected systems. Modules are hot-pluggable. The system supports 96kHz sampling, is Dolby E-compatible and includes signal processing from simple gain adjustment to comprehensive processing, such as equalizers and limiters. It is available with a self-healing dual-star topology. BE

John Luff is a broadcast technology consultant.

Mobile TV

Two companies vie to be the option for broadcasters.

BY CRAIG BIRKMAIER

While HDTV acquisition and production took center stage at the middle and high ends of the marketplace, the importance of delivering content to mobile receivers and handheld devices was not lost on NAB participants. Dr. Eric Schmidt, CEO of Google, drew a large crowd for his keynote interview. The day NAB opened, Google announced it had cut a deal with Clear Channel to sell up to 30 percent of Clear Channel's radio spot inventory.

During the Q&A portion of the session, several venture capital types asked Schmidt for some free advice: "What's Next? What should we be investing in?" Schmidt answered slowly, "Well first, there's mobile. Then there's mobile. And, finally, there's mobile."

The current options

MediaFLO and Modeo demonstrated the mobile TV services they are rolling out to U.S. markets. These

Harris and LG Electronics' van at NAB2007 demonstrated MPH technology.

services target mobile phone network operators that will market them as part of their expanding menu of services for cell phones and PDAs. For now, the content is mostly national, often a scaled down version of the nonbroadcast networks distributed via cable, DBS and IPTV services.

The mobile operators need local content, and broadcasters could be the source of that content. The question raised at NAB: How can U.S. broadcasters best exploit the opportunity to serve the portable/mobile markets?

The two ATSC-compatible systems — Advanced-VSB (A-VSB) from Samsung and Rohde & Schwarz, and MPH (for mobile, pedestrian and handheld devices) from Harris and LG Electronics — could allow local stations to get in the mobile TV game without having to rely on outside service providers or telcos to get the signal to subscribers.

The van test

The two technologies were demonstrated in Las Vegas on two respective vans equipped with receiving equipment, a spectrum analyzer and LCD monitors to view the signals. Each van showed DTV signals coming from local TV stations, with the overall 19.4Mb/s signal split into a main channel at 15Mb/s and two sub channels. For the MPH demo, one stream was sent at about 560Kb/s using 2.2Mb/s (called half rate) and another 2.2Mb/s at about 300Kb/s (or one-fourth rate). The A-VSB demo also offered half- and one-fourth-rate streams with comparable overhead.

Both systems worked well. The MPH demo used a single dipole antenna, while the A-VSB demo used two diversity antennas. The A-VSB demo included a split-screen display in the van and several handheld receivers, which were manufactured by LG for the Korean market and were modified to receive the A-VSB broadcasts. The A-VSB proponents also demonstrated a SFN solution using three low-powered transmitters located in the proximity of the convention center.

Achieving success

The next challenge for broadcasters is determining how to develop this market. Can broadcasters do it on their own, or should they partner with mobile services like MediaFLO and Modeo?

To go it alone, broadcasters need to back a standard and gain support from consumer electronics manufacturers to build receivers. They will also need a business model to produce revenues from this service. Several broadcasters were talking about a subscription model not unlike those being used by mobile phone operators.

Partnering with the mobile operators has two options. The first is to create and sell localized content to these operators, using their networks and receivers. The second is to convince the mobile operators to include the ATSC mobile demod capabilities in their receivers, allowing consumers to tune directly to the ATSC mobile broadcasts. The latter could be offered free-to-air or via subscription.

The ATSC has begun standardization of A-VSB and will likely want to harmonize the standards and provide a mechanism for licensing. Representatives for MPH suggested that they might bypass this route and take their system directly to the marketplace.

Meanwhile, nine U.S. TV broadcast groups announced the launch of the Open Mobile Video Coalition, an industry alliance to speed up the development of DBS. The coalition includes Belo, FOX, Gannett Broadcasting, Gray Television, ION Media Networks, NBC and Telemundo, Sinclair Broadcast Group and Tribune Broadcasting. BE

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

Cameras

Smart gear comes of age.

BY BARRY BRAVERMAN

NAB2007 marked a watershed event in the annals of HD cameras and support. The advent of efficient IT-oriented camera systems was certainly a part of it. The two-hour plus wait to see the Miracle Machine of Color (aka Red) was just one example of the IT juggernaut running roughshod over diverse market sectors from broadcast ENG to feature films and digital cinema. For shooters, there was another angle to consider at the show: Brains, not brawn, will ultimately carry the day. Inexpensive and increasingly intelligent gear is having a profound and mostly positive effect on the quality of our images.

Panasonic HPX500

Intelligent camcorders

This trend has been apparent for several years. The Panasonic HVX200, for example, is able to capture remarkable HD images, despite its relative low price, coarse resolution imager and modest prosumer-grade optics. This is because the camcorder understands the shortcomings of its permanent non-interchangeable optics and can therefore compensate for them digitally to achieve satisfactory lens performance. The HVX doesn't feature the typical breathing of focus one might expect when zooming through a low-cost lens. Why? The soft spots known to the camera manufacturer and engineers are mapped out as a function of the camera's routine image processing.

The HPX500, the company's new

2/3in 3-CCD P2 camcorder, goes a step further, extending the notion of the intelligent camcorder to embrace the challenge posed by interchangeable lenses. Here the dogging issue is chromatic aberration (CA), an ugly fringing artifact found to some degree in all zoom lenses. For HD shooters, CA is a major occupational hazard, as such defects can be highly visible in HD because of the increased resolution.

Panasonic has uploaded the performance details for four currently available Chromatic Aberration Compensation (CAC) lenses from Canon and Fujinon. When a CA lens is mounted on the HPX500 (or HPX2000), the camera recognizes the make and model of the optics and applies the necessary compensation profile from the appropriate lookup table stored in the camera's memory. The performance gains in modestly priced lenses can be remarkable, with such optics suddenly exhibiting the clean look characteristic of lenses costing twice the price.

Studio smarts

For years studio integration of 1/3in camcorders has been a source of frustration. Much has changed, and now many users are adapting this gear for serious multicamera and studio use. The advent of HD-SDI output and genlock in some models has helped considerably, but the studio/multicamera challenge remains for corporate, event and small-market broadcasters.

Targeting its GY-HD250 720p60 camcorder, JVC addressed this issue in a big way at NAB2007. The new KA-HD250 studio adapter incorporates a standard 26-pin connector so the camera integrates nicely into new and most existing studio setups — a smart move that substantially extends the versatility overall of the HD250 camcorder. This versatility also includes the ability to output directly from the camera's onboard MPEG-2 encoder for microwave and satellite feeds. This makes the small-format HD camera well suited for modest-sized multicamera broadcast applications.

Sony XDCAM EX

Thinking beyond HDV

The fortunes of the world's most inadvertent HD format continue to fade as manufacturers look to smarter, less onerous codecs to carry the torch for

low-bit-rate HD. Long-GOP HDV was designed to take advantage of dual-use cameras that could shoot both SD and HD in the same inexpensive package. Now with SD becoming less of a priority for shooters, the overarching need for dual-use gear is no longer as compelling. Thus, demand is growing for an alternative HD format that can provide better performance without the dread and hassle of native HDV editing in your favorite NLE. Sony's XDCAM certainly fits this bill, and this year the company unveiled the XDCAM EX, a three-chip 1/2in flash memory-based camcorder that can shoot a wide range of frame rates and resolutions from 1080i/720p at 50Hz/60Hz on two 16GB onboard media cards.

Flash memory allows great flexibility in terms of economy, recording formats, frame rates and resolution — a reality consistent with the more IT-based workflows of the future.

Integrated agents

The tools in a shooter's toolkit often interface poorly and provide little or no feedback from one to the other. This had been the case with interchangeable lenses that (until CAC) failed in most implementations to inform the camera of potential shortcomings, such as egregious artifacts like chromatic aberration.

The same disconnect had been true for support gear with respect to unwanted camera movement. The head, lens and camera have traditionally acted as independent agents with only the expertise of a highly disciplined operator to hold the entire shooting enterprise together.

Pioneering technology from Vinten and Canon allows precise pan-and-tilt data from the Vector 950 Active head to be transmitted to the stabilization system in Canon's long field lenses. The benefit is compelling: a dynamic stabilization system that can distinguish between intentional camera motion and unwanted vibration or wind buffeting or even the unintentional slip of the operator's hand Now that's progress!

In summary

More relevant to most of us than a new camera sporting native 4K resolution, these latest-generation smart tools reflect a newfound sensibility on the part of the industry to intelligently and economically address the HD shooter's specialized needs. Look for CAC to become de rigeur in future camera gear. Look for smart image stabilization and smart support to become commonplace as well. In the future what our cameras might lack in brawn and expensive glass, they will more than make up for in technological savvy. BE

Barry Braverman is a veteran cinematographer. His latest book, "Video Shooter," is available from Focal Press/Elsevier.

All channels point to IP

An IP-based network is the most cost-effective way to deliver HDTV and new multimedia services.

BY PATRICK SIMS

The big picture is clear: Consumers want more entertainment options, faster service and higher quality. Nearly half of U.S. households already own or plan to purchase an HD-enabled television in the next year. Nine million homes purchased HDTVs during the 2006 holiday shopping season alone.

In addition, the FCC has set February 2009 as the deadline for the end of analog television. Over the next two years, many more viewers will likely purchase new TV sets.

Add to this the surging demand for high-speed broadband, and it is obvious that viewers want more, and they want it now.

