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MARCH 2008

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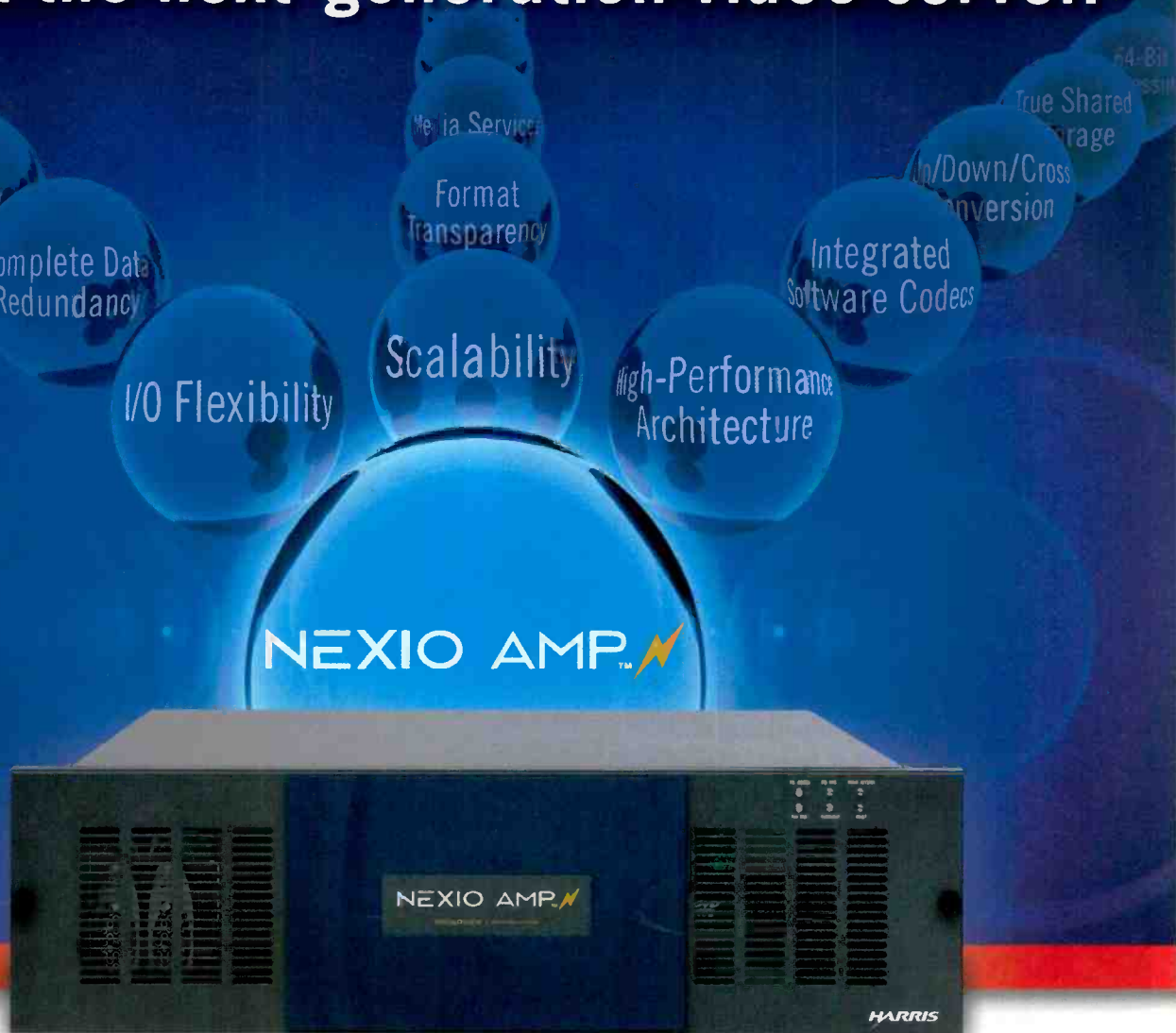
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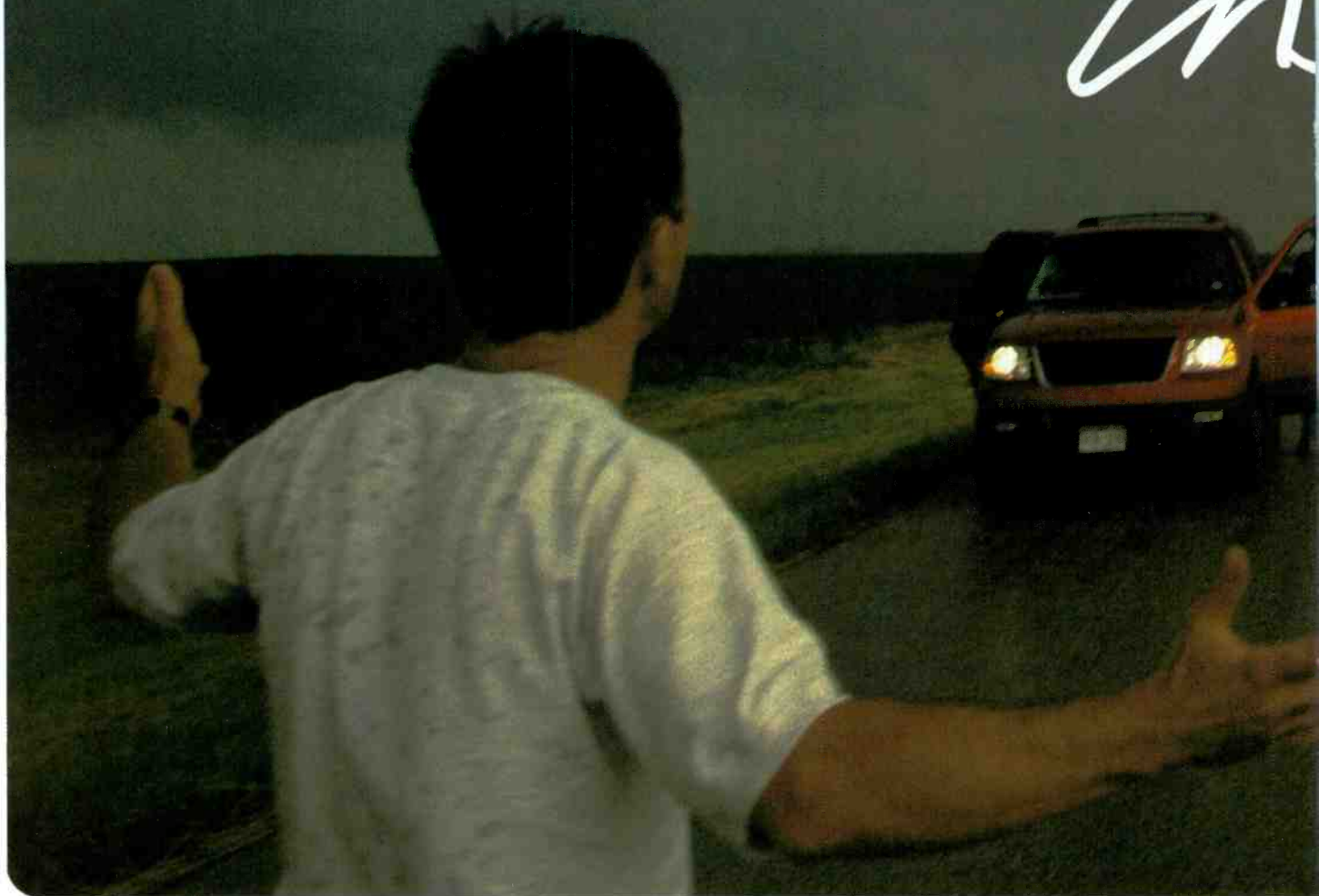
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A photograph of a person standing on a paved road, holding a camera up to their eye as if taking a picture. The road is flanked by green fields under a dark, overcast sky. The overall mood is somber and professional.

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# BroadcastEngineering®

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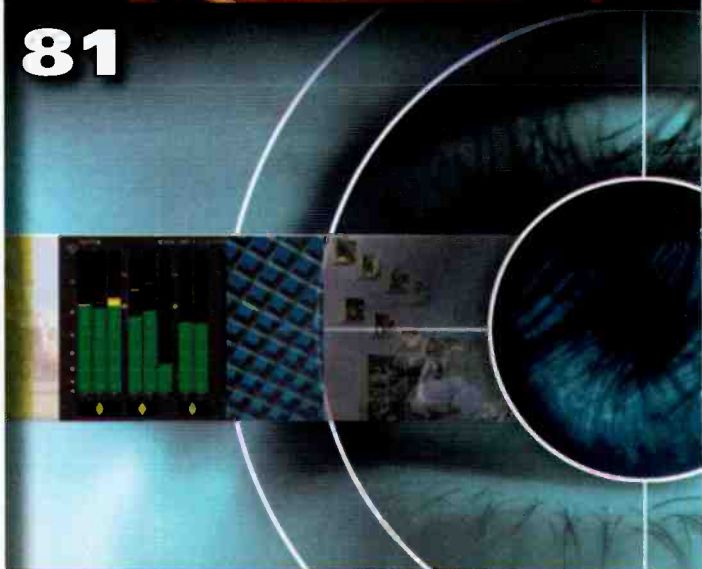
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### MARCH FREEZEFRAME QUESTION

MPEG-4 AVC, otherwise known as H264 when used for transmission, claims to have better performance over MPEG-2. This means lower bit rates for the same quality or improved quality at similar bit rates. Which of the following techniques are employed by H264 to achieve this improved performance?

- 1) Variable block sizes
- 2) Deblocking filter
- 3) Lossless macro block coding features
- 4) Higher precision motion prediction and compensation
- 5) Higher bit depth precision

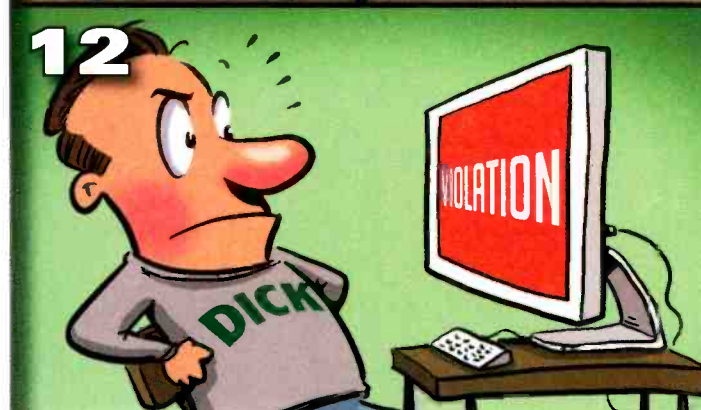
### MARCH FREEZEFRAME ANSWER

All of them

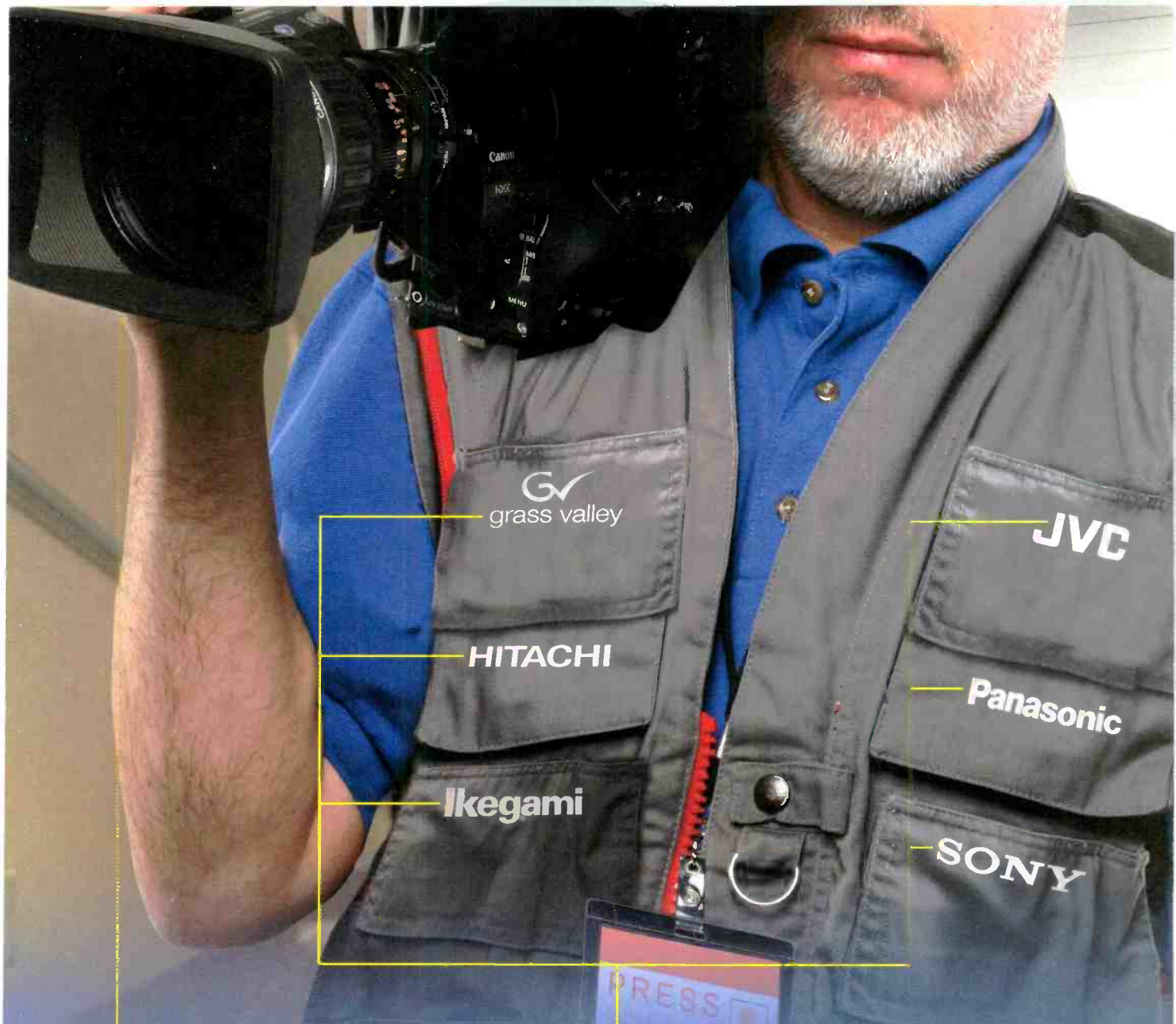


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report

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# My name is Dick

**D**id people ever make fun of you as a kid? Maybe your ears were large. Or, maybe your voice was too high or low, depending on your sex. There could be dozens of reasons that, as a kid, you were picked on, or in today's vernacular, bullied. In my case, people made fun of my last name: Dick.

I haven't any idea of the name's origin. I don't know a nationality that would claim it, but somehow my father's family ended up with it. Therefore, as father is named, so too is son.



I've heard more awful jokes about my name than you can imagine. I mean really, I've heard them all — long, short, hairy, big, little. If someone thought that adding an adjective to my last name created a funny phrase, they said it. I've used the phrase, "Stick and stones ..." more times than you can count.

Fast-forward to today. Not much is said to me anymore about my last name — probably because I'm older, or even just old. Anyway, adults seem less likely to make fun of my name. Sometimes an authority person will make the mistake of asking, "What's your first name? Bradley or Dick?" I just reply "Moby." That usually shuts them up.

This January, I was researching broadcast engineer training when I ran across the firm Cleveland Institute of Electronics (CIE). To get more information about its program, I had to complete an online form. I got as far as filling the box with my last name when my screen was im-

mediately filled with a warning notice, "Inappropriate language." You can see a screen grab of the message at [www.broadcastengineering.com/images/inappropriate.jpg](http://www.broadcastengineering.com/images/inappropriate.jpg).

CIE had determined that my name, Dick, is inappropriate language. The site refused to process my information request until I changed my last name.

I decided to try another approach by changing the entry in the last name field to, "You may not like my last name but it's still Dick." Wham, I hit the enter key and the data was accepted.

About three weeks later, I received an automated e-mail response from CIE. Here's how the e-mail was addressed. "Dear Brad You may not like my last name but it's still Dick."

The e-mail invited me to take a free quiz to identify the best type of training for me. I'm also getting e-mails from Elizabeth at e-learning.com filled with photos of pretty girls inviting me to click for more information.

That was bad enough, but now my own company is bullying me because of my name. When registering at the new *Broadcast Engineering Forum*, I typed my username, "bdick," completed the remainder of the form and hit enter.

Once again, the language censors took over. "Filled in username is prohibited on this forum." (This one can also be found at [www.broadcastengineering.com/images/inappropriate.jpg](http://www.broadcastengineering.com/images/inappropriate.jpg).)

What's most distressing is that our Web wizards claim this can't be fixed. To which I replied, "Yes, it can be fixed, but that would take an engineer, and all you've got are programmers."

**BE**

*Brad Dick*

EDITORIAL DIRECTOR

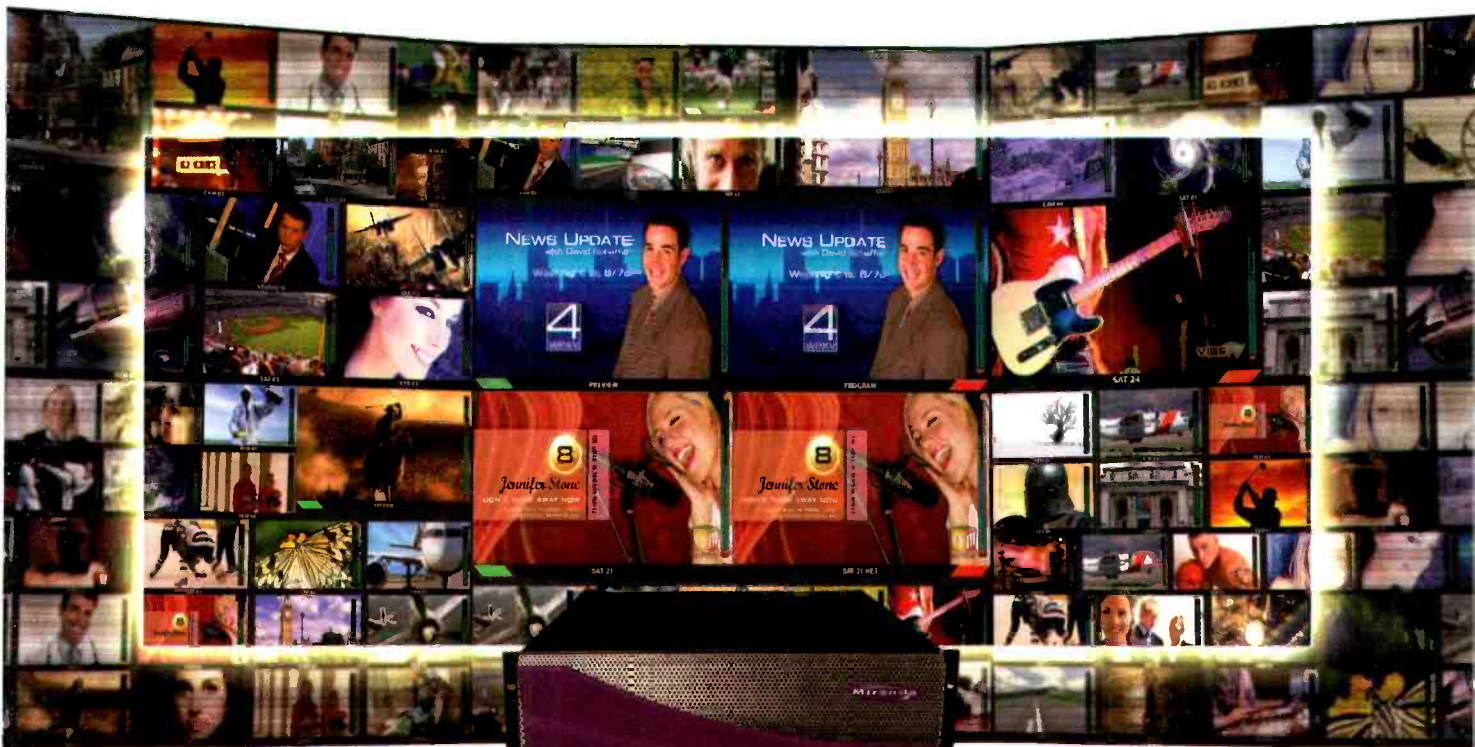
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## Frames and fields

Dear editor:

I grew up in my professional career with *Broadcast Engineering* magazine. Its pages have always given me information on both the old and new technology. When reading the sidebar accompanying David Birdy's "High-def video cameras come of age" article in the January 2008 issue, I found that I had to point out some errors.

Beginning with paragraph two, 59.94 was not used to reduce flicker. The field rate was 60fps until color was adopted in 1953. Because of the 3.58MHz that was chosen for the subcarrier, and its relationship to horizontal and therefore vertical, a slight adjustment to the frame rate was made to use the chosen subcarrier. Those of us that have worked in analog for years and had ground loop problems remember the hum bars slowly rolling up the picture, a true sign that the frame rate did not match the 60Hz power frequency.

Paragraph three states that film was shot at 23.97fps for television. This is not true. Film has always been shot at 24fps. A motion picture theater plays back film at 24fps, but displays 48fps by presenting each frame twice to reduce flicker. A telecine converts 24fps to television rates by using 3:2 pulldown. The film is running at 23.976fps (speed adjusted for 59.94 field rate). The first frame of film is presented to three fields of video. The next frame of film is presented to two fields of video. The process then repeats.

Glen

David Birdy responds:

When I wrote "to comply with broadcast standards, film is shot at 23.97fps" that was written within the context of how a telecine machine works to provide a usable format for television broadcast. The film is "shot" with a video camera as part of the telecine process. I can see how that may be confusing on its own, but given the context of the paragraph, I hope most readers understood the camera "shooting" to be a video camera, not a film camera.

I stand by the statement that 59.94 will avoid picture flicker on an electrical system that runs at 60Hz.

A ground loop is shown as a hum bar on the television display. The reason the hum bar is present has nothing to do with a frame rate. The hum is present due to a ground differential — two AC devices on different power sources that travel to a ground at different times, thus creating a potential visible as a hum bar.

Thanks for your constructive comments. I see we are both longtime readers of *Broadcast Engineering* and enjoy the magazine very much.

## IT/broadcast engineer gap

Dear editor:

Do you have any suggestions on bridging the gap between IT employees and broadcast engineers?

Dale Scherbring

John Luff responds:

That is a HUGE question. I have some clients who feel that if there are "networks" involved, video people should stay away. Others feel that if the network carries content, then the IT folks should have an advisory role only. I applaud the SBE certification that provides for a bridge to educate video professionals in network fundamentals. Unfortunately, the curriculum to do the educating is hard to come by. I am working with NAB to see if there is a role it can play in doing that, so stay tuned!

I think the key is to get someone to help educate the management on the complexity of carrying video over networks, and then get them to buy into training personnel in the cross-over technology areas.

## New forum

Dear editor:

Glad to hear you started a forum (<http://community.broadcastengineering.com/forums>). CompuServe had one years ago before computer users got dumbed down through icons. Thanks for existing!

Tim Townsend



## 02.17.09 Countdown to Digital

Broadcast Engineering's weekly online poll

What's your opinion about the FCC allowing unlicensed devices to operate in the white spaces on the digital spectrum?

Should be allowed ..... 9%  
Should not be allowed ..... 71%  
Won't have any negative effect..... 18%

## Test Your Knowledge!

See the Freezeframe question of the month on page 8.

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# Decoupling

Less can be more in the world of DTV broadcasting.

BY CRAIG BIRKMAIER

I spend a fair amount of time interacting with industry experts on e-mail forums. Recently, one forum, the DVDList, has been abuzz about what most members perceive as the dawn of a new era in high-quality HDTV: the end of the format war between Blu-ray and HD-DVD.

I am not the most popular member of the DVDList at the moment. I have taken the position that Blu-ray will not replace SD DVD as the delivery system of choice for home theater systems. I believe Blu-ray will appeal primarily to the videophile audience and those who like to collect movies rather than renting them, which is how most movies are acquired for home viewing today.

The Blu-ray zealots claim that all TVs benefit from the use of a 1920 x 1080 raster updated progressively (i.e. not interlaced as with 1080i). They may be right, but for the wrong reasons. They claim the improvement in image quality on a 1080p display fed by a Blu-ray player can easily be seen even on the 32in to 42in panels sport-

ing the 1080p raster. In this, they are wrong, as this column will explain.

## An observation

A recent post from Jerry MacKay, Littleflick Pictures, to the DVDList will help explain what's going on here: "I just rented a movie last night, and it had a commercial on it for Blu-ray. It showed footage from 'Pirates of the Caribbean,' 'Wild Hogs,' 'National Treasure,' 'Lost,' etc. Watching the commercial, I thought 'Man, Blu-ray looks GREAT!!' The movie I rented was an SD disc, played from an up-converting DVD player going to my Sony 46in DLP projection HDTV."

Thanks Jerry! You just revealed the dirty little secret about SD DVD. Because the format is optimized for interlaced displays, it does not typically deliver the full resolution potential of a 480/576 line format. The level of vertical detail is significantly lower than what can be delivered using frame-based 480/576p formats.

SD DVD players could have used the full resolution potential of 480p

from day one if they had included a cheap convolution filter to reduce the vertical detail in the interlaced composite and S-video ports of the players. Instead, SD DVD authors are forced to reduce the levels of vertical detail for everyone. Scenes with higher levels of horizontal detail — like car grills — must be prefiltered to prevent severe aliasing on interlaced displays. The average level of vertical detail is reduced throughout because of the filtering required for presentation on interlaced displays.

The commercial MacKay watched via his upconverting SD DVD player looked sharper for good reason. It was produced in HD using the full resolution available and then resampled for encoding as 480p rather than 480i. It has significantly more vertical detail than the rest of the content on that disc. This makes it pop on today's big-screen progressive displays and alias on those old analog interlaced displays. The Blu-ray vendors are not worried about the folks watching on those old displays. They are trying to get viewers to upgrade to Blu-ray on big progressive displays.

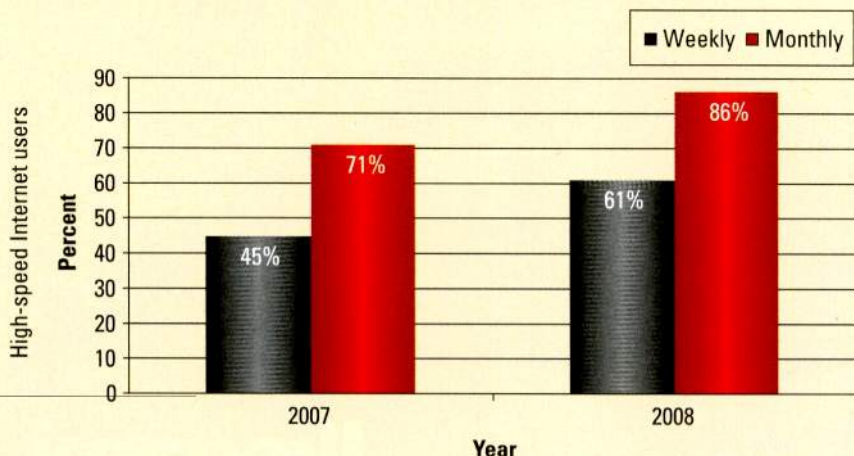
Authoring a movie title for SD DVD is a complex process. The average bit rate for the movie must be calculated so that it will fit in 4.7Gb. A compression-ist typically reworks scenes that exhibit compression artifacts at this average rate. They may allow the bit rate to increase for that scene or low-pass filter it to reduce the stress on the encoder.

This raises an important point. DVDs are one of the few digital video distribution mediums where people are paid to make the content quality as good as possible given the bandwidth restrictions. The other medium where video quality is taken seriously is with some of the Internet video download services. Apple's iTunes store is a prime example.

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

### Online video watching/downloading is up

This year, 61 percent of people will view online video weekly.



Source: Horowitz Associates

www.horowitzassociates.com





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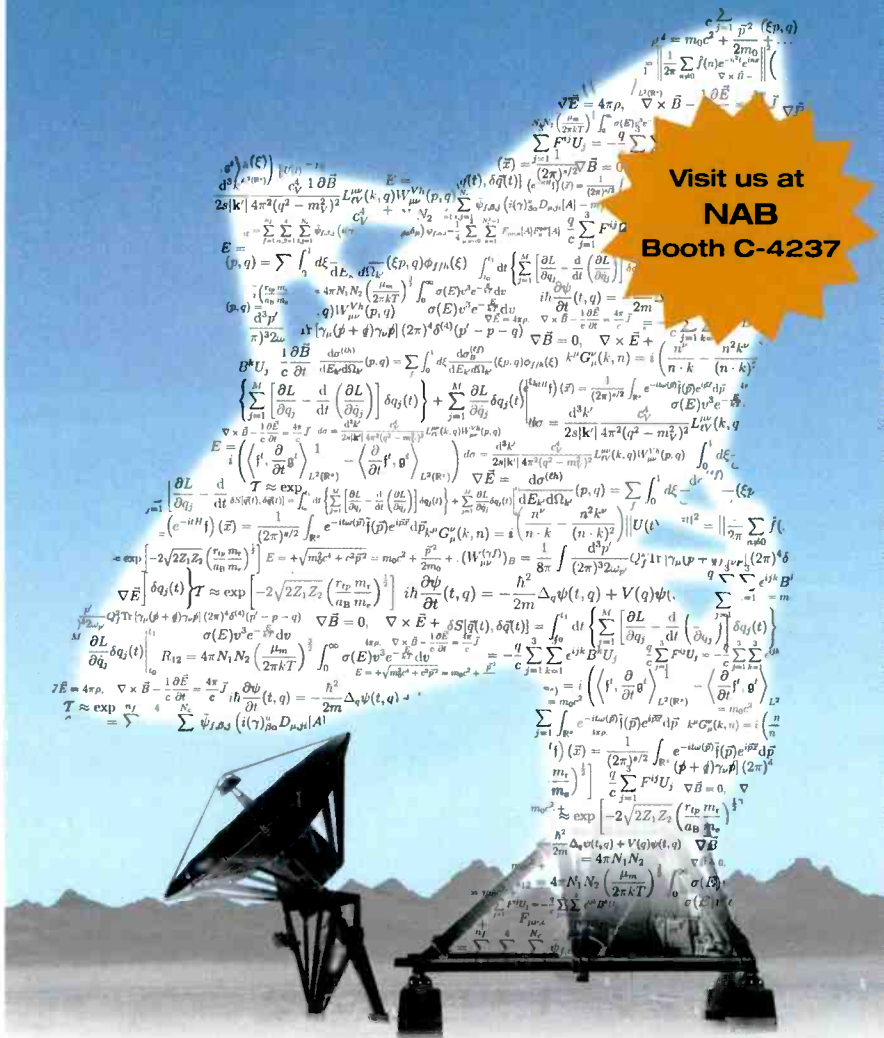
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## DOWNLOAD BEYOND THE HEADLINES

The SD movies that Apple sells and rents via the iTunes store are encoded with 640 x 360 samples from progressive source. There is no pre-filtering for interlaced displays. This resolution is slightly shy of the 720 samples per line for SD DVD, but the vertical resolution is superior because the source is not filtered for interlace, which reduces the effective resolution of 480i to less than 300 lines.

### Another observation

Every TV department of any consumer electronics store today touts the wonders of 1080p. The salespeople say 1080p is the best possible resolution for an HD display. They are less likely to tell you that size matters.

1080p is a good thing on almost any display, especially those 50in or larger. Display oversampling is beneficial. Increasing the pixel density helps to hide the visibility of the raster and can be used by other applications.

The key issue here is the sampling theorem. Shannon and Nyquist learned that when sampling images from the real world, a sampling rate 2X or more than the highest frequency we want to capture is needed. Cameras typically use optical filters ahead of the sensors to limit the level of detail seen by the sensor to half the resolution of the sensor. This allows the camera to see horizontal and vertical lines that are not perfectly aligned with the sensor sites, and it helps to eliminate aliasing on diagonal lines. Increase the sampling rate beyond 2X, i.e., oversampling, and things get even better.

When an image is resampled to a lower resolution for emission encoding, it reduces noise and puts more information under the modulation transfer function (MTF) curve, which improves the contrast level viewed by a human. The picture appears sharper.

In the world of computer applications, the Nyquist limits can be ignored for certain applications. For example, we can draw single pixel lines and have sharp edges on text. We perceive some aliasing, but we get much higher contrast. This forms the

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basis for the graphical user interface and much of the content on the Web. A computer can also display Nyquist limited imagery like video and digital photos; however, the highest frequency in these images must be reduced by half.

So a 1080p display is a good thing. It makes it possible to see more of a Web page when a browser is put into a big-screen TV. And it allows us to upsample whatever source the TV receives with more samples to present the available information. The question, however, is: Can you see this extra detail? The answer depends on two factors: screen size and viewing distance.

Recently, CNET Labs directly compared two 50in displays, one with 1280 x 720 resolution and one with 1920 x 1080 resolution. The source used to feed both was 1080p from a Blu-ray player. (See "Web links.") The observers found that on TVs 50in and smaller, the added resolution has only a minor impact on picture quality. Bottom line: It's almost always difficult to see any difference — especially from farther than 8ft away on a 50in TV.

Carlton Bale took exception with this conclusion in a story published on his Web site. He created an interesting diagram that attempts to relate how much resolution is needed for

various screen sizes at different viewing distances. (See "Web links.") While taking issue with the CNET study, his conclusions are nearly the same.

**The realities of decoupling**

In the world of analog TV, everything is tightly coupled. The cameras, equipment in the studio and the TV all operate synchronously at the same scanning rates. The main reason that NTSC has improved in recent years is related to CCD cameras that oversample in the horizontal axis. These cameras typically use more than 1000 samples per line to produce a 720 x 480 raster.

With DTV, acquisition, emission and display are decoupled. It allows creators to use the highest resolution possible to acquire the image and then resample it to lower resolutions for different applications that range from the big screen in the family room to the 2in handheld display. In bandwidth-constrained channels, such as those that exist today for cable, DBS and ATSC broadcasts, delivering the highest pixel count can reduce the delivered image quality as the EBU found when comparing 720p and 1080p formats for emission. (See "Beyond MPEG-2" in "Web links.")

The MPEG compression algorithms are low-pass filters. The more the source is quantized, the lower the quality of the delivered samples. Resampling to a lower resolution for emission can improve the delivered image quality in a bit rate constrained channel.

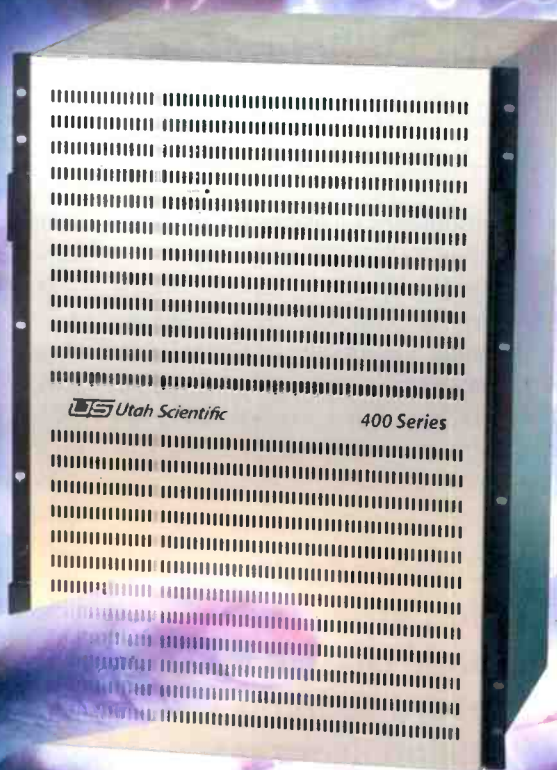
What really matters is that we deliver the highest quality samples possible to the receiver, which must scale everything to the native display resolution. The folks that author DVDs already know this. It's time for broadcasters to understand that less, not more, may be the most productive path to improving the quality of DTV. **BE**

*Craig Birkmaier is a technology consultant at Pcube Labs.*

**Web links**

- *The DVDList*  
[www.tully.com/DVDList](http://www.tully.com/DVDList)
- "720p vs. 1080p HDTV: The final word," CNET Reviews  
[http://reviews.cnet.com/4520-6449\\_7-6810011-1.html?tag=txt](http://reviews.cnet.com/4520-6449_7-6810011-1.html?tag=txt)
- "1080P Does Matter — Here's When"  
[www.carltonbale.com/2006/11/1080p-does-matter](http://www.carltonbale.com/2006/11/1080p-does-matter)
- "Beyond MPEG-2," *Broadcast Engineering*, October 2006  
[http://broadcastengineering.com/infrastructure/broadcasting\\_beyond\\_mpeg/index.html](http://broadcastengineering.com/infrastructure/broadcasting_beyond_mpeg/index.html)

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# Record-keeping rules

## New FCC rules require TV licensees to electronically file record-keeping forms each quarter.

BY HARRY C. MARTIN

In January, the FCC released its television reregulation order. The order heralds a dramatic change in the reporting and record-keeping requirements for television licensees. It imposes standardized and enhanced programming reporting slated to go into effect 60 days after a new reporting form is approved by

electronically each quarter by April 30, July 30, Oct. 30 and Jan. 30.

In the quarterly reports, which cover not only the main broadcast channel but also any additional programming streams, each full-service and Class A licensee is required to describe its programming according to a list of categories, including:

association Web site, if permitted to do so.

Stations must give notice twice daily (including at least once between 6 p.m. and midnight) that the station's public inspection file is available at the station's main studio and on its Web site.

While political files are not required to be posted on the Web site, e-mails (but not public correspondence received in hard copy) from the public must be included in the electronic public file. Stations must retain hard copies of all letters and e-mails from the public in their hard copy public inspection files.

Some documents, such as children's television reports, which are required to be included in the public file, are also available on the FCC's Web site. If a licensee wants simply to link to such documents on the FCC site (or on any site where the documents may be located, as long as access to that target site does not require any payment or registration), it may do so.

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

**In January, the FCC released its television reregulation order. The order heralds a dramatic change in the reporting and record-keeping requirements for television licensees.**

the Office of Management and Budget and published in the Federal Register. New public file rules, also adopted in the order, take effect 60 days after the FCC's order is published in the Federal Register.

### Reporting requirements

The current issues and programs lists required by full-service and Class A licensees will be replaced by the new FCC Form 355. Licensees will have to file the form with the commission

- national news;
- local news;
- local civic affairs;
- local electoral affairs;
- local programming;
- public service announcements;
- paid public service announcements;
- programming from underserved communities;
- religious programming; and
- programming that is independently produced.

The report form also requires information on closed captioning of programming. In addition, the form requires a certification that the reporting licensee has undertaken ascertainment efforts to assess the needs of its community, together with a description of any programming it has designed to address those needs.

### Public inspection file requirements

Stations with Web sites must post their public inspection files online. Stations without Web sites must post their files on their state broadcaster

### Dateline

- April 1 is the deadline for TV stations in Texas to file their biennial ownership reports.
- In the following states, April 1 is also is the deadline for TV, Class A and LPTV stations that originate programming to place their annual EEO reports in their public files and place them on their Web sites: Delaware, Indiana, Kentucky, Pennsylvania, Tennessee and Texas.

**?** Send questions and comments to: [harry.martin@penton.com](mailto:harry.martin@penton.com)

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# Smart antennas

They can minimize the impact of the DTV transition.

BY ALDO CUGNINI

The analog cutoff is now less than one year away, and with that change will come new reception issues for terrestrial broadcast viewers. Although the FCC has sought to replicate analog service in its digital channel allocation plan, most broadcasters will have a digital channel assignment different from their analog one. Inherently, this means that the RF field conditions at the viewer's location will be considerably different from those of the analog service. Smart antennas offer a convenient way to minimize the impact on the viewer.

Because terrestrial television receivers must potentially receive signals from various locations, a fixed antenna cannot provide optimum reception across

the available channels. In addition, community antennas using the same transmitting site may cause receivers to experience different multipath reception conditions across different channels. While indoor antenna re-aiming

Electronically steerable smart antennas that automatically optimize the preferred signal direction for each particular broadcast emission were developed years ago for military applications and are increasingly being

**Most broadcasters will have a digital channel assignment different from their analog one. Smart antennas offer a way to minimize the impact on the viewer.**

may not affect an analog viewer — or the viewer simply tolerated a lower SNR on some channels — re-aiming an antenna for optimum digital service could be quite burdensome.

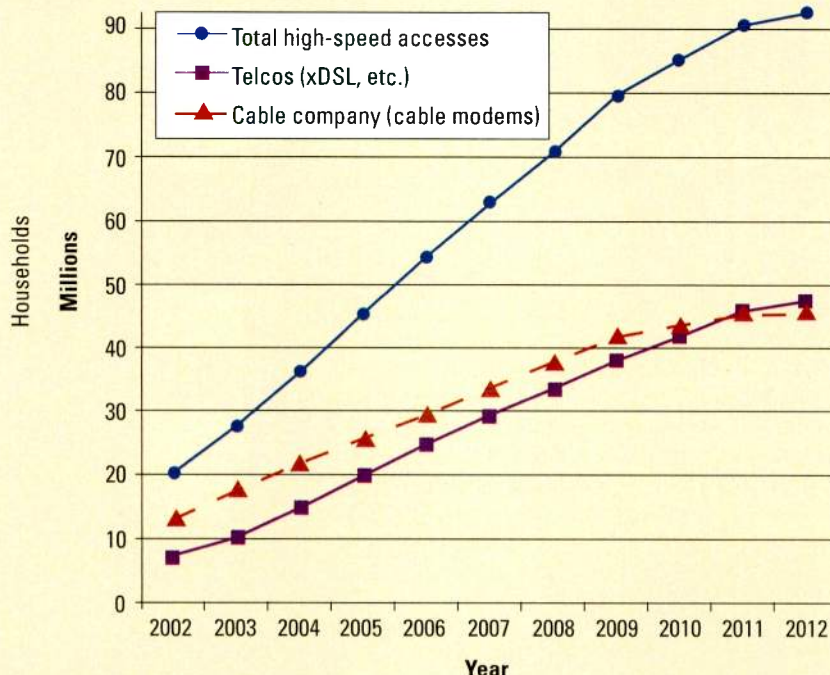
used in cellular telephone base stations. This optimization can take into account various signal quality factors, such as signal strength, multipath energy and BER.

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### Digital signal reception varies widely

Terrestrial television reception is subject to many transmission path impairments, including multipath interference, where delayed echos of the transmitted signal can arrive at the antenna because of reflections off large objects in the receiving space. Moderate to severe multipath can lead to an increase in BER, which could compromise video and audio or, in the worst case, result in no reception at all.

While this situation can often be remedied by physically re-aiming the receiving antenna, this adjustment may not be ideal for all received stations because of their different transmission powers, frequencies and locations.

These difficulties are compounded because of the cliff effect, wherein the BER increases catastrophically below a certain C/N ratio or D/U interference ratio. As such, antenna adjustment can be problematic under many reception conditions. The situation



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is equally inconvenient with outdoor antennas (requiring a rotator) or indoor ones (requiring frequent trips to the television).

It is now practical to use this same technology for consumer digital television reception. By providing an automatic mechanism to adjust the

adjusts the antenna for optimal reception of each DTV station.

One example of such a system is shown schematically in Figure 1. The optimization algorithm is typically executed by the CPU in the receiving device and is done once during initial setup. In addition to selecting

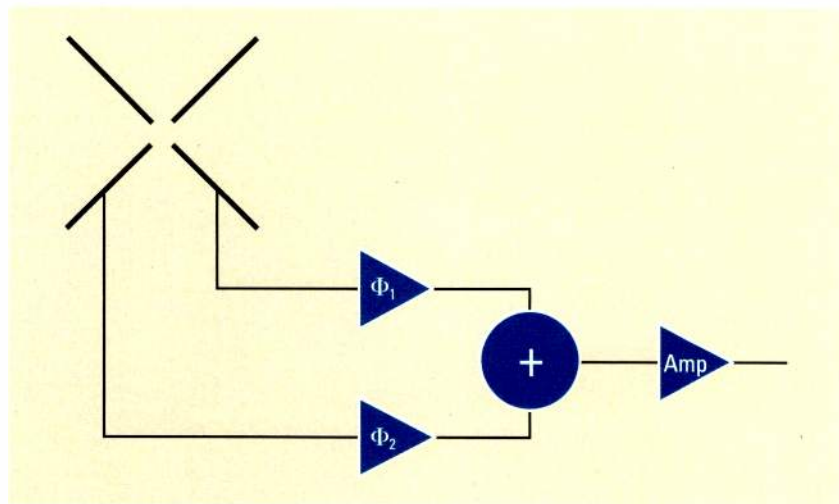
### A standardized smart antenna interface

While a smart antenna can be an option to the consumer, it will only function if the appropriate interface is available at the receiver. Such an interface has been developed and standardized by the Consumer Electronics Association, and is known as CEA-909A, "Antenna Control Interface."

This standard describes how a compliant receiver can operate with any compliant antenna, regardless of manufacturer. The standard also specifies the data format used, the connection standards and other requirements.

The antenna configuration is neither specified nor implied, leaving specific design considerations to the manufacturer. As such, an elaborate system can even be designed using a full-blown antenna farm. The more practical design allows for the realization of an affordable, attractive antenna with a small form factor, as seen in Figure 2.

The CEA R4-WG4 working group has also defined a control protocol that works over the antenna coax, resulting in two options for the CEA-909A standard: one that uses a sepa-



**Figure 1. Simple smart antenna system, with selectable element phase and overall gain**

antenna, the direction and gain (amplification) of the antenna can be electronically changed, with no need for user intervention or physical adjustment of the antenna. This type of antenna functions by changing the relative gain and phase (delay) of the internal elements. While offering a high degree of optimization for both signal capture and interference rejection, this kind of adaptive antenna is somewhat complex and hence expensive to implement.

### Practical smart antennas

An alternate type of smart antenna is the so-called switched beam antenna system. In this system, multiple fixed elements within the antenna are selectively used so that a primary receiving direction is favored. At the same time, strong sources of multipath can be negated. An optimization algorithm can perform a trade-off between the two factors. The user simply plugs the antenna in to a suitably equipped DTV receiver or converter box, and the receiver automatically

different azimuth directions, units can operate with different levels of RF amplification. This is useful in areas of high signal strength to avoid overload of the receiver front end, which could otherwise result in high intermodulation distortion.

Selecting an antenna direction and gain setting for optimum signal reception involves assessing the signal quality over the operating extent of the antenna. Various parameters of the received signal can be evaluated and weighed, including signal strength, mean squared error of the channel equalizer, spectral flatness and unwanted interference.

Depending on the system architecture, this optimization process can be tightly integrated with the demodulator or implemented separately. The combination of direction and gain can also be used in a more sophisticated algorithm that anticipates third-order intermodulation interference from strong UHF taboo channels, or from the  $n \pm 1$ , two-channel pairs where tuner RF selectivity may be minimal.



**Figure 2. A smart antenna can be a small, attractive and affordable solution.**

rate connector for the control signal, and one that shares the RF signal connector/coax.

### Proven utility

DTV smart antennas have been tested in a variety of field locations

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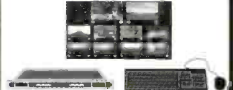
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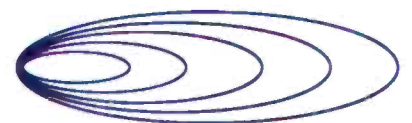
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## TRANSITION TO DIGITAL

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with promising results. The new antenna has demonstrated a considerable advantage over various indoor antennas, including the popular mini yagi, with no amplification, and the set-top UHF loop/VHF rod antenna combination with built-in amplification. The smart antenna performs at least as well as a hand-optimized yagi — but doesn't require user intervention. In a few locations, smart antennas may be unable to automatically optimize the signal. However, in those few cases, a yagi would require meticulous adjustment as well, especially when subjected to a high level of multipath.

Preliminary tests by the CEA R-5 Antenna Standards committee have shown impressive results, finding that a smart antenna can be most effective in ghosty areas and

**A smart antenna can be most effective in ghosty areas and increase DTV system performance by as much as 12dB.**

can increase DTV system performance by as much as 12dB. In addition, both the MSTV and the NAB have endorsed the technology, and the NTIA is allowing the interface on converter boxes certified in its DTV coupon program.

Various DTV converter box manufacturers now include the smart antenna interface on their products. Nonetheless, and despite the potential of the technology, the public knows little about it, and retail stores are of little help. With a bottom line mentality, the major store chains have been hurt in the past by poor antenna sales, so they don't want to carry a slow mover that won't come down in price unless millions are sold. Just imagine the confused customer who has reception difficulties and blames it on the DTV receiver or converter. As with the DTV transition itself, education is needed in order to fully appreciate the benefits of digital television.

**BE**

*Aldo Cugnini is a consultant in the digital television industry.*

*Disclosure: The author is a consultant to a company that manufactures smart antennas.*



Send questions and comments to: [aldo.cugnini@penton.com](mailto:aldo.cugnini@penton.com)

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# Comparing BXF/MXF

Although different, the standards are complementary.

BY BRAD GILMER

**B**y now you probably have heard of the Material Exchange Format (MXF), and if you haven't already heard about the Broadcast Exchange Format (BXF), you will soon. As these two formats grow in popularity, broadcasters want to know the difference between the two.

The two technologies cover fundamentally different aspects of the transition to digital technology, yet they are highly complementary. Part of the confusion about these formats is caused by their names. Although they both include the word "format," it might be more appropriate to call BXF a protocol and MXF a wrapper. And while they both contain the word "exchange," BXF exchanges metadata as messages, while MXF primarily exchanges pictures and sound along with a small amount of metadata.

## Defining the two standards

As Bruce Devlin of Snell & Wilcox, one of the primary authors of MXF, points out, "MXF is a container which glues together video, audio, VBI, VANC and metadata. BXF is a metadata language which facilitates standardized communications between the program planning, automation and traffic areas of your facility."

Chris Lennon, the chairman of SMPTE 22.10, the committee that developed BXF, says, "BXF, despite the acronym's similarities to MXF, is

something entirely different. BXF allows for the exchange of decoupled content-related metadata among systems, and also allows for the communication of content movement instructions."

Lennon goes on to point out, "Not only do BXF and MXF have no collisions, they serve completely different

**Although they both include the word "format," it might be more appropriate to call BXF a protocol and MXF a wrapper.**

needs. But BXF and MXF are likely to be key components of a total system. Picture a BXF message initiating the movement of content from server A to server B. When the content arrives, wrapped in MXF, its metadata is extracted by MXF-aware utilities, which then use BXF to notify traffic, program-planning and automation systems that the content has arrived at the playout server."

## Distinguishing between a wrapper and a protocol

As Figure 1 shows, a wrapper is a

type of file format that is specifically designed to carry other things inside. In the figure, you can see that video, audio and title information are all contained inside one MXF file. Metadata is also enclosed in the file. Some people think of MXF as a digital version of a tape in a box with a label on the front and a rundown sheet inside.

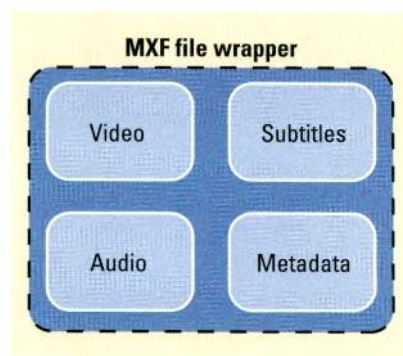


Figure 1. MXF is a file wrapper that can contain video, audio, subtitles and metadata.

MXF is primarily intended for the exchange of finished content between two devices. While MXF supports streaming of content, it is primarily deployed in file transfer applications.

How does this compare to BXF? Earlier I referred to BXF as a protocol. It fits the Dictionary.com definition of a protocol as "a set of rules governing the format of messages that are exchanged between computers." BXF is a standard that defines an agreement between

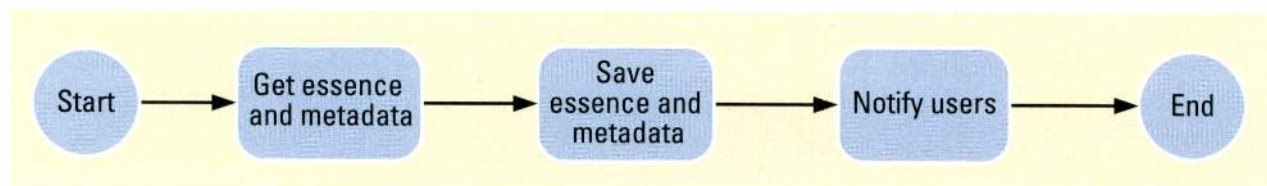


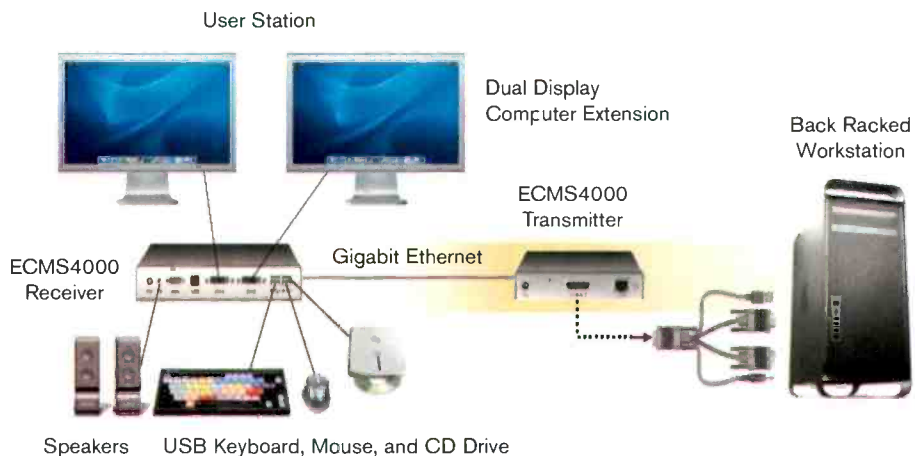
Figure 2. An ingest pull process flow. While this is an extremely simplified diagram, it shows the top-level steps for acquiring a piece of media and metadata, saving the media and metadata, and then notifying the user (or follow-on systems) that the ingest is complete. BXF messages allow the exchange of standardized messages between systems as this process takes place.

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manufacturers in the broadcast industry about messages that are sent between different systems in a television facility. More specifically, the agreement covers the software technology to be used, the meaning of specific messages and the behavior that is expected between originators and receivers of messages using BXF technology. Hopefully, this explains just how completely different BXF and MXF really are.

Figure 2 on page 30 shows an extremely simplified case of acquiring essence and metadata, storing that essence and metadata, and notifying users that the process is complete. Clearly, this diagram could be greatly expanded, but the point is to show the level at which BXF operates. BXF involves agreements about messages that are sent as part of a process. So the layout of messages to get the content, notify users, exchange information about the metadata associated with the content, and so on are standardized in BXF.

In this process, you may get the essence and metadata in Figure 2 as an MXF file. But the essence can come in another format as well. BXF is all about the messages and commands that are exchanged across a network in support of a workflow process.

### Complementary standards

So if BXF and MXF are so different, how are they also complementary? An example will help illustrate how the two can work together.

In Figure 3, a commercial is scheduled in the traffic system. The traffic system sends a BXF message to the content distribution system, requesting the commercial. The commercial, wrapped as an MXF file, is delivered to the edge server at the station, where the automation confirms that the MXF metadata identifier matches the commercial that was ordered. The automation system then automatically ingests the commercial, transferring it from the edge server to the playout server as an MXF file. The

traffic system schedules the commercial for air and sends a playout log to automation using BXF. After airing, the automation system sends as-run information about the commercial to traffic using BXF.

**BXF is all about the messages and commands that are exchanged across a network in support of a workflow process.**

In this example, BXF and MXF work together in a typical ingest-to-broadcast workflow. The figure is greatly simplified, but it illustrates the points that BXF and MXF fulfill different roles in a facility, and that they are complementary. Furthermore, BXF

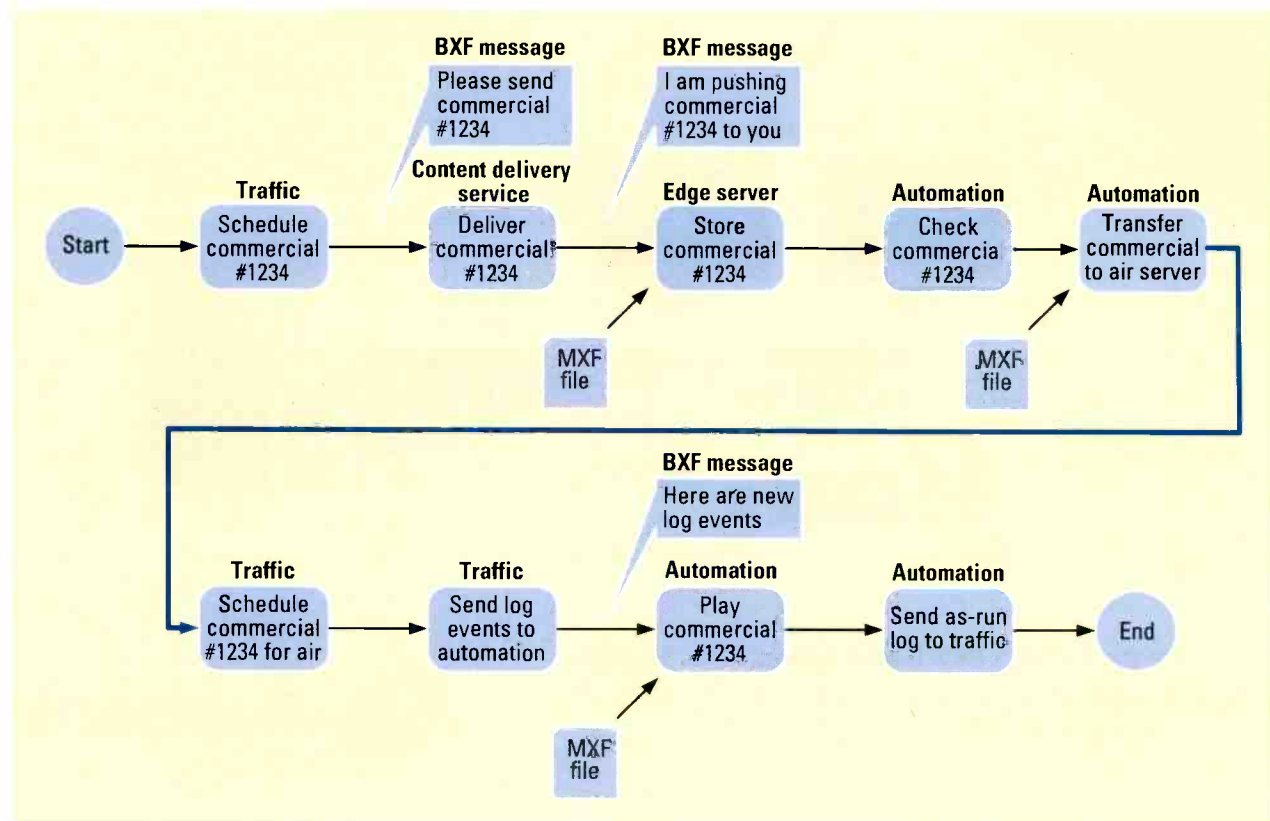


Figure 3. A simplified workflow example using both BXF and MXF




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enhances the ability of systems to communicate information about content so that as new information becomes available in one system, it can be used to update databases in other systems

**Pressure is growing to address this area of the industry as the drive to reduce errors and deliver more flexibility in the viewing experience increases.**

also tracking that content. This avoids rekeying — one of the main sources of transmission errors in nonintegrated facilities.

### Focus is on harmonization

As BXF and MXF are rolled out in broadcast facilities, there is a new focus on harmonizing the exchange of business information upstream of the playout facility. Right now, some systems participate in a business process that ultimately results in the compiled on-air or online viewer experience. Of course, a lot of information is exchanged between business entities during this process, and up to this point, very little of this is standardized. In fact, quite a bit of this still takes place using fax machines and spreadsheets.

Some broadcasters are just now exploring whether it is possible to create the amount of Electronic Data Interchange (EDI) specifications or standards to support these processes. Pressure is growing to address this area of the industry, as the drive to reduce errors and deliver more flexibility in the

viewing experience increases.

BXF and MXF are two different technologies, but both are necessary to support digital workflows. New work is beginning in the area of business electronic data interchange upstream of the traditional on-air systems to support increased flexibility and to create even better end-viewer experiences. **BE**

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

? Send questions and comments to: [brad.gilmer@penton.com](mailto:brad.gilmer@penton.com)

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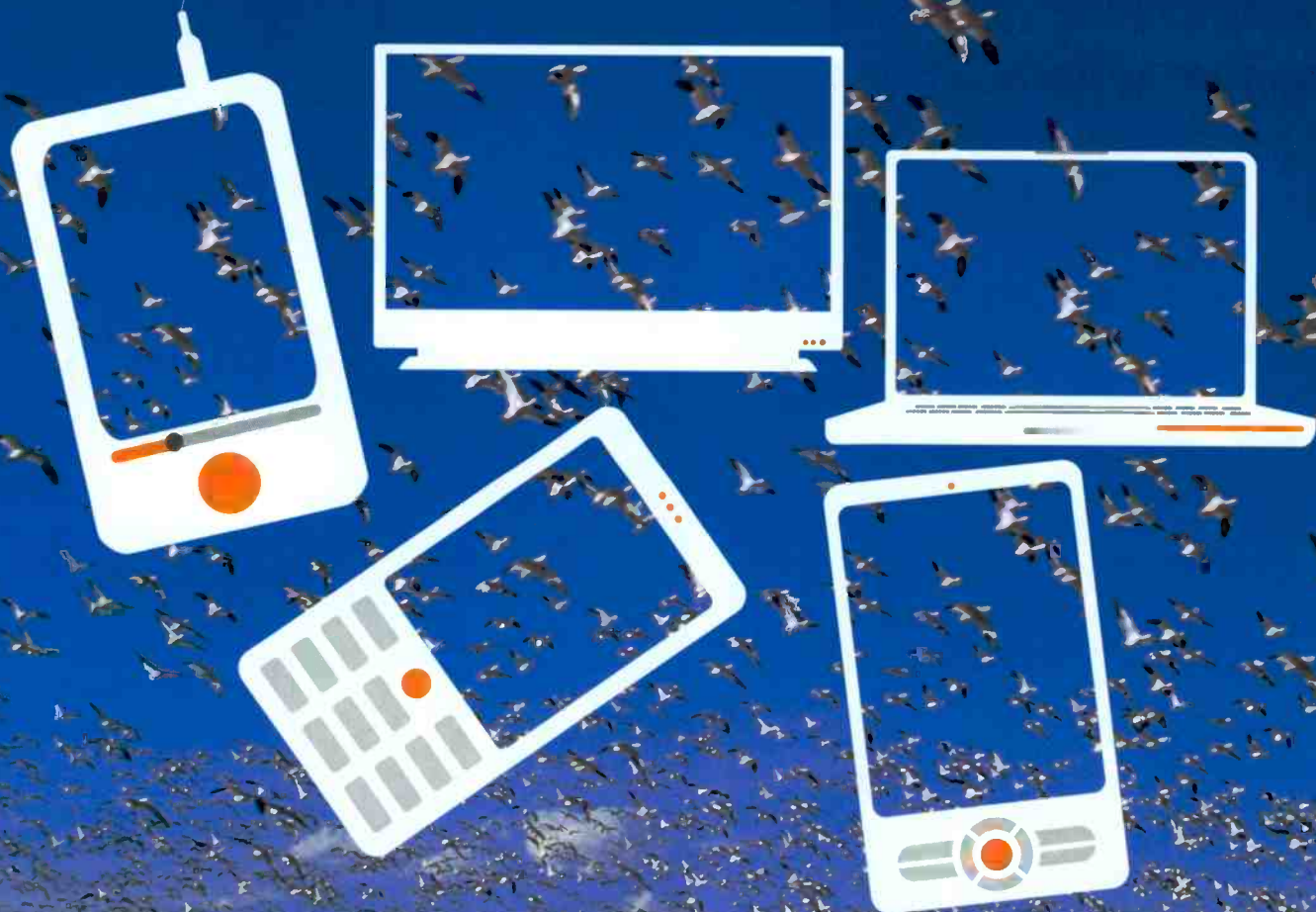
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# Camera support

Proper maintenance is important. New camera options make setup and alignment a breeze.

BY DAVID HART

**C**amera maintenance has changed. During the days of the tube camera, much more needed to be done to maintain the overall quality of the camera. With CCD cameras and now digital cameras, maintenance requirements have changed and are, overall, easier. However, just because the requirements are easier doesn't mean you still don't need the proper tools to set up and align cameras to maintain a consistent quality. The need for correct tools is one requirement that has not changed.

## Color temperature

Your alignment flow and lighting and test charts must be the same for all cameras to maintain consistency.

What's most important is to have a consistent and correct color temperature lighting source. My Sony PTB 500 light box, for example, has sensors that vary the voltage to the lamp as the lamp deteriorates so it will maintain a consistent output and color temp. My Minolta color meter rates the light box at 3180K, which is close to the ideal 3200K.

If your lighting is not exactly 3200K but very close, it's probably fine. The

**The issue is not necessarily having the exact color temperature, but having a consistent color temperature.**

issue is not necessarily having the exact color temperature of 3200K, but having a consistent color temperature.

Having a chart on the wall with the proper lighting to cover it evenly is also a fine setup for aligning cameras. However, you should measure the color temperature daily to be sure

that it is consistent, as tungsten lights deteriorate in temperature with time.

## Reference lenses

It is advisable to have a reference lens for calibrating your cameras. The optimum sweet spot for the lenses I use has been 60mm to 70mm. That puts me in the middle of the zoom range on most normal 15- or 18-to-1 lenses. I try to be 6ft to 7ft away from my charts or light box.

With the advent of digital cinematography, you may want to consider some of the prime lenses for the test area instead of a zoom lens as the primes are used most often in movie creation. Again, being consistent and using the same lens for all the setups will provide consistent results. Consistency is the key to success.

## Camera setup

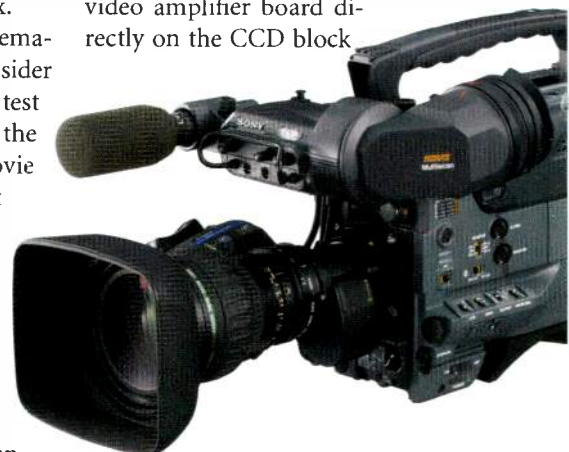
As for the cameras, almost all have the same basic type of setup. In older analog cameras, the user would verify an output level from the CCD block green channel using the lens iris and then balance the output of the first stage or video amplifier board to be a nominal value for red,

green and blue. In the case of most Sony cameras, it was 0.5V on the output. On some cameras, you would also need to balance the test signal outputs to 0.5V for each channel. Then, assuming the rest of the camera (i.e. the encoder) works correctly, you can use that same test signal to adjust

the rest of the signal path through the camera.

The analog camera is out, and we are in the digital camera age. These cameras are easier to adjust. In essence, all that is needed is to set the output of the CCD block either in the first stage, the video amplifier board in Sony cameras, or directly on the CCD block itself.

Several cameras now have either a video amplifier board directly on the CCD block



**The Sony HDW790 is one of the many new HD cameras that has quick and easy setup and alignment options.**

or the initial output is set on the pre-amplifier board on the CCD block. Next, set the test signals, and balance the output of the video amplifier card using the test signals. After doing this, the camera is set. There are, of course, separate issues of black and white shading that need to be checked and adjusted to match your lenses.

## Alignment

To give an example of how to align an HD camera, let's look at Sony cameras. Most cameras will use a similar process.

Because of the dual output on these HD cameras, the levels of each of the two outputs for each channel,



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RGB, need to be balanced. The balance should be checked and adjusted for both black and white — black with the lens capped, and white using a grey scale. Balancing the outputs assures you that there will not be any abnormalities in the final output of the camera.

Next, the lens needs to be adjusted to the recommended f-stop. I recommend using a remote control or master setup unit to set the lens iris. The readout on either of these is much more accurate than trying to line up the markings on the iris ring on the lens.

Once you have the proper iris level, the outputs of each channel should be adjusted on the CCD block preamplifier board. The levels are normally given in the service manual.

Not all cameras have the same output level. However, most of them do have the same adjustments. You can also use the remote control or master

setup panel to set the test output levels. This is done by setting the individual levels of each channel for 100 percent on the HD waveform and then storing the information in your reference file.

Finally, the output level of the CCD block signal on the video amplifier board is set to 100 percent, also using the controls on the video amplifier board. When this is completed, both the test signals and the analog video signals should be 100 percent.

Many of the new cameras are almost alignment free. For example, Sony's HDC1500, F23 and HDWF900R normally do not need any of the alignments the older HD cameras required. They are set at the factory to exacting standards for the output of the CCD blocks. And even though the CCD is an analog device, the output through the camera will remain the same over the entire life of the unit.

In cameras with lens files, a white offset for individual lenses can be stored. This is a great advantage if you use several different manufacturers' lenses. It allows you to adjust the red and blue balances to correct for any difference in color transmission between lenses. You can also store white shading data in that same lens file.