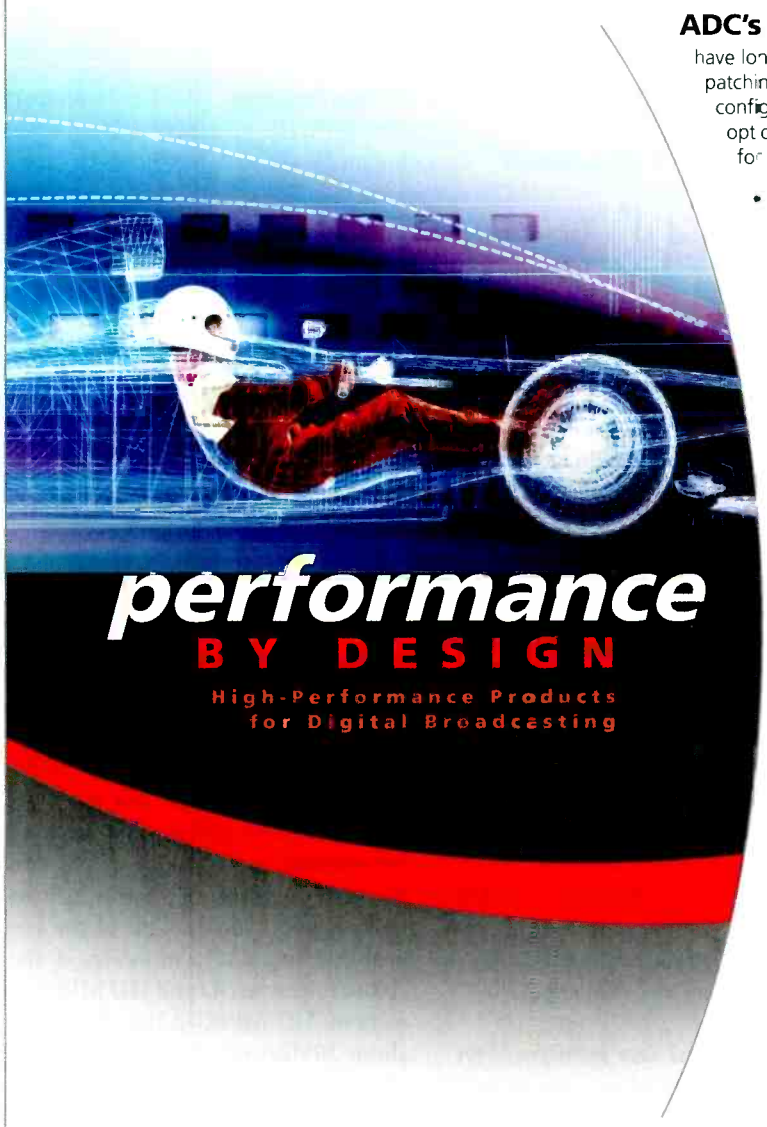
Broadcasters are ready. Most high-profile programs, including sporting events, prime-time programming and even news, are already broadcast in HD, and more HD programming and channels are being added each month.

All of these factors are driving content service providers, including telco, cable and satellite, to IP-based delivery platforms and networks. IPTV is the first platform being rolled out.

Defining IPTV

IPTV describes a system where a digital television service is delivered using IP over a network infrastructure. Such delivery systems are typically built by a broadband operator using a single infrastructure. Customers are provided total control over their multimedia experience, resulting in an interactive and high-quality service.

IPTV holds the allure of tapping into new revenue sources by delivering advanced multimedia services over broadband networks. One key



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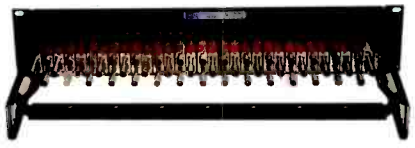

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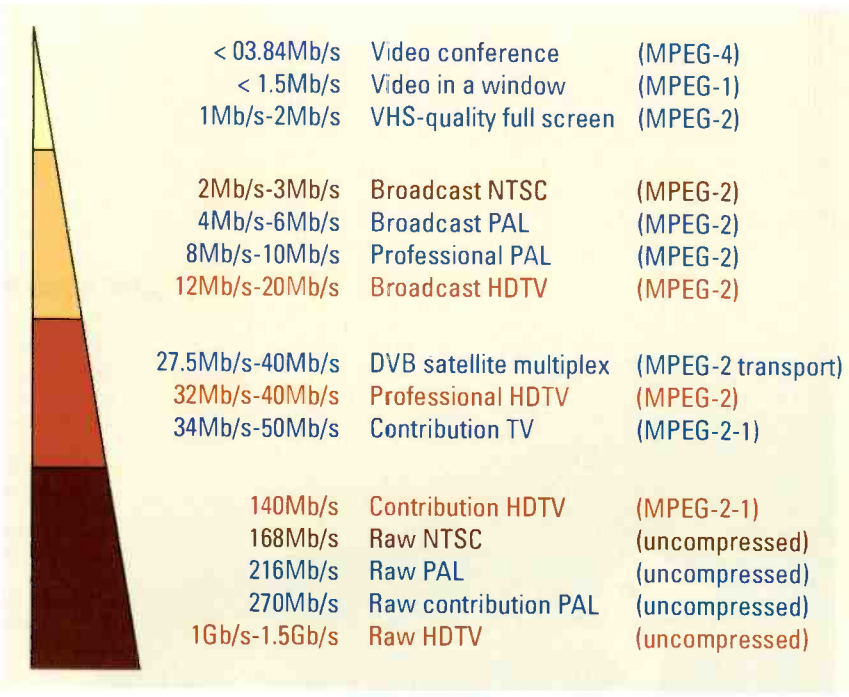

Table 1. Typical bandwidth requirements for MPEG-2 standards

element in this development is that, when combined with modern compression such as MPEG-4 AVC, the telcos can begin using their copper distribution system (xDSL) to deliver highly enhanced and profitable services to an eager audience.

As competition grows more fierce, what's the best way to deploy IPTV? There is no single answer. Today, the basic delivery mechanisms include DSL; passive optical networks (PON), such as fiber-to-the-home (FTTH); traditional CATV over hybrid fiber coax (HFC); or a combination. Each has advantages and challenges.

The demand for bandwidth

With current video compression technologies, neither symmetric high-speed digital subscriber line (SHDSL) or asymmetric DSL (ADSL) can provide the bandwidth required for IPTV. With ADSL2+ at 26Mb/s and high-speed DSL (VDSL) at 50Mb/s, more bandwidth is available, but the limitation is delivery distance. Subscribers need to be close to the central office or remote terminal as the available speed of any xDSL network decreases with distance.

Operators often find that IPTV deployment over xDSL is a more attractive option given their existing investments in the copper plant and the need to ramp up to deliver these new services quickly. One of the key problems in xDSL, however, is the ability to deliver SD and HD MPEG-2 content. HD MPEG-2 signals require about 20Mb/s per channel compared with 2.5Mb/s to 3.5Mb/s for SD content. (See Table 1.)

MPEG-4 AVC

Fortunately, MPEG-4 AVC provides

Use scenario	Resolution and frame rate	Example data rates
Mobile content	176 x 144, 10fps-15fps	50Kb/s-60Kb/s
Internet/SD	640 x 480, 24fps	1Mb/s-2Mb/s
HD	1280 x 720, 24fps	5Mb/s-6Mb/s
Full HD	1920 x 1080, 24fps	7Mb/s-8Mb/s

Table 2. Typical bandwidth requirements using MPEG-4 AVC

a solution. Also called H.264, MPEG-4 AVC is a well-understood compression technology. It is generally considered at least twice as bandwidth-efficient as MPEG-2. In addition, because MPEG-4 is a new technology, even higher compression ratios are likely to be developed in the future.

Conversely, MPEG-2 is at the end of its compression improvement curve, and little advances are expected in its performance. Typical MPEG-4 AVC data rates for familiar content are shown in Table 2.

Network capacity

The objective when examining network capacity is to determine whether a particular implementation can meet a given service bandwidth requirement. This is important in the southbound PON port capacities, and even more important in the northbound interfaces where multicasting techniques will be initiated. (See Figure 1.)

The objective when examining network capacity is to determine whether a particular implementation can meet a given service bandwidth requirement.

Network capacity must meet maximum usage needs without video blocking for any given take rate. The system architecture must be engineered to handle regular usage by the given take rates and still have sufficient capacity to ensure adequate video service during peak demand times. Maximum network capacity can be estimated by multiplying the number of subscribers by the maximum number of video feeds per subscriber. Another way would be to assign a maximum bit rate or bandwidth per subscriber times the number of subscribers.