### Lighting

Any camera, including the latest generation of HD cameras, needs a consistent light source for the charts and a standard lens for the tests. Without them, you can never be sure that any of your cameras — analog, SD or HD — are set correctly. But with consistent lighting for charts and a standard lens for the cameras, all your cameras will give you the same look every time. **BE**

*David Hart is 37-year veteran of the video, HD and digital cinema camera field, specializing in Sony cameras.*



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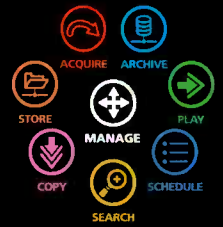
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# Organic workflow



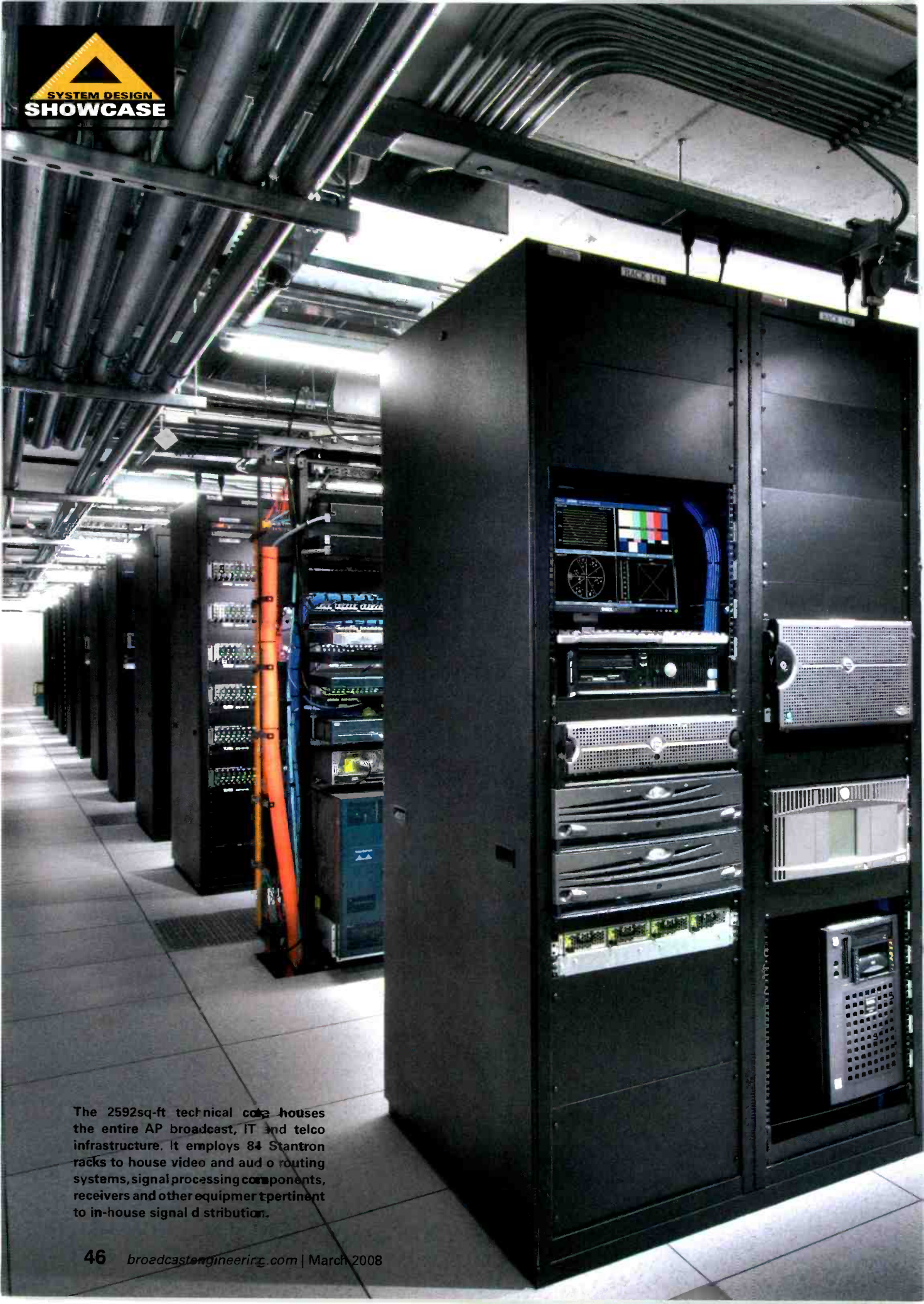
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The 2592sq-ft technical core houses the entire AP broadcast, IT and telco infrastructure. It employs 84 Stantron racks to house video and audio routing systems, signal processing components, receivers and other equipment pertinent to in-house signal distribution.

# The Associated Press

## Press consolidates its D.C. operation

BY CHUCK HEFNER AND DANNY GURLEY

The Associated Press (AP) is one of the world's oldest and largest news organizations, with major offices in London, New York and Washington, D.C., as well as regional offices around the world. The Washington, D.C., operation had two separate K Street locations — just two blocks apart. One was for AP's Washington News Bureau and the other for the Broadcast News Center. In December 2007, AP consolidated the two by moving to a new downtown facility. The layout of the new building, at the corner of 13th Street and L Street, maximizes the editorial, production and administrative synergies for the more than 460 people working there.

The relocation allowed AP to bring its multiple departments, including international video, radio, domestic video, online video, multimedia, photography, broadcast graphics and print journalism, together into a single facility. Hundreds of miles of data cable, four miles of electrical cable, three miles of conduit and more than a mile of mechanical piping link the four-floor, 82,000sq-ft facility, where three levels share an interconnecting scissor-type stairway.

### Planning

Professional Products of Gaithersburg, MD, and AP engineering handled the systems design and integration for the entire broadcast, IT and telco infrastructure, including:

- a technical core and data center with 14 rows of Stantron racks and emergency power system support;
- three TV and four radio studios;
- a central news desk area with an intercom, router panels and audio/video monitoring at each workstation;
- about 70 video and audio digital, ENPS MOS-enabled editing stations;
- LAN closets to enable data drops to 400 desktops connected over a 10GB fiber backbone; and
- a master control center that supports video ingest and playout operations, satellite positioning and camera control, among other applications.

### The server system

The chief objective was the implementation of a facility video server system for all departments to share, edit, view and distribute story information. Each department previously used separate, dedicated servers and relied on tape

with AP's ambitions, and it was clear the cross pollination between departments would suffer in some capacity with a standard out-of-the-box server.

AP selected an MOS-enabled solution that was interoperable with its ENPS newsroom system and Final Cut Pro editor. The goal was to ingest a story once and then repurpose it across multiple departments. The computing hardware is based on the Apple Xserve, Mac Pro and Xsan platforms, as well as Gallery's Sienna OriginOne MOS gateway software.

### Workflow

Master control is located on the sixth floor and is home to eight operator stations, three of which are designated for video ingest and playout operations. The AP server has 12 ingest channels and four playout channels. Master control operators communicate with content management

During ingest, QC checks for audio and video levels, and adjustments are performed with a Harris TVM-850 and Snell & Wilcox RollPod. The DV25-based content is available for editing on all workstations as soon as the recording process begins. Operators can browse low-resolution proxy content. The immediate availability of the audio and video assets is based on Gallery's Sienna StoryCut feature, which ties the editing system to the newsroom computer.

This is where the advantage becomes clear for different departments. Radio operators can begin the process of stripping audio from video. The Associated Press Television Network can run with the audio and video. And the Online Video Network can use different aspects of the file for its applications.

The server provides 18TB of fully mirrored ingest and editing storage and 4TB of playout storage, which represents a week's worth of online content. Five Vicom Vmirror VM-2 network appliances provide the mirroring for Apple Xserve RAID storage.

The ingest-to-playout ratio of storage space reflects the philosophy of a news organization, making room for fresh story material. Edited material is transferred to the playout volume, where master control distributes it to AP's London headquarters or other client facilities.

Long-term storage is mainly handled with DVCAM videotape. Journalists and producers assign video MOS objects to ENPS stories as the story is created. Content managers then assign specific stories into an archive run list. When the list becomes active, it creates a playlist of all video objects in proper running order, which are then automatically archived to the DVCAM tape.

Two operator stations in master control are primarily used for camera control and shading. Three stations are used for audio and video feed monitoring and disaster recovery, which permits taking control if the London control room has a problem. All MCR positions can access the satellite dishes through CompuSat. Each station receives sources through a Pro-Bel Sirius



**The main newsroom on the fifth floor is where the majority of incoming and outgoing content is organized for every AP department, including the Associated Press Television Network (APTN) and Online Video Network (OVN).**

exchanges and audio/video baseband connections to share resources and information for stories. The streamlined workflow not only provides a more efficient operation but also cuts costs and system complexity.

The challenge of designing a central server system for all operations is finding a technology platform to accommodate everyone. The existing commercial options for broadcast servers in early 2007 were not entirely compatible

and satellite coordinators in the main newsroom over a Clear-Com Eclipse digital intercom system to coordinate ingest schedules and playlists.

On the fifth floor, the main newsroom is the main traffic area for organizing incoming and outgoing content. Master control operators communicate with the central resource desk coordinators and refer to the ScheduALL traffic system to confirm incoming satellite feeds and available ingest channels.

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256 x 320 router. Monitoring is handled by six, 46in Sharp LCDs and an Evertz VIP-12 channel multi-image display.

Master control shares the sixth floor with the technical core, a 2592sq-ft room that houses the entire broadcast, IT and telco infrastructure. Most of the facility's 140 Stantron racks are housed in this space (84 E-Racks, plus

about 20 two-post IT and telco racks). Professional Products populated the racks with equipment, preterminated the cables and tested the rack systems at its Maryland warehouse, saving valuable time once on-site.

**Details**

A 12in raised floor was installed

in the technical core prior to the integration process. Stantron provided customized bases that were set into the floor, allowing the installers to drop and bolt the finished racks into predrilled holes. The raised floor is a critical piece of the HVAC plan, with cool air flowing up through the floor and into the racks to keep the equipment cool. The air is directed upward and out the top, where Stantron rack top fans assist the airflow pattern. Four 20-ton Stulz Air Technology Systems provide total facility heating and cooling.

The Stantron E-Racks (36in deep by 22in wide) offer plenty of space for cable management, with tie-off points provided every eight inches.



Master control operators share various duties across eight stations, including ingest and playout and feed monitoring.

Built-in horizontal lacing bars further enhance cable management in the densely populated racks. Cables are tied to the interior sides of the rack, where Stantron PowerOptions 180-degree rotational power strips are vertically mounted on Stantron PowerMount brackets. Power redundancy is provided through dual power supplies, with each rack featuring a grid A and grid B. The technical core system is backed up on multiple systems from MGE UPS Systems with power



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conditioning. A large Caterpillar generator can power the entire facility for 30 hours.

The broadcast portion of the technical core is systematically arranged to house equipment responsible for various stages of the video signal flow en route to the main routing switcher. External sources are brought into the facility through various satellite and fiber receivers, which comprise one rack row. The signals then move on to a second row of racks filled with Snell & Wilcox signal processing, conversion, distribution and synchronization gear. More than 100 Snell & Wilcox A/D converters are used for signal conversion. The Pro-Bel Sirius video router, with an Aurora controller and a Freeway RS-422 control router, is the heart of the video system. Snell & Wilcox distribution amplifiers assist the facility with Belden 1695A plenum cabling.

Internal video sources consist of three small TV studios, including two chroma key studios on the fourth floor, each complete with a Hitachi HV-D15 camera and Crystal Vision Sapphire chroma keyer for inserts. There also is a 48ft x 24ft two-camera Hitachi Z-4000 studio on the fifth floor, used for panel discussion and other video productions. It features a Ross Video Synergy 100 digital production switcher, an Avid Deko 550 character generator and a Yamaha MG166FX audio mixer.

## Integration

The integration of broadcast and IT within the same technical core was perhaps the greatest technical challenge. The IT portion included integration of a Nortel voice-over-IP system that connects to each user workstation. Professional Products handled the entire IT integration, based on a complex Cisco routing infrastructure.

The two-post racks from APWMayville in the technical core are populated with Cisco routers, switchers and patch panels, most of which include built-in fan systems because of the density of this equipment. The two-post configuration accommodates the side-to-side cooling required for IT equipment by eliminating the side panels found on traditional broadcast racks.

Two LAN closets are on each floor. Each LAN closet, cooled to 68 degrees, features three APWMayville two-post racks populated with patch panels for both LAN and SDI signal distribution. Four separate GigE data connections, plus one SDI video output and RF cable output, are available to each user. The LAN closet locations ensure that cable runs are restricted to 200ft. Professional Products also installed cable to 21 client stations on the fourth floor. The rooms feature a broadcast service panel with ties to the facility's router and intercom. Cable runs were also provided to a series of offices on the seventh floor for other A/V applications.

## Enjoying success

The project was a challenge on many fronts. Managing 300 miles of cable from floor to floor over a massive amount of real estate was challenging enough. However, the server integration and automation workflow turned out to be the biggest challenge. The result is one symbiotic system where everyone is sharing sources and repurposing assets across multiple departments — a truly integrated A/V system. **BE**

*Chuck Hefner is senior applications engineer and Danny Gurley is project supervisor for Professional Products.*

## Design team:

### Professional Products

Steve Losquadro, director of project management  
Rick Winde, exec. mgr., Designed Systems Group  
Danny Gurley, project supervisor  
Jack McMahan, senior project supervisor  
Bob Myer, systems design engineer  
Chuck Hefner, senior applications engineer  
Jeff Schowalter, systems test engineer  
Alan Spain, applications engineer  
Paul Ghattas, senior systems programmer

### Associated Press

Steve Kuhn, director of broadcast engineering  
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## Technology at work

### AP

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# Prevent antenna failures

A system crash could cost your station airtime.

BY DON L. MARKLEY

In January, this column discussed the growth of the antenna complex on the Sears Tower in Chicago. As noted in that article, the installation was successful, but problems occurred, and they were taken care of by an excellent group of contractors.

## Minimizing disruption

Helicopters were used to place the two towers on the cylinders at the Sears Tower. The towers were fabricated in pieces weighing 10,000lbs or less to conform to the lifting ability of the helicopter. Then, they were picked up from a parking lot a couple of blocks from the building. The work was done early on Sunday mornings because at that time of day, the wind was calm, allowing the pieces to be swung into place with the least degree of difficulty.

It was important for the equipment to be as close as practical to the building where it was being placed. That minimized the actual time that

the helicopter had to fly around carrying the load. It also minimized the amount of property that was flown over while carrying the load.

If the helicopter had gotten into trouble for some reason, it would have dropped the load. No one wants to see 10,000lbs of tower fall onto the roof of an office building. Even more so, no one wants to pay for the damage that would result from such a drop.

Other than physical damage, life safety issues for all but the workers on the project were monitored by the city. The top floors of all buildings that were under the path of the helicopter were vacated, and all streets being flown over were blocked off.

## Structural analysis

Antenna manufacturers depend on mechanical engineers to do the structural analysis and design of their products. The electrical engineers determine how they want the antenna made for



A helicopter was used to lift an antenna to the top of the Sears Tower. Photo courtesy Radio Frequency Systems.

the desired electrical performance. That design must then be coordinated with the mechanical engineers to ensure that the completed structure will survive the anticipated loads in accordance with the existing version of the applicable standards. The standards obviously include the current edition of ANSI/EIA/TIA-222 as well as the local building department requirements.

Some large antenna companies have mechanical engineers on staff, while others hire engineering consultants to do the needed design and testing work. In the case of the two antennas going on the Sears Tower, the work was farmed out to area firms.

## Supporting the structure

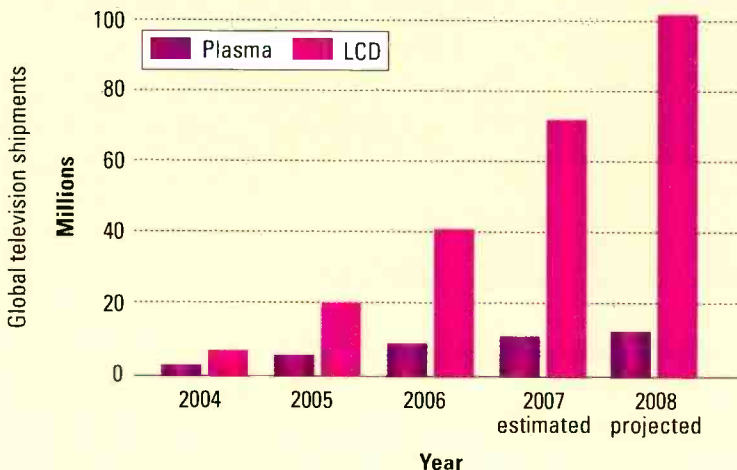
The supporting structure of a TV antenna can be either a lattice tower or a metal cylinder. In either case, the vertical portion of the antenna has to be connected to a ring or plate at the

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base, which in turn will be bolted to the tower. Many older antennas used a "bury" section to help with the mechanical transition from tower to antenna. That has largely been replaced by the use of a plate or ring with a bolt circle specified by the mechanical engineers. The ring or plate is welded to the vertical section.

laboratory. The testing should include determining the depth of the welds and their quality. That testing usually includes X-ray analysis as well as the use of several different magnetic methods of evaluation.

Look at it this way: Although you may be hanging an antenna out in the country where there will be minimal

or injure a large number of people and open all involved to financial losses that simply are too huge to contemplate. That's why it's important to make sure that such a failure doesn't occur.

### A structural failure can bring the tower down, resulting in a lot of downtime and costs for the station.

The material used in welds and the amount of that material is carefully specified by mechanical engineers. For the type of project where unusual loads are involved, such as holding an antenna up by one end, the welds should be tested by an independent

damage from a structural failure, you still want to avoid that failure. Even if no one is hurt, a structural failure can bring the tower down, resulting in a lot of downtime and costs for the station.

For an antenna on a building in a major city, a structural failure could kill

#### Final check

On the Sears Tower, the antennas were delivered by truck and placed on the roof of an adjacent parking garage. The final preparation for the lifts was done there, and the hardware was checked one last time. The installation company didn't think the final system complied with the original design specifications. In particular, the welds didn't seem to be as massive as anticipated. A new testing firm reviewed the steel work and determined that there were several problems with both the quantity and quality of the welds. Repairing the welds wasn't complicated because the problem was caught before the antennas were placed on the building.

#### Avoid harm

If you're involved with a project of this type, don't be hesitant to question any part of either the electrical or mechanical equipment construction. An old practice used to be to confirm the antenna input impedance before it was taken off the truck. That still isn't a bad idea. However, the function here isn't just to avoid problems. The overriding consideration is to avoid harm to people and damage to the station. Don't be afraid to question anything that you are not fully comfortable with. I assure you that the station management isn't going to complain that you were too careful.

**BE**

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



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### Multitasking with **GF STATION**

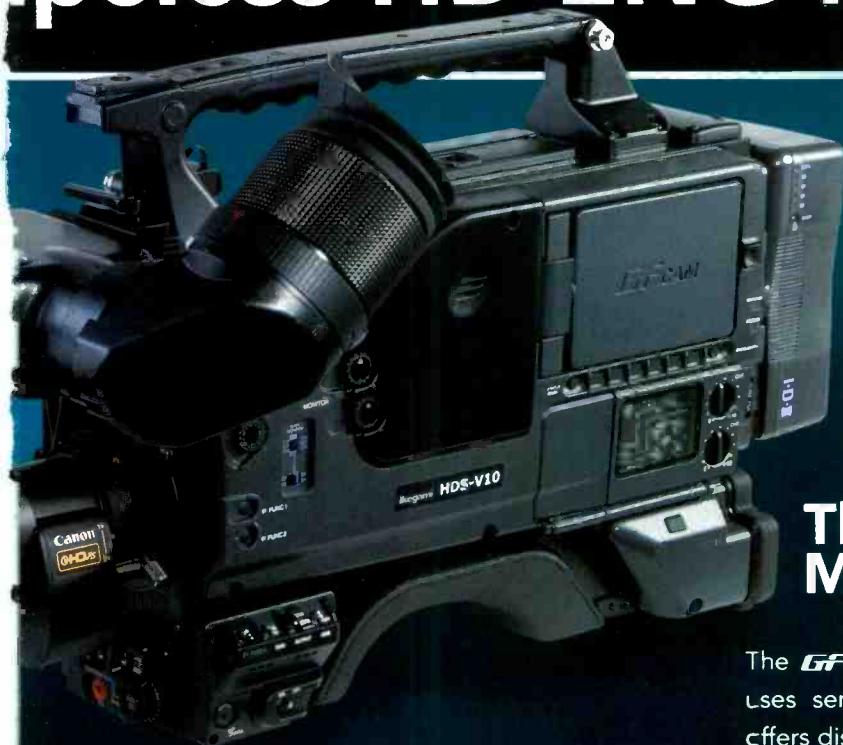
The **GF STATION** is a multi-task platform built around high-capacity internal Flash memory. It is the home for video sources transferred via a network to a non-linear editor, an import terminal for uploads from external sources, and an IN/OUT editor supporting instant direct editing during file transfer from a **GF PAK**. IN/OUT editing is also possible during recording, via the **GF STATION**'s front-panel or its universal controller interface.

### Meta Data and Proxy Data Solutions

As the **GF CAM** records the full-resolution image and sound data, it can also simultaneously record proxy video and meta data. Proxy video, a low-



# Ikegami Team Up For Tapeless HD ENG Package.



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A single **GF PAK** can store up to 128 minutes of HD images, affording ample field recording time.



resolution MPEG4 mirror of the full-resolution image and sound, has the same time code as the original and can be quickly delivered over a network or accessed on location for initial viewing and to support scripting and editing. Meta data recorded during acquisition supports workflow efficiency by logging key facts on the shoot, including the date, location, program name, and equipment used.



# GF CAM

## Key System Specifications

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- MXF file recording
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# HD newsrooms

The knowledge and experience of a systems integrator can be invaluable when converting to HD.

BY PHIL CIANCI

**D**roduction of news in HD and the upgrading of newsrooms have been somewhat late arrivals to the DTV transition. Recent industry counts report that less than 10 percent of the more than 1500 terrestrial broadcasters are producing their news in HD.

Even so, in order to remain competitive, broadcasters have no choice but to produce their daily news programs in HD. This is especially true for local broadcasters, because news operations generally are where they make their money. When one station in a market goes HD, the others must follow.

## Two paths

Once a commitment to an HD newsroom has been made, there are two possible migration paths. The first is an upgrade of an existing facility; the other is a green-field design and installation. Each has its pros and cons. The choice depends on how much (if any) of the existing infrastructure is HD-ready.

Upgrades require staying on the air and necessitate scheduling equipment installation and commissioning around production and broadcast schedules. Because newsrooms never sleep, this is not an easy task. However, if the facility has converted to digital and installed HD-capable distribution equipment, ingest and playout servers, some of the existing infrastructure can be used.

A green-field design offers the advantage of being free from the constraints of daily production, and equipment can be installed and commissioned uninterrupted. However, new equipment must be procured, and therefore, the undertaking will



The new WETA HD video control room for "The NewsHour with Jim Lehrer" features a Sony MVS8000A switcher, expanded Thomson Grass Valley HD routers and a Barco multiple rear-projection display wall.

cost more than an upgrade of an existing facility.

A serious challenge in any upgrade may be getting all the diverse equipment to work and communicate as a system. The equipment is still evolving, and manufacturers frequently offer new features. These factors make it difficult for a station to make the proper decisions without outside expertise.

unforeseen problems can be avoided or resolved before they wreak havoc on a system. In a complex undertaking, there is no substitute for experience.

## Consider the source

News operations face a particularly difficult aesthetic challenge compared with syndicated content or even local studio programs. Especially true for HD is the fact that pro-

**In order to remain competitive, broadcasters have no choice but to produce their daily news programs in HD.**

Beyond this point lies the great unknown. The devil is most certainly in the details of an HD infrastructure. This is where the use of a knowledgeable systems design and integration company may prove invaluable. Many

gram quality depends on the source. Set design, lighting and makeup must stand up to the new HDTV displays. Fortunately, most stations are meeting the challenge, and talent can actually look better in HD,

provided that makeup is properly applied. HD-friendly sets are available from theatrical design and lighting



The WETA studio includes six new Sony HDC1000LW HD studio cameras with Fujinon lenses.

integrators and others who specialize in news set design.

A major challenge with HD news production is that source content

may arrive in a plethora of audio and video formats, all of which must be properly format converted, transcoded or transrated for production and distribution. Video can come in 1080i, 720p, 480i, NTSC, IMX, P2, HDCAM, HDV and many other formats. Audio can be analog, digital, mono, stereo or 5.1. For the time being, broadcasters will have to handle both 4:3 and 16:9 imagery. This requires a thoughtful solution.

Finally, broadcasters are finding that user-generated content (UGC) is an increasingly important part of the newscasts. Even an HD production system needs to be able to ingest, edit and playback low-quality imagery from a variety of handsets and service providers.

### Historical footage

One problem that will never go away for newsrooms is the need to

use historical footage. This creates several issues. The footage may reside on multiple tape formats, from quad to 1/2in or M to VHS.

This poses a serious challenge when converting to HD news production. Money spent on equipment needed to convert legacy material to HD broadcasts may be more expensive than the depreciated value of a device. The decisions made here will affect what formats can be ingested in the future.

It may be significantly more cost-effective to digitize and ingest content that has a high probability of use prior to its being needed for a segment and then decommission the equipment. Or, equipment could be kept on-hand and operational for ad hoc conversion as needed for a breaking story. Whether you can find a quad-knowledgeable maintenance engineer is an entirely different question.

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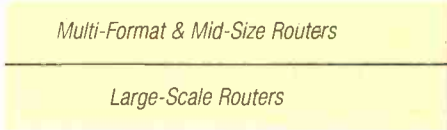
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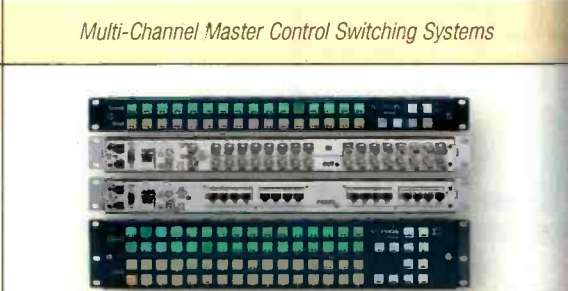
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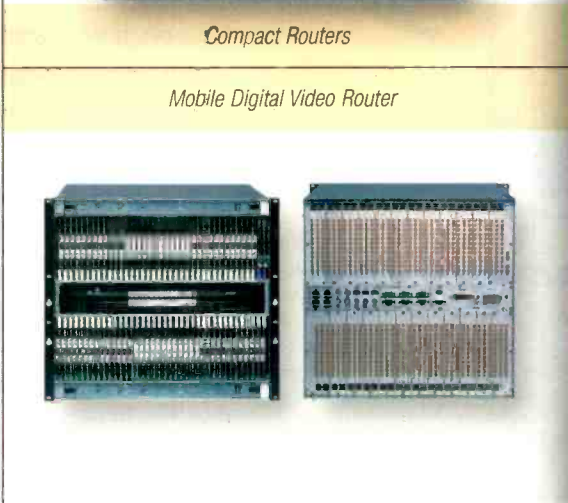
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any case, an experienced systems design firm has probably faced these issues before and can discuss the merits of each approach based on your production workflows.

### Visual aesthetics

How HD content will be presented in SD requires some thought. The simplest approach is to use a 4:3 center cut for SD broadcast. Another approach is to downconvert and letter-box a 16:9 image in a 4:3 SD display. This alleviates the need to consider framing a shot for both aspect ratios. Some broadcasters try to leverage the best of both worlds by creative integration of graphics and windowing that is visually appealing in both 16:9 and 4:3 aspect ratios.

Graphics packages may now need to support two aspect ratios. Although existing graphics that were produced for SD may initially be used for HD

broadcasts, at some point, new graphics need to be produced in HD.

### Sound decisions

Audio requires special consideration. Even if a production has "gone digital," it is still probably only producing stereo audio for SD resolution video. Dolby Digital encoding will be needed for program release. A decision must be made as to how audio should be formatted and distributed during production. Discrete and embedded audio require different distribution and processing techniques.

Because viewers now have high-quality audio systems in their homes, consistent audio presentation is imperative across live studio and remote segments, preproduced clips and commercials. Changes in level and quality from segment to segment that were not previously noticeable are now glaringly obvious and annoying.

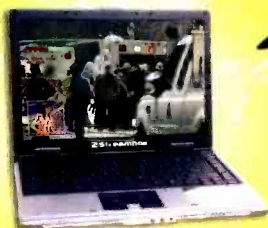
Differences in source volume levels can be a large problem in HD audio presentation. Appropriate Dolby metadata must be generated and included in the audio bit stream. This will require an upgrade in audio equipment and the added attention of audio production personnel. Monitoring becomes critical. (See the December 2007 *Broadcast Engineering* article "Dialnorm: A good idea gone bad?" for further background on the use of dialnorm in broadcast environments. The article is available at [http://broadcastengineering.com/audio/dialnorm\\_good\\_idea/index.html](http://broadcastengineering.com/audio/dialnorm_good_idea/index.html).)

### IT matters

Because many newsrooms have already migrated to a tapeless, file-based production workflow, one important consideration when converting the newsroom to HD is the increased requirement for network bandwidth

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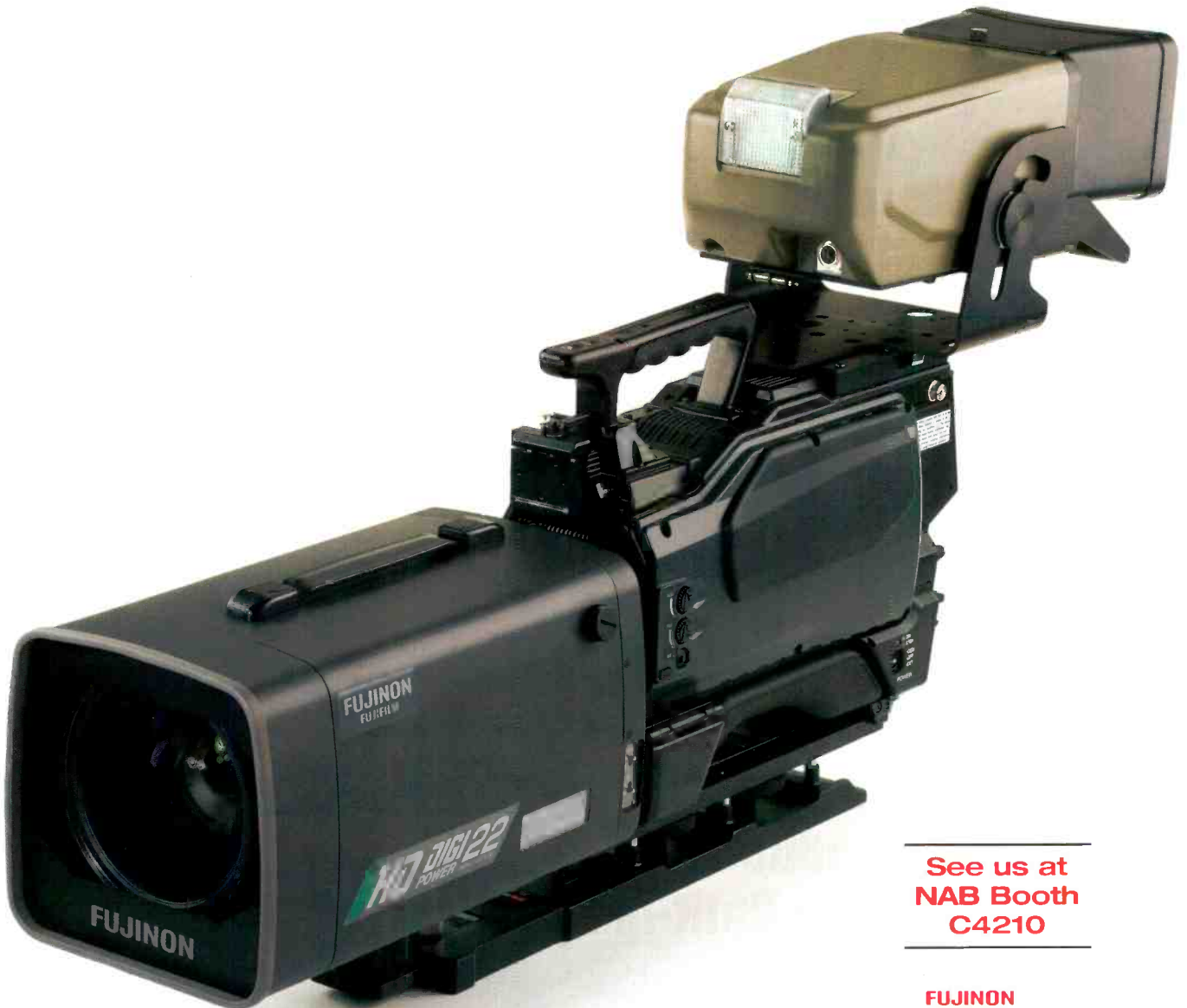
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and storage capacity. Regardless of the house compression format, HD data rates are considerably higher than SD. Expect to double or triple



The WETA digital audio control room employs an SSL C100 5.1 surround-sound console.

storage capacity and the network backbone bandwidth. The challenge is to develop a production workflow and infrastructure that maximizes

quality and minimizes HD content data rates while staying within budget constraints.

Large HD files require greater bandwidth than SD files when sent over IT networks. A network that works fine during normal production may fail under the strain of a breaking news story, when double or triple the number of newsroom personnel are trying to access the content. This is when a failure or glitch will have the largest effect on production. Production delays could allow a rival to break the story first.

It's necessary to upgrade video servers to HD capability and significantly increase disk storage. Network bandwidth should be for HD file-based production. Deciding on a network and storage topology is also important. A key decision is whether to store content in a federated storage area network (SAN) with local proxy

editing or employ local editing of full-resolution video as the preferred workflow.

Maybe the answer is both. An experienced systems design and integration firm can present viable system implementation options based on its experience. It can work with your in-house IT department to ensure the broadcast and production networks are properly integrated with the business and corporate network and applications. At this time of transition, knowledge of the particular needs of broadcast IT can be transferred to nonbroadcast technologists.

### Take heed

Physical considerations cannot be overlooked. New HD systems are more compact but are power hungry. This may strain the existing power and cooling infrastructure. It is also important to avoid placing racks and

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consoles against walls and in tight confines. Not only will they rapidly overheat, but access to the equipment will be difficult.

Signal distribution of HD-SDI at 1.5Gb/s requires significantly more care than SDI at 270Mb/s. Cable types and lengths become critical. Fiber will be needed for long connection paths. Observing bend radius specifications and proper splicing and termination is imperative. A lot of time can be lost tracking down marginally performing equipment only to find that the cabling is faulty. Compromised digital signal systems — HD in particular — have the disturbing characteristic of looking great right up until the point that they crash because of errors induced by poor cabling.

Many older pieces of equipment will not pass embedded Dolby or vertical interval time code (VITC) and other forms of ancillary data. This

will affect the need to support both 608 and 709 closed captions. A broadcast facility will require an appropriate conversion system to support the HD workflow and the purchase of conversion equipment.

Monitoring systems must support Dolby and non-Dolby audio, as well as SD and HD video. Dolby E and AC-3 will have to be decoded at the test stations. This means purchasing upgrades or new systems and possibly additional interface devices.

### The HD value proposition

Obviously, there is no one-size-fits-all solution for an HD newsroom upgrade. Each station has particular needs and workflows that must be carefully analyzed. Every station has budget limitations. Partnering with an experienced design and integration company enables the broadcaster to focus on the HD newsroom workflow.

Converting to HD news production will probably be more expensive than the optimistic figures generally put forth. Consider whether these numbers based on the current cost of SD versus HD equipment, or on the prices of SD equipment from years ago and now adjusted for inflation.

Your staff will have to learn how to use the new equipment and the nuances of producing in HD. Be sure to allow for adequate training and rehearsal time. HD workflows may be different, and the production staff will need to adjust its practices.

An infrastructure must perform flawlessly. For this reason alone, the use of an outside partner in the design and implementation process should be carefully considered. **BE**

*Phil Cianci is a design engineer for Communications Engineering Inc. in Newington, VA.*



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Broadcasters can use IP technology to improve their real-time workflow. Photo courtesy Evertz.



# Delivering QUALITY REAL-TIME VIDEO OVER IP

## Can an IP router replace a video router?

BY STEPHANE BILLAT

**W**ith telco entering in the quadruple play of video, Internet, phone and cell phone, it seems that video over IP is part of a video future. The requirements to deliver acceptable video and audio signals via IP are different from traditional voice and data delivery methods, bringing new challenges. IP is not new to broadcast facilities, as many files get transferred between locations, servers and workstations. However, most of that transfer is not in real time.

As manufacturers develop solutions to support the new IPTV deployment, traditional broadcasters are looking at using some of the IP technology to improve their real-time workflow. One question comes to mind: Can broadcasters replace a traditional video router with a standard IP router?

### Can any broadcast signal fit into IP?

In theory, any type of data stream can be encapsulated into IP. In most cases, it is a good idea to limit the maximum size of the IP packet to 1500 bytes. The overhead for the encapsulating is small. It's about 40 bytes for 1500 bytes total, which is less than 3

percent. Today's networks commonly run at 1Gb/s (950Mb/s useable), even though there are still a lot of 100Mb/s networks inside existing facilities. The future will bring a 10Gb/s plus backbone and beyond, but this will not be

Signal type	Typical bit rate (Mb/s)	IP network available bandwidth (Mb/s)		
		100	1000	10000
		Number of signals on one Ethernet	Number of signals on one Ethernet	Number of signals on one Ethernet
SD MPEG-2 compressed distribution	5	18	180	1800
HD MPEG-2 compressed distribution	15	6	60	600
SD MPEG-2 compressed contribution	25	3	36	360
SDI with JPEG2000 compression	30	3	30	300
HD MPEG-2 compressed contribution	50	1	18	180
HD-SDI with JPEG2000 compression	90	1	10	100
Uncompressed SDI	270	0	3	33
Uncompressed HD-SDI	1485	0	0	6
Uncompressed 3Gig	3000	0	0	3

Table 1. Number of video streams in standard Ethernet connections. The boxes shaded in blue indicate which signals are practically useable over the given network/bandwidth.

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# FEATURE

## DELIVERING QUALITY REAL-TIME VIDEO OVER IP

widely spread outside of the large telco companies for some time. Broadcasters can encapsulate hundreds of video streams of H.264 or MPEG-2 SD distribution rate content on a 1GigE connection. There is no defined standard for encapsulating uncompressed SDI, HD or 3G video in IP packets. So at this time, carrying uncompressed HD-SDI or 3Gig around the plant

over IP is possible, but not practical. (See Table 1 on page 70).

### Delivering content between facilities

IP networks are different from traditional video networks. (See Figure 1.) IP networks are switched networks, which — with inconsistent signal paths — make it challenging to trou-

bleshoot. The classic example is VOD, which by definition is only active while the user orders and watches the movie. It is therefore difficult to “follow the wire” from point to point.

Delivering packets from the source to the destination is a well-known and controlled process (ATM, SONET). Timing and packet order has always been a challenge but is not critical

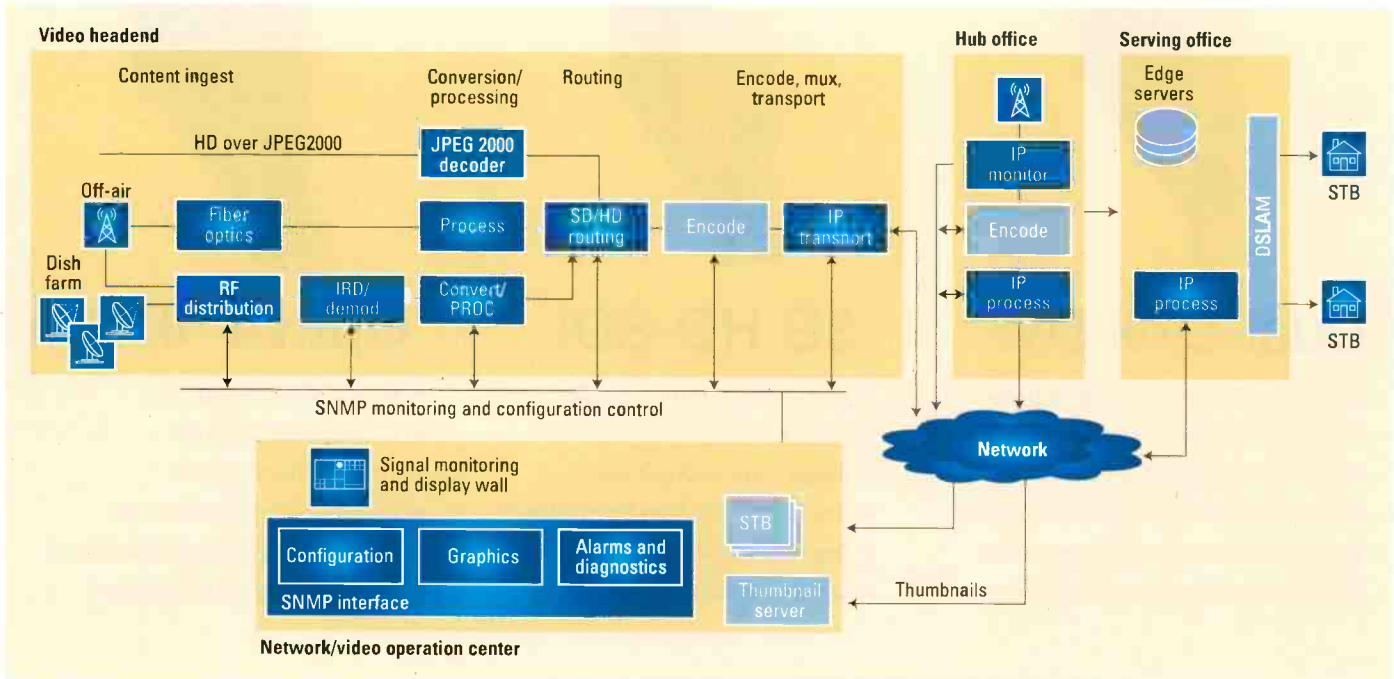


Figure 1. This block diagram shows an example of Evertz IPTV monitoring topology, using an MVP display wall to show the results of data supplied by a VistaLINK SNMP interface.

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# FEATURE

## DELIVERING QUALITY REAL-TIME VIDEO OVER IP

in the case of e-mail and data. Most IP routers have a buffer built in but not much compared with high-speed video routers.

When delay happens in the network, it can result in underflow and overflow of the buffer at the switch. When data gets lost, freeze-frame occurs or there is tiling on the video output.

The media delivery index (MDI), which measures network jitter and drop of IP packets, is a composite number proposed by the IETF and adopted by multiple test equipment vendors. It offers a simple but accurate way of measuring the network delivery quality in IP probes.

### Using video over IP in the studio

As IP becomes mainstream, broadcasters are wondering if they could use the momentum of the IP networking to improve their real-time workflow.

The attraction comes from the fact that an IP router is perceived to be low-cost, can handle all kinds of data in real time or not real time and seems to be independent of the codec bit rate. The concept is that if you can equip yourself with an IP router, you should be able to encapsulate any signal available now and in the future.

So the question that broadcasters are asking to the industry is: Can I use an IP router for my core video router?

### I/O ports

In a video router, the I/O count is key. A typical video router has a large number of input ports and output ports. Each port can carry one video signal SD, HD, 3G or compressed ASI in the case of an advanced video router. The port count of a video router can now go to 1024 inputs and 1024 outputs in large facilities.

In an IP router, each port is bidirectional and can support multiple video signals. That is a great advantage to the IP router, as multiple SD video sources can flow in both directions, whereas only one video source can travel on a video router I/O. Typical IP routers have a core up to 48 ports, a low number in the traditional video world. Multiple 48-port line cards can be combined in one chassis. The larger one-chassis design in the IP world is 480 ports. Note as most routers today are limited to GigE ports running at 950Mb/s, it is therefore impossible to switch real-time uncompressed HD-SDI and 3G because these won't "fit" in a GigE. 10GigE ports are becoming available, but they don't yet have the density of video routers.

### Routing of the content

The switching fabric of a video router can route any input to multiple outputs. There is no limitation of input load or how many points the same video can be routed.

Video routing in the IP domain is different in concept. In a low-end IP router, the routing is performed in software, allowing flexible routing. This often creates processing conflicts when a large volume of switching is required in real time. New, advanced IP routers offer hardware routing, which improves performance when high bit rate and large numbers of streams are switched.

Video router switching times are typically in the order of one frame, but most importantly, they are deterministic. IP routers can delay routing requests because of traffic or multiple requests at the same time.

### Router control

Video router controls are fairly simple and unsophisticated. A typical router takes RS-232 commands with X-Y coordinate for input and output and responds to a simple command. More modern routers support IP controls with SNMP commands, but the principals remain the same. All the control is handled out of band of the video using a dedicated port. This method

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requires the user of the content to have access to the router control, which is typical under automation.

IP routers act differently because most of the control, when the routing rules have been set up, is handled in-band. Multicast and IGMP allow downstream devices to request, through the data port input signal, to the video switch without accessing the core control of the IP router. On one physical port, multiple video can be requested and routed. Note that the time to get the routing execution depends on the IP router configuration. This can take from as few as 100ms to 30 seconds, depending on the settings of the downstream devices and switches. This capability makes the IP router attractive and powerful, but requires the proper use of advanced settings.

#### Reliability and availability

Great care is taken in a design of a video router to ensure reliability. Redundant I/O, crosspoint and switching logic is typically a high selling point for router manufacturers. This redundant architecture results in better than 99.999 percent of availability. Downtime doesn't exist, and there is no maintenance window readily available.

IP routers are reliable today. It is, however, difficult to manage load balance and guarantee there won't be downtime in IP ports. It is not unusual to have a two-second redundant switching time. This is not a long time in the data world, but definitely represents many lost video frames. In normal circumstances, an IP router is expected to be taken offline for maintenance windows.

#### Cost

Modern, high-video I/O port, high-bandwidth video routers are considered expensive, and they are typically about \$1000 per port.

Even if a consumer eight-port GigE switch runs about \$25 per port, a large, level-three broadcast-suitable IP router that can support the proper

bandwidth will cost about the same as a video router.

#### Other applications for video over IP in the plant

Another popular video over IP application is for CCTV applications in a broadcast plant. Most broadcasters today have an RF distribution plan for monitoring internal channels as well as news channels. Each facility often has analog RF channels with a coaxial cable distribution reaching the required offices. At each office, a monitor is used to watch the program. This RF internal channel system is typically analog and doesn't support HD or the increasing requirements for a larger number of channels.

The trend is to replace this aging system with an IP network. The video quality requirement is typically lower than broadcast and is used to deliver the monitored content. The user can employ a standard desktop software decoder.

#### Challenges

Using video over IP in the broadcast facility requires a different set of skills to configure and appropriately manage a large IP router. The video/IT engineer needs to understand and be fluent in DVMRP, PIM, MOSPF protocol, Rendezvous or Flood and Prune protocol. Many of those protocols are completely foreign to video engineers and require advanced training.

Because IP routers are technically and economically viable for monitoring purposes, it is clear that they are not yet ready to replace video routers in large facilities. As 10GigE and 100GigE networks make their way to the market and technology advances, it is possible to imagine a complete video routed network based on an IP infrastructure. By then, the IT department will have more staff than the video engineering department, and every video engineer will be IT-certified. **BE**

*Stephane Billat is product manager for Evertz Microsystems.*



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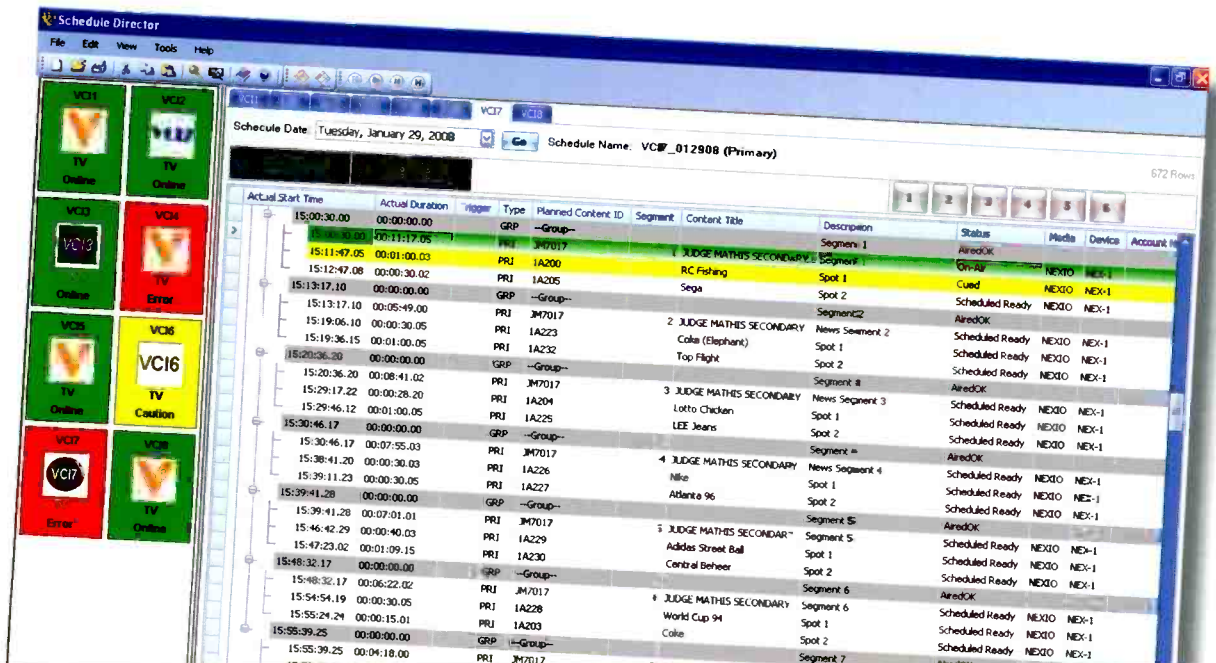
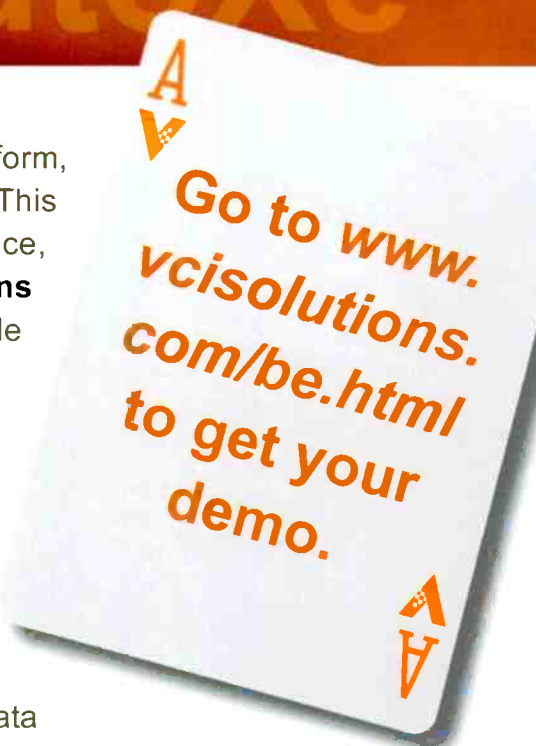
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# Looking INSIDE



## file-based content

BY JON HAMMARSTROM

**W**hether you are a traditional broadcaster, a content aggregator or a network services provider, today you have access to more file-based digital content than ever before. And compared with just 10 years ago, there are many new sources for broadcast-quality video and audio content. Archives are growing every day, and the variety of standards and formats that you may need to support this is still evolving.

Adding to the complexity of the problem — and thanks to a wide variety of enabling digital video technologies and new advances in consumer electronics — there are more opportunities to reach viewers. Empowered by the Internet and enabled by a variety of new consumer electronic developments, content viewers have developed new expectations about what they watch, when they watch it and what they watch it on.

With the inherent operational advantages in an all-digital workflow, many are looking for a practical application

of the technologies that will make their organizations more efficient, more differentiated among the competition and ultimately more profitable. Success can mean optimizing and ensuring

enabled file-based content across the broadcast industry and in our everyday lives.

Where service differentiation is becoming more transparent, the

**It's not just the audio, video  
and metadata that matter now;  
format and syntax are critical.**

ing the quality of your content to gain maximum return and getting content in front of more viewers.

### **Rapidly changing environment**

The video ecosystem is comprised of the companies that produce and post content, companies that deliver content, and the manufacturers whose products and technologies have enabled delivery of content to the consumer. The video ecosystem has changed considerably over the last decade, with the addition of new digital video technologies that have

watchwords are “content is king.” Factors that could help differentiate one provider from another will likely include the perception of quality of what the consumer sees. Ensuring and optimizing file-based content quality means evaluating and reacting to media quality inside your network and understanding the impact your content can have on other elements in the ecosystem as well. It's not just the audio, video and metadata that matter now; format and syntax are critical.

Content providers, content aggregators and broadcasters have been

building file-based content archives for years, and many have taken advantage of the opportunities to evolve their workflow to support an all-digital environment. Because more content is being compressed and archived in one format and then repurposed to another format, archives are anything but homogenous, and working to

maintain control over your facility's output can be challenging.

### Analysis of file-based content

With the proliferation of available content, it is unreasonable to think an operator can personally look at every piece of content prior to de-

livery. With the vast array of formats and standards, it seems even less likely that a visual inspection would uncover the unseen concerns that revolve around digital compression technology. In this new digital world, what are the new quality parameters that must be considered, how can they impact your business and how can they be measured?

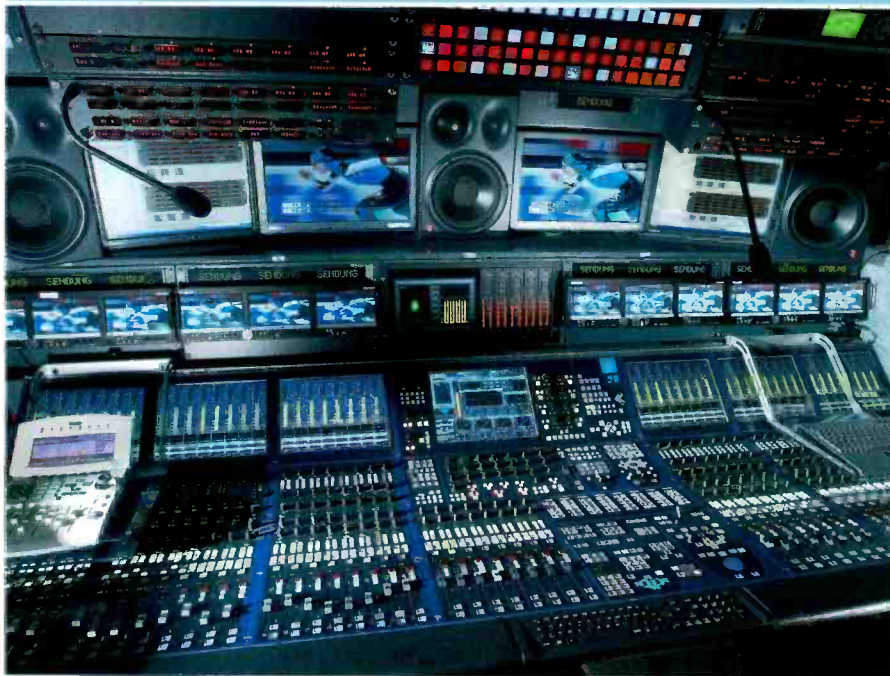
Ensuring the quality of file-based assets means more today than simple validation of color space compliance and ensuring legality of the content. Appropriate analysis of compressed file data can uncover format-related issues in addition to identifying errors that can be created when video and audio are encoded (compressed). Tools are available to help you do this without the need to decode and visually inspect. These are some of the problems that file-based content verification can uncover:

- Incorrect play time.
- Incorrect stream setup.
- Transport stream errors.
- Multiplexing errors.
- Missing metadata used by an automation system.
- Incorrect bit rate for the video or audio.
- Encoding quality errors, where the encoder produces a series of blocky video frames.
- MPEG encoding syntax errors, which can occur due to multiple mux/demux operations, or an encoder blip.
- Errors in the syntax of the video and audio elementary streams.

Any one of these items could catastrophically affect the quality of what the viewer sees and hears — or doesn't see and hear. File-based digital content lends itself well to an inside-out look. While proper analysis can help you optimize content quality, it can also significantly help you to understand how the content may impact other elements in the ecosystem. In addition, it could give you a leg up in the struggle to differentiate yourself with viewers.

The following section discusses some of the opportunities afforded

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by new file-based quality control tools available today.

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Will a file decode correctly and be viewable by my customer? If your viewer uses a set-top box to decode and view content, the set-top box will expect data in a specific format. The most effective way to check the health of file-based content prior to transmission is by verifying that the syntax of the file is correct. It is useless checking gamut if the syntax is incorrect, so syntax must be the first check. There is no sense in ensuring a file looks good if it can't be decoded at delivery.

File-based video generally comprises one or more complex digital file(s) with many elements, all of which must be correctly decoded for the file to play. A large proportion of file-based video has syntax errors, so it's

important to look for tools that can automatically check for correct syntax, enabling you to find the errors before you get complaints that the consumer's set-top box has crashed.

**Process/equipment optimization**

When designing or buying equipment that encodes, decodes and transcodes content, can you optimize the quality of the output to provide a better user experience?

When organizations want to assess how an audience will react to content as viewed on a specific medium (TV set or movie screen), they will employ a group of professional viewers to view content. The industry standard for subjective picture quality measurement is defined by ITU-R BT.500. This standard defines a variety of conditions to measure the picture quality of the image, such as display

type, viewing distance, viewing environment and viewer characteristics.

This kind of evaluation requires that a designer validate during several steps of the design process, provide viewable content in the appropriate format and ship it to a third party that then arranges the human viewing exercise and produces a written report.

Picture-quality analysis tools can help provide an objective analysis of encoder and decoder performance and reduce the evaluation period significantly for new components. Such tools can shorten design time and optimize designs.

In addition to ensuring the quality of the content inside your facility, you have an opportunity to impact the user experience when selecting the encoders and decoders for your facility. The process used to select components should include a consideration for components that are specifically



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designed and fine-tuned to deliver the highest quality to the consumers' particular viewing medium. Selecting encoders and decoders that score well in an objective comparison could positively affect the viewers' perceptions of the final content. This may be a particularly important consideration if you are repurposing content for multiple destinations and customers.

### Workflow

With the proliferation of digital file-based content and the inherent cost advantages that can be achieved by repurposing content archived in one format for use in another, broadcasters are faced with many new technology challenges.

In the file-based state, there are considerations that can be evaluated without decompressing and decoding. Parameters that affect image qual-

ity, systems interoperability and general user experience can be evaluated while the content is file-based.

File-based content analysis tools come in a variety of shapes and sizes. Each brings a specific set of values as

**Ensuring the color space compliance of incoming content in an uncompressed state is a great start.**

a solution in your workflow. Keep the basic levels of analysis in mind as you design the workflow, or discuss with your engineering and operations staffs how you might optimize it around file-based content.

### Content evaluation

You want to ensure that you have the highest quality content possible coming into the system because there will be loss of quality during any compression process. Ensuring the color space compliance of incoming content in an uncompressed state, or while it is still in the production workflow, is a great start.

The first opportunity you will have to evaluate the file-based content in your facility is likely to be at the point it is ingested into the workflow and deposited on a facility server. Ensuring proper file format and syntax at this point, in conjunction with adequate network management discipline, could be enough to ensure that good data enters the system and isn't adversely affected by the system. This can be especially true if the operation doesn't include transcoding or decoding/encoding prior to distribution.

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In some instances, you will receive content from a production facility that has already been compressed for distribution and is in the format that you will ingest into your system. In these cases, encouraging your supplier to verify file-based content to your quality standards could improve efficiencies at both facilities. Evaluation of file-based content at ingest may be the appropriate level for your facility.

### Monitoring file-based content

More complex workflows often will include multiple points in the process where content is transcoded from one format to another or ultimately repurposed prior to delivery. Each time the content of the file changes, there is risk of introducing errors.

File-based QC tools, which are network-enabled, can be positioned throughout a facility workflow and provide invaluable data relative to the health of the content as it progresses through the facility. In simple environments, this means concentrating on evaluating the compressed content at ingest and just prior to distribution out of the facility. In more complex environments, it may mean evaluating the health of compressed video and audio files after the initial encode and then following each re-encode or transcode that occurs.

### The impact of your content

With the proliferation of digital file-based content and the inherent cost advantages in repurposing content archived in one format for use in another, broadcasters are faced with many new technology challenges. Key areas of concern include:

- *Interoperability.* Will a file decode correctly and be viewable by my customers?
- *User experience.* Compared with the original, how will the repurposed content be perceived when viewed by my customers?
- *Equipment/process optimization.* When buying equipment that encodes,

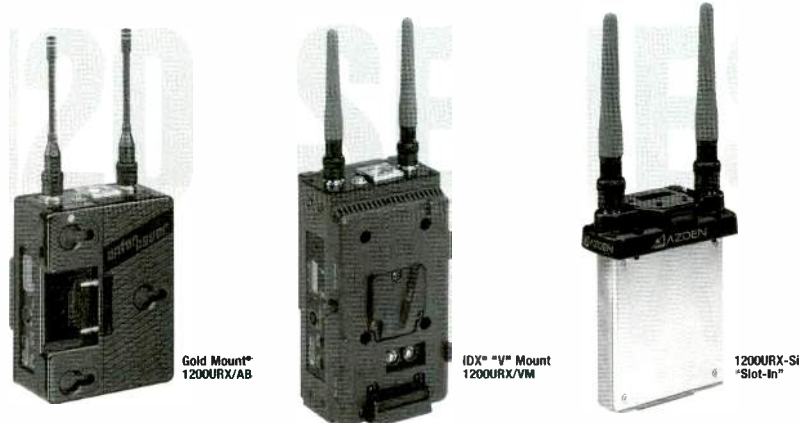
decodes and transcodes my content, how can I optimize the quality of the media viewed by my customer?

Content creators, broadcasters and equipment designers use file-based content verification to determine how the products and services they provide impact the video ecosystem by ensuring standards compliance, checking

syntax, and optimizing encoder and decoder designs based on predictive image quality measurements. There are advantages to be gained leveraging the technology behind file-based digital content. **BE**

*Jon Hammarstrom is senior video marketing manager for Tektronix.*

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# Multiformat ENCODING

BY BARB ROEDER



In the past year, there has been an explosion in the technological capabilities of streaming media, from the greater reach of broadband networks to the introduction of video-enabled cell phones.

With the explosion in the technological capabilities of streaming media, today's service providers are certainly pitching their video capabilities to the home over high-performance DSL and cable lines. In addition, many public outlets offer stable WiFi access that can also transport streaming media. The current generation of cellular networks based on the 3GPP standard is geared to this market as well. Just as in the early years of Web video, device technology has evolved to allow something more than postage-stamp sized images playing back jerky motion, as demonstrated by Apple's iPhone introduced last January.

Today, the myriad array of formats, networks and devices used in the delivery of video and audio streams creates a true challenge for broadcasters that want to reach these platforms. As advertising dollars shift to take advantage of these mobile audiences, it makes sense for broadcasters to develop their infrastructure to reach them

as well. Technically, there are several stages in the process that need to be addressed to maintain quality and compatibility with the current field of delivery destinations. (See Figure 1.)

## Playback devices

Sometimes it's best to set an end point before you begin the process. So let's first explore the platforms that exist for online and mobile device playback of streaming media.

Desktop playback of video and audio still include Windows Media, Real and Quicktime, but Flash video

has become the format of choice for many producers because of its prevalence across computer platforms. Each has its own set of codecs, which players and browsers can decode on the receiving end. If not preinstalled on a system, one-step downloads and automatic updates make them accessible to the end user as well.

In the mobile domain, there is an even wider selection of platforms as this market is only in its early stages. The largest market share probably goes to Apple's iPods and iPhones, which pushed the technology curve

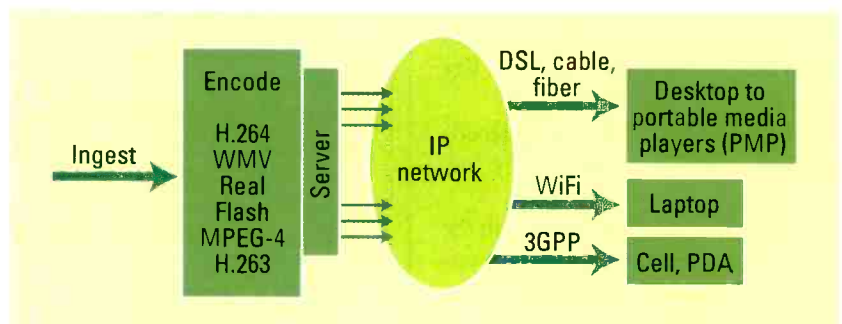


Figure 1. A myriad array of formats, networks and devices are used in the delivery of video and audio streams.

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# FEATURE

## MULTIFORMAT ENCODING

well into the future with its introduction last year. While many portable media players (PMPs) are designed for audio-one, Apple's success is sure to see some competition in the coming years. Microsoft has already attempted to enter this market with its Zune player, which is also capable of playing back H.264 video and AAC audio as well as Windows Media (WMV and WMA) files. Other contenders include cell phone manufacturers, who are always pairing up with wireless carriers to provide new services and content.

In order to reach these platforms, we need to look at their network connectivity. Broadband access has grown tremendously, with several viable options for high-performance delivery over cable, phone and more recently fiber. Many consumers also want the flexibility to receive streaming content on their laptops via wireless LAN and WAN networks. This is best accom-

plished using one of the more recent incarnations of the 802.11 standard, which have good capacity compared with broadband wired networks, as indicated in Table 1. The most stringent bandwidth restrictions enter in the cellular domain, which generally relies on the 3GPP standard, a subset of MPEG-4, for delivery. As indicated

in the table, these networks are less robust and highly variable given the mobile nature of the end user, so target bit rates are generally lower.

### Encoding parameters

So, given these playback devices and platforms with various incarnations of IP network connectivity, what are the

Network	Platform	Playback	Target bit rates
Broadband DSL, cable, fiber	Desktop	480x360x30	500Kb/s to 700Kb/s
	PMP	320x240x30	300Kb/s to 500Kb/s
WiFi 802.11b/g	Laptop	320x240x30	200Kb/s to 400Kb/s
	PDA, PMP	320x240x30	200Kb/s to 300Kb/s
3GPP	Cell phone, PDA, PMP	176x144x15	100Kb/s to 200Kb/s

Table 1. One of the more recent incarnations of the 802.11 standard can be used to stream content on consumers' laptops via wireless LAN and WAN networks.

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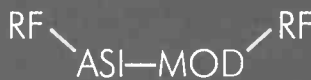
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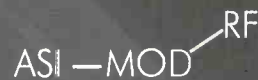
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## FEATURE

### MULTIFORMAT ENCODING

possibilities for encoding parameters to reach the multitudes? Today's technology allows the portable media players like the iPhone and Zune to decode 320x240 frames at a solid 15fps and even 30fps. Most computer and laptop displays are much higher resolution, making this frame size much less than one-quarter of a screen. Larger content

providers, more typically with longer form programs, are attempting to create 480x360 frames, or using built-in DSP technology to create a full-size video image on the desktop. Today's CPUs and bus structures can handle that even at 30fps, allowing broadcasters to captivate even their discriminating audiences with broadcast quality on their

computers. While this requires increasing the bit rate, most of the broadband networks can sustain well over 500Kb/s to offer a viable experience to the end user. On the other end of the spectrum, the cell phone devices are more likely to playback QCIF resolution images at 176x144 at 10fps to 15fps, reminding us again how early in the game this is for mobile video delivery.

Codec technology has also evolved to the point that many platforms for encoding can achieve this wide range of parameters sets. The latest versions of Windows Media, Quicktime, Real and Flash can certainly accomplish this range of encoding requirements. They will also reach into the realms of DVD and HD encoding, as Windows Media's VC-1 and the preferred codec in Flash, ON2's VP7, have demonstrated recently. Of course, a single standard, such as H.264, most often used in Quicktime, would simplify the process for broadcasters, but technology developments have allowed many device manufacturers the flexibility to offer more than one format for delivery.

### Choosing a format

Choosing one format over another for encoding may simplify the process, but most broadcasters will want to reach the largest audience by developing an infrastructure that can manage more than one platform and many different bit rates to accommodate varying network circumstances. Banks of dedicated CPUs, either dual-dual or full quad, will be required to process the target delivery formats in parallel.

Many vendors offering transcoder tools to run on these machines also offer a server/management application that can automate and balance the load across them when networked on a LAN. All of these devices will also be capable of ingesting a multitude of input formats, but the highest quality, progressively scanned source would be the most desirable for the IP delivery discussed in this article. **BE**

*Barb Roeder is a consultant and president of BarbWired (www.barb-wired.net).*



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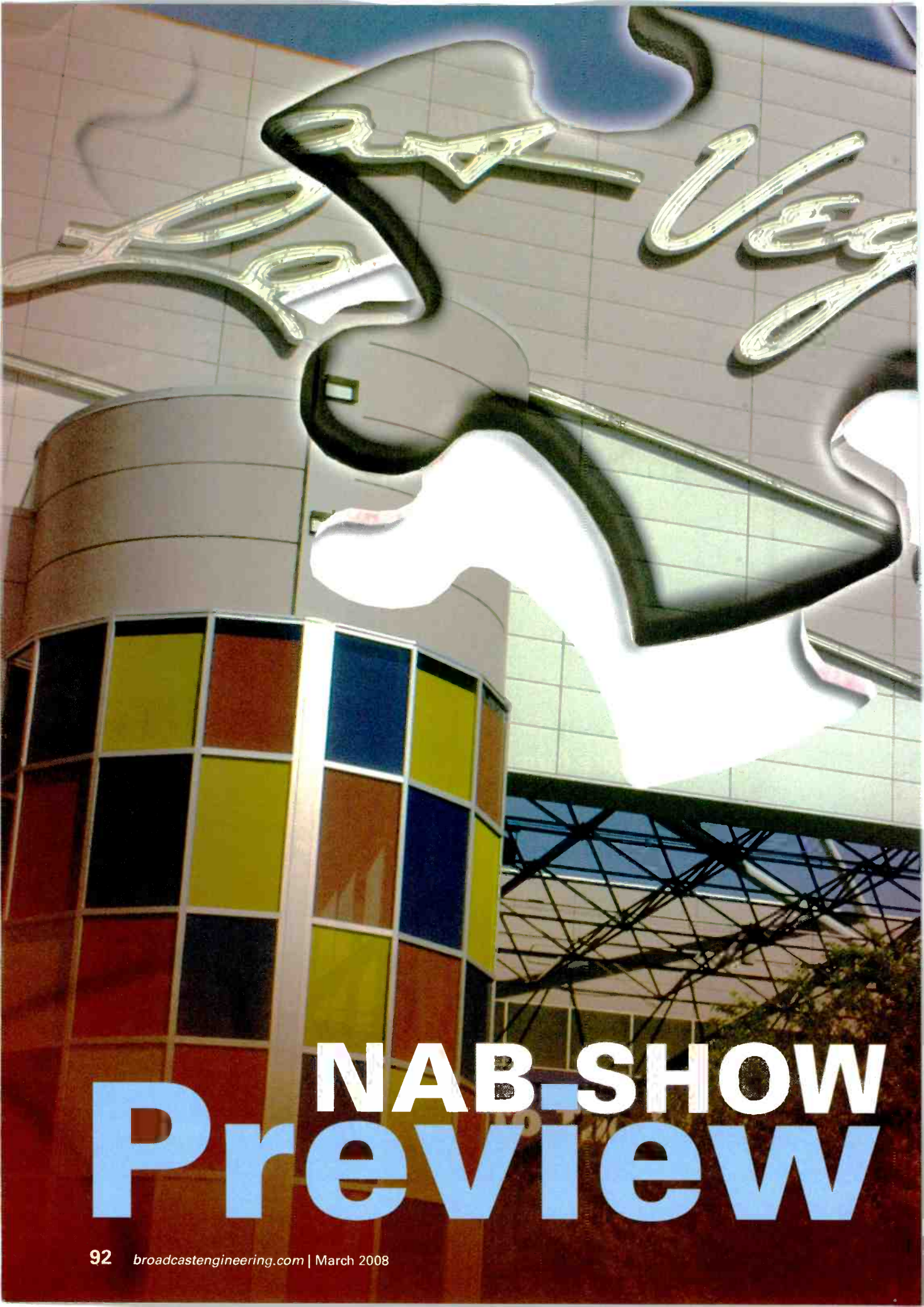
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# NAB-SHOW Preview



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A detailed map to help you navigate

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A showcase of this year's hottest products

---

## SOLVING THE NAB SHOW PUZZLE

It's show time again! For four days, from April 14-17, more than 1600 vendors from around the world will showcase their products and technologies, and *Broadcast Engineering* is here to help you make the most of this event. This manual is meant to serve as your ultimate resource guide for solving the NAB Show puzzle!

First, we announce the winners of our 7th annual engineering Excellence Awards competition. We'll recognize these facilities at the NAB Show for their achievement in each of nine categories.

Next, our FASTtrack section will save you time — and your feet! Vendors are divided into product categories and then listed geographically for easy reference. No matter what you're looking for, this listing will help you find the way to the vendors you're interested in.

In addition, we've published a map of the entire convention show floor to make navigating the four halls a breeze. From audio to video and RF, all the vendors are located on this custom, easy-to-use map.

And finally, the NAB Show has always proved to be the place to see new product and technology launches. Our DTV Marketplace showcases this year's hottest introductions. Browse more than 25 pages of product descriptions and photos to build your ultimate shopping list.

We'll see you at the show!



# The Broadcast Engineering 7th annual Excellence Awards

## Note from the editor

This year's *Broadcast Engineering Excellence* awards totaled 45 entries. The contest pages posted on our Web site generated more than 23,000 page views!