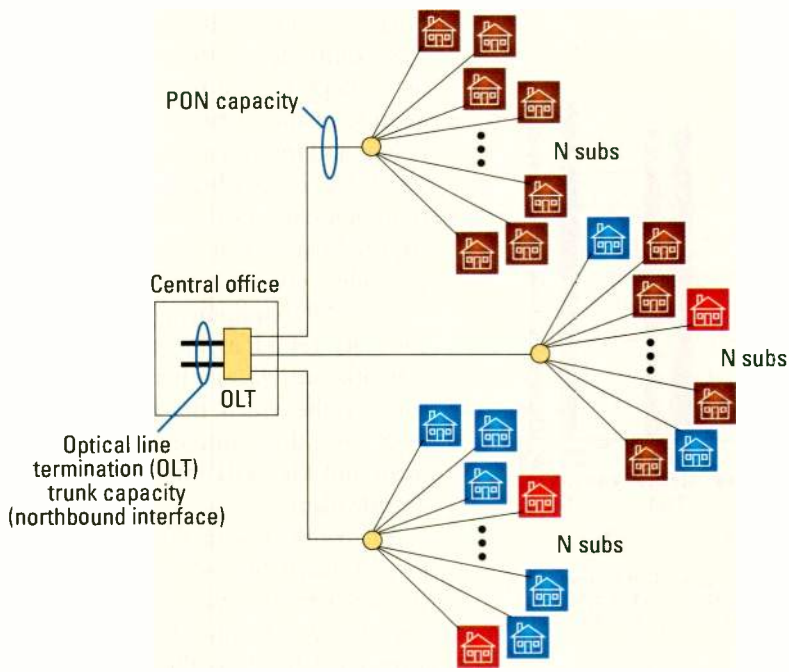

Figure 1. PON capacities in the northbound and southbound interfaces

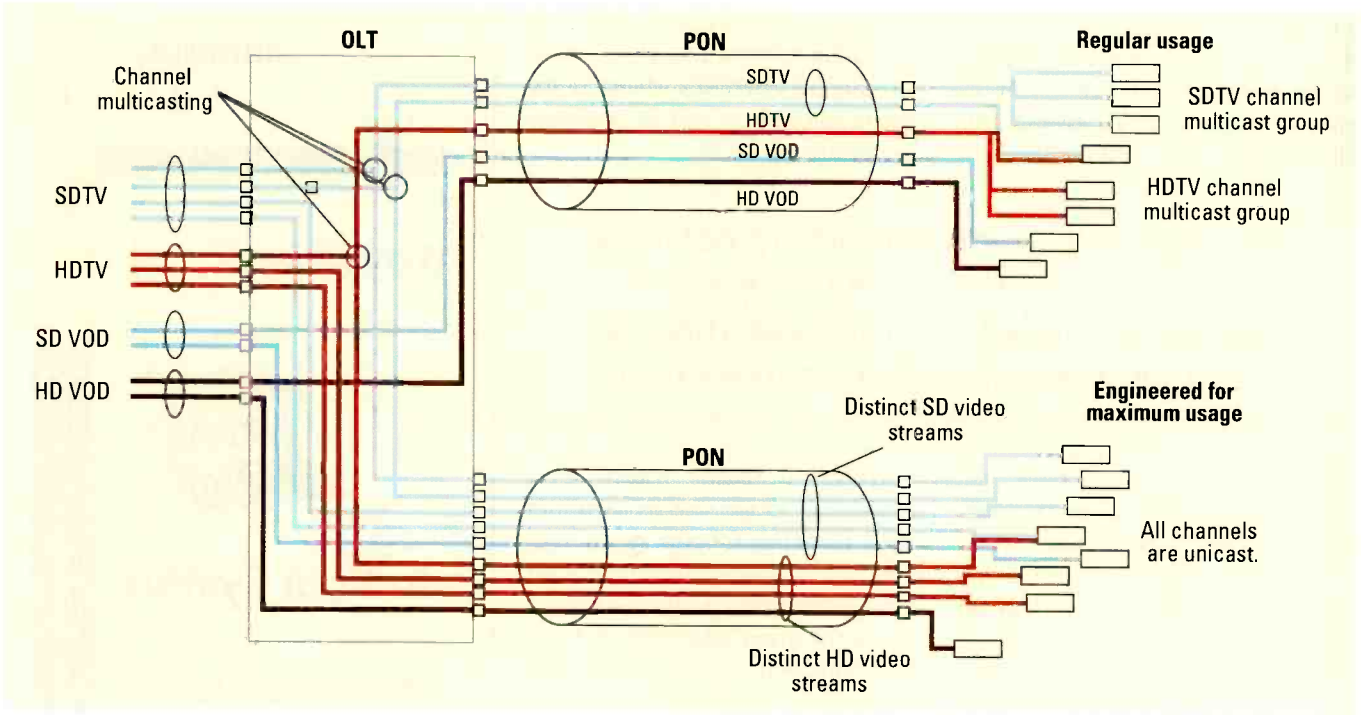

Figure 2. PON and OLT capacities by services

In Figure 2 on page 104, the channel lineup and VOD demand affects the optical line termination (OLT) trunk capacity from the video headend. Depending on the number and type of VOD services offered, channels may use unicast or multicast techniques. Multicast is the ability of one network node to send identical data to several viewers, such as broadcast.

Unicast video is a point-to-point transmission requiring the source to transmit an individual copy of a message to each requester. Multicast is more bandwidth efficient, but unicast offers more options and user control.

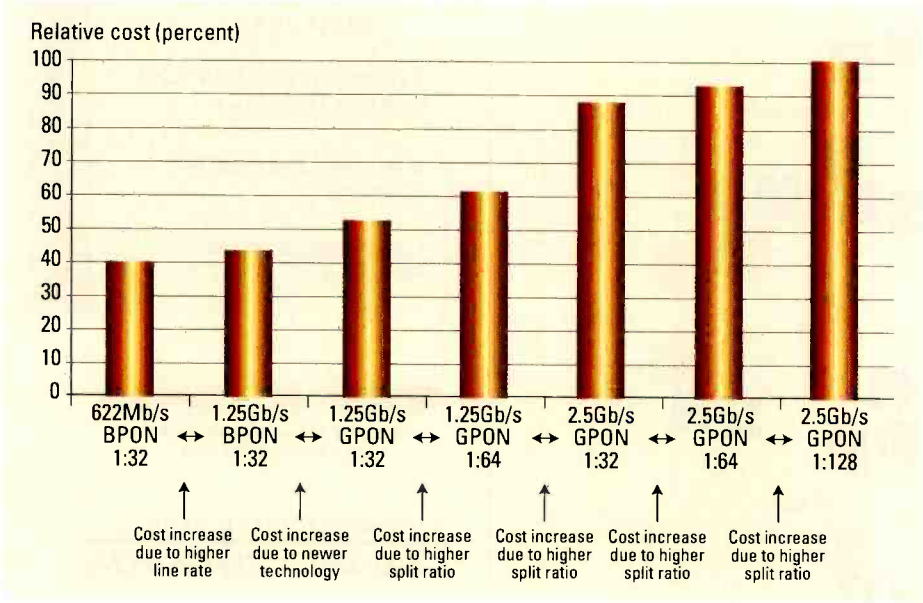

Figure 3. PON interface cost. As technology (bit rates) improves, split ratios also increase. For example, with a 622Mb/s system, the signal can be split into 32 feeds. A much faster 2.5Gb/s system would support four times as many feeds, or 128.

PON cost components

Component and interface costs change over time relative to different network architectures. Today, typical broadband PON (BPON) costs are significantly lower than either gigabit or GigE passive networks simply because of the maturity of the technology and the availability of the chip sets. When comparing the real cost of technology, however, BPON lacks the required bandwidth to support VoIP and video services.

The PON equipment component costs are found in the northbound network interfaces that physically connect the video headend to the PON OLT, the common OLT equipment and the PON interfaces to the outside plant.

A network's central office electronics and installation accounts for only about 8 percent of the network's total cost, whereas the outside plant hardware and labor typically account for about 40 percent of the total cost. (See Figure 3.) The customer premise

equipment and installation account for more than 50 percent of the total cost. As one large telco has discovered, the real costs of deployment start at the drop box.

There is a clear positive relationship between technology changes and the interface costs. Higher line rate, higher split ratio and newer technology all lead to a higher PON interface cost.

As stated above, BPON is expected to incur a lower initial cost due to the maturity of the technology and higher volume. Gigabit networks may be expected to have a faster cost reduction rate. This may be partially due to the spreading out of the gigabit PON (GPON) cost over 64 subscribers over time and improvements in MPEG-4 performance. As that happens, the cost differences between BPON and GPON will be reduced.

PON revenues

Before any network design decisions are made, managers and system engineers need to ask themselves the following key questions:

- Is this a greenfield deployment where, as the incumbent, I can expect a 100-percent take rate where all the service revenues are new?
- Am I overbuilding with existing subscribers who are already my customers for voice and data, and the only new revenue streams will come from video?
- Am I overbuilding myself to stem the tide of competition coming into my territory? If so, do I need to implement a copper solution first? Or, can I wait for higher-bandwidth solutions to come down in cost?

Because voice, video and data services represent significant revenues, ultimately there may be a high cost for delaying deployment and potentially losing market share.

Ultimately, the broadcaster must deliver sought-after content or face the risk of losing audiences to other forms of entertainment.

Implications for broadcasters

New technology is available to make the implementation of high-bandwidth services easier and less expensive. Even those costs, however, will drop over time. If a service provider can wait, it will gain a cost build-out advantage.

If, on the other hand, the service provider needs to move now, there are copper and copper/fiber network solutions. These can be implemented now and updated to provide more bandwidth without a future forklift renovation.

MPEG-4 will be the compression of choice for these new services. While STB and encoder choices are limited today, more options are coming quickly. This new compression standard offers vast improvements over MPEG-2. The potential downside is that MPEG-4 installations usually require a greenfield.

Broadband service providers are investing billions to build out the infrastructure needed to support IPTV and the delivery of other IP-based services. These companies know that the demand for video is the main driver. Ultimately, the broadcaster must deliver sought-after content or face the risk of losing audiences to other forms of entertainment. While the service providers are laying the pipes, broadcasters have to fill the demand. BE

Patrick Sims is principal engineer for ADC.