The winning entries were selected based on the votes received from our readers on the Web site. Lucky voters were selected at random to receive a *Broadcast Engineering* T-shirt. T-shirts will be mailed by April 1.

Congratulations to all of the entrants in this year's contest. You represent the highest quality in television, production and network technology. To see firsthand the equipment and solutions used by these leading facilities, visit the NAB booths of the vendors described in the stories. For directions to each vendor's booth, see our map, which begins on page 135.

*Brad Dick*

**Brad Dick**  
Editorial Director

Chosen by our readers from 45 cutting-edge facilities, the winners and runners-up are:

### New studio or RF technology – station

**WINNER: AARP** ..... 96  
Submitted by: Lawson Associates & Architects

Runner-up: WCCO-TV ..... 96  
Submitted by: Brightline  
Runner-up: WGBH-TV ..... 96  
Submitted by: The Systems Group

### New studio technology – network

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Submitted by: Network Electronics

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Submitted by: TV GLOBO

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Submitted by: Communications Engineering Inc.

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**WINNER: 30 Rock** ..... 112  
Submitted by: NBC Universal

Runner-up: Greene HD Productions..... 112  
Submitted by: Ross Video



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# WINNER:

## AARP

### Category

New studio or RF technology — station

### Submitted by

Lawson & Associates Architects

# RUNNER-UP:

### Category

New studio or RF technology — station

### Submitted by

Brightline

# RUNNER-UP:

### Category

New studio or RF technology — station

### Submitted by

The Systems Group

# AARP

## Winner of new studio or RF technology — station

In the AARP 12,000sq-ft facility, the group wanted the equipment to represent forward thinking, and with the exception of two studios, the entire plant was rebuilt.

The association wanted upbeat colors, special wall materials, special light fixtures, and for everyone to be able to see what was being done in all the control rooms, and yet when necessary, have privacy. The answer: glass with a light switch! An added benefit is that smart glass saves costs for heating and cooling and lighting, as well as avoids the cost of installing and maintaining motorized light screens or blinds.

AARP selected equipment with long-term growth and interoperability in mind. The NVISION routing system, the core of the technical operations center, consists of an NV8256-Plus digital video router, NV7256-Plus synchronous AES router and NV5128 analog video router, as well as RS-422 data and time-code routing. The NV8256-Plus router along with all plant wiring is fully capable with 3Gb/s SMPTE 324 1080P video. Euphonix Max Air audio platforms, Sony

MVS8000 switcher systems and Barco video walls driven by Evertz MVP processors are used in the production control rooms.

The electronics were designed by the AARP engineering department in VidCad for ease of change and documentation capability. No raised floors were used. All cable distribution is on overhead cable trays fitted with accessible hinged custom covers that have magnetic catches for easy access. With AARP's renovated facility, everything is possible. ■



# WCCO-TV

By 1956, seven years after its on-air debut, Minneapolis' WCCO-TV was drawing lunch-time crowds outside its studio windows, on which the weatherman would write the day's forecast while those gathered watched themselves on the monitors. This inventive take on technology and a desire to connect with its public have survived to the present day. In the last 18 months, the CBS-owned-and-oper-



ated station has inaugurated a reconfigured newsroom and two redesigned broadcast studios. ■

# WGBH-TV

In May 2005, WGBH-TV broke ground on its new facility in Brighton, MA, the first step in the station's attempt for a smooth transition from its vintage analog A/V plant in Allston, MA, to a new serial digital facility. Located outside of Boston, WGBH produces about one-third of PBS' prime-time programs and serves the New England area with seven local and one national channel.

The workhorse of its new master control



room is the Thomson Grass Valley Maestro, because the project called for a switcher with internal branding, audio store and CG. ■

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# Televisa

## Winner of new studio technology — network

**T**his year, Grupo Televisa, one of the world's largest Spanish-language media corporations, streamlined its broadcast operation. The organization dramatically improved efficiency by implementing an automated, fully tapeless workflow system across its two facilities, Chapultepec and Santa Fe, both located in Mexico City. In collaboration with systems integrator AM Tecnología (AMTEC), Televisa spent many months in planning, design and installation before the new state-of-the-art operation went on the air in fall 2007.

At its Chapultepec broadcast technology center, Televisa produces news and other programming and broadcasts three national channels and one local channel. The facility has a streamlined, futuristic look that reflects its high-tech efficiency. The Santa Fe facility produces reality shows and other programming and ingests commercials for playout.

At the core of Televisa's new infrastructure are an Omneon MediaGrid active storage system and five Omneon Spectrum media servers. The 24TB MediaGrid system at the Chapultepec facility acts as a central nearline repository for content, storing finished material that is subsequently moved to Spectrum servers for playout and to a Tedia media asset management system for archive.

The MediaGrid system also provides edit-in-place storage for multiple Apple Final Cut Pro editors.

Four of the Spectrum server systems are located in the Chapultepec facility, with two designated for main and mirrored playout, a third for archiving and a fourth for ingest, primarily of long-form content. Each of



these servers includes 16 SD channels and one HD channel, configured for a variety of functions including preview, high-res quality control, ingest and playout. The fifth server was installed at the Santa Fe facility for ingest of commercials that are then transferred under the control of Aveco Astra automation over a private fiber-optic network to the main mirrored playout servers at Chapultepec. ■

## WINNER:

Televisa

### Category

New studio technology  
— network

### Submitted by

Omneon

## RUNNER-UP:

### Category

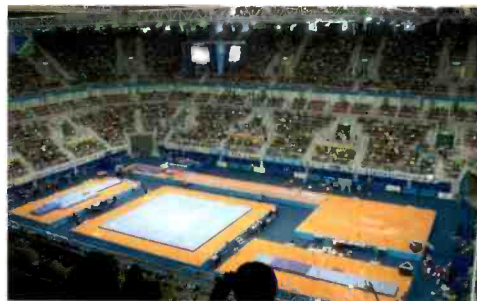
New studio technology  
— network

### Submitted by

Network Electronics

# Pan Am Games

**F**ollowing five years of preparation, Rio de Janeiro, Brazil, hosted its biggest sporting event in July 2007. The XV Pan American Games kicked off in the city's new Maracana Stadium. A continental version of the global Olympic Games, the competition has been held every four years since 1951. Athletes compete in 34 sports spanning 16 days. In all, 5648 contestants from 42 American nations competed in front of a potential 1 billion global viewers, with live coverage originating from 16 different locations. An elaborate network was designed to support live simultaneous feeds from 10 geographically dispersed events. Some events required multiple feeds.



Network Electronics began working with its Brazilian distributor, Libor, in August 2006 to design and supply a system based on the company's Flashlink fiber-optic transport platform to accommodate situations requiring a mix of HD and SD gear and long-haul transmission. The International Broadcast Center (IBC) provided a signal for major broadcasters around the world. ■





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# Globo's Studios

## Winner of new studio technology — HD

### WINNER: Globo's Studios

#### Category

New studio technology  
— HD

#### Submitted by

TV GLOBO

**T**he Brazilian network TV GLOBO is known for its production of telenovelas, which dominate primetime viewing. Telenovela is a form of melodramatic serialized fiction produced and broadcast six days a week (a yearly average of 200 episodes each) that attract a broad audience and command the highest advertising rates. GLOBO does not only produce for the local market but also exports its telenovelas worldwide.

With a huge production complex in Rio de Janeiro (CGP), GLOBO has heavily invested in quality and technology, the most important pillars to support its success.

In January 2007, GLOBO upgraded its old SDI studios using a brand new technology based on SMPTE-424/425M, a standard that expands upon SMPTE 259M (143/270/360Mb/s) and SMPTE 292M (1.485Gb/s) providing bit rates of 2.970Gb/s (3G). These bit rates allow the broadcast of 1080/60p 4:2:2 and 1080/60i 4:4:4 formats.

The project's main purpose was to prepare the infrastructure for 3G technology, so the network invested in cables, patches, routing switchers and modules that were already compliant with SMPTE-424M. In the future, the network will continue to upgrade equipment. In the meantime, GLOBO produces both in SDI (SMPTE 259M) and

HD-SDI (SMPTE 292M).

Each studio is comprised of four control rooms (technical, video and lighting, production and audio) with five new cameras; four fiber-optic external lines; tape and tapeless recording for postproduction; a multiviewer, providing operational flexibility to the monitor walls; UMD and



tally system; new microphones; and a new wireless communication system that offers mobility and additional network managing (SNMP), which supports the whole system. Many design changes were also introduced in the four technical areas, which were fully dismantled and rebuilt.

In August 2007, GLOBO TV started producing the first HDTV telenovela in the new studio. ■

### RUNNER-UP:

#### Category

New studio technology  
— HD

#### Submitted by

Front Porch Digital

## KYW-TV

**O**n April 2, 2007, Philadelphia's KYW-TV (CBS 3) broadcast its 11 o'clock news from the station's new 120,000sq-ft facility. It was one of the nation's first all-HD TV stations built from the ground up, and was designed and constructed in less than 10 months.

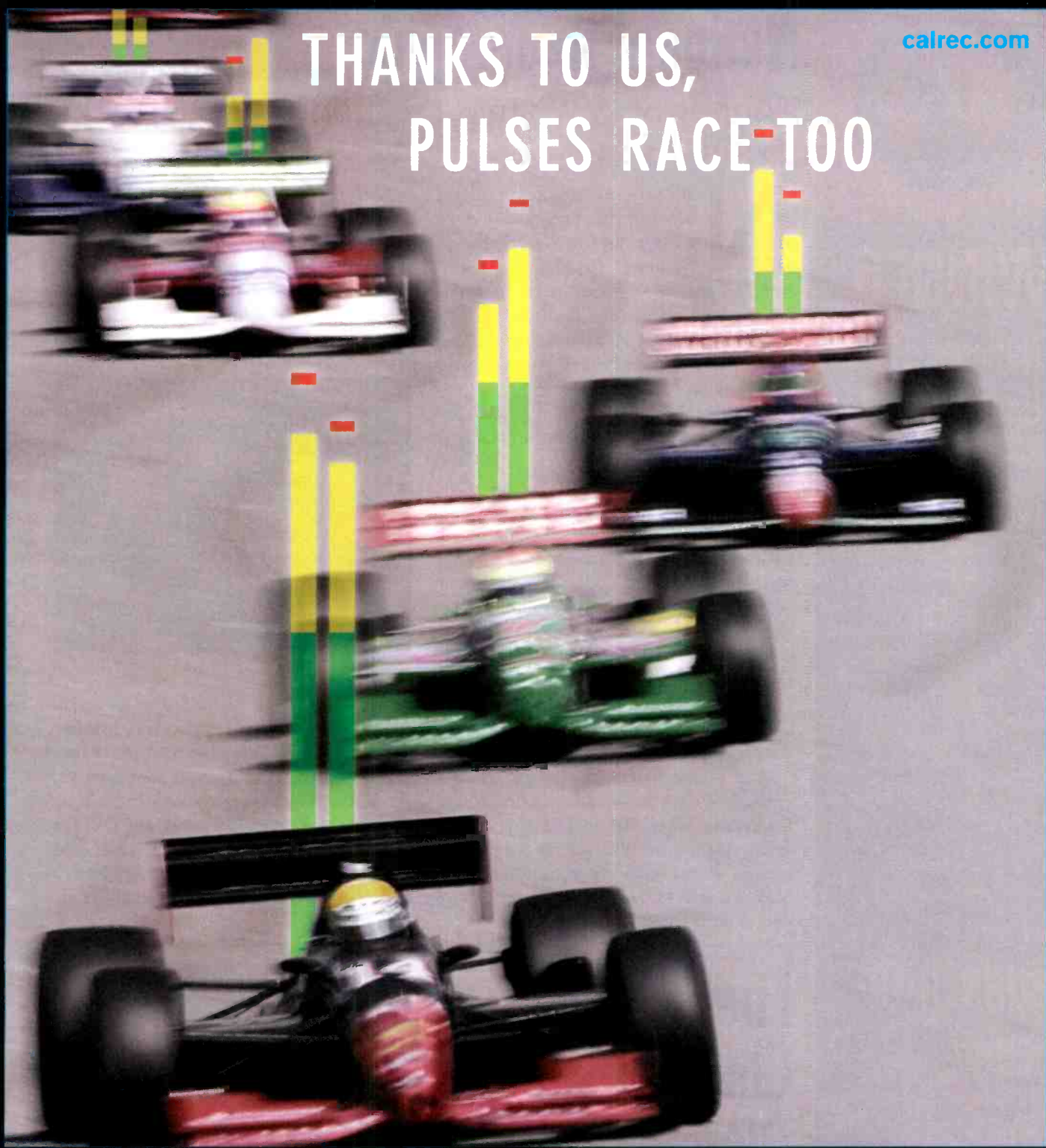
The facility is also home to WPSG-TV, a CW station. KYW produces five-and-a-half hours of news per day in addition to sports specials and charity fund-raisers. When the station's lease was up, the engineering team saw an opportunity to build an efficient, scalable facility that would also be a pleasant place to work. The team knew this would require a different model for storage and work-



flow than the SD model, which would soon be overwhelmed by the density of information HD carries.

Key to the success is the digital workflow anchored by Front Porch Digital's DIVArchive content storage management system, which works with Thomson Grass Valley's Aurora editing suite and a Spectra Logic LTO3 library. ■

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**WINNER:**

**National Geographic**

**Category**

New studio technology  
— nonbroadcast

**Submitted by**

SGI

**RUNNER-UP:**

**Category**

New studio technology  
— nonbroadcast

**Submitted by**

Communications Engineering Inc.

# National Geographic

## Winner of new studio technology — nonbroadcast

**N**ational Geographic Digital Motion, the archive and stock footage licensing agent for all National Geographic Television film and video, wanted to transform its analog video archive and licensing business into a streamlined digital workflow. It has more than a century's worth of moving images from around the world, and new footage, much in HD, arrives all the time. The company's key requirement was the ability to store content and deliver content to the Web in uncompressed formats to maintain the highest possible quality.

National Geographic designed the system and selected the various components. For storage, it contacted OSSI, an SGI channel partner, which suggested SGI InfiniteStorage as the major storage and file-sharing component. The SGI InfiniteStorage CXFS shared filesystem and SGI InfiniteStorage arrays optimize delivery of rich-media content and seamlessly support a variety of complex transactions.

One of the biggest challenges was the amount of data that would be brought into the system. When National Geographic encodes video, three different file formats are created at the same time: uncompressed, MPEG-2 and MPEG-1. The uncompressed data alone is about 100GB per hour.

National Geographic encodes its tapes into an asset management system backed with 34TB shared over two SGI InfiniteStorage TP9300 systems and a later-added additional 35TB of storage on a SGI InfiniteStorage 4000 system. The SGI storage is where operators catalog the clips with



keywords and push them out to an external Web site to allow customers to preview the content and determine their purchases. Once licensed, that content is played out via the SGI SAN and made available in multiple formats, including NTSC, PAL and DVD as before, and now files over FTP. National Geographic will soon be able to encode clips in HD and offer customers all high-definition formats. ■

# First Baptist Church of Glenarden

**I**n September 2007, the First Baptist Church of Glenarden built a new 205,000sq-ft structure that features state-of-the-art live production and broadcast capabilities inside a theater-style sanctuary capable of seating 4000 attendees. Key production system goals for the new facility were to provide high-quality coverage of the services and events; enable fast, efficient distribution of recorded services in various formats on a



large scale; and enhance the worship experience of the attendees and home viewers. The church hired Communications Engineering Inc. (CEI) to design, integrate and install a network-quality live production facility. RCI Sound Systems provided a concert-grade sound system, and RJC Designs developed the original system concept and preliminary design. ■

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# KEYE-TV

## Winner of station automation

One of the biggest challenges a station can face is taking an existing DOS, a highly customized legacy system and replacing it. This is exactly what KEYE-TV had to do this past year in upgrading its facility from the CBS Group-W-designed TMRT system.

There were the usual considerations like master control features, functionality and scalability. Additional system requirements for KEYE included content delivery integration and satellite integration. But, the true test of a system would be its flexibility to integrate and comply with a workflow that was already highly customized.

After an exhaustive search, KEYE found not only everything that it needed, but everything that it wanted in the autoXe automation system from VCI Solutions. The master control functionality and flexibility is there — and then some.

“I’m a computer-oriented person, so when

we started talking about SQL, SOA and true relational databases, I knew the system was carefully thought out with a true understanding of what today and tomorrow’s broadcast environment was going to be like,” said George Todd, KEYE maintenance engineer.

A few of the capabilities that the team at KEYE likes are Video Spy, logging capability, vertical and horizontal view of the delivery manager, and the versatility of the workstations because they can do all jobs. ■



## WINNER:

### KEYE-TV

#### Category

Station automation

#### Submitted by

VCI Solutions

## RUNNER-UP:

#### Category

Station automation

#### Submitted by

Thomson Grass Valley

# WFSB-TV

Meredith’s CBS affiliate WFSB-DT began broadcasting from its new 60,000sq-ft Rocky Hill, CT, HD-SDI plant in June, calling it a broadcast production dream come true. The new facility features all aspects of the production process

on the first floor, streamlining a hectic workflow that formerly included four floors in a 46-year-old building. The rooms feature a variety of Thomson Grass Valley equipment, including nine Aurora Edit SC and XT news editing systems. ■

## RUNNER-UP:

#### Category

Station automation

#### Submitted by

Sundance Digital

# WFUM-TV

To get from a tape-lugging analog facility to fully digital, automated, tapeless multichannel HD at WFUM-TV called for good planning, patience, ingenuity and unique, cost-saving engineering solutions. As the PBS member station licensed to

the Regents of the University of Michigan in Flint, MI, funding arrives intermittently and is never enough to do major projects all at once. Fortunately, the station made the transition in smart phases. At the core is Sundance Digital Titan automation. ■

## RUNNER-UP:

#### Category

Station automation

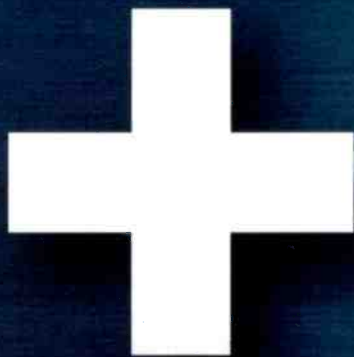
#### Submitted by

Utah Scientific

# WQED-TV

Pittsburgh’s WQED-TV, the first public broadcaster in the nation and home of “Mister Rogers’ Neighborhood,” is now the one of the first HD broadcasters and production centers in its tri-state region, thanks to a major renovation of master con-

trol and editing, as well as new audio and video control rooms. WQED has been transmitting in HD since 2002, but prior to this upgrade, it was only able to transmit PBS’s HD feeds. A Utah Scientific UTAH-400 routing switcher ties the facility together. ■



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# Ascent Media

## Winner of network automation

**WINNER:**

**Ascent Media**

**Category**

Network automation

**Submitted by**

Sundance Digital

**W**hen the additional demands of new business hit Ascent Media, it was time for a bi-coastal upgrade. The organization offers broadcast, cable and satellite network distribution solutions from Stamford, CT, and Burbank, CA. The East Coast Network Origination Center (NOC) has handled distribution for the YES Network, A&E Television Networks and the NFL, and recently added the NHL Network. The West Coast NOC distributes the “Classic Arts Showcase,” a free cable TV program, and added ReelzChannel, a cable and satellite network, to its roster.

The new networks meant that an infusion of advanced, scalable and reliable technology was needed to provide the highest quality transmission service that caters to high-pro-

were added for agile, on-demand stations to accommodate live events as needed.

Each highly scalable configuration drives an Omneon Spectrum server and Harris IconMaster master control switchers for branding. Sundance Digital’s MediaCacher was installed in both locations to efficiently and robotically cache content from tape to the servers.

Although the Titans are near mirror images of each other, some individuality was required to maximize efficiency. The spontaneous nature of the sports networks serviced by Stamford’s playback center required a system responsive to real-time, last-minute playlist changes due to game timeouts, rain delays and the like. Sundance Digital’s NewsRecorder was installed to achieve the live ingest of sporting events for server-based playback.



file sports and entertainment channels. The dynamic nature of sports networks typically requires individual live master control rooms, while entertainment programming needs more efficient multichannel operations.

Ascent Media opted to unify each origination center under the central control of a robust automation configuration. In the end, it chose nearly identical, but individually operated, fully redundant, multichannel Sundance Digital Titan automation solutions.

The new automation systems enable Ascent to add channels easily to Titan as its roster grows. Recently, an additional three channels

In Burbank, Titan drives a Front Porch/StorageTek archive system that is an important component of the entertainment-centric ReelzChannel and “Classic Arts Showcase.”

In Stamford, each channel operates from its own master control room. In Burbank, the networks are managed in a multicustomer room. Both facilities are multicustomer installations and require significant scalability.

The new automation solution cost-effectively increases Ascent’s existing platform to accommodate additional customers without needing to purchase a new automation system each time business grows. ■



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Success is a matter of adjusting one's  
efforts to obstacles, and one's abilities  
to a service needed by others.

---

(Henry Ford)



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# Intelligent Tool

## Winner of newsroom technology

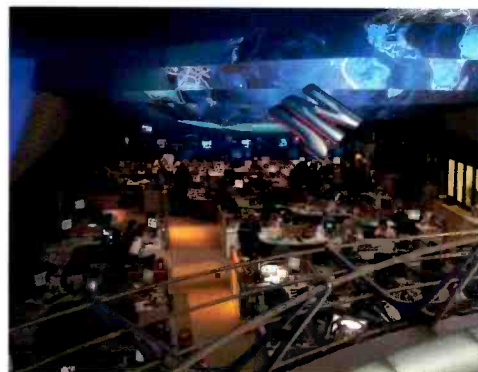
**B**ecause Brazil has continental dimensions, news is the key tool to integrate all regions of the country and is the main GLOBO production, with a total of 58,000 hours per year produced by 3000 journalists. GLOBO's newscast schedule is divided into local and network newscasts from morning to evening. Each affiliate produces up to 13 hours of weekly news for its districts and sends content to network headquarters for broadcast.

Traditionally, content was exchanged via microwave or satellite links in real time, which means booking complexity and limited time windows in expensive communication channels. But since July 2007, GLOBO and its affiliates have operated a customized system to exchange off-air news content using IP technology over a robust and private broadband network.

This Intelligent Tool shares the content produced by each affiliate based on 24/7 operations. All participants are able to search, select, watch low-res content (LR=WM@256Kb/s) and retrieve high-res files (HR=WM@4Mb/s). The system provides security settings for protecting confidential information and defines rights management for content usage. Each affiliate can automatically manage the files' download priority according to its program guide. Other impor-

tant features include archive control, partial retrieval, customized reports and peer-to-peer sharing between affiliates.

The system architecture is comprised of an SQL redundant central database, a redundant central DNS Web server, workstations and MPLS network technology.



All content shared in the new system is available 24/7 over a reliable private network with firewall and cryptography protections, which equates to three times the savings when compared with the booked and rented A/V satellite or microwave links.

The application has a user-friendly Web GUI for the journalists, who can watch the low-res clips before asking for the high-res content, which is transferred at least two times faster than real time. ■

## WINNER:

### Intelligent Tool

#### Category

Newsroom technology

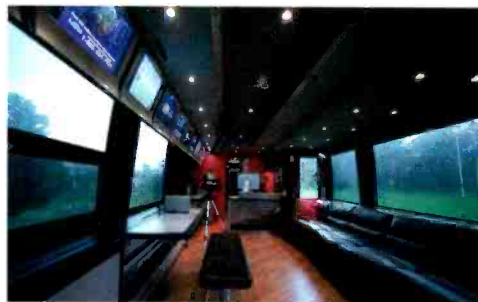
#### Submitted by

TV GLOBO

## CNN

**C**NN first used a mobile news bureau to cover the presidential campaign in 2004, which was a 1980 tour coach. Although crude in design, with folding tables and virtually no connectivity, its potential for much more was obvious. In 2005, CNN decided that a fully customized conversion could provide a premier workspace and give the connectivity that had been missing from the previous coach.

David Bohrman, CNN's Washington, D.C., bureau chief and senior VP, wanted to create a multiuse platform that would provide a combination HD studio, satellite transmission center and newsroom with an editing suite. The project required contributions



across several disciplines. Frontline, a builder of satellite transmission trucks, provided overall project management and installation of the broadcast electronics. Parliament Motor Coach provided coach interior outfitting and chassis modifications. CNN's willingness to think outside the norm in broadcast vehicle design illustrates its commitment to deliver the highest quality news reporting. ■

## RUNNER-UP:

#### Category

Newsroom technology

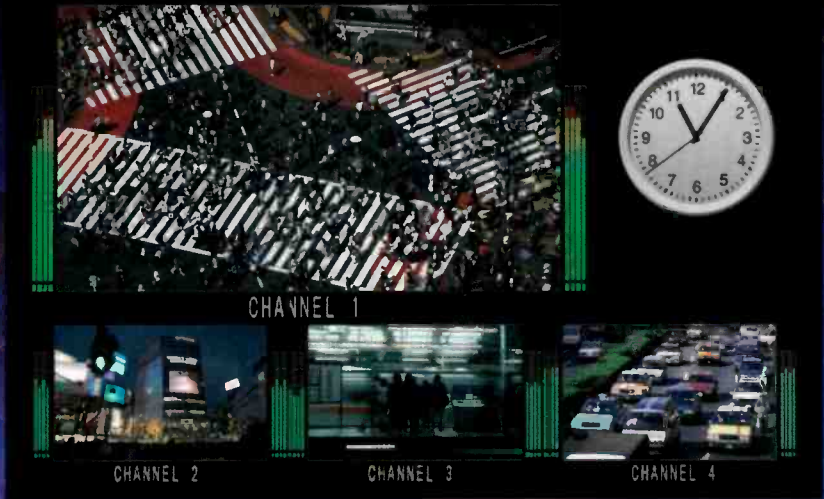
#### Submitted by

CNN/Frontline Communications

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- Support for mixed input of different frame rate signals
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- Includes layout software for size and position of sources as well as pre-set patterns.
- Network video transfer function: LAN interface provided as standard for enabling transfer of output video over the network
- Audio level display: Includes level display function for embedded audio signals superimposed on HD/SD-SDI (8ch display)
- Includes tally display, title display, and time display functions
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# NBA Entertainment

## Winner of post & network production facilities

### WINNER:

### NBA Entertainment

#### Category

Post & network production facilities

#### Submitted by

SGI

**N**BA Entertainment's (NBAE) all-digital, centralized media production and asset management facility in Secaucus, NJ, has been fully functional for more than a year. The SGI-integrated workflow has allowed the NBAE to capture, catalog and store every play as it happens in real time. The SAN, based on an SGI InfiniteStorage CXFS shared filesystem, provides real-time storage for high-res online editing systems while handling low-res proxy and cue management using NBA-written applications. During daily broadcast production, the NBAE ingested more than 45,000 assets into the system over the last year, storing about 30,000 hours of content, or a little more than 1.5 petabytes of data. Those assets are a combination of all of last season's live NBA games and field material, plus historic content.

The volume of asset ingest is significantly more than SGI or NBAE anticipated in the initial system design, which was conceived as having at least two years of built-in growth capacity. The NBAE originally planned to take up to seven years to get the entire archive, dating back to 1946, into digital format. In order to take better advantage of the workflow improvements, the NBAE has accelerated its library conversion. Doubling

the size of the media management system, where material is ingested into the SGI storage using Snell & Wilcox iCR encoders, will allow for as many as 100,000 assets to be ingested annually.

To meet this directive, a second 3000-slot StorageTek SL 8500 robot system is being added, which will take the NBAE's total



nearline capacity to 6000 LTO data tapes and significantly improve workflow by moving data into the system quicker and retrieving data more rapidly. The Fibre Channel fabric is expanding from 128 ports to 192 ports, and the system is migrating from SGI's legacy technology to three SGI Altix 450 systems, each with 16 Intel Itanium 2 processors and 16GB RAM per processor, running Novell SUSE Linux Enterprise Server 10. ■

### RUNNER-UP:

#### Category

Post & network production facilities

#### Submitted by

Communications Engineering Inc.

## Library of Congress

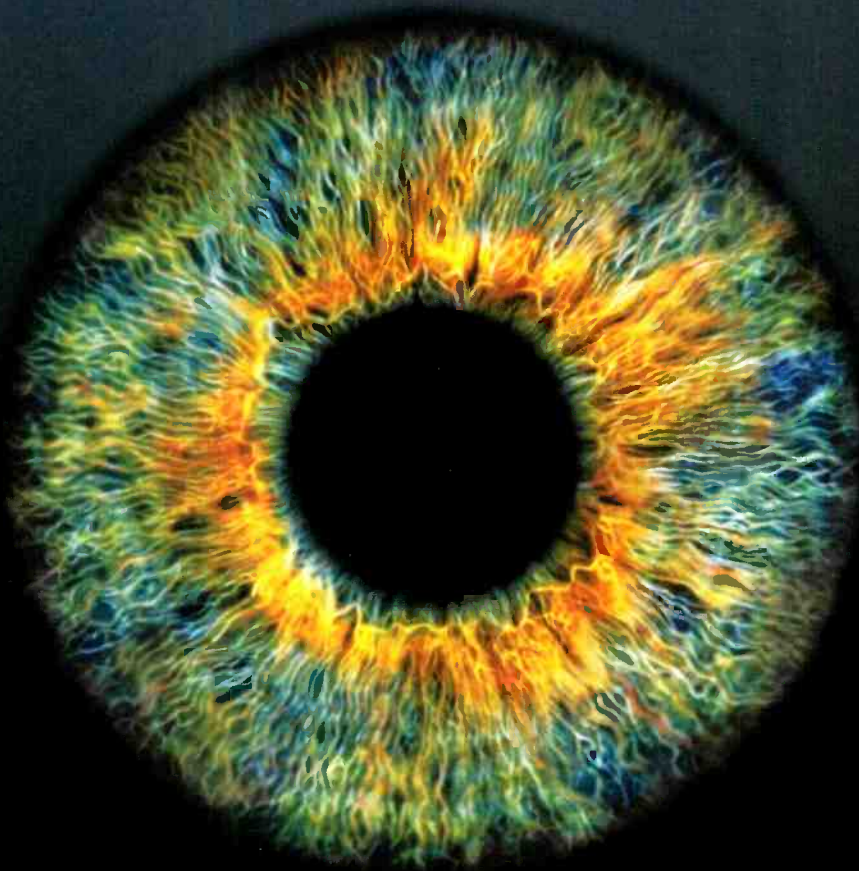
**I**n Culpeper, VA, the Library of Congress' new Packard Campus of the National Audio-Visual Conservation Center (NAVCC) houses the world's largest and most comprehensive collection of films, TV programs, radio broadcasts and sound recordings. It contains underground storage for this entire collection — 5.7 million items — on 90mi of shelving, along with extensive modern facilities for the acquisition, digitization, cataloging and preservation of all audiovisual formats.



The Library of Congress began planning for the NAVCC about 10 years ago. One of the primary goals was the digital duplication and storage of all the items that would be kept at the campus. The Library of Congress hired Communications Engineering Inc. (CEI) to handle the installation and integration of all the equipment. CEI began working on the project in August 2006. ■

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# 30 Rock

## Winner of IPTV and mobile technology

**N**BC Universal receives more than 100 remote feeds to its headquarters in New York City. In the past, these signals were distributed via an analog closed circuit Cat 5 system used for monitoring purposes by the news and sports production staff. This Cat 5 system was available only in key production areas, and every channel of the 850MHz plant was occupied.

Recently MSNBC moved to 30 Rock with an additional 50 new remote feeds that needed to be monitored throughout the facility. Adding to the existing analog system was out of the question. A digital cable (QAM) technology was considered; however, this would require a new digital cable-ready TV or set-top box for every user, a logistical and financial challenge. An IPTV approach operating on the corporate LAN allows all users equal access to content using existing PCs, regardless of the location in the facility.

The system was designed for 200 SD channels, with plans to add more SD and HD channels in the near future. Because bandwidth was a critical factor of the design, H.264 (MPEG-4) compression was chosen. Operating each service at about 1.7Mb/s yields sufficient quality for monitoring purposes yet occupies a reasonably streamlined profile in the GigE backbone.

Careful planning of our network infrastruc-

ture was required. The IPTV traffic shares the same facilities and pipeline as the rest of our corporate data, including e-mail, Web browsing, archiving and various other production tools. We could not afford to disturb any of these. A large task was ensuring that every switch and router was enabled for multicast (IGMP) traffic. We are fortunate that back-



bone was previously upgraded to GigE so bandwidth to each switch was not considered an obstacle.

The benefit of multicasting is that bandwidth is not occupied on a local network segment unless a request for a service is made by a user. No matter how many users on a segment request the same service, that service doesn't require any more bandwidth than the initial request. ■

## WINNER:

### 30 Rock

#### Category

IPTV and mobile technology

#### Submitted by

NBC Universal

## RUNNER-UP:

#### Category

IPTV and mobile technology

#### Submitted by

Ross Video

# Greene HD Productions

**G**reene HD Productions in Arlington, TX, decided after building a prototype from a 1998 converted coach to build a luxury HDTV production mobile from scratch, starting with a Prevost XLII 45ft mobile. Teaming up with Marathon Coach, its design goal provided comfort for VIPs and the work crew by offering a good working/living environment, which saved time. This was achieved by offering as many as 12 HD cameras, two advanced edit stations, in-motion editing, tapeless recording environment, stadium seating in



the production room, an audio mixing cabin, fiber-based HD-SDI cable, a producer's lounge, a full galley/full bath, and sleeping quarters for up to four people. This not only saves on transportation and hotel costs, but allows the crew to work on the next event while in motion as the mobile is fully functional. The coach features Ross Video's Synergy 1.5 multidefinition digital switcher. ■

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### COMING IN APRIL

**VOD: Broadcasters using local cable VOD to extend their digital reach**

Presented by Jim Radmann  
April 8, 2008 – 2:00 pm EST



What at first appears as a cable competitive technology can provide unique and valuable benefits to OTA broadcasters. This cable expert shows TV stations how to integrate the features of VOD with over-the-air scheduling. Broadcasters can benefit from multiple playbacks and commercial exposures and viewers benefit from being able to personally schedule their favorite programs. This session will help operational personnel better understand cable VOD and how it can increase station visibility and improve viewer numbers.

### COMING IN MAY

**IT for engineers**

Presented by Al Kovalic  
May 13, 2008 – 2:00 pm EST



As IT-based equipment becomes increasingly common in broadcast and video equipment, engineers need a better understanding of its underlying technology. Central to that are networking and storage issues. Attend this webcast to learn more about how IT platforms can be leveraged for improved performance for broadcast and high-quality production environments. This course is taught by a world-class author with years of broadcast and IT experience. Don't miss this important learning experience on IT.

# NAB SHOW™

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# IPTV PAVILION

From the editors of **Broadcast Engineering** and **TELEPHONY**

*Broadcast Engineering* and *Telephony* are teaming with NAB to highlight the latest developments in IPTV technology and applications at the upcoming **NAB Show, April 14-17 at the Las Vegas Convention Center**. The event will feature a new conference series and super session aimed at telecommunications and wireless industry professionals, along with a new IPTV Pavilion that will showcase new IPTV products and services.

The NAB Show has named *Broadcast Engineering* and *Telephony* the official media sponsors of the IPTV Pavilion, and to complement the event's expanded focus on IPTV, the editors of the two publications will produce an array of IPTV-focused content for the event, including:

## NAB SHOW IPTV DIRECTORY

This comprehensive guide will be distributed at the IPTV Pavilion and feature profiles of NAB Show exhibitors that serve the IPTV market, product descriptions and additional content and insight on the IPTV sector from the editors of *Telephony* and *Broadcast Engineering*. The directory will give NAB Show attendees a complete overview of the IPTV-focused exhibits and programs at the event.

## IPTV PAVILION WEB SITE

*Telephony* and *Broadcast Engineering* also will host a web site, **[www.iptvpavilion.com](http://www.iptvpavilion.com)**, dedicated to the NAB Show's IPTV Pavilion and featuring complete coverage of the event's IPTV focus and a wide range of editorial content about the IPTV sector.