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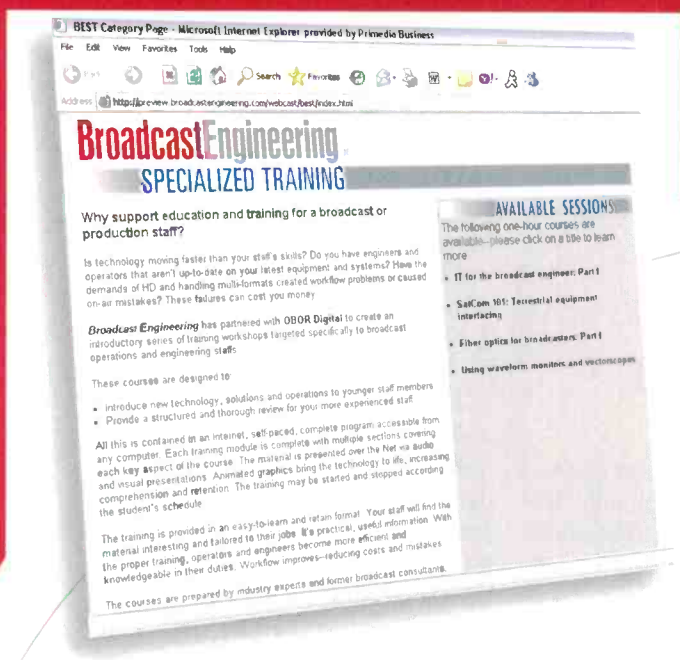

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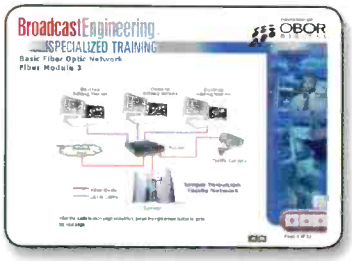

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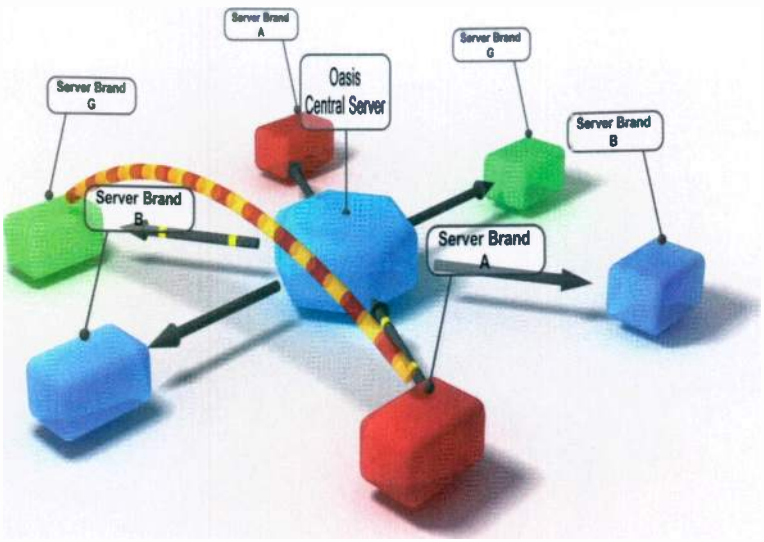

Oasis, Bitcentral's digital sharing and archiving solution has burst on the scene, and news managers everywhere are being wowed by its ability to leverage their news assets.

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WRAL in Raleigh NC, the nation's leader in HD news, uses Precis to simultaneously produce for multiple platforms. This includes their 24 hour a day cable News Channel pictured above.

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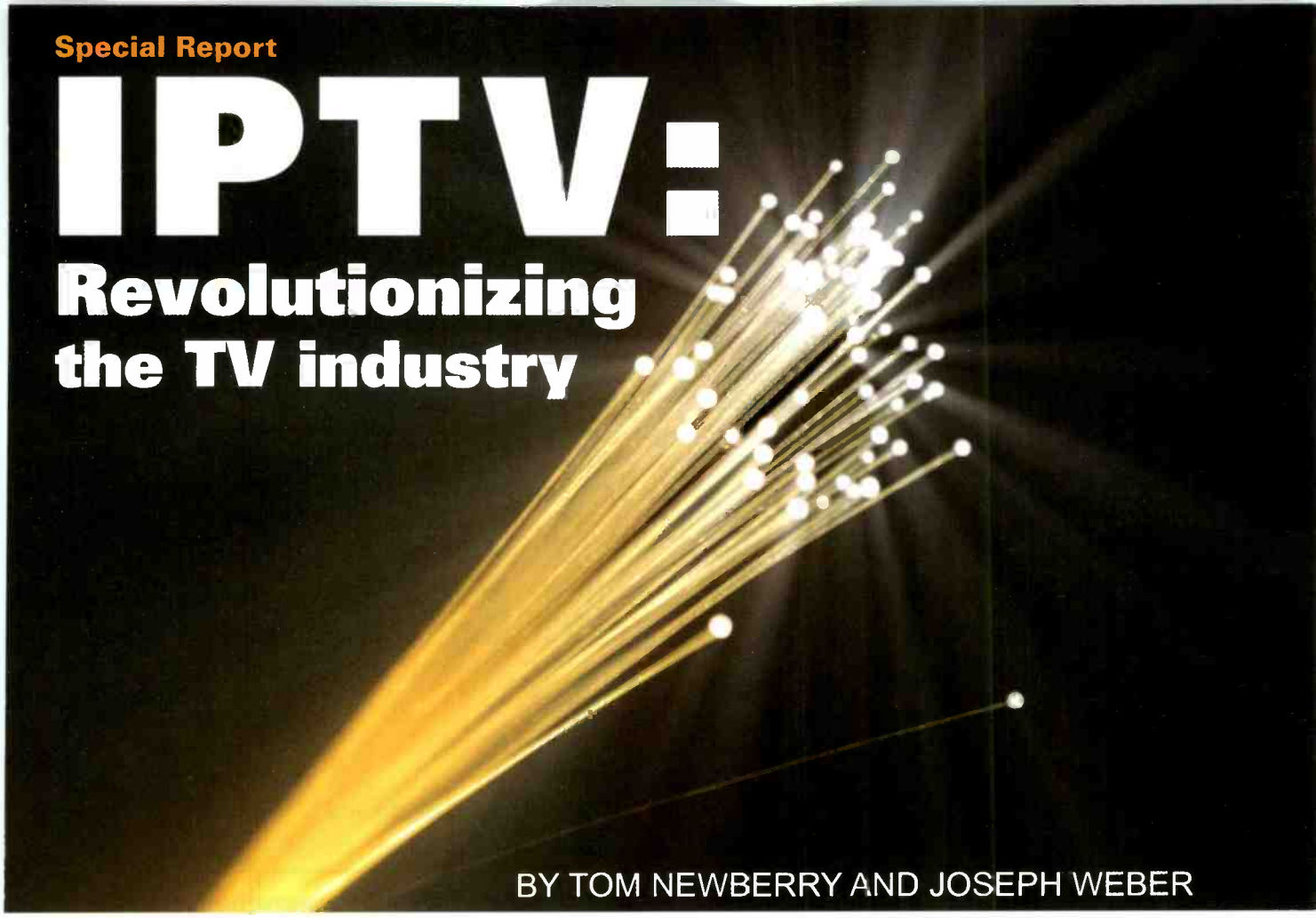
Special Report

IPTV: Revolutionizing the TV industry



BY TOM NEWBERRY AND JOSEPH WEBER

The word IPTV can be used in several contexts, in posting user-generated video on the Web, such as on YouTube, or in billion-dollar investments by the telephone companies to create a competitor to satellite and cable broadcast TV. Whether the application is delivering a 30-second video clip over the Internet or broadcasting a feature-length HD digital movie, the technical basis of IPTV remains the same: the delivery of digital video data using IP.

IP forms a common international language that allows a range of devices to communicate anywhere in the world over a range of physical media, including telephone wires, two-way radios and optical fiber. It was not designed, however, to deliver time-critical data as would be required for real-time playback of digital video.

To make broadcast IPTV work, several additional protocols and a lot of bandwidth are added to IP networks. The use of IP provides more than just a method to deliver digital bit streams. It also forms the basis for command and control messages that allow consumers to select content and interact in a bidirectional manner with the service delivery system. While broadcast television is passive, IPTV can be interactive. Many believe that this interactivity gives IPTV the promise of changing the business of television.

This article will provide an introduction to the basis of the IP suite and how it delivers packets of media data between devices, as well as some of the pertinent and more advanced protocols that IPTV uses in creating a television service.

While broadcast television is passive, IPTV can be interactive. Many believe this interactivity gives IPTV the promise of changing the business of television.

The IP suite

The IP suite is a set of communications protocols that form the foundation for network communications. The term protocol stack refers to a suite of networking protocols and the actual software that executes those protocols on a specific machine.

While these protocol stacks are developed or compiled specifically for each make of computer, they have a common set of protocols between layers. In this way, an Apple computer running OS X can communicate with an IBM server running Linux, or any other hundreds of combinations. The

common IP language among these computers removes the differences in operating systems, network connections and hardware architectures, including central processing chips.

IP packets

To send a digital message between any two computers on a network, the data is broken up into packets. There are two IP addresses at the beginning of each packet in the IP header: the address of the source computer and the address of the destination computer. This simple requirement enables the movement of data through the network, from the source, through intermediate routers and finally to its destination. A good analogy for IP is sending a letter via a series of postcards. The letter is broken into small packets, and each packet has a source address and the destination address attached to it. The postcards are then sent individually. (See Figure 1.)

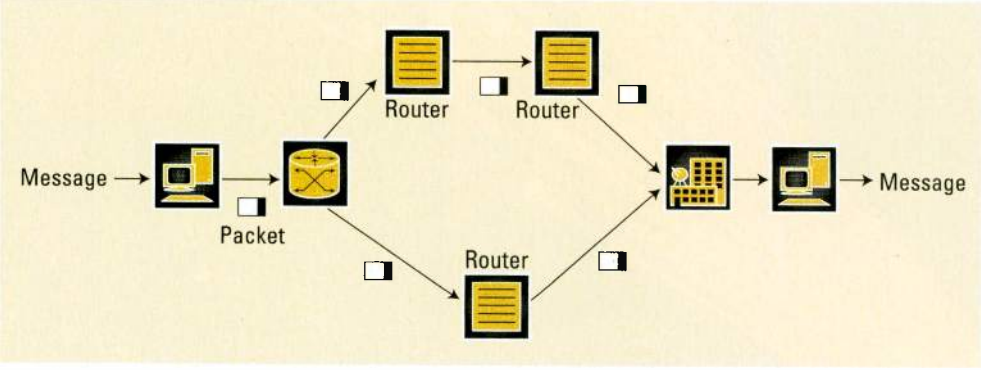


Figure 1. IP messages between devices are broken into smaller packets and distributed across the network.

TCP and UDP

IP defines two protocols for sending messages within IP packets. Transmission Control Protocol (TCP) is a reliable, connection-oriented protocol that guarantees reception and in-order delivery of data from a sender to a receiver. For example, if a packet doesn't arrive in time and is assumed lost, the sender will receive a request to resend that packet. Using the postcard analogy, with IP, some postcards are duplicated, and

some are lost. TCP puts the postcards back in order, throws away duplicates and requests the missing ones. This is important to the delivery of compressed digital video, where the loss of a single byte can affect video and audio quality.

User Datagram Protocol (UDP), on the other hand, is a connectionless protocol that provides a best effort in getting the data to its final destination. For many real-time, time-sensitive applications, such as streaming A/V, UDP is often used instead of TCP. UDP minimizes overhead and is not affected by network data loss or delays. However, unlike TCP, UDP is not a guaranteed transport mechanism. If a packet gets lost anywhere along the line, the destination application will simply never get that data.

Why would IPTV use UDP if packets can get lost? Broadcast IPTV services using IP multicast are a good example of how UDP might be preferred over TCP. A typical MPEG-2 compressed bit stream might deliver millions of bits per second, contained in thousands of IP packets. The sending device broadcasts these thousands of packets to potentially hundreds of devices in the multicast group simultaneously. If a packet gets lost and is not received by one of the viewers, it would not make sense to halt the transmission while a request is made to resend that missing packet.

Unlike TCP, UDP is not a guaranteed transport mechanism. If a packet gets lost anywhere along the line, the destination application will simply never get that data.

Unicast vs. multicast

IP is primarily a unicast protocol. It was designed to convey messages from a single source device to a single destination device. IP, however, also defines multicast addresses: destination addresses that represent more than one destination device. Internet Group Management Protocol (IGMP) manages multicast data flows.

From an IPTV perspective, VOD is an example of a unicast application. Data is sent from a single source — the VOD server — to a single

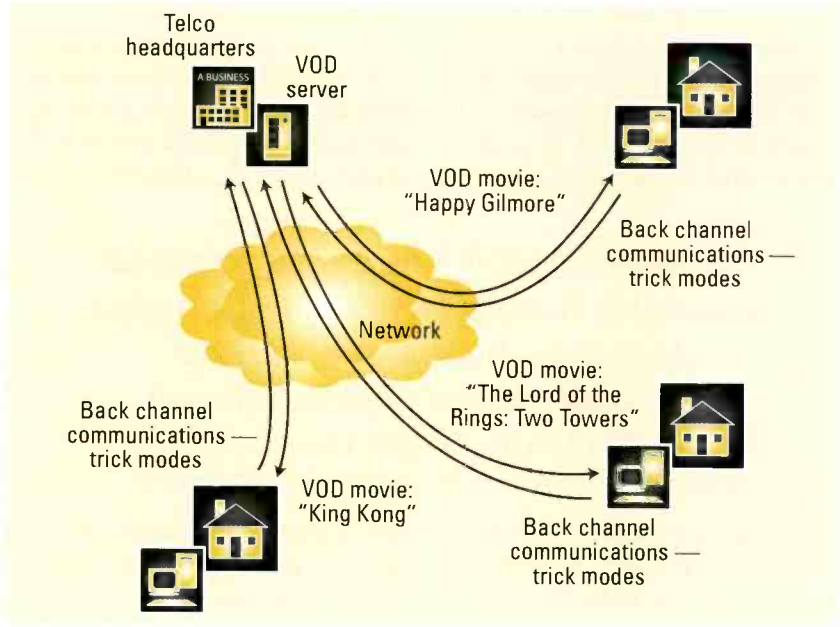


Figure 2. VOD using unicast in a broadband network

destination — a consumer's home. For each unicast VOD session, there is a separate stream of content on the network. Each stream could be 5Mb/s for SD or up to 15Mb/s for HD video. That could add up to a huge amount of bandwidth within the network.

Figure 2 shows a broadband network with three homes playing a VOD movie. Each home has an active unicast session with a VOD server in the headend. There are three separate video bit streams flowing from the headend/VOD server to each house, along with a back channel for trick mode support, such as pause, play, fast forward and rewind.

With multicast, a single source sends data to multiple destinations at a single time. Each broadcast television channel would have a unique IP multicast group, for example. Using IGMP protocol, clients can receive the broadcast packets and enable the routing of the broadcast stream to their network device through the network. Multicast saves much more network bandwidth than unicast, but there is no reliability mechanism so lost packets stay lost.

Figure 3 shows a broadband net-

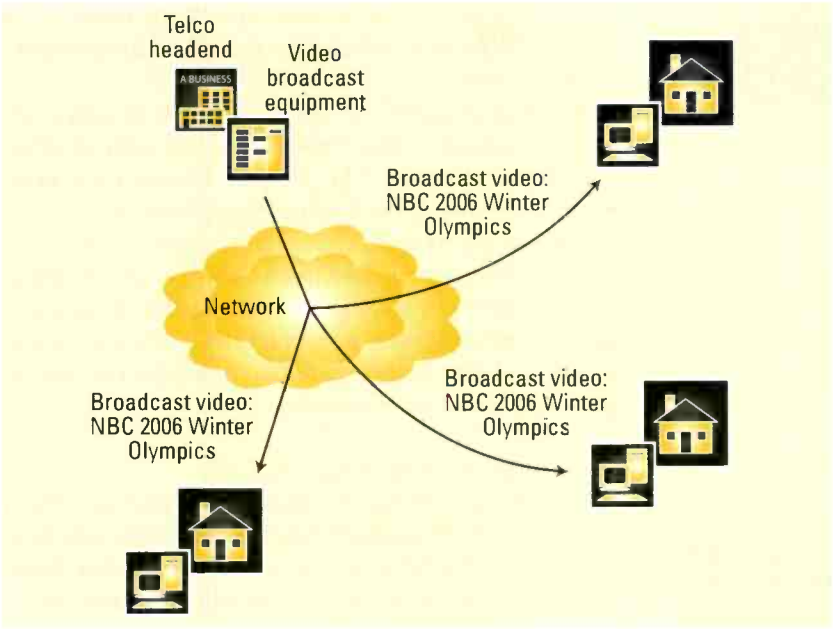


Figure 3. Broadcast video using multicast in a broadband network

work with three homes currently playing the same broadcast video stream of the 2006 Winter Olympics. Each home has an active multicast session receiving the same video bit stream, which originates from the headend.

Multimedia over IP

Multimedia and networking is core to IPTV. Multimedia applications use various media types, such as text, graphics, animations, audio and video. There are many network-based multimedia applications today. Furthermore, there are many bright and imaginative minds working on ideas for applications intended for high-speed bidirectional networks.

Networked multimedia applications are important, so it is critical for the IPTV network architect or content creator to understand the issues associated with multimedia networking as well as understand what tools can enable effective and compelling new applications.

Within the network, multimedia data can be affected in the following ways: dropped packets, jitter between packet delivery times, delayed packets and data corruption. Even

when the TCP protocol is used, the effectiveness of the IPTV service can be affected by the reliability and speed of the network.

The goal of quality of service (QoS) is to make sure the network can deliver end-to-end data with expected and predicted results. This includes latency, error rates, up-time, bandwidth and network traffic loads.

QoS can be extremely important to a successful IPTV service within a congested network. Only service operators that also own and manage the IP network to homes can guarantee QoS for the service. IPTV services that use the general Internet are not guaranteed the QoS necessary for a good user experience.

Real-time transport protocol

IP networks were not designed for real-time delivery of data and can have unpredictable jitter and delay. The multimedia data that travels on the IP networks must arrive on time and in the same order it was sent. Real-time Transport Protocol (RTP) addresses the time-critical requirement of multimedia bit streams. It provides a timestamp and sequence number to IP packets containing media data. These can be used by the receiving device to synchronize playback and manage buffers for network jitter.

QoS can be extremely important to a successful IPTV service within a congested network.

Encapsulating media data into IP packets

Delivery of media bit streams over IP requires several layers of encapsulation. MPEG-2 transport streams, for example, consist of a series of 188-byte packets. These are grouped together and wrapped within an RTP packet. Finally, the RTP packet is encapsulated within a TCP or UDP datagram, forming an IP packet.

Figure 4 shows an RTP packet containing several MPEG-2 transport packets within its payload, all encapsulated using UDP in an IP packet. This diagram shows seven 188-byte transport packets that constitute the RTP payload.

Each encapsulation adds additional header data and therefore reduces the bandwidth efficiency. If the network has sufficient QoS, it is possible to deliver media packets without the overhead of RTP. The packets are instead inserted directly into UDP packets. Figure 5 shows how MPEG-2 transport stream packets can be encapsulated within a UDP/IP packet.