## IPTV PAVILION E-NEWSLETTERS

The official media sponsors of the NAB Show's IPTV Pavilion also will produce a series of e-newsletters before and during the event that provide additional insight about the IPTV Pavilion and live news coverage of IPTV developments at the 2008 NAB Show.

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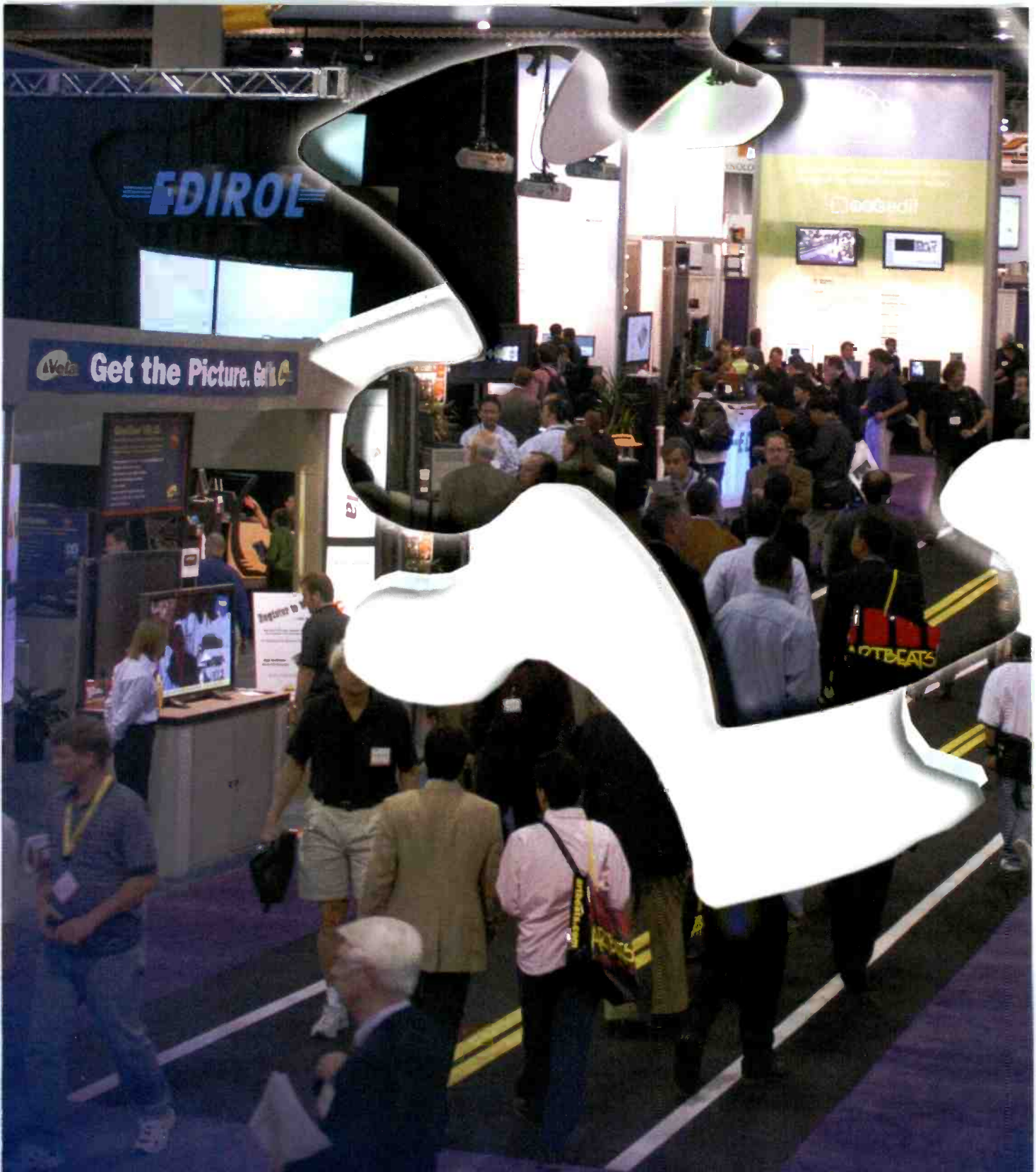
“All the IPTV activity in the industry has serious implications for everyone already in the video entertainment business, as well as for the telecom service providers now trying to use IPTV to break into that business. At the NAB Show, every segment of the IPTV realm will be represented, as the industry in general seeks to sort out a future that right now is bursting with opportunity—but also challenge and risk.”



**BRAD DICK**  
Editor-in-Chief  
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# 2008 FASTtrack



## **SOLVING THE SHOW FLOOR PUZZLE**

With more than 1600 exhibitors to see in just four days, *Broadcast Engineering* is here to help you find the shortest route between point A and point B, while saving your feet.

Our exhibitor map on page 135 gives you an overview of what is where and how far you'll have to trek to get there. In addition, with our FASTtrack section, simply find what you're looking for in our category list to the right. Then go to the indicated page, where you'll find a listing of companies showing that product. For your added convenience, the exhibitors' booth numbers are listed in geographic order. Therefore, scouring the show floor for a particular piece of equipment will be as efficient as possible. Listings are based on information provided to *Broadcast Engineering* by manufacturers. Booth numbers are provided by NAB and are current as of our press deadline.

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**AUDIO ACCESSORIES**

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**Clear-Com** ..... C5908  
 Bexel's Broadcast Video Gear ..... C5912  
 Horita ..... C7311  
 Hannay Reels ..... C7822  
 Wireworks ..... C7924  
 ISIS Group ..... N602  
**Dolby Laboratories**.....N713  
 DPA Microphones.....N730  
**Wohler Technologies** .....N1314  
 Hamlet .....N1531  
 DK - Technologies.....N1533  
 K-Tek .....N2630  
**ESE**.....N3121  
 Audio-Technica U.S. ....N4529  
 Zaxcom .....N4533  
 Sonifex .....N4919  
**Azden**.....N4924  
**Lectrosonics** .....N5223  
 Netia .....N5433  
 RCS .....N5917  
 Klotz Digital Audio Systems .....N5925  
 Prism Media Products .....N5935  
 Logitek Electronic Systems .....N7124  
 JK Audio .....N7929  
 Aviom .....N8236  
**Lawo**.....N8720  
 Henry Engineering.....N9023  
 Gefen.....SL2312  
 Acoustical Solutions.....SL2417  
 Adrienne Electronics.....SL8420  
 Abaltat .....SL9610  
 Whisper Room .....SL10220  
 TASCAM .....SL10328  
 Chief Manufacturing .....SL10830  
**Ward-Beck Systems** .....SU7420  
**Network Electronics** .....SU10814  
 TSL .....SU14615

**AUDIO MIXERS,  
ON-AIR, PORTABLE,  
STUDIO, PLAYBACK**

**Linear Acoustic** ..... C2151  
 Burst Electronics ..... C9032  
 ISIS Group ..... N602  
**Dolby Laboratories**.....N713  
**Harris** .....N2502  
**Stagetec** .....N2835  
**Solid State Logic**.....N4031  
 Zaxcom .....N4533  
 Sonifex .....N4919  
**Azden**.....N4924  
**Euphonix** .....N5217  
 Apex Systems .....N5617  
 Klotz Digital Audio Systems .....N5925  
 Logitek Electronic Systems .....N7124  
 Sound Devices .....N7235  
**Wheatstone** .....N7612  
 Telos Systems .....N7620  
**Studer Soundcraft**.....N8229  
 Aviom .....N8236  
**Lawo**.....N8720

**Calrec Audio**.....N8723  
**Yamaha Audio** ..... SL5710  
 TASCAM ..... SL10328  
**Edirol**..... SL10520  
**Sony Electronics**..... SU 906  
 Pixel Instruments ..... SU3111  
 Dalet Digital Media Systems ..... SU8520

**AUDIO RECORDING,  
STORAGE, PLAYBACK**

**Dolby Laboratories**..... N 713  
 Audio-Technica U.S. ....N4529  
 Zaxcom .....N4533  
 Sonifex .....N4919  
**Euphonix** .....N5217  
 Netia .....N5433  
 Aphex Systems.....N5617  
 RCS .....N5917  
 Sound Devices .....N7235  
**Sennheiser Electronic**.....N8207  
 HHB .....N8207  
 Henry Engineering.....N9023  
 Gefen.....SL2312  
 Digital Vision .....SL3205  
 TASCAM .....SL10328  
**Sony Electronics**.....SU906  
 Pixel Instruments ..... SU3111  
**Digital Broadcast** .....SU6205  
 Nagravision Kudelski Group ..... SU7515  
 EMC .....SU7820  
 Dalet Digital Media Systems.....SU8520  
 Pharos .....SU8905  
**Omneon Video Networks**.....SU9620

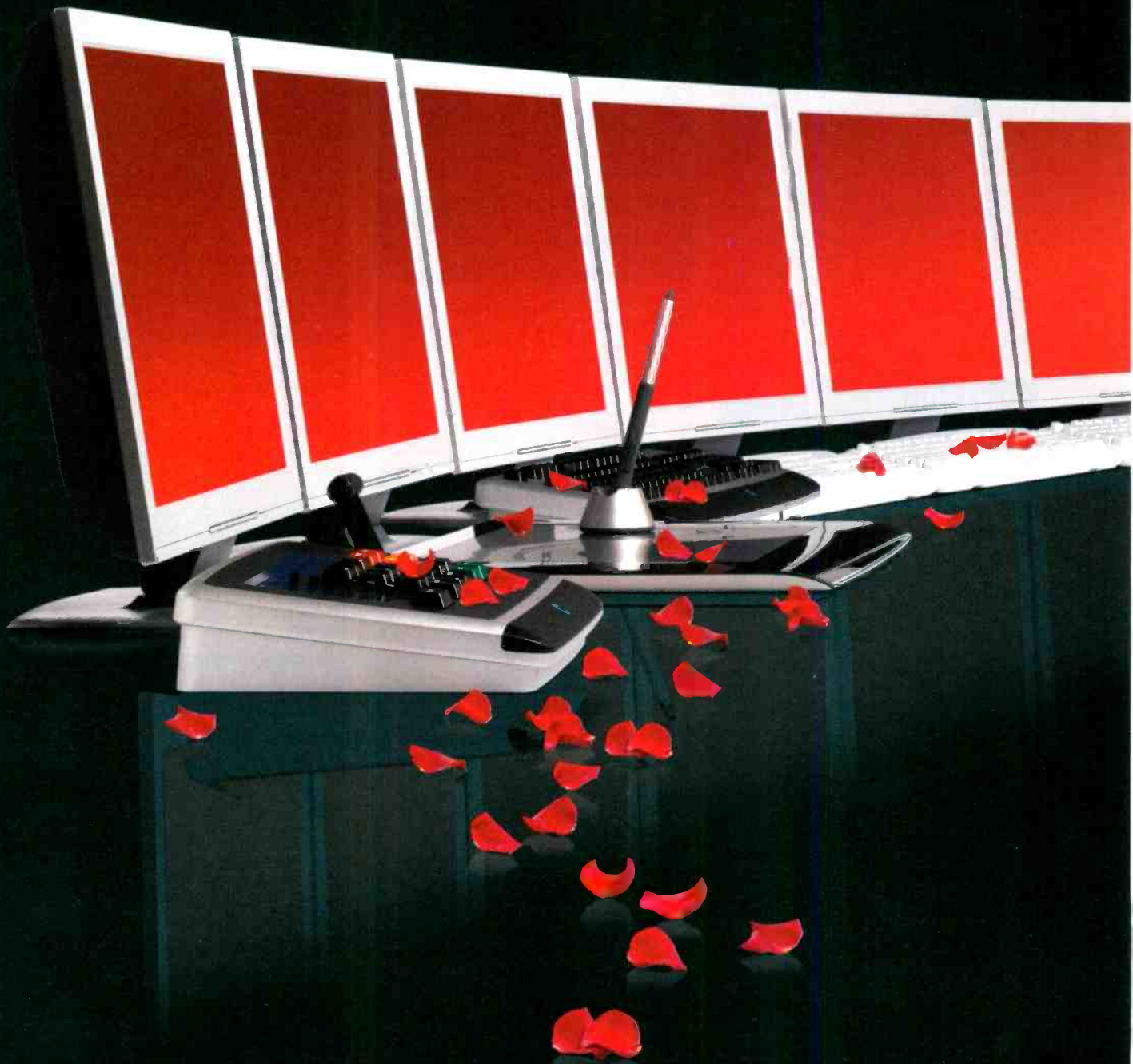
**AUDIO ROUTING,  
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**Linear Acoustic** ..... C2151  
 Bittree ..... C2243  
**Clear-Com**..... C5908  
 Switchcraft ..... C7508  
**Riedel Communications**.....C7511  
 Burst Electronics ..... C9032  
 DNF Controls .....N313  
 ISIS Group .....N602  
 Crystal Vision .....N610  
**Dolby Laboratories**.....N713  
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**Wheatstone** .....N7612  
**Sennheiser Electronic**.....N8207  
 HHB .....N8207

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 Gefen.....SL2312  
 Sierra Video Systems .....SL4305  
**Communications Specialties** ..... SL8025  
 TASCAM .....SL10328  
**Ensemble Designs**.....SU2326  
 Image Video.....SU3305  
**Telecast Fiber Systems**.....SU4227  
 Eyeheight .....SU5905  
**Ross Video** .....SU6010  
**Miranda Technologies**.....SU6811  
**Ward-Beck Systems** .....SU7420  
 EMC .....SU7820  
 Wegener .....SU7911  
 Dalet Digital Media Systems.....SU8520  
 Pharos .....SU8905  
**Network Electronics** .....SU10814  
**NVISION**.....SU11620

**AUTOMATION, INCLUDING  
NEWS AND MASTER  
CONTROL**

**EVS** ..... C4911  
 Telescript..... C5933  
 Vinten Radamec..... C6414  
 Innovision Optics ..... C8124  
 DNF Controls..... N313  
 Pilat Media North America .....N323  
**Thomson** .....N914  
 Front Porch Digital .....N1830  
**Harris** .....N2502  
 Octopus Newsroom Trading .....N2838  
 Broadway Systems .....N3135  
 SintecMedia .....N3138  
**Utah Scientific**.....N3531  
**VSN/JustEdit**.....N3714  
 Masterclock .....N4121  
 Netia .....N5433  
 RCS .....N5917  
 Klotz Digital Audio Systems .....N5925  
 Sierra Automated Systems .....N6520  
 Broadcast Software International.....N9111  
**Thomson** ..... SL106  
 VDS .....SL124  
**Quantel** ..... SL720  
**Thomson** ..... SL2120  
**ScheduAll Software**..... SL2308  
 Anystream.....SL2608  
 Ultimatte .....SL4920  
**Telestream** ..... SL5405  
 Adtec Digital.....SL6110  
**BitCentral**..... SL7720  
 Chief Manufacturing .....SL10830  
**Avocent** ..... SL13016  
**VCI Solutions**.....SU727  
 Orad Hi-Tec Systems .....SU1920  
 Cinegy .....SU3113  
 Konan Digital .....SU3605  
**OmniBus Systems** .....SU4205  
 Leightronix .....SU5010  
**Crispin**.....SU5408



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<b>Ross Video</b> .....	<b>SU6010</b>
<b>Digital Broadcast</b> .....	<b>SU6205</b>
<b>Miranda Technologies</b> .....	<b>SU6811</b>
Florical Systems .....	SU6820
Dalet Digital Media Systems .....	SU8520
Irdeto .....	SU8811
Pharos .....	SU8905
Videoframe .....	SU9027
Video Technics .....	SU9227
AZCAR .....	SU11005
<b>PlayBox Technology</b> .....	<b>SU11308</b>
Hi Tech Systems .....	SU11515
Blue Order Solutions .....	SU11711
Fission Software .....	SU12708
<b>Pro-Bel</b> .....	<b>SU12712</b>
Masstech Group .....	SU13813
<b>Obor Digital</b> .....	<b>SU14605</b>
Pebble Beach Systems .....	SU15205
Controlware Comm. Sys. ....	SU15215
Eyeheight .....	SU5906

**CABLE TV EQUIPMENT**

DVB .....	C2239
<b>EVS</b> .....	<b>C4911</b>
Comtech EF Data .....	C5942
Egripment .....	C6911
Horita .....	C7311
Volicon .....	N2514
<b>Opticomm</b> .....	<b>N3718</b>
Patriot Antenna Systems .....	OE103
Adtec Digital .....	SL6110
Broaddata Communications .....	SU3107
<b>TANDBERG Television</b> .....	<b>SU4210</b>
Motorola .....	SU5013
<b>Triveni Digital</b> .....	<b>SU5605</b>
Scientific Atlanta .....	SU6120
Miravid .....	SU6906
Nagravision Kudelski Group .....	SU7515
Irdeto .....	SU8811
Harmonic .....	SU9612
NTT Electronics .....	SU10220
ViACCESS .....	SU10226
<b>Scopus Video Networks</b> .....	<b>SU11228</b>
SeaChange International .....	SU12011

**CAMERA SUPPORT, ROBOTICS, VIRTUAL SETS**

<b>Fujinon</b> .....	<b>C4210</b>
Miller Camera Support .....	C4928
<b>Hitachi Kokusai Electric</b> .....	<b>C 5018</b>
Frezzi Energy Systems .....	C5023
Anton/Bauer .....	C5917
Bogen Imaging .....	C5922
Gitzo .....	C5924
Telescript .....	C5933
Manfrotto .....	C6225
<b>Camera Dynamics</b> .....	<b>C6408</b>
Sachtler .....	C6410
Vinten .....	C6412
Vinten Radamec .....	C6414
OConnor .....	C6418
Spider Support Systems .....	C6915
<b>Telemetrics</b> .....	<b>C6933</b>
Shotoku Broadcast Systems .....	C7515
Innovision Optics .....	C8124

Abel Cine Tech .....	C8508
Glidecam Industries .....	C10315
Vizrt .....	R129
Media 3 .....	R327
Vizrt .....	SL4805
<b>Teletream</b> .....	<b>SL5405</b>
Hybrid MC .....	SL13216
Orad Hi-Tec Systems .....	SU1920
<b>Telecast Fiber Systems</b> .....	<b>SU4227</b>
<b>FOR-A</b> .....	<b>SU5220</b>
Complex .....	SU11514

**CAMERAS, LENSES, ACCESSORIES**

TRON-Tek .....	C1336
Link Research .....	C1807B
<b>Broadcast Microwave Services</b> .....	<b>C2329</b>
Cine Bags .....	C3254
<b>Panasonic Broadcast</b> .....	<b>C3512</b>
<b>Fujinon</b> .....	<b>C4210</b>
JVC Professional Products .....	C4218
<b>Ikegami Electronics</b> .....	<b>C4228</b>
<b>Hitachi Kokusai Electric</b> .....	<b>C5018</b>
Thales Angenieux .....	C5323
Bexel's Broadcast Video Gear .....	C5912
Anton/Bauer .....	C5917
Bogen Imaging .....	C5922
KATA .....	C5923
Formatt .....	C6222
Schneider Optics .....	C6233
Petrol Bags .....	C6416
<b>Telemetrics</b> .....	<b>C6933</b>
ARRI .....	C7428
<b>IDX System Technology</b> .....	<b>C8032</b>
Lemo USA .....	C8119
Innovision Optics .....	C8124
Camera Corps .....	C8137
Abel Cine Tech .....	C8508
I-Movix .....	C11819E
<b>Thomson</b> .....	<b>N914</b>
K-Tek .....	N2630
Media 3 .....	R327
<b>Thomson</b> .....	<b>SL106</b>
<b>Thomson</b> .....	<b>SL2120</b>
<b>Sony Electronics</b> .....	<b>SU906</b>
Band Pro Film & Digital .....	SU1320
<b>Canon</b> .....	<b>SU3020</b>
16x9 .....	SU3310
<b>Iconix Video</b> .....	<b>SU6426</b>
<b>Miranda Technologies</b> .....	<b>SU6811</b>
Teranex .....	SU10924
AZCAR .....	SU11005
Complex .....	SU11514

**CGS, PROMPTERS, CAPTIONING**

QTV/Autocue .....	C5333
Telescript .....	C5933
Listec Video .....	C6533
Horita .....	C7311
Burst Electronics .....	C9032
<b>Evertz</b> .....	<b>N1713</b>
<b>Harris</b> .....	<b>N2502</b>
<b>VSN/JustEdit</b> .....	<b>N3714</b>

Spencer Technologies .....	N3836
Broadcast Software International .....	N9111
Vizrt .....	R129
Chyron .....	SL3713
Vizrt .....	SL4805
Compix Media .....	SL8205
EEG Enterprises .....	SL11215
<b>Miranda Technologies</b> .....	<b>SU6811</b>
SoftNI .....	SU9024
Pixel Power .....	SU10920
Cavena Image Products .....	SU11008
Screen Subtitling Systems .....	SU11808
SysMedia .....	SU14316
Eyeheight .....	SU5906

**CONSULTING SERVICES, TECHNICAL ENGINEERING**

DVB .....	C2239
ND SatCom .....	C4849
TV Magic .....	N2136
<b>VSN/JustEdit</b> .....	<b>N3714</b>
Patchamp .....	N4617
Media 3 .....	R327
SGI (Silicon Graphics) .....	SL4314
Orad Hi-Tec Systems .....	SU1920
Pixel Instruments .....	SU3111
<b>Crispin</b> .....	<b>SU5408</b>
Scientific Atlanta .....	SU6120
EMC .....	SU7820
Harmonic .....	SU9612
AZCAR .....	SU11005

**FILM EQUIPMENT, DUPLICATION, DISTRIBUTION EQUIPMENT**

<b>EVS</b> .....	<b>C4911</b>
Abel Cine Tech .....	C8508
<b>Thomson</b> .....	<b>N914</b>
<b>Evertz</b> .....	<b>N1713</b>
<b>Thomson</b> .....	<b>SL106</b>
<b>Quantel</b> .....	<b>SL720</b>
<b>Thomson</b> .....	<b>SL2120</b>
da Vinci Systems .....	SL2620
Digital Vision .....	SL3205
Video Accessory .....	SU3413
eMotion Engines .....	SU9206
NTT Electronics .....	SU10220

**GRAPHICS, ANIMATION PRODUCTS**

<b>Panasonic Broadcast</b> .....	<b>C3512</b>
Accuweather .....	C6428
Burst Electronics .....	C9032
DNF Controls .....	N313
<b>Harris</b> .....	<b>N2502</b>
Broadcast Software International .....	N9111
Vizrt .....	R129
VDS .....	SL124
<b>Quantel</b> .....	<b>SL720</b>

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<b>AJA Video</b> .....	<b>SL1413</b>
Autodesk .....	SL1420
Digital Anarchy .....	SL2128C
da Vinci Systems .....	SL2620
Chyron .....	SL3713
SGI (Silicon Graphics) .....	SL4314
Vizrt .....	SL4805
Ultimatte .....	SL4920
e-mediavision.com .....	SL11005
Hybrid MC .....	SL13216
GenArts .....	SL14516
Orad Hi-Tec Systems .....	SU1920
Orad Hi-Tec Systems .....	SU1920
<b>FOR-A</b> .....	<b>SU5220</b>
<b>Miranda Technologies</b> .....	<b>SU6811</b>
<b>AJA Video</b> .....	<b>SU7105</b>
eMotion Engines .....	SU9206
Video Technics .....	SU9227
<b>PlayBox Technology</b> .....	<b>SU11308</b>
Eyeheight .....	SU5906

**INTERCOM,  
IFB PRODUCTS**

HME .....	C3022
<b>Eartec</b> .....	<b>C4046</b>
<b>Clear-Com</b> .....	<b>C5908</b>
<b>Telex</b> .....	<b>C5928</b>
<b>Riedel Communications</b> .....	<b>C7511</b>
Television Engineering .....	C8632
AVT Audio Video Technologies .....	C9619B
IntraCom System .....	C9512
Comrex .....	N2125
<b>Opticomm</b> .....	<b>N3718</b>
Sierra Automated Systems .....	N6520
JK Audio .....	N7929
Broadata Communications .....	SU3107
<b>Telecast Fiber Systems</b> .....	<b>SU4227</b>
HME .....	SU10626

**LIGHTING EQUIPMENT**

Frezzi Energy Systems .....	C5023
Anton/Bauer .....	C5917
Bogen Imaging .....	C5922
Avenger .....	C5925
Reflecmedia .....	C6223
Gossen .....	C6224
Abel Cine Tech .....	C8508
Dedotec USA .....	C9132
<b>Kino Flo Lighting Systems</b> .....	<b>C9419</b>
<b>Videssence</b> .....	<b>C9508</b>
K5600 .....	C9715
ARRI .....	C6929
Sabre Towers & Poles .....	N5938
Brightline .....	SU5027
Light Tech Group .....	SU14414

**MICROPHONES,  
ACCESSORIES**

<b>Panasonic Broadcast</b> .....	<b>C3512</b>
Bogen Imaging .....	C5922
Gitzo .....	C5924
<b>Riedel Communications</b> .....	<b>C7511</b>

Lemo USA .....	C8119
DPA Microphones .....	N730
Audio-Technica U.S. .....	N4529
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<b>Azden</b> .....	<b>N4924</b>
<b>Lectionics</b> .....	<b>N5223</b>
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Beyerdynamic .....	N7917
<b>Sennheiser Electronic</b> .....	<b>N8207</b>
HHB .....	N8207
Media 3 .....	R327
<b>Marshall Electronics</b> .....	<b>SU1926</b>
Broadata Communications .....	SU3107
<b>FOR-A</b> .....	<b>SU5220</b>
<b>Miranda Technologies</b> .....	<b>SU6811</b>

**MULTI-IMAGE DISPLAYS**

<b>Evertz</b> .....	<b>N1713</b>
NEC Display Solutions .....	N1725
<b>Harris</b> .....	<b>N2502</b>
Barco .....	SL3213
Image Video .....	SU3305
Miravid .....	SU6906
<b>Avitech International</b> .....	<b>SU13215</b>

**NEW MEDIA, STREAMING  
PRODUCTS, MULTIMEDIA/  
INTERNET**

Stream Guys .....	C1848
DVB .....	C2239
Logic Innovations/Sys Tech. ....	C4546
Radyne-Tiernan-Xicom .....	C4842
Accuweather .....	C6428
<b>Thomson</b> .....	<b>N914</b>
<b>Sencore</b> .....	<b>N1122</b>
Volicon .....	N2514
<b>VSN/JustEdit</b> .....	<b>N3714</b>
Sonifex .....	N4919
<b>Sennheiser Electronic</b> .....	<b>N8207</b>
HHB .....	N8207
APT .....	N8811
<b>Thomson</b> .....	<b>SL106</b>
<b>Thomson</b> .....	<b>SL2120</b>
Anystream .....	SL2608
Digital Vision .....	SL3205
Chyron .....	SL3713
<b>Telestream</b> .....	<b>SL5405</b>
Microsoft .....	SL5520
Adtec Digital .....	SL6110
Celco .....	SL6626
VELA .....	SL7712
Inlet Technologies .....	SL8325
Digital Rapids .....	SL8724
VBrick Systems .....	SL11614
<b>ViewCast</b> .....	<b>SL13109</b>
<b>Sony Electronics</b> .....	<b>SU906</b>
SAMMA Systems .....	SU2720
Cinegy .....	SU3113
Optibase .....	SU3811
<b>Snell &amp; Wilcox</b> .....	<b>SU4220</b>
<b>Crispin</b> .....	<b>SU5408</b>
<b>Triveni Digital</b> .....	<b>SU5605</b>
IPV .....	SU6330
<b>Miranda Technologies</b> .....	<b>SU6811</b>

Floral Systems .....	SU6820
Miravid .....	SU6906
EMC .....	SU7820
Wegener .....	SU7911
Radyne-Tiernan-Xicom .....	SU7915
IPV .....	SU8608
Irdeto .....	SU8811
S&T (Strategy & Technology) .....	SU9306
Harmonic .....	SU9612
NTT Electronics .....	SU10220
<b>Fujitsu</b> .....	<b>SU10928</b>
AZCAR .....	SU11005
Screen Subtitling Systems .....	SU11808
<b>Sencore</b> .....	<b>SU12108</b>
Envivio .....	SU13205
<b>Streambox</b> .....	<b>SU15515</b>

**POWER PRODUCTS,  
BATTERIES, GENERATORS**

Superior Broadcast Products .....	C1107
Active Power .....	C3036
Frezzi Energy Systems .....	C5023
Anton/Bauer .....	C5917
<b>IDX System Technology</b> .....	<b>C8032</b>
Abel Cine Tech .....	C8508
Staco Energy Products Company .....	N4218
Kay Industries .....	N7222
16x9 .....	SU3310

**PRODUCTION SWITCHERS,  
VIDEO EFFECTS, KEYS**

L-3 Electron Devices .....	C3018
<b>Ikegami Electronics</b> .....	<b>C4228</b>
Logic Innovations/ Sys Technologies .....	C4546
Laird Telemedia .....	C4646
Bexel's Broadcast Video Gear .....	C5912
Bogen Imaging .....	C5922
ISIS Group .....	N602
Crystal Vision .....	N610
<b>Thomson</b> .....	<b>N914</b>
<b>ESE</b> .....	<b>N3121</b>
Spencer Technologies .....	N3836
<b>Small Tree Communications</b> .....	<b>N3937</b>
<b>Thomson</b> .....	<b>SL106</b>
<b>Thomson</b> .....	<b>SL2120</b>
RGB Spectrum .....	SL2315
<b>Analog Way</b> .....	<b>SL4623</b>
<b>Snell &amp; Wilcox</b> .....	<b>SU4220</b>
<b>FOR-A</b> .....	<b>SU5220</b>
<b>Ross Video</b> .....	<b>SU6010</b>
<b>Miranda Technologies</b> .....	<b>SU6811</b>
Echolab .....	SU9607
<b>Broadcast Pix</b> .....	<b>SU10605</b>
Brick House Video .....	SU10811
AZCAR .....	SU11005
<b>NVISION</b> .....	<b>SU11620</b>
<b>Pro-Bel</b> .....	<b>SU12712</b>
Eyeheight .....	SU5906

**RECORDING MEDIA**

<b>Ikegami Electronics</b> .....	<b>C4228</b>
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Bexel's Broadcast Video Gear .....	C5912
<b>Maxell .....</b>	<b>C8428</b>
Volicon .....	N2514
Fast Forward Video .....	N2519
<b>VSN/JustEdit .....</b>	<b>N3714</b>
Spencer Technologies .....	N3836
<b>Sennheiser Electronic .....</b>	<b>N8207</b>
HHB .....	N8207
Focus Enhancements .....	SL2605
VELA .....	SL7712
<b>Edirol .....</b>	<b>SL10520</b>
Videomagnetics .....	SU5020
<b>Crispin .....</b>	<b>SU5408</b>
<b>Digital Broadcast .....</b>	<b>SU6205</b>
Dalet Digital Media Systems .....	SU8520

### SATELLITE EQUIPMENT, SERVICES

<b>Microwave Radio Comm. ....</b>	<b>C1807</b>
Advent Communications .....	C1807A
L-3 Electron Devices .....	C3018
<b>NPR Satellite Services .....</b>	<b>C4237</b>
Logic Innovations/Sys Technologies ...	C4546
Intelsat .....	C4837
Radyme-Tiernan-Xicom .....	C4842
ND SatCom .....	C4849
SES Americom .....	C5246
Frontline Communications .....	C8422
Quintech Electronics and Comm. ...	C8737
MCL .....	C9737
Miteq/MCL .....	C9737
Patriot Antenna Systems .....	OE103
Intelsat .....	OE346
Stratos .....	OE400
Intelsat .....	OE402
<b>ScheduAll Software .....</b>	<b>SU2308</b>
<b>TANDBERG Television .....</b>	<b>SU4210</b>
Motorola .....	SU5013
<b>Crispin .....</b>	<b>SU5408</b>
Scientific Atlanta .....	SU6120
Wegener .....	SU7911
Radyme-Tiernan-Xicom .....	SU7915
Irdeto .....	SU8811
Harmonic .....	SU9612
NTT Electronics .....	SU10220
ViACCESS .....	SU10226
<b>Fujitsu .....</b>	<b>SU10928</b>
AZCAR .....	SU11005
<b>Scopus Video Networks .....</b>	<b>SU11228</b>

### STUDIO, FACILITY SUPPORT PRODUCTS

Bittree .....	C2243
<b>Nucomm .....</b>	<b>C3007</b>
RTI-Research Technology .....	C3851
Laird Telemedia .....	C4646
Leader Instruments .....	C4932
Bogen Imaging .....	C5922
Telescript .....	C5933
<b>RF Central .....</b>	<b>C6622</b>
<b>Nucomm .....</b>	<b>C6622A</b>
Horita .....	C7311
Switchcraft .....	C7508
<b>Riedel Communications .....</b>	<b>C7511</b>

Shotoku Broadcast Systems .....	C7515
Wireworks .....	C7924
Lemo USA .....	C8119
<b>Wohler Technologies .....</b>	<b>N1314</b>
Hamlet .....	N1531
<b>ESE .....</b>	<b>N3121</b>
Spencer Technologies .....	N3836
<b>Small Tree Communications .....</b>	<b>N3937</b>
Masterclock .....	N4121
<b>ADC .....</b>	<b>N4124</b>
Netia .....	N5433
<b>Sennheiser Electronic .....</b>	<b>N8207</b>
HHB .....	N8207
<b>Nucomm .....</b>	<b>OE432</b>
Media 3 .....	R327
<b>AJA Video .....</b>	<b>SL1413</b>
Thinklogical .....	SL2009
<b>ScheduAll Software .....</b>	<b>SL2308</b>
Gefen .....	SL2312
RGB Spectrum .....	SL2315
Digital Vision .....	SL3205
Barco .....	SL3213
Christie Digital Systems .....	SL6113
<b>TBC Consoles .....</b>	<b>SL6709</b>
Martin & Ziegler .....	SL7407
Boland Communications .....	SL7725
Chief Manufacturing .....	SL10830
<b>Avocent .....</b>	<b>SL13016</b>
Ascent Media .....	SU720
<b>Marshall Electronics .....</b>	<b>SU1926</b>
<b>Ensemble Designs .....</b>	<b>SU2326</b>
Forecast Consoles .....	SU2723
<b>TBC Consoles .....</b>	<b>SU2729</b>
B&H Photo-Video-Pro Audio .....	SU2905
Image Video .....	SU3305
IBM .....	SU3614
<b>TANDBERG Television .....</b>	<b>SU4210</b>
<b>Telecast Fiber Systems .....</b>	<b>SU4227</b>
<b>Crispin .....</b>	<b>SU5408</b>
Stantron .....	SU5613
Winsted .....	SU5616
<b>AJA Video .....</b>	<b>SU7105</b>
<b>Ward-Beck Systems .....</b>	<b>SU7420</b>
Pharos .....	SU8905
Videoframe .....	SU9027
Middle Atlantic Products .....	SU10205
AZCAR .....	SU11005
<b>NVISION .....</b>	<b>SU11620</b>
Statmon Technologies .....	SU13805
Eyeheight .....	SU5906

### TBCs, FRAME SYNCs, CONVERSION EQUIPMENT

Laird Telemedia .....	C4646
Intelsat .....	C4837
Bexel's Broadcast Video Gear .....	C5912
ISIS Group .....	N 602
Crystal Vision .....	N 610
<b>Thomson .....</b>	<b>N914</b>
<b>Wohler Technologies .....</b>	<b>N1314</b>
<b>Evertz .....</b>	<b>N1713</b>
<b>Cobalt Digital .....</b>	<b>N2819</b>
<b>ESE .....</b>	<b>N3121</b>
<b>ADC .....</b>	<b>N4124</b>
Sonifex .....	N4919
Intelsat .....	OE346