Sending MPEG-2 transport stream packets over UDP is used extensively within the private networks of cable

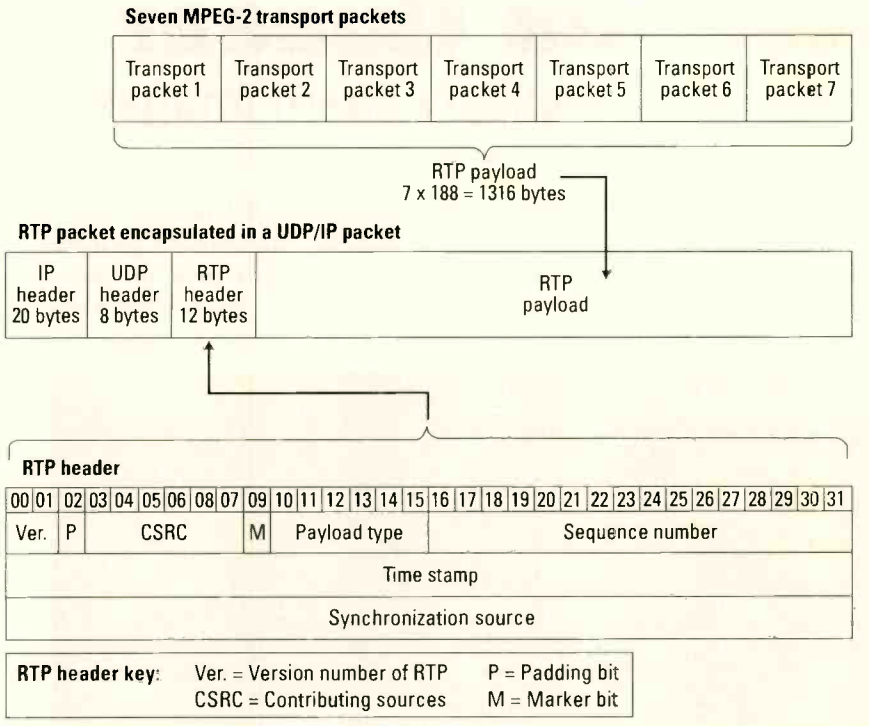


Figure 4. An RTP packet encapsulated in UDP/IP

and telephone companies to deliver MPEG-2 transport streams throughout the system. For general delivery over the unmanaged Internet without QoS guarantees, streaming protocols such as RTP need to be used, but even then, packets may be lost in delivery, resulting in artifacts in the media presentation.

There are other system layer standards besides MPEG-2 and next-generation compression methods such as AVC H.264. While the encapsulation methods may differ slightly, they all require either strong QoS or overhead to ensure timely delivery of media packets.

the television industry. Just as the Internet changed the way we shop, read the news and personally interact, television services over IP could change how we integrate television entertainment into our daily lives. Decades old business models may change as a result of this technological shift to IPTV.

The Internet and the protocols used within it were not designed for the real-time delivery of multimedia content. Assuring the required QoS over a network may require additional protocols and additional bandwidth to overcome the inherent limitations of IP. **BE**

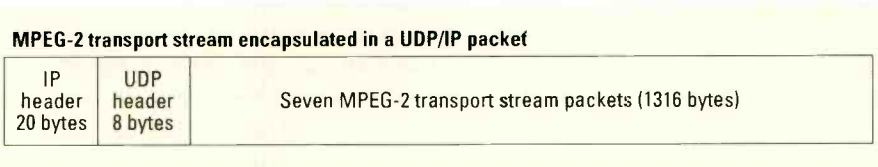


Figure 5. MPEG-2 transport stream encapsulated in UDP/IP

Summary

Delivering TV and movie services over IP promises to revolutionize almost every component of

Tom Newberry is product development manager for Thomson, and Joseph Weber, Ph. D., is director of product management for TiVo.

Snell & Wilcox Quasar

Motion estimation technology delivers sharp images.

BY IAN ELLIS

Long after the majority of TV viewers are watching in HD, most broadcasters will still be working in a hybrid SD/HD environment. For the foreseeable future, TV content will exist in many different forms, including vast archives of SD video material, film-based material with 2:2 or 2:3 cadences, graphics, captions and titles, animation with different frame rate sequences, and mixtures of all of the above.

Making all of this look good within the HD environment will be a challenge, and it's important for broadcasters to address this issue now, as purchases of HD displays move beyond the early adopter phase and begin to penetrate the wider market.

Thinking outside the box

When Snell & Wilcox developed the Quasar Ph.C HD upconverter, the company's objective was to improve performance by devising a system-level solution that could also handle embedded and AES audio and closed captions, and provide noise reduction, preprocessing, video enhancement, legalizer and clipper tools. The result is a system that provides clean and sharp high-resolution upconverted images from sources without introducing deinterlacing or conversion artifacts.

On the inside

Several different technologies make up the upconverter, with the most critical being a motion-compensated deinterlacer using Ph.C motion estimation technology.

Ph.C is a frequency domain technique, and as such, it is capable of zeroing in on details while ignoring factors, such as luminance levels and noise and grain, within the picture.

The estimating technology provides a correlation surface for the image, which communicates the motion and content on a pixel-by-pixel basis. So no matter what the motion speed or the content type, the correct processing is performed on each pixel. The result is a robust and reliable deinterlacing process.

Quasar Ph.C from Snell & Wilcox upconverts from a mixture of sources, including video, film, captions, graphics, logos and, most importantly, station branding.

Using this analysis, the upconverter can perform a fully motion-compensated deinterlace. If the input is 525 (480i) NTSC, the system converts this internally to 525 (480p), or twice the resolution of the original input. This deinterlaced image is then scaled to create the 720p or 1080i output. The meticulous deinterlacing process eliminates errors that would be magnified by scaling. By using a deinterlaced image for scaling, it allows users to sample points closer to the desired output pixel and thus maximize the resolution of the video output.

In addition to newly developed algorithms for upconversion and motion estimation, the upconverter combines several other technologies, including Prefix compression preprocessing technology, DEFT 2:3 cadence detection technology and CleanCuts, which prevents bleeding across cuts.

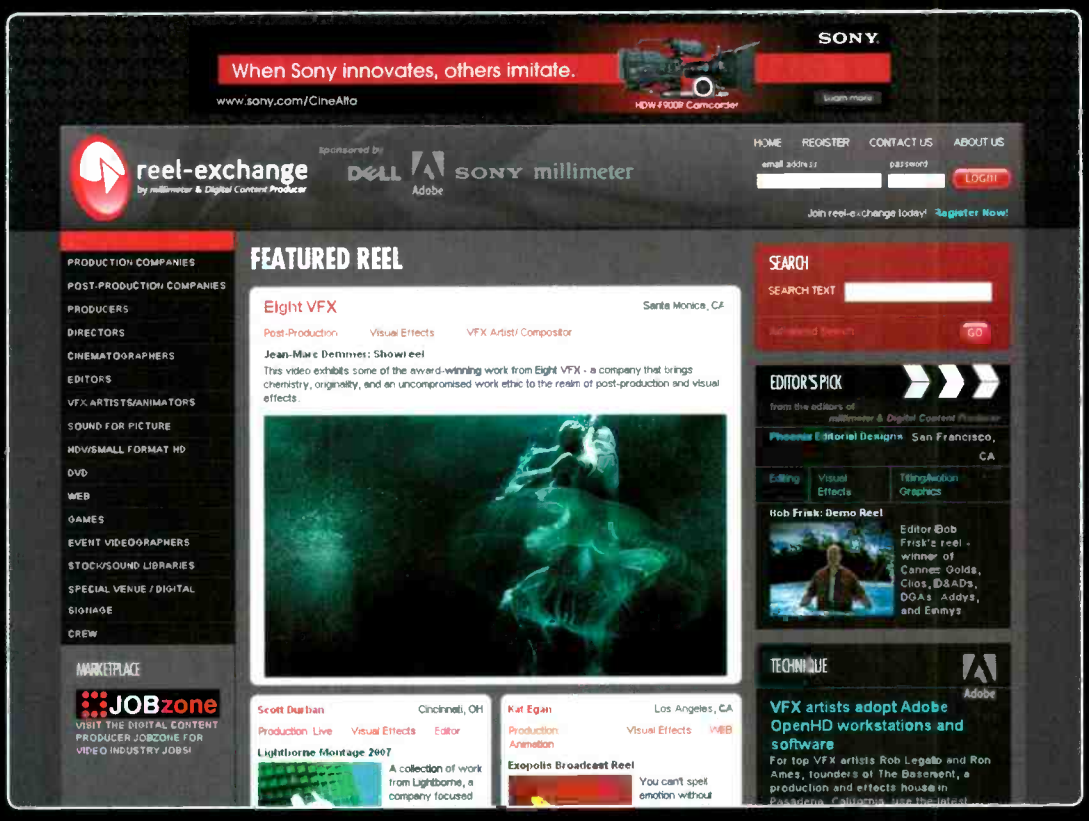
Additional functionality includes an enhancer, taken from the company's Archangel image restoration solution. The enhancer enables the system to handle low-resolution or poor-quality sources.

The system's gamut legalizer ensures that signals are legal and maintains the optimum look for the picture when transmitted, encoded and displayed. The upconverter's integrated color space converter addresses the differences between color space in SD and HD content. Built-in aspect ratio conversion handles typical conversions as well as user-configured conversions that can be controlled by wide-screen signals.

HD fix

The Quasar Ph.C integrates easily into a variety of facilities and applications, providing broadcasters with a fast fix for delivery of HD content in a world where most sources are still SD. It is a valuable tool for future expansion of HD operations. BE

Ian Ellis is the product manager, conversion, for Snell & Wilcox.



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Graphics and FX

TV effects are closely related to computer graphics.

BY JOHN LUFF

Recently, I had a conversation with a friend about computer graphics and animation. Both of us are techies, so of course the discussion gravitated to hardware and software.

In 1986 B.W. (before Windows), a computer graphics company called Bosch had an initial run of success. The company's main product was the FGS-4000 graphics box, a full rack of expensive computing hardware with a price tag starting in the quarter-milliondollar range.

It offered 3-D rendering of models such as lettering and other items that could be defined on-screen using what today would be considered a primitive user interface. A hot machine in that era, it sported analog NTSC output cards and typically rendered to either a disk recorder or a Sony BVH-2500 analog 1in video recorder that could record single frames.

I have tried to find data on the capabilities of the system, but suffice it to say, any desktop computer today offers much greater capabilities.