Intelsat .....	OE402
<b>Thomson .....</b>	<b>SL106</b>
<b>AJA Video .....</b>	<b>SL1413</b>
<b>Thomson .....</b>	<b>SL2120</b>
RGB Spectrum .....	SL2315
Digital Vision .....	SL3205
Data Check Video .....	SL3705
<b>Telestream .....</b>	<b>SL5405</b>
Convergent Design .....	SL7828
<b>Edirol .....</b>	<b>SL10520</b>
<b>Ensemble Designs .....</b>	<b>SU2326</b>
SAMMA Systems .....	SU2720
Pixel Instruments .....	SU3111
Hotronic .....	SU3308
<b>Snell &amp; Wilcox .....</b>	<b>SU4220</b>
<b>FOR-A .....</b>	<b>SU5220</b>
<b>Ross Video .....</b>	<b>SU6010</b>
<b>Doremi Labs .....</b>	<b>SU6026</b>
<b>Miranda Technologies .....</b>	<b>SU6811</b>
<b>AJA Video .....</b>	<b>SU7105</b>
<b>Ward-Beck Systems .....</b>	<b>SU7420</b>
Videoframe .....	SU9027
Echolab .....	SU9607
Brick House Video .....	SU10811
<b>Network Electronics .....</b>	<b>SU10814</b>
Teranex .....	SU10924
Ligos .....	SU11805
<b>Pro-Bel .....</b>	<b>SU12712</b>
Lynx Technik .....	SU14609
Eyeheight .....	SU5906

### TELCO, IPTV AND MOBILE VIDEO EQUIPMENT

<b>Screen Service .....</b>	<b>C1324</b>
TRON-Tek .....	C1336
<b>Microwave Radio Comm. ....</b>	<b>C1807</b>
N Systems .....	C1815
<b>Broadcast Microwave Services .....</b>	<b>C2329</b>
Larcam USA .....	C2618
Global Microwave Systems .....	C3318
<b>Ikegami Electronics .....</b>	<b>C4228</b>
<b>Riedel Communications .....</b>	<b>C7511</b>
AVT Audio Video Technologies .....	C9619B
Miteq/MCL .....	C9737
Crystal Vision .....	N610
<b>Thomson .....</b>	<b>N914</b>
<b>Score .....</b>	<b>N1122</b>
<b>Evertz .....</b>	<b>N1713</b>
<b>Harris .....</b>	<b>N2502</b>
Volicon .....	N2514
<b>Opticomm .....</b>	<b>N3718</b>
<b>ADC .....</b>	<b>N4124</b>
FiberPlex .....	N8433
Media 3 .....	R327
<b>Thomson .....</b>	<b>SL106</b>
<b>Thomson .....</b>	<b>SL2120</b>
Atto Technology .....	SL4320
<b>Telestream .....</b>	<b>SL5405</b>
Microsoft .....	SL5520
Adtec Digital .....	SL6110
<b>Communications Specialties .....</b>	<b>SL8025</b>
<b>Canon .....</b>	<b>SU3020</b>
<b>TANDBERG Television .....</b>	<b>SU4210</b>
DVEO/Computer Modules .....	SU4928
<b>Triveni Digital .....</b>	<b>SU5605</b>
Scientific Atlanta .....	SU6120



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Miravid .....SU6906  
EMC.....SU7820  
Wegener .....SU7911  
Harmonic .....SU9612  
NTT Electronics .....SU10220  
Brick House Video .....SU10811  
**Network Electronics .....SU10814**  
**Enensys Technologies.....SU11111**  
**Scopus Video Networks.....SU11228**  
Camplex.....SU11514  
**Sencore .....SU12108**  
**Sencore .....SU12108**

**TEST & MEASUREMENT  
EQUIPMENT**

DVB .....C2239  
Z Technology.....C2939  
Leader Instruments.....C4932  
DSC Laboratories.....C5512  
Bexel's Broadcast Video Gear .....C5912  
Horita .....C7311  
Narda Safety Test Solutions .....C8741  
Burst Electronics .....C9032  
**Rohde & Schwarz .....C1539**  
**Rohde & Schwarz .....C1933**  
DNF Controls.....N313  
K-WILL .....N319  
**Sencore .....N1122**  
**Wohler Technologies .....N1314**  
Hamlet .....N1531  
DK - Technologies.....N1533  
**Harris .....N2502**  
Volicon.....N2514  
Tektronix .....N2520  
**ESE .....N3121**  
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Mediaproxy .....N3536  
Prism Media Products .....N5935  
**Bird Technologies Group .....N6138**  
Audemat- Aztec.....N7932  
Data Check Video .....SL3705  
XOrbit.....SL6226  
Image Video.....SU3305  
Hotronic .....SU3308  
**TANDBERG Television .....SU4210**  
**Triveni Digital.....SU5605**  
**Doremi Labs.....SU6026**  
**Miranda Technologies.....SU6811**  
Miravid .....SU6906  
JDSU .....SU7226  
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Enensys Technologies .....SU11111  
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Pixelmetrix .....SU12105  
Eyeheight .....SU5906

**TV TRANSMITTERS,  
FEEDLINE, ANTENNAS,  
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**Axcera .....C1307**  
Richland Towers.....C1314  
**Screen Service .....C1324**

TRON-Tek .....C1336  
E2V .....C1718  
**Microwave Radio Comm. ....C1807**  
Dielectric Communications .....C1918  
Myat .....C2215  
DVB .....C2239  
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Propagation Systems (PSI) .....C2324  
**Broadcast Microwave Services....C2329**  
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Larcán USA .....C2618  
Micro Communications (MCI) .....C2624  
DMT USA.....C2628  
Radian Communication Services....C2632  
**Nucomm.....C3007**  
L-3 Electron Devices .....C3018  
**Teamcast.....C3020**  
Radyne-Tiernan-Xicom.....C4842  
ND SatCom .....C4849  
Kathrein, Scala Division.....C5508  
Comtech EF Data .....C5942  
Thales Components.....C5946  
**RF Central.....C6622**  
**Nucomm.....C6622A**  
Advanced Designs .....C7433  
Acrodyne Industries Inc .....C7842  
**Rohde & Schwarz .....C1539**  
**Rohde & Schwarz .....C1933**  
**Harris .....N2502**  
Unimar .....N3221  
**Opticomm.....N3718**  
**ADC.....N4124**  
Magnum Towers .....N4525  
Sabre Towers & Poles .....N5938  
Shively Labs .....N6424  
ERI-Electronics Research.....N6929  
CPI .....N7220  
**Nucomm.....OE432**  
**Canon .....SU3020**  
Radyne-Tiernan-Xicom.....SU7915  
KTech Telecommunications .....SU11608

**VIDEO EDITING SYSTEMS**

**Panasonic Broadcast.....C3512**  
**Ikegami Electronics .....C4228**  
**EVS .....C4911**  
DNF Controls.....N313  
**Thomson .....N914**  
Fast Forward Video .....N2519  
Spencer Technologies.....N3836  
**Thomson .....SL106**  
Matrox Electronic Systems .....SL320  
**AJA Video .....SL1413**  
**Thomson .....SL2120**  
da Vinci Systems.....SL2620  
Adobe Systems.....SL3220  
Microsoft .....SL5520  
Boris FX.....SL8720  
**Blackmagic Design .....SL10920**  
**ViewCast.....SL13109**  
Sonnet Technologies .....SL13808  
Cinegy.....SU3113  
Optibase.....SU3811  
IPV .....SU6330  
**AJA Video .....SU7105**  
Dalet Digital Media Systems .....SU8520

IPV .....SU8608  
eMotion Engines .....SU9206  
Video Technics .....SU9227  
Brick House Video .....SU10811  
Pixel Power .....SU10920  
Masstech Group .....SU13813

**VIDEO ROUTING**

Bittree .....C2243  
Media Links .....C3313  
Logic Innovations/Sys Technologies ..C4546  
Horita .....C7311  
Burst Electronics .....C9032  
DNF Controls.....N313  
ISIS Group.....N602  
Crystal Vision .....N610  
**Thomson .....N914**  
**TV One .....N1725**  
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Patchamp.....N4617  
**Thomson .....SL106**  
**Thomson .....SL2120**  
Gefen.....SL2312  
Kramer Electronics .....SL4305  
Sierra Video Systems .....SL4305  
Microsoft .....SL5520  
Adtec Digital.....SL6110  
VELA.....SL7712  
**Communications Specialties ....SL8025**  
**Blackmagic Design .....SL10920**  
Image Video.....SU3305  
Hotronic .....SU3308  
MultiDyne .....SU3411  
Video Accessory .....SU3413  
**Telecast Fiber Systems .....SU4227**  
Leightronix .....SU5010  
Scientific Atlanta .....SU6120  
**Miranda Technologies.....SU6811**  
**Ward-Beck Systems .....SU7420**  
Pharos .....SU8905  
**Network Electronics .....SU10814**  
AZCAR .....SU11005  
**NVISION.....SU11620**  
**Pro-Bel.....SU12712**  
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**VIDEO STORAGE,  
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**Panasonic Broadcast.....C3512**  
RTI-Research Technology.....C 3851  
**Ikegami Electronics .....C4228**  
**EVS .....C4911**  
Wafian.....C11016  
DNF Controls.....N313  
**Thomson .....N914**  
Front Porch Digital .....N1830  
Volicon.....N2514  
Fast Forward Video .....N2519  
**VSN/JustEdit .....N3714**

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Spencer Technologies.....	N3836
<b>Solid State Logic.....</b>	<b>N4031</b>
Netia.....	N5433
<b>Thomson.....</b>	<b>SL106</b>
<b>Quantel.....</b>	<b>SL720</b>
<b>Thomson.....</b>	<b>SL2120</b>
Focus Enhancements.....	SL2605
Chyron.....	SL3713
SGI (Silicon Graphics).....	SL4314
<b>Xytech Systems.....</b>	<b>SL4326</b>
Microsoft.....	SL5520
Adtec Digital.....	SL6110
VELA.....	SL7712
<b>BitCentral.....</b>	<b>SL7720</b>
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Studio Network Solutions.....	SL8208
Digital Rapids.....	SL8724
Quantum.....	SL13805
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<b>Sony Electronics.....</b>	<b>SU906</b>
SAMMA Systems.....	SU2720
Cinegy.....	SU3113
Konan Digital.....	SU3605
IBM.....	SU3614
<b>Crispin.....</b>	<b>SU5408</b>
<b>Ross Video.....</b>	<b>SU6010</b>
<b>Doremi Labs.....</b>	<b>SU6026</b>
<b>Digital Broadcast.....</b>	<b>SU6205</b>
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Wegener.....	SU7911
Pharos.....	SU8905

Video Technics.....	SU9227
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## WEATHER/DATA SERVICES

Accuweather.....	C6428
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<b>Baron Services.....</b>	<b>C9422</b>
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Chyron.....	SL3713
Vizrt.....	SL4805
Orad Hi-Tec Systems.....	SU1920
Weather Central.....	SU7405
Irreto.....	SU8811
Pixel Power.....	SU10920

## WIRE, CABLE, CONNECTORS

<b>White Sands Engineering/TVC.....</b>	<b>C1736</b>
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Bittree.....	C2243

Radio Frequency Systems.....	C2321
Trompeter.....	C2333
BTX Technologies.....	C3548
<b>Kings-Winchester Electronics.....</b>	<b>C6908</b>
Gepco.....	C6918
Switchcraft.....	C7508
<b>Clark Wire &amp; Cable.....</b>	<b>C7519</b>
Wireworks.....	C7924
Lemo USA.....	C8119
Quintech Electronics and Comm.....	C8737
Belden.....	C8828
NEC Display Solutions.....	N1725
<b>Fischer Connectors.....</b>	<b>N3837</b>
<b>ADC.....</b>	<b>N4124</b>
Patchamp.....	N4617
Sabre Towers & Poles.....	N5938
Neutrik.....	N9029
Patriot Antenna Systems.....	OE103
Kramer Electronics.....	SL4305
<b>Communications Specialties.....</b>	<b>SL8025</b>
<b>Marshall Electronics.....</b>	<b>SU1926</b>
<b>Telecast Fiber Systems.....</b>	<b>SU4227</b>
<b>Canare.....</b>	<b>SU4805</b>

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# We know a lot about fluorescent studio lighting.

*After all, we invented it.*



Our founder invented the first fluorescent lighting for television studios, more than 23 years ago. And we've been helping stars to shine ever since. With a whole range of innovative products including

the only fluorescent fixture in the industry with an adjustable beam, we pride ourselves on being a tough act to follow. In fact, we continue to set the standard in efficient design, flexibility and performance.

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**[www.videssence.tv](http://www.videssence.tv)**

**NAB Booth # C9508**



**Videssence™**

10768 Lower Azusa Road  
El Monte, CA 91731

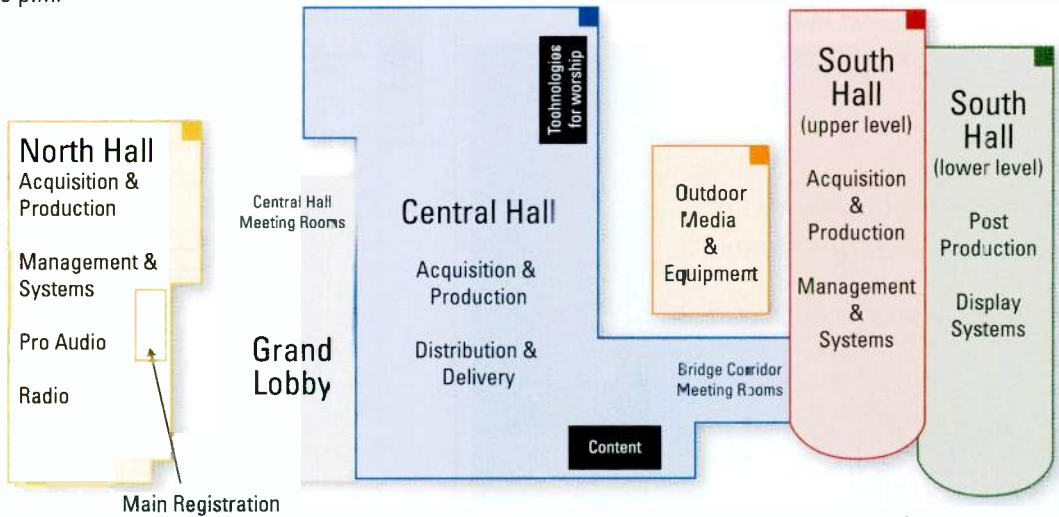


Las Vegas Convention Center, Las Vegas

## EXHIBIT HALL HOURS

Monday, April 14 - Wednesday, April 16  
9:00 a.m. - 6:00 p.m.

Thursday, April 17  
9:00 a.m. - 4:00 p.m.



Map information current as of Feb. 21, 2008

## MAP INFORMATION

The following is a brief description of what you will find in this year's NAB map from *Broadcast Engineering*.

To the right, you will see a listing of the NAB categories and what products can be found in each. Next to each listing you will find a color square that indicates the convention hall each category is located in. On the overview map (above) you will see each hall with its product categories.

Our table of contents lists each hall and the pages they are found on. On each of these pages you will notice some booths are highlighted with different colors. The ■ highlighted booths are our magazine advertisers, while the ■ highlighted booths are our map advertisers.

We thank all of our advertisers for their support of our NAB coverage and exhibit hall map.

## PRODUCT CATEGORIES

- **Acquisition & Production** — Cameras, lenses, lighting and grip and ingest technologies.
- **Post-Production** — Video editing, graphics, animation, special effects software and hardware, audio editing and music/sound libraries.
- **Management & Systems** — Video servers, systems integration, database technologies and digital asset management.
- **Distribution & Delivery** — Transmitters and towers for television, radio broadcasting, satellite technologies, cable, fiber, IPTV, mobile video and streaming products.
- **Display Systems** — Projection equipment, LCD and plasma displays and digital signage.
- **Pro Audio** — Audio recording and mixing equipment, encoding and compression technologies.
- **Radio** — The entire spectrum of products and services for analog, digital and streaming radio.
- **Outdoor Media & Equipment** — ENG vehicles, outdoor signage, satellite services, power products and production equipment.
- **Content** — Owners, aggregators and producers showcase their digital content to align with broadcasters, distributors and delivery technologies.
- **Technologies for Worship** — Video and audio capture, mixing and presentation technologies and services geared toward the religious marketplace.

## TABLE OF CONTENTS

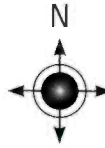
<span style="color: red;">■</span> North Hall .....	4-5
<span style="color: blue;">■</span> Central Hall.....	6-7
<span style="color: red;">■</span> South Hall, upper level .....	8-10
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See Videssence at booth #C9508 on page 7

# NORTH HALL

Advertisers
  Map advertisers
  Points of convenience

MAP #	COMPANY	BOOTH
1	Small Tree	N3937
2	Otari	N3938



See Lectrosonics at booth #N5223 on page 5

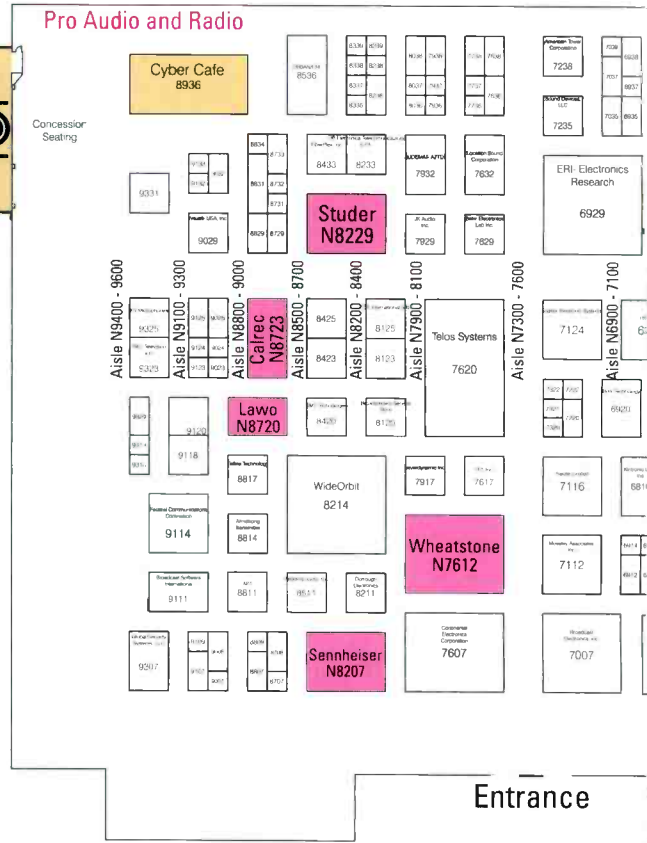
The future of wireless is just around the corner.

It's waiting for you at NAB.



Booth N5223  
North Hall





Add N to beginning of all booth numbers

See Harris at booth #N2502 on page 5

Interoperable workflows.

Integrated technologies.

Innovative solutions.

# BroadcastEngineering

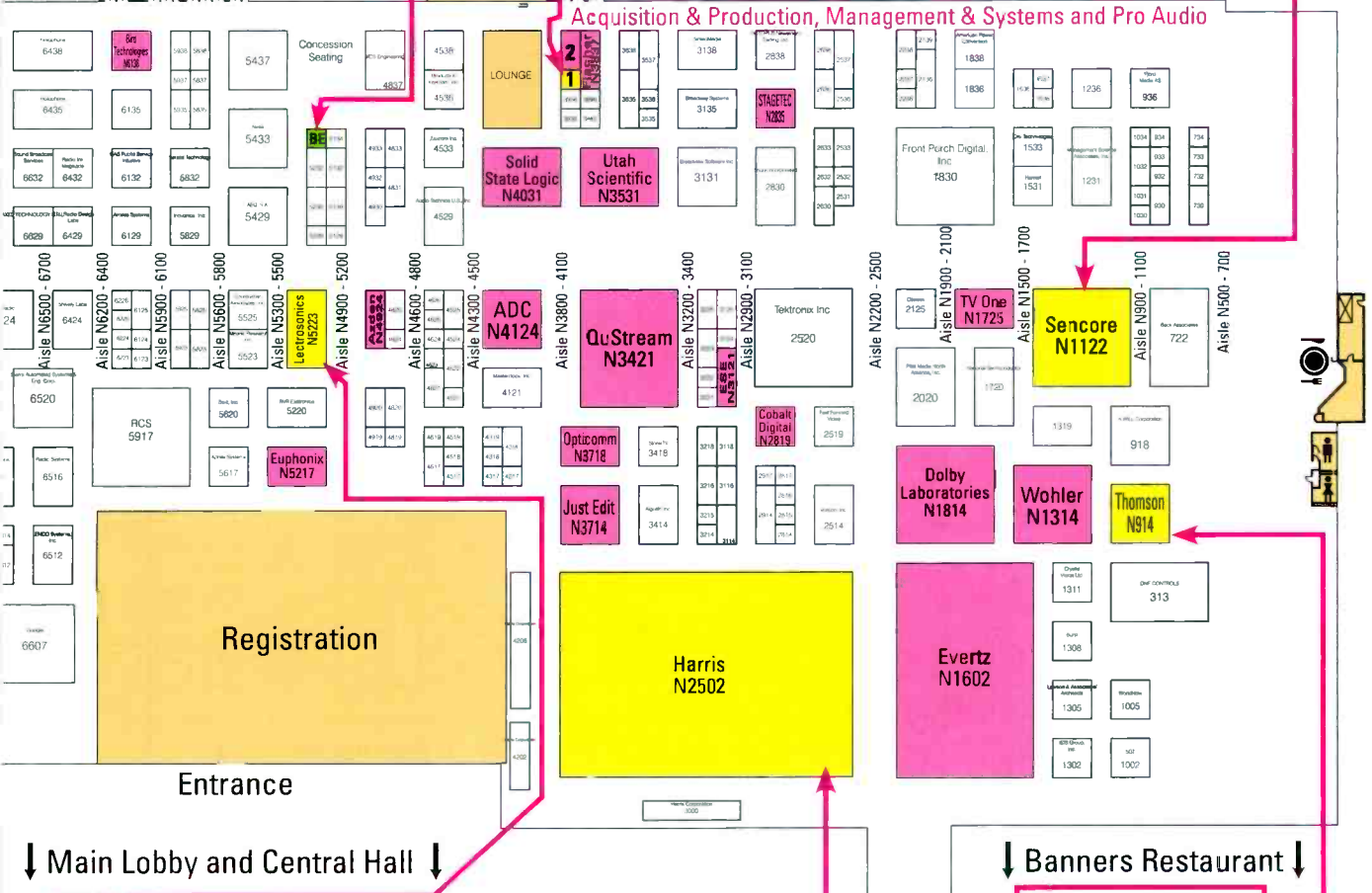


# SENCORE

↑ Walkway to Hilton

↑ Walkway to Hilton

Acquisition & Production, Management & Systems and Pro Audio



# ONE

- Business Operations
- Media Management
- Broadcasting and Editing
- Core Production
- Channel Release
- Media Transport
- Transmission
- IPTV / Mobile TV

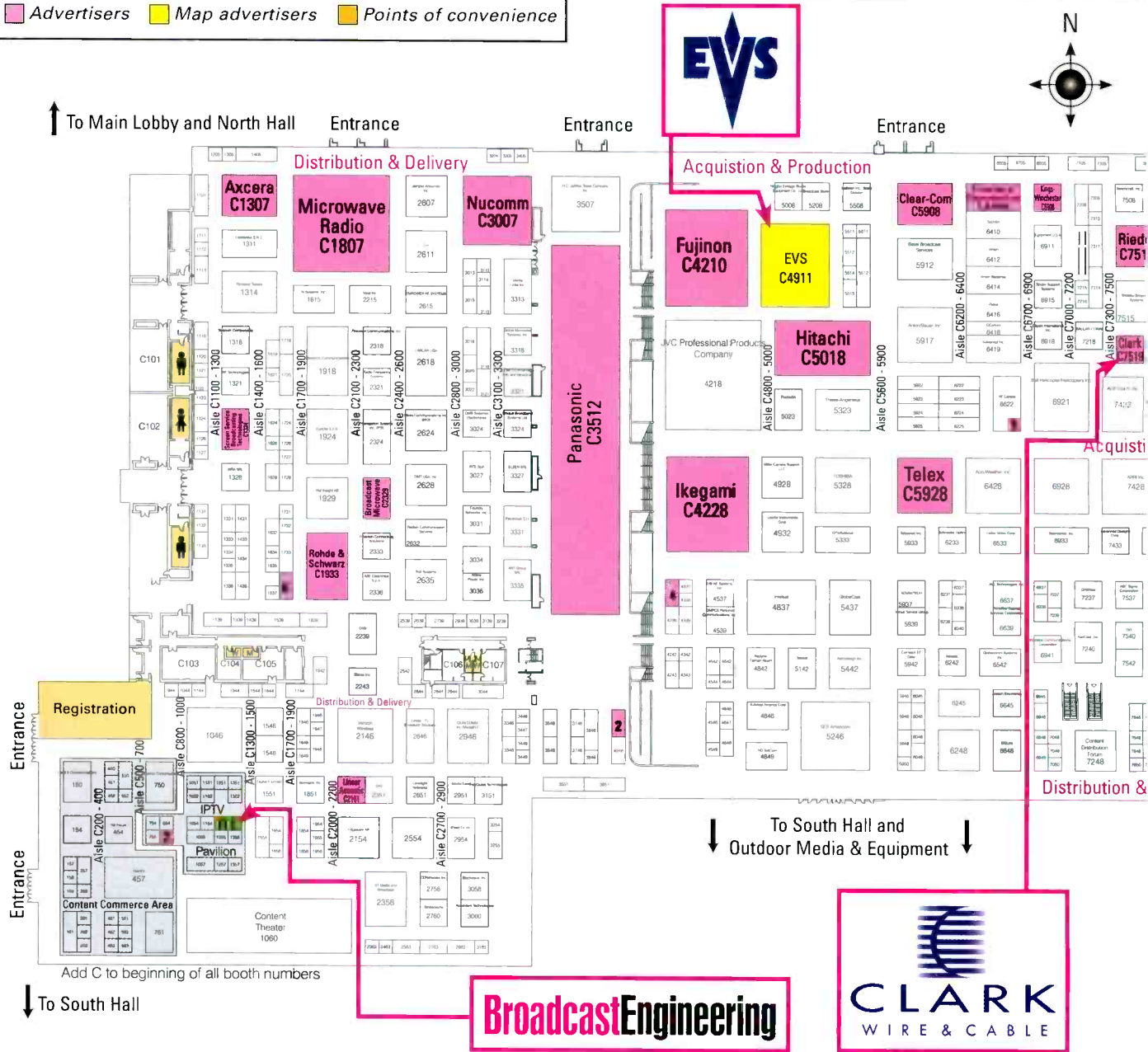
ONE Company. ONE Direction. The Future.

NAB2008 Booth N2502 | [www.broadcast.harris.com](http://www.broadcast.harris.com)



# CENTRAL HALL

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See EVS at booth #C4911 on this page

	<b>Reliable</b>		09.00.13		<b>Fast</b>	Multiple formats & codecs	09.02.24
	<b>XT2</b>	<b>Agile</b>	09.03.48		<b>Scalable</b>	<b>Full HD support</b>	



When time is critical... **Instant** tapeless technology

USA | BELGIUM | CHINA | FRANCE | HONG KONG | ITALY | SPAIN | UAE | UNITED KINGDOM  
 EVS Broadcast Equipment Inc - Tel: +1 973 575 7811 - Fax: +1 973 575 781 - E-mail: usa@evs.tv

[www.evs.tv](http://www.evs.tv)

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 Mon. - Wed. ....9 a.m. - 6 p.m.  
 Thurs.....9 a.m. - 4 p.m.



↓ To South Hall and  
 Outdoor Media & Equipment ↓

MAP #	COMPANY	BOOTH
1	Videssence	C9508
2	Eartec	C4046
3	Evertz	C855
4	NPR	C4237
5	Nucomm	C6622A
6	White Sands	C1736

# XYTECH SYSTEMS

## IMPROVE YOUR MEDIA BUSINESS OPERATIONS

- Business Workflow
- Resource Scheduling
- Library Management
- Digital Workflow



Learn about Xytech's Enterprise Version 11 with new Self Service Request module for remote media asset management and service requests via the internet.

Visit us at  
 Booth SL- 4326  
 to see a demo.



### END-TO-END MEDIA WORKFLOW

[www.xytechsystems.com](http://www.xytechsystems.com)

See Xytech at booth #SL4326 on page 12

See Sencore at booths #SU12108 on page 9, and #N1122 on page 5

**NOW!**  
 TAKE FULL CONTROL OF CONTENT

**DMS 3503B**  
 DIGITAL MEDIA STREAMER

**NEW!**

[WWW.SENCORE.COM](http://WWW.SENCORE.COM)

**SENCORE**

INNOVATIVE BROADCAST SOLUTIONS  
 SINCE 1951

1-800-SENCORE

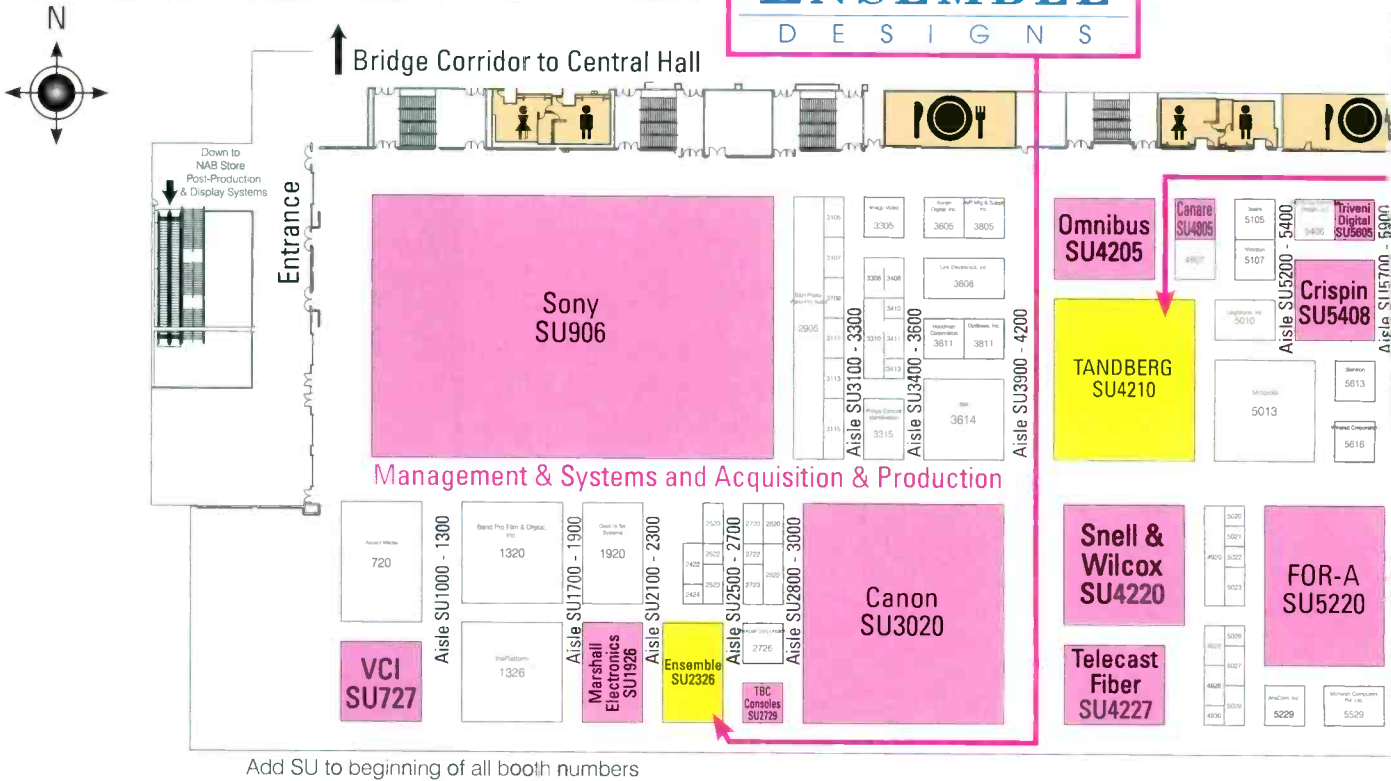
Visit Sencore at **NABSHOW**  
 (Booths N1122 and SU12108)

- The DMS 3503B allows you to stream content via:
  - DVB-T/H
  - 8-VSB
  - QPSK
  - IP
  - ASI
  - QAM A/B/C
- User Control from Front Panel or Web Interface
- Perfect Solution for:
  - Retail Video Distribution
  - Manufacturing Testing
  - Design Laboratories
  - Digital Signage

# SOUTH HALL, upper level

Advertisers Map advertisers Points of convenience

## ENSEMBLE DESIGNS



See Ensemble at booth #SU2326 on this page

## Win a Free HD Upconverter

Grab a proven, reliable BrightEye 91 HD Upconverter for your broadcast, sports or mobile needs today. 12 and 16 bit processing ensures gorgeous video. Audio processing, HDMI, USB and more make this amazing unit a sure fit for your application.

Would you like to win a free, new BrightEye 91 HD Upconverter? You can. Enter today at <http://www.ensembledesigns.com/contests/NAB2008/>

Or see us at NAB and enter there. And get a hands-on demo for yourself.



## ENSEMBLE DESIGNS

PO Box 993 • Grass Valley CA 95945  
Tel: 530.478.1830 [www.ensembledesigns.com](http://www.ensembledesigns.com)

NAB SU2326



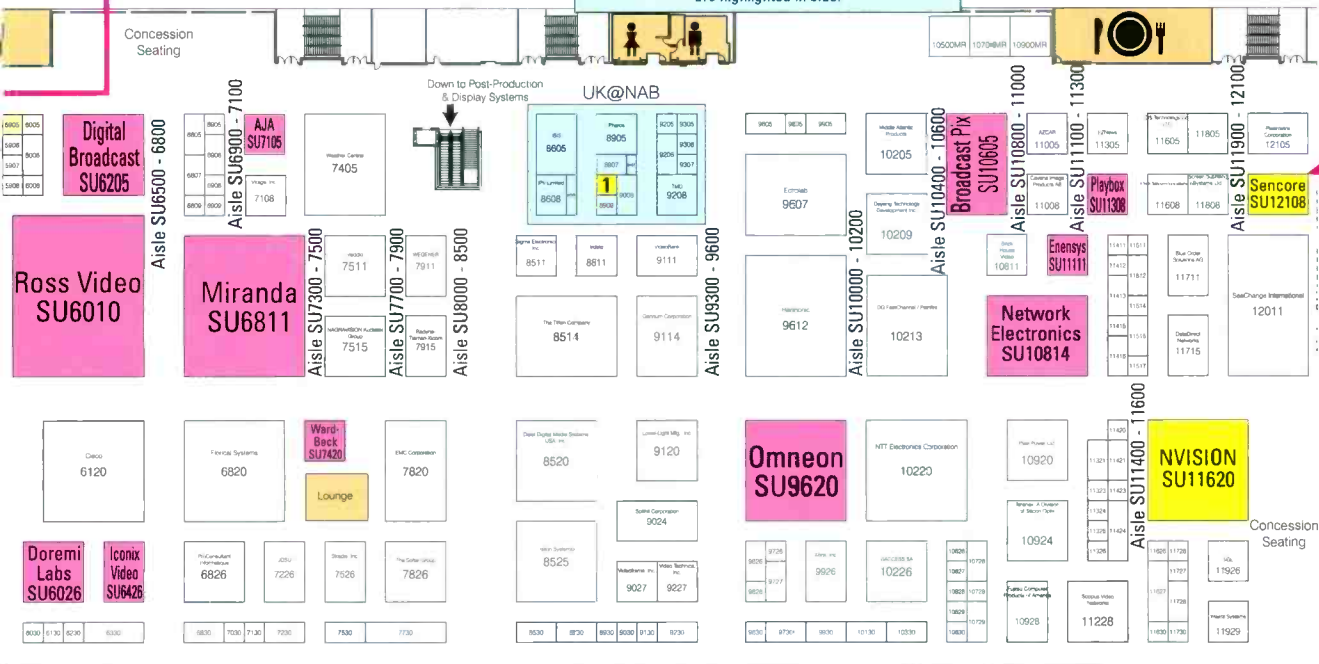
# TANDBERG television

Part of the Ericsson Group

MAP #	COMPANY	BOOTH
1	UK Partners Pavilion	SU8908

UK Partners Pavilion sponsored exhibitors are highlighted in blue.