Moore's Law

We can thank Gordon Moore, a founder of Intel, for describing the growth in computing power in our era. In simple terms, Moore stated that the number of transistors on integrated circuits would double every 24 months. The assumption is that as the number of transistors grows, the power of the chip grows in direct proportion. (See Figure 1.)

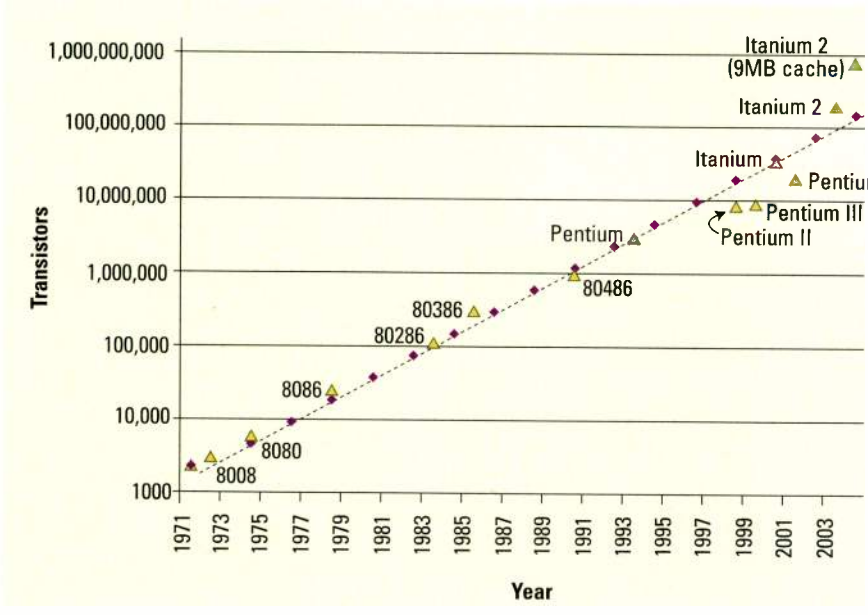

Figure 1. Moore's Law assumes that as the number of transistors grows, the power of the chip grows in direct proportion.

To the first approximation, his prediction has been remarkably accurate. It is an empirical observation, from which nothing can really be calculated. From a business standpoint, however, it has assumed the status of nearly a law of nature.

Applying Moore's Law to TV graphics

Nowhere is this power more useful than in graphics applications, both scientific visualization and the creation of TV and motion picture special effects.

Many of the effects that the FGS-4000 couldn't render in real time a couple of decades ago are today rendered in hardware on graphics cards at higher resolution.

For example, take a look at the Microsoft Windows 3-D text screensaver to see the jump in real-time processing power that Moore's Law describes. That simple 3-D text would have taken many hours to render in the 1980s.

The power has moved from CPU-intensive operations to graphics primitives that are manipulated in high-speed, special-purpose graphics engines on graphics cards. Now, graphics cards are capable of outputting video to the tight specifications professional TV systems require. Today, essentially all cards on the market can be programmed into raster formats for common and unusual TV formats, with the correct color spaces and interfaces necessary for broadcast use.

The tablet PC on which I am writing this article will output clean NTSC, and with the proper physical layer interface adapter, it can output SMPTE 259M SD or SMPTE 292M HD signal formats. Software today can create excellent text keys (lower-thirds and full-screen images) that can be rendered in real time on cards designed for consumer applications and suitable drivers. The growth in home computer gaming is directly benefiting broadcast applications.

Video capture

Output is only half of the picture, of course. Capturing video on general-purpose computers used to create color space conversion and monitoring problems. Simply put, the computer industry was slow to understand that the details of broadcast

standards needed to be taken into account in both hardware and software design if the product was to have any applicability to our marketplace.

In the 1980s, plenty of terrible video was created using immature tools. By the mid-90s, the growth of prepress and broadcast graphics had spawned tons of options for graphics professionals involved in creating content. Timing, jitter and color space issues no longer existed in video capture. Black burst inputs on computer systems were not uncommon. More than anything else, the need for display hardware and software manufacturers to achieve predictable results for screen, print and professional monitors meant a new focus on the details was essential.

Open Adobe Photoshop and explore the myriad of color space options it now supports. It makes you want to open Charles Poynton's books, "A Technical Introduction to Digital Video" and "Digital Video and HDTV, Algorithms and Interfaces," and bone up on the fundamentals of color reproduction.

TV effects today and in the future

The refinement of effects for television production effects is closely tied to the evolution of computer graphics hardware and software. Early graphics pioneers found unique ways to leverage the power of mainframe computers to accomplish the calculations needed to create art.

Today, the number of programs for the effects industry is staggering. A credible artist may move a project through a dozen programs to take advantage of the specialties each program features. Some are plug-ins for programs, including the Adobe suite of products.

Companies that specialize in effects work for television are finding it increasingly difficult to keep a hold on the market. Manufacturers that build general-purpose hardware with television-specific I/O have been successful as long as the hardware remained the favorite among developers. Today the popular choice is any Intel-based good-quality hardware platform that offers blazing speed.

Take a look at the Microsoft Windows 3-D text screensaver to see the jump in real-time processing power that Moore's Law describes. That simple 3-D text would have taken many hours to render in the 1980s.

It's a tall order to create a proprietary system that fully meets customers' needs. Even harder is predicting customers' future desires and keeping the product in step with the pace of development in the industry. Some companies have met this challenge by focusing on a subset of the application market.

Moore's Law to expect more far in the future is the kind of folly that Mark Twain might have turned into a pithy and quite apropos statement. BE

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WAGT, the Augusta Georgia NBC and The CW Network affiliate is seeking an Assistant Chief Engineer. Responsibilities include analog and digital television transmitter and microwave maintenance, studio equipment maintenance and the ability to assist chief engineer in all phases of broadcast operations, including some IT support.

The ideal candidate will have a minimum of 5 years television maintenance experience, strong technical skills, and posses SBE certification or FCC license.

WAGT Television offers an excellent salary and benefit package. No phone calls please.

Please send cover letter & resume to:
Attn: Assistant Chief Engineer Position
WAGT Television, Inc.
905 Broad Street
Augusta, Georgia 30901

WAGT Television Inc. is a Schurz Communications Inc. station, an EOE and Drug Free Workplace.

CABLE & SATELLITE BUSINESS DEVELOPMENT MANAGER

Panasonic Broadcast & Television Systems Company (PBTS) has opening for a full time Cable & Satellite Business Development Manager based out of our North American Headquarters in Secaucus, NJ. For the right candidate, will consider having this position based anywhere on the East Coast.

APPLY NOW: Candidates interested in this or any position with Panasonic must register and login at the Panasonic Career Center: **www.panasonic.com/careers, Job requisition number 13700**

FUNCTION: Responsible to work with PBTS's upper management, sales staff and marketing to develop the strategies to maximize PBTS's business in the Satellite, Cable and emerging IPTV markets. Develop and maintain business relationship with the key executives. Coordinate local sales staff activity. Responsible to assist in the launch of new products.

QUALIFICATIONS: Associate Degree in electronic technology or equivalent training and experience, engineering degree preferable. Ten years experience in broadcast and cable market. Must be capable of resolving customer relations and business problems that develop with the largest direct customers PBTS has.

We are committed to creating a diverse work environment and proud to be an equal opportunity employer (m/f/d/v). Pre-employment drug testing may be required. Due to the high volume of responses, we will only be able to respond to candidates of interest. All candidates must have valid authorization to work in the U.S.

CLASSIFIEDS

Help Wanted

BROADCAST AND RF ENGINEERS

Echostar's Cheyenne, WY and Gilbert, Arizona facilities are seeking experienced Video/Broadcast and RF Engineers. Responsibilities include performing and coordinating maintenance of broadcast equipment, troubleshooting of large distribution systems and complex signal paths, direct communication with national program providers, monitoring and adjusting audio/video. Qualified candidates with strong knowledge of technical TV, broadcasting equipment and OTA transmission systems. Knowledge of broadcast automation systems and thorough understanding of PC hardware and software operations as well as networking preferred. Ideal candidate should possess strong troubleshooting skills and have the ability to work independently and quickly in high-pressure situations. Must be flexible - may include evenings, nights and weekends. Associate's degree or technical school; and four+ years experience; or equivalent combination of education and experience. If interested, please email resume to **kim.degney@echostar.com**

Help Wanted

BROADCAST SYSTEMS OPERATOR

KLCS-TV/DT (Los Angeles, CA) seeks an experienced self-starting Broadcast Systems Operator. The ideal candidate will have a minimum of two years experience operating video and audio equipment in a broadcast, cable, or postproduction facility. In this role, the Broadcast Systems Operator will provide operational support by setting up, loading, adjusting, and operating a variety of analog and digital equipment (color cameras; audio, video, duplication, and lighting systems; recorders; system servers; broadcast automation equipment; and character generators, etc.) used in television production, post-production, and transmission of analog and digital color television programs. This position requires outstanding people skills, the ability to work flexible shifts (various shifts in a 24-hour, 7-day a week broadcast operation.), and willingness to participate in cutting edge broadcast technology. Visit www.lausdjobs.org for the detailed job announcement and to apply online. Los Angeles Unified School District EOE

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Please submit resumes to:
Jeff Sharpe - Director of Engineering
Turner Studios
jeff.sharpe@turner.com
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No phone calls, please

Please visit:
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www.turnerjobs.com

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GlobeCast Australia

Broadcast Engineer (Television)

GlobeCast Australia, Australia's premier Broadcast Services Provider with over 100 transmission channels, is continuing to expand its Engineering and Operations facilities in Sydney. We have a vacancy for a motivated **Broadcast Engineer** in our Broadcast Centre who will play a key role in the development of its infrastructure. The successful candidate will be required to work in a busy, demanding and expanding company with commensurate rewards.

The ideal candidate will have an Engineering background, obtained in the Broadcast Industry, and will have had several years' experience working with equipment used to broadcast services via satellite and fibre. Hands on experience of digital transmission systems ranging from video and audio compression equipment, multiplexing and SDI is a requirement, as is the ability to work efficiently within a team of engineers and the Operations Department.

Relocation and visa expenses for the successful interstate or international candidate will be met by GlobeCast Australia.

Please email your application with all relevant details to
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www.globecastaustralia.com

MOBILE UNIT ENGINEER

TRIO VIDEO, the Midwest's leading mobile television production company, is seeking qualified applicants for the position of Mobile Unit Engineer to operate and maintain its standard and high definition mobile unit fleet from its base of operations in Chicago. Responsibilities include coordinating, troubleshooting and maintaining on-site mobile unit operations and equipment. All experience levels considered with: engineering degree, technical training, multiple years of hands-on broadcast experience or any combination.

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

BROADCAST MAINTENANCE TECHNICIAN

WOOD TV8 is seeking a Broadcast Maintenance Technician. The ideal candidate will have developed skills in I.T. and video and knowledge of networks, routers, and servers. Software knowledge of Microsoft Windows XP, server 2003, Visual Basic.Net, Exchange and alternate operating systems such as Linux and Unix. The applicant should also have knowledge of analog and digital video and as a plus, knowledge of mpeg 2 encoding. Contact Engineering WOOD TV8 120 College SE Grand Rapids MI 49503 Careers@woodtv.com No Phone Calls please. Offer of employment contingent upon completion of pre-employment checks. EEO

CHIEF ENGINEER
TRUMAN STATE UNIVERSITY
DIVISION OF LANGUAGE & LITERATURE/
DEPARTMENT OF COMMUNICATION

Truman State University announces a full-time, 12-month Chief Engineer position.

Summary of Position and Responsibilities: Truman offers the successful candidate the chance to join a growing convergent journalism program that continues to shift toward digital delivery of content on two non-commercial FM radio stations, a campus community cable news channel, online sites, and traditional print. Associated production facilities support the instruction of broadcast and print journalism students, as well as courses in related areas within the Department of Communication. The position includes full-time engineering responsibilities for two digital IBOC transmitters, two full-power FM transmitters, television production/control/master control facility, video and radio remote functions, production and studio equipment, and a satellite receive/cable distribution center. The position additionally requires installation of new broadcast equipment.

See complete, detailed job description at **http://LL.TRUMAN.EDU/ENGINEER**

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Pinning down mobile TV

The industry needs a mobile broadcast standard.

BY ANTHONY R. GARGANO

The shots that rang across the Tug Fork River between the storied Hatfield and McCoy feuding families paled in comparison with the vitriolic exchanges between supporters of ATSC and their rivals in the DVB camp.

For several years, a battle raged between DVB proponents that were enthralled with the delivery capabilities of the COFDM modulation technique and ATSC supporters of the 8-VSB modulation scheme. There were many issues and claims concerning the pitfalls and benefits of these two different standards. Key among the many discussion points and arguments were robustness of received signals in a multipath environment and the ability to facilitate content delivery for handheld and mobile applications.

The ATSC standard

The FCC adopted the ATSC proposed standard for DTV on December 26, 1996, but DVB evangelists continued with their efforts to overturn that standard. However, as more U.S. DTV stations came on-air using 8-VSB and as receiver manufacturers continued with improvements in tuner chips, DVB support gradually disappeared.

One of issues remaining, however, is the ability to facilitate mobile applications. In this day of growing handheld services, such as MediaFLO, MobiTV and V CAST Mobile TV, the ability to reliably deliver content to portable and mobile devices is taking on increasing importance. Even cable and satellite services are getting in on the action. This year's NCTA show kicked off with a seminar titled "Mobile TV Boot Camp," and Sirius Satellite Radio will introduce Sirius Backseat TV this fall in selected 2008 model cars.

The infamous ATSC Table 3, and its 18 different formats (times two, so actually, it's 36 different formats!), attempts to make everyone happy. Fortunately though, one thing was done right: The ATSC standard is dynamic and can accommodate enhancements. To that end, the ATSC is currently considering a plan that would improve the transmission system to more reliably support new portable, handheld and mobile reception applications.

The A-VSB standard

Potentially providing exactly what the ATSC needs, Samsung Electronics and Rohde & Schwarz have partnered to develop Advanced-VSB (A-VSB). A-VSB is a toolkit built on the current ATSC transmission standard. It can enhance a DTV receiver's ability to receive the main transport stream in less-than-ideal reception environments. It also enables broadcasters to include turbo-coded streams that contain additional error correction for mobile reception and other conditions of weak signal to noise. Additionally, the toolkit facilitates synchronization of multiple transmitters, enabling the creation of single frequency networks.

The key elements of A-VSB are:

- A supplementary reference sequence to the transmitted signal allows an A-VSB receiver to remain locked in to the program content whether the receiver is in motion or being subjected to multipath interference.
- Scalable turbo streams use multiple redundancy for reliable payload delivery.
- Synchronizing the transport frame sequences to a 10MHz GPS reference enables the use of multiple transmitters in a harmonized single-frequency network for coverage fill-in.

If the broadcast community wants to participate in this growing revenue stream opportunity, it needs to supply not only the technical capability but also a viable business model.

The standard is fully backwards-compatible with existing DTV receivers, and a real-time, on-air mobile demo was conducted at this year's CES show in Las Vegas.

Mobile TV growth

Nothing defines a growth opportunity like competition. Harris and LG Electronics/Zenith recently introduced MPH (for mobile, pedestrian and handheld devices) as their answer to mobile TV.

Market research group IDC projects 24 million paying mobile TV subscribers by 2010. IMS Research predicts a year-on-year market growth rate of 50 percent through 2010.

If the broadcast community wants to participate in this growing revenue stream opportunity, it needs to supply not only the technical capability but also a viable business model. The standardization process needs to move quickly along so that a business strategy can evolve. BE

Anthony R. Gargano is a consultant and former industry senior executive.

? Send questions and comments to: anthony.gargano@penton.com

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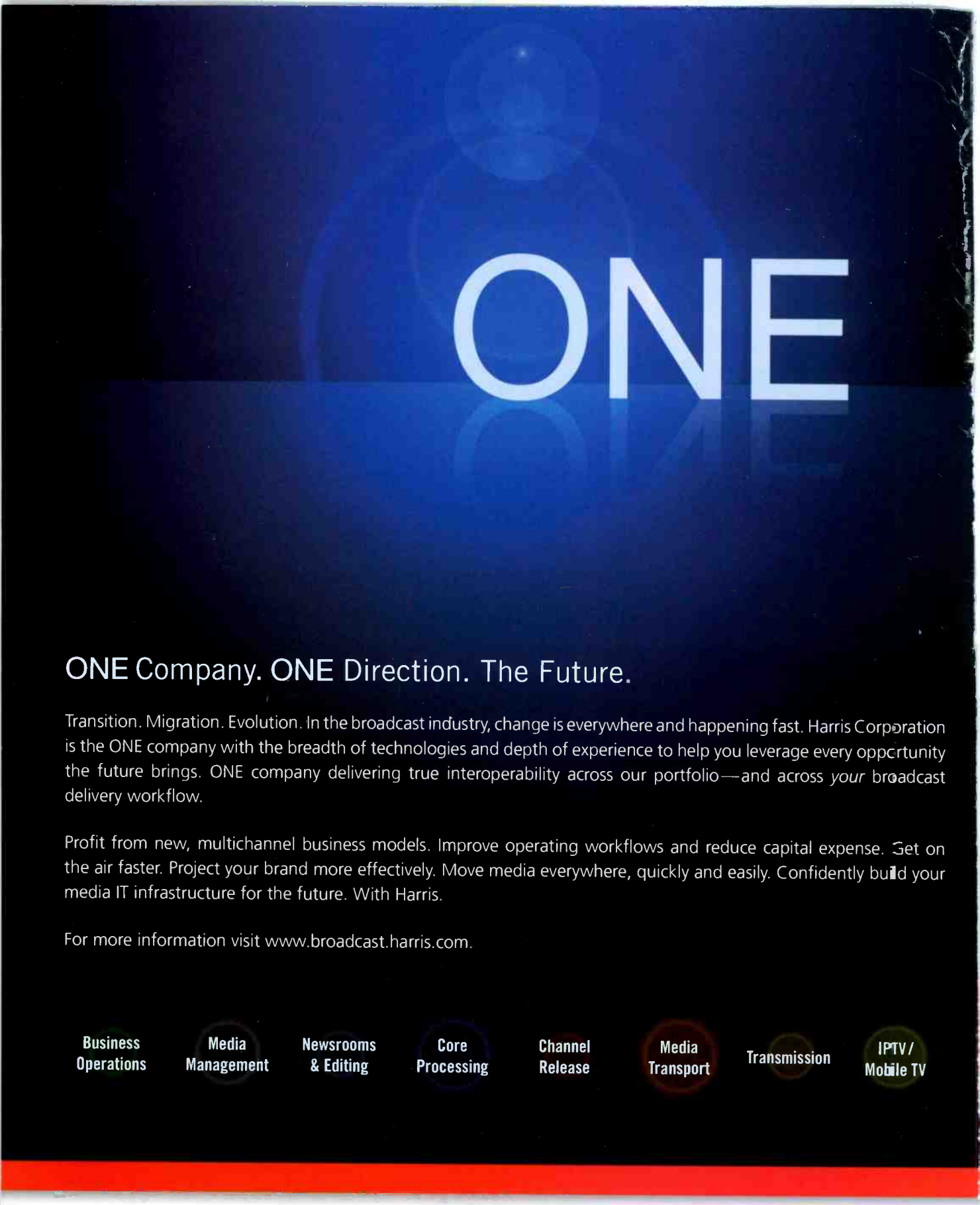

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