# SENCORE



South Hall (upper) continues on page 10

See NVISION at booth #SU11620 on this page

# #1 in HD & 3Gig



Moving pictures and sound around, perfectly.

See NVISION at  
**NAB 2008**  
 Booth #SU11620

Looking for error-free routing and management of digital audio & HD/SD video signals?

With its innovative technology and deep expertise in both digital and HD, NVISION knows how to create a superior and cost-effective configuration for your facility.

- Large-Scale, Mid-Size and Multi-Format Routers
- Rrouter Control
- Compact Routers
- SD and HD Master Control
- Synapse Modular Signal Processing

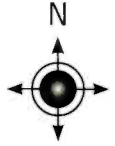
**NAB Product Demonstrations**  
 Visit: [www.nvision.tv/nab2008](http://www.nvision.tv/nab2008)  
 to learn more

1-800-860-HDTV (4388)  
[www.nvision.tv](http://www.nvision.tv)  
 email: [nvsales@nvision.tv](mailto:nvsales@nvision.tv)

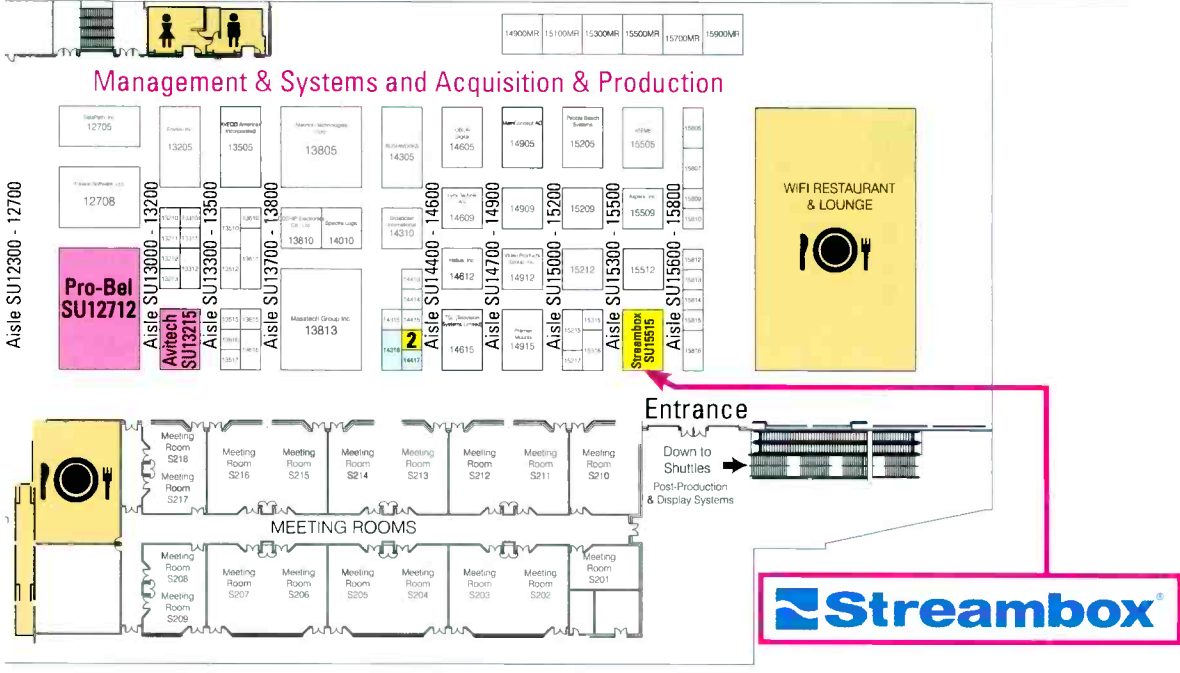
# SOUTH HALL, upper level

  Advertisers
   Map advertisers
   Points of convenience

MAP #	COMPANY	BOOTH
2	UK Partners Pavilion	SU14416
UK Partners Pavilion sponsored exhibitors are highlighted in blue.		



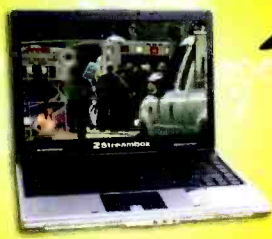
South Hall (upper) continues on page 9



See Streambox at booth #SU15515 on this page

# THIS BOX HAS

# EXCELLENT COMMUNICATION SKILLS



In an ideal world, high quality video could be transported from one place to another, in real-time, without error. Okay, while the world may not be ideal, the solution is pretty close: Streambox.

Our broadcast and broadband solutions work over a variety of IP networks and speak a variety of languages: NTSC, PAL, and NTSC-J. And our error correction is heroic—no hiccups, delays or jitter. Closed captioning? Perfectly articulated.

**Look, if you want to move video content without losing anything in translation, start communicating with us. Learn more at [www.streambox.com](http://www.streambox.com) or call +1.206.956.0544 ext 222.**

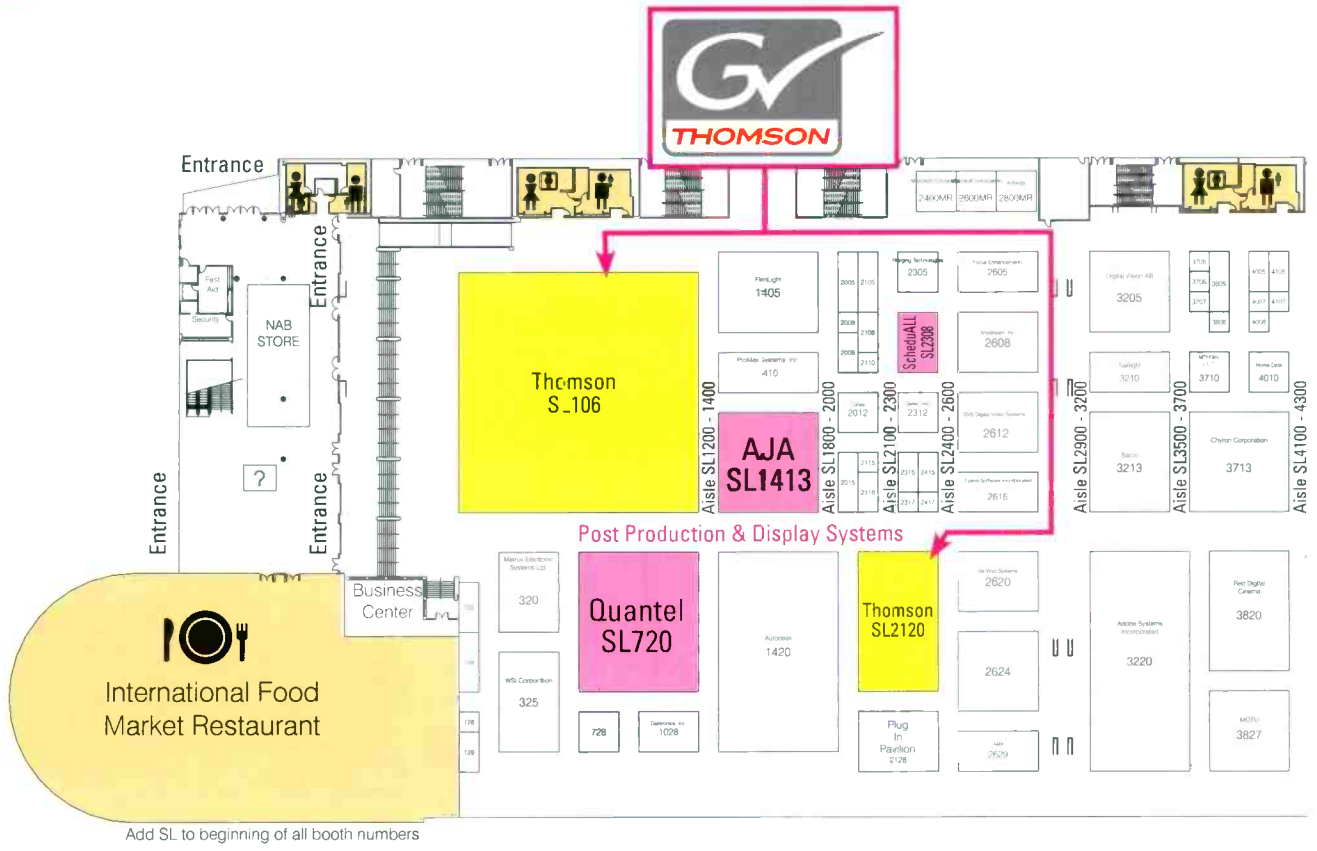
**Streambox**  
Innovation is in the box™

**SEE US AT NAB, BOOTH #SUI5515**



# SOUTH HALL, lower level

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 Thurs. .... 9 a.m. - 4 p.m.



See Thomson/GV at booths #N914 on page 5, #SL2120 and #SL106 on this page

## EDIUS 4.5 DESKTOP VIDEO EDITING



**VERSION 4.5  
FREE UPGRADE**

**Realtime.  
Mixed-format editing.  
No rendering. No waiting.**

Spend more time on the creative process. With EDIUS® version 4.5 you can mix SD and HD formats, and use new progressive formats including HDV 720p 50/60, as well as HDV 1080 24p over 60i. All without rendering.

Wrap this in a cool new user interface, and you have one of the most cutting-edge desktop video editing solutions available today.

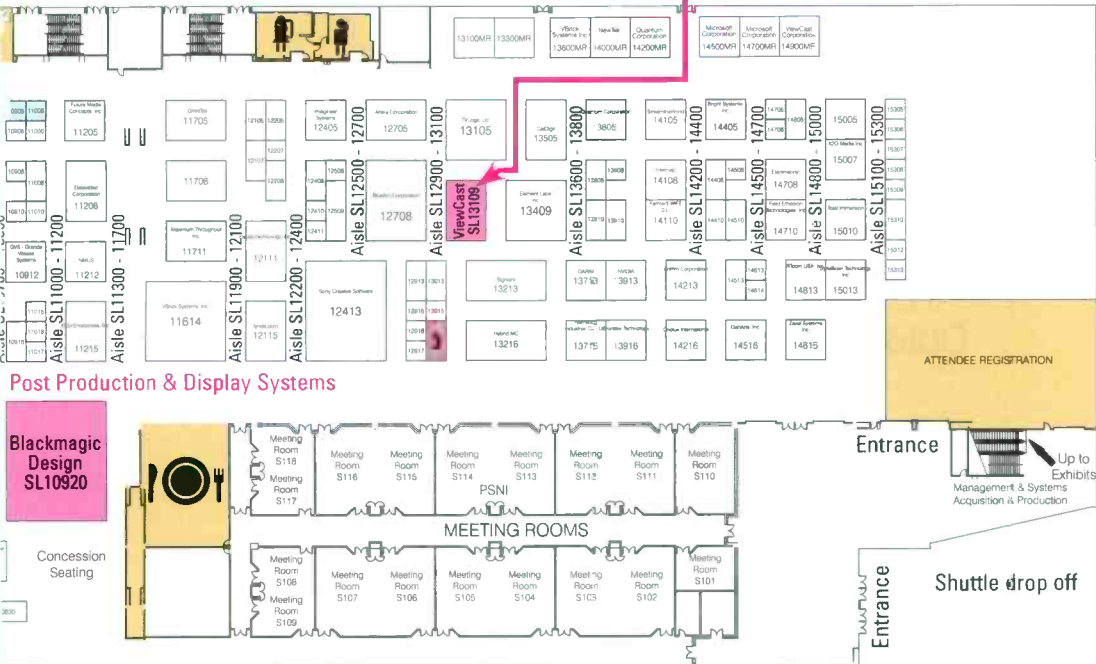
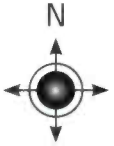
Brought to you by the experts in real-time, mixed format video editing.

See us at NAB 2008, Booth SL2120

[www.grassvalley.com/edius4.5](http://www.grassvalley.com/edius4.5)







MAP #	COMPANY	BOOTH
1	Analog Way	SL4623
2	TBC	SL6709
3	Avocent	SL13016

## Leverage the value of your media

Telestream products make it possible to get video content to any audience regardless of how it is created, distributed or viewed.

See our world-class digital media workflow solutions at NAB  
**FlipFactory** ■ **Episode** ■ **Pipeline** ■ **Flip4Mac**

[www.telestream.net](http://www.telestream.net)

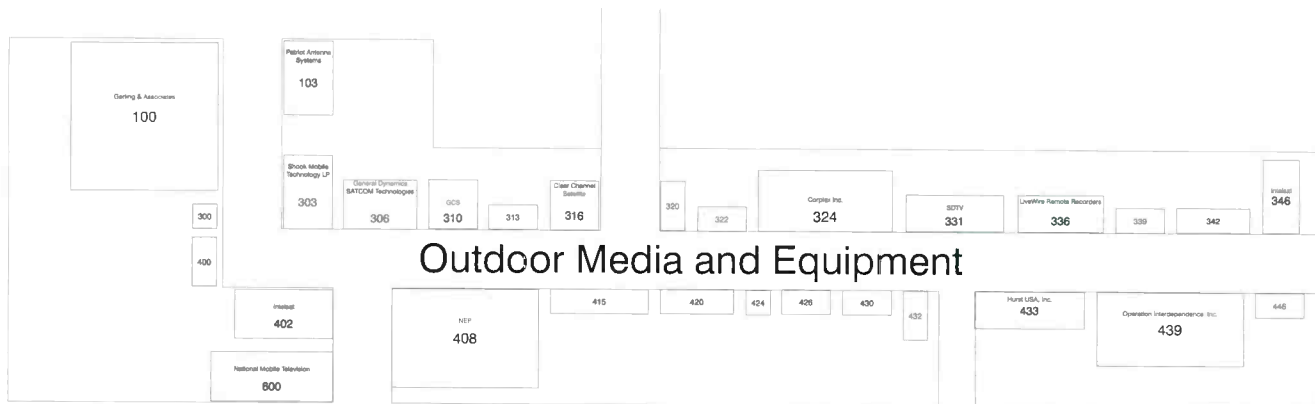
**NAB Booth SL5405**

# OUTDOOR MEDIA & EQUIPMENT

  Advertisers  
   Map advertisers  
   Points of convenience



## Central Hall



Add OE to beginning of all booth numbers

## South Hall

See **TANDBERG** at booth #SU4210 on page 8

# the vision in television™

DTV | HDTV | VOD | IPTV



Whether it's advanced compression, on-demand or content distribution, we deliver the multimedia technology that's moving digital video forward.

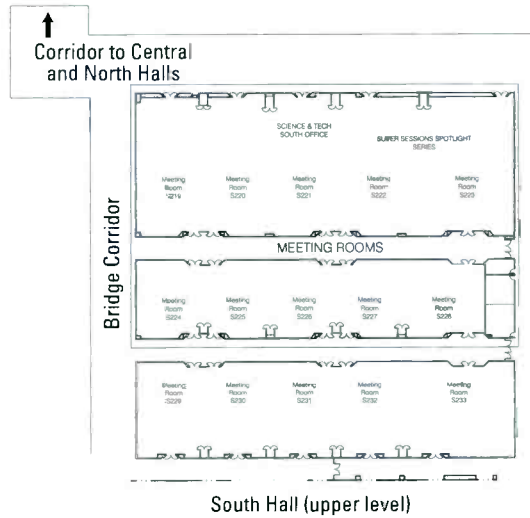
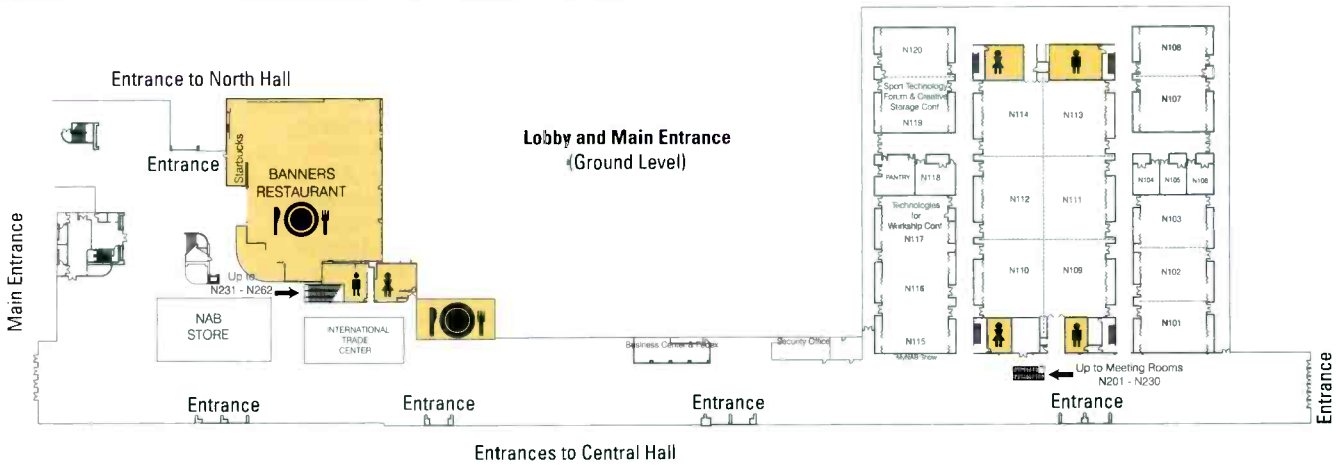
Visit us at NAB Booth #SU4210  
[www.tandbergtv.com](http://www.tandbergtv.com)

## TANDBERG television

Part of the Ericsson Group

# MEETING ROOMS

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 Thurs. .... 9 a.m. - 4 p.m.



See Sencore at booths #SU12108 on page 9, and #N1122 on page 5

**NOW INTRODUCING**

**openGear**

**MULTI-DEFINITION  
TERMINAL EQUIPMENT**

[WWW.SENCORE.COM](http://WWW.SENCORE.COM)

**SENCORE**

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- High Density Multi-Format Decoder Solutions
- 10 Channel VSB into Downconverted SD Out
- AFD Controlled Down-Conversion
- Fully Compatible with ALL OpenGear Components
- Multiple I/O MPEG2/4 HD & SD Decoding

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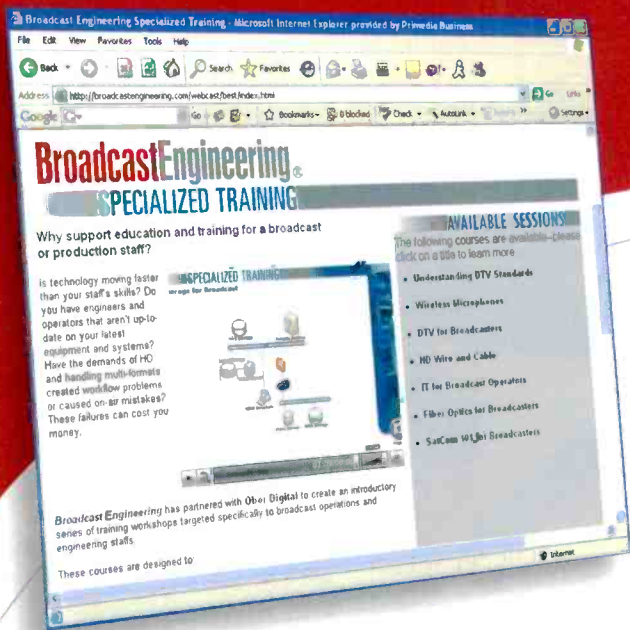
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2008

# DTV marketplace





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Booth: SU7420

**10-CHANNEL TV AUDIO PROCESSOR**

**Linear Acoustic AEROMAX 5.1-XL**



Features built-in Dolby Digital (AC-3) encoding; enables broadcasters to deliver compelling 5.1 channel surround sound; is equipped with a loudness controller, upmixer and metadata manager, as well as full-time, two-channel downmixing to support legacy analog paths; built-in AutoMAX processing fixes two-channel audio that is broadcast wrongly signaled as 5.1 channels.

717-735-3611; [www.linearacoustic.com](http://www.linearacoustic.com)

Booth: C2151

**AUDIO MIXERS, ON-AIR, PORTABLE, STUDIO, PLAYBACK**

**HD MASTER STUDIO SYSTEM**

**Solid State Logic C300 HD**

Features include tri-level sync support, serial control of HD VTRs, enhanced 96kHz feature set with provision for up to 16 discrete audio channels; offers extended DAW control with SoftKey keyboard commands and an improved center section GUI.

212-315-1111; [www.solid-state-logic.com](http://www.solid-state-logic.com)

Booth: N4031

**ULTRA-COMPACT CONSOLE**

**Wheatstone Air 1**

Meets the needs of on-air, production, news applications, remotes and the podcasting markets; features a low-profile frame and a rugged tabletop mount with direct access TRS rear connectors.

252-638-7000; [www.wheatstone.com](http://www.wheatstone.com)

Booth: N7612

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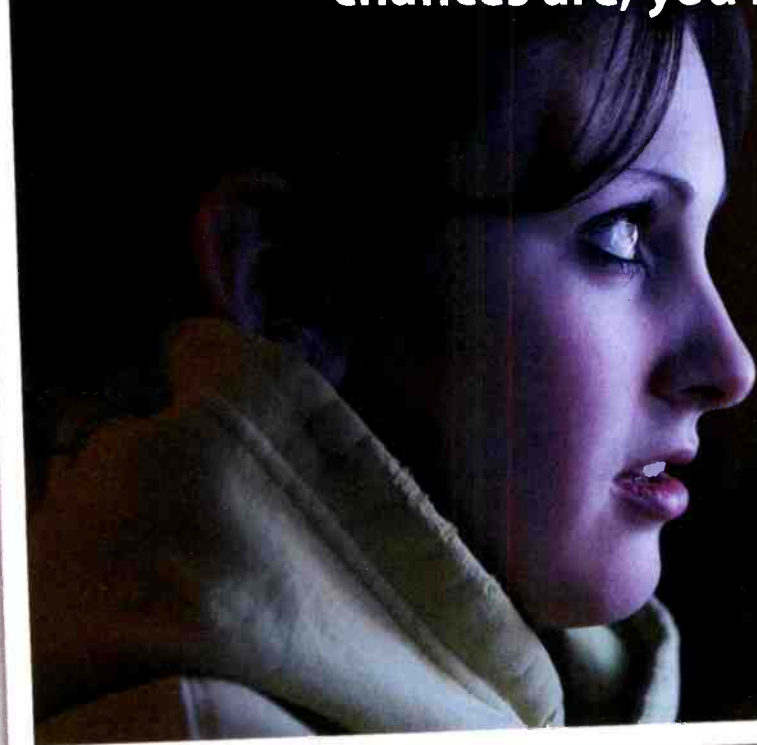
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At Ross, we believe every production is critical. The OverDrive Automated Production Control System was designed with this in mind. As the clear market leader, OverDrive offers the widest range of tools that enable users to efficiently manage their live productions. Scripted, un-scripted or fast-paced on-the-fly productions are brought to air cleanly, every time. With systems in 9 of the top 10 markets in North America, and top facilities across mid and small markets, OverDrive is the best choice for your critical productions.



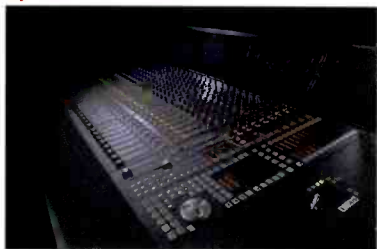
**Experience OverDrive for yourself at NAB 2008 Booth #SU6010**

Ross Video designs, markets, manufactures, and supports a wide range of innovative products for use in broadcast, distribution, live event and production applications. Ross products are found in over 100 countries and are used 24 hours a day, 365 days a year to produce and distribute video and audio signals. [www.rossvideo.com](http://www.rossvideo.com)

**ROSS**  
Live Production Technology™

## DIGITAL AUDIO MIXER

### Euphonix S5 Fusion



Features DSP SuperCore, which powers the mixer's signal processing and routing, providing full multiformat channels with EQ, filters and dynamics together with mix, aux and group busses with bus processing; EuCon Hybrid, which incorporates the EuCon high-speed Ethernet protocol, extends the control capabilities of the console beyond the DSP SuperCore to bring Mac and PC DAW tracks onto the console surface for mixing.

650-855-0400; [www.euphonix.com](http://www.euphonix.com)

Booth: N5217

## BROADCASTING AND PRODUCTION CONSOLE

### Lawo North America mc266

Features a lightweight construction, low-power consumption and compact dimensions; in combination with the routing matrix integrated in the core, it offers maximum flexibility for I/O interfaces and DSP resources; has a matrix capacity of 8192 mono inputs and outputs and 512 DSP channels.

416-292-0078; [www.lawo.ca](http://www.lawo.ca)

Booth: N8720

## AUDIO MIXING CONSOLE

### STAGETEC (Salzbrenner Stagetec Mediagroup) AURUS

Features dual encoders, analog user interface, multichannel processing, TFT color displays, sample rates of 44.1kHz, 48kHz and 96kHz, up to 300 audio channels, 128 buses, up to 32 full channels per DSP board, subsystems interconnection with fiber-optic cables, sample rate converters as optional or standard features and a modular structure for simple system expansion.

888-782-4391; [www.stagetec.com](http://www.stagetec.com)

Booth: N2835

## DIGITAL CONSOLE

### Studer Vista 5 SR

A Vistonics screen provides a direct viewing angle when operating in a standing position, particularly in daylight; a temperature control system makes the console reliable in the broad temperature ranges of its sound reinforcement applications; features flash memory, redundant power supplies, and optional redundant audio and control links.

818-920-3285; [www.studer.ch](http://www.studer.ch)

Booth: N8229

## SIGNAL PROCESSING LINE

### Wohler Technologies openGear

New system uses a standard card and the user's choice of IP core applications; choices include an HD format dual-channel logo keyer, an HDVANC data inserter/extractor and the HDCC-200A HD/SD-SDI dual-channel closed-caption encoder/decoder bridge, which is a compact and flexible solution that simplifies closed-caption encoding of two independent SD and/or HD sources, in any international standard.

510-870-0810; [www.wohler.com](http://www.wohler.com)

Booth: N1314

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## DIGITAL MIXING CONSOLES

Yamaha Commercial Audio Systems  
LS9 series

Consists of the 32-mic/line input 64-channel LS9-32 and the 16-mic/line input 32-channel LS9-16; compact and light enough for one person to move; offers easy setup; features an extensive range of gating, compression and equalization capabilities.

714-522-9063; [www.yamahaca.com](http://www.yamahaca.com)

Booth: SL5710

## AUDIO RECORDER/MIXER

## Zaxcom Fusion



Mixes 16 inputs to eight output busses for recording up to eight tracks; records to two CompactFlash cards simultaneously; features four balanced AES inputs with sample rate conversion.

973-835-5000; [www.zaxcom.com](http://www.zaxcom.com)

Booth: N4533

AUDIO ROUTING,  
DISTRIBUTION

## ALL-DIGITAL FIBER-OPTIC SYSTEM

Communications Specialties Pure  
Digital Fiberlink 3150 series

Provides broadcast-quality transmission for HD/SD-SDI over one single mode or multimode fiber; allows transmission of HD or SD-SDI as per SMPTE 292 and 259, with or without embedded audio and data, as well as DVB-ASI; equalizes and reclocks signals prior to fiber-optic transmission; features a reclocked and equalized SDI loop through.

631-273-0404; [www.commspecial.com](http://www.commspecial.com)

Booth: SL8025

## SWITCHING SYSTEM

Clear-Com Eclipse Digital Matrix  
Version 5.0

Acts as a central switching unit for communication across a broadcast operation in the studio or out in the field; links together the company's V-Series panels and CellCom wireless beltacks and headsets; the new version offers increased connections and expandability through robust E1/T1 telecom connection, fiber linking and IP connectivity for flexible and reliable communication between local and remote locations.

510-337-6600; [www.clearcom.com](http://www.clearcom.com)

Booth: C5908

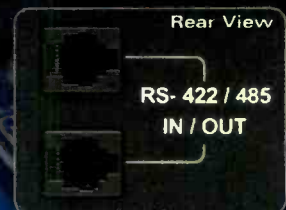
## MULTICHANNEL WIRING SYSTEM

## Otari LWB-16M

Allows the I/O configuration to be changed by inserting the required modules into the five slots; routes audio channels on a two-channel or one-channel basis in addition to the four-channel basis of previous versions; features a Key Lock function to prevent unintentional changes, a level indicator clips hold and an LED dimmer.

+81 424 818612; [www.otari.com](http://www.otari.com)

Booth: N3938

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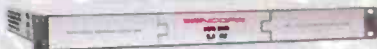
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NAB PREVIEW

## AUTOMATION, INCLUDING NEWS AND MASTER CONTROL

### AUTOMATION AND PAYOUT SYSTEM cinegy air



New slow-motion feature uses motion vector-based image interpolation; offers multi-channel active mode, providing users with simultaneous broadcasting of different playlists in various TV formats to multiple channels, with an additional horizontal timeline providing a clear view of what is playing.

202-742-2736; [www.cinegy.com](http://www.cinegy.com)

Booth: SU3113

### DIGITAL DISTRIBUTION AND ARCHIVING SOLUTION

#### Bitcentral Oasis

Connects with existing news production systems (whether proprietary or tape-based); saves stories as digital files on commodity storage devices, which can be instantly and automatically shared over existing bandwidth; allows newsroom groups to share content between HD and SD stations.

949-417-4126; [www.bitcentral.com](http://www.bitcentral.com)

Booth: SL7720

### MULTIDEFINITION LOGO INSERTER

#### Eyeheight LI-1DM

Features dual independent logo generators and dual independent keyers; allows HD or SD logos to be uploaded to flash memory, monitored and controlled via Ethernet.

866-469-2729; [www.eyeheight.com](http://www.eyeheight.com)

Booth: SU5905

### SD/HD MASTER CONTROL SYSTEM

#### Pro-Bel Masterpiece

Features up to four DSKs, a preview bath, 16-level audio mixing, AES voice-overs, Dolby E mixing, DVE, bug inserter and frame delay; offers tight integration with Pro-Bel control panels, Morpheus control and monitoring and Morpheus Automation.

631-549-5150; [www.pro-bel.com](http://www.pro-bel.com)

Booth: SU12712

### HD/SD NEWSROOM SYSTEM

#### Harris NewsForce



Provides file-based newsroom workflow from field editing to delivery on-air; offers four versions — NewsForce ES (a high-res, high-performance news editor), NewsForce Desktop (a proxy editor that operates on standard desktop PCs), NewsForce XNG (a software-based laptop editor for the field and newsroom) and Velocity NX (a full-featured promotions/craft-style editor).

513-459-3400; [www.harrisbroadcast.com](http://www.harrisbroadcast.com)

Booth: N2502

### NEWS PRODUCTION SYSTEM

#### JustEdit vsnnews

Allows text and video to be edited in the same application; guarantees an optimized workflow in the reporting of news and programs; integrates the rundown planning assigning of resources, text editing, material ingest, storage and cataloging, archive integration, shared editing of video/audio with voice-over from journalist workstations, graphics in real time and the automatic publication of news on the Web; integrates with most NLEs

+34 93 734 99 70; [www.vsn-tv.com](http://www.vsn-tv.com)

Booth: N3714

### ASSET MANAGEMENT SYSTEM

#### Pilat Media IBMS

A comprehensive multichannel airtime sales, traffic and management system; handles both nonlinear (IPTV and VOD) and linear programming and advertising; new module enables advertising to be automatically inserted according to the household or individual subscriber profile across all platforms — digital TV, IPTV and mobile TV.

877-873-4267; [www.pilatmedia.com](http://www.pilatmedia.com)

Booth: N2020

### AUTOMATION SYSTEM

#### VCI Solutions autoXe MC

Enables automated content lifecycle management; allows users to manage one, 15, 50 or more channels with one workstation, in one screen, using monitor by exception; houses all metadata in one database, allowing multiple users simultaneous access without the need for a dedicated workstation.

413-272-7200; [www.vcisolutions.com](http://www.vcisolutions.com)

Booth: SU727

**MC SWITCHING AND  
GRAPHICS PROCESSOR****Miranda Technologies Imagestore 750**

New capabilities include Dolby E/AC-3 encoding/decoding; features an integral audio mixer for advanced audio processing with 16 audio channels, de-embedded from each of four video inputs, together with up to 32 channels of AES; allows audio channels to be mixed, shuffled and modified before being embedded into the video output, or being made available as discrete AES.

514-333-1772; [www.miranda.com](http://www.miranda.com)

Booth: SU6811

**MULTICHANNEL MASTER CONTROL  
NVISION NV5128-MC**

Combines digital master control and multiformat routing in the same frame; fits in 8RU; features optional built-in Dolby E decoding and a variety of standard features, including A/B mixing with full auto transition control, multilevel video keying, logo store, two-picture squeezeback and audio over mixer.

530-265-1000; [www.nvision.tv](http://www.nvision.tv)

Booth: SU11620

**PRODUCTION AND  
TRANSMISSION SYSTEM  
OmniBus Systems iTX 1.2**

Combines broadcast master control and playout chain for SD and HD; new features include schedule preview, support for multi-regional breaks and opt-outs, capabilities for newsflash and roll-under situations, closed captions, and enhanced integration with external content stores and video services to streamline integration with legacy systems.

303-237-4868; [www.omnibus.tv](http://www.omnibus.tv)

Booth: SU4205

**CONTENT PLAYOUT  
PlayBox Technology AirBox 4**

Now includes ability to add servers to playout software; offers H.264 support; features a new Mixed Playout Engine that supports real-time transitions between clips of different compression formats; replays multiple compression formats from a list comprising clips coded in; features MXF support for MPEG-2, DV and HDV, and a live presentation control interface.

+44 1707 66 44 44; [www.playbox.tv](http://www.playbox.tv)

Booth: SU11308

# SunBright Monitors



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- Wide Viewing Angle
- Extended Temperature Rating
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- Durable Metal Enclosure
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V-LCD84SB-AFHD

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booth # SU 1926**LCDracks.com**



## NEWS SYSTEM Quantel Newsbox HD



Arrives ready to go on-air straight out of the box; available in both HD-now and HD-upgradable configurations; 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; features new options that increase flexibility and applications.

+44 1635 48222; [www.quantel.com](http://www.quantel.com)

Booth: **SL720**

## PRODUCTION CONTROL SYSTEM Ross Video OverDrive Automated Production Control System Version 7.0



Includes applications for news, sports, worship and live event productions; offers MOS integration for graphic and video server systems and an enhanced client/server architecture; features sidecar, a compact remote control panel; provides multiple user-programmable timers, preview custom controls and the ability to enable or disable remote control of mixers or robotic cameras on the fly.

613-652-4886; [www.rossvideo.com](http://www.rossvideo.com)

Booth: **SU6010**

## AUTOMATED CONTENT REPURPOSING SYSTEM Snell & Wilcox iCR V3.0



Ideal for producers of film and broadcast content in the mobile, telco, cable and broadband markets; enables ingest of SD and HD content; offers new universal conversion tools to simplify creation of multiple variants of HD and SD programs within the file-based domain; features motion-compensated, software-based Alchemist IP SD standards conversion, advanced MPEG-4 authoring tools, enhanced QC reports and XML-based integration to asset management systems.

818-556-2616; [www.snellwilcox.com](http://www.snellwilcox.com)

Booth: **SU4220**

# HD Microwave Solutions



## Compact Size High Performance HD Next Generation COFDM Tech

With over 10 years of COFDM experience, BMS offers a complete robust line of cutting edge SD/HD microwave solutions. BMS receivers use an advanced implementation of FastFT-M/RC diversity technology that assures superior signal reliability and quality.

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### DR2200USB



2-Way Diversity Receivers

### DR2400LD



### DR6000HD



6-Way Diversity Receiver



CT2200HDV  
HDV Transmitter



CT2020HD  
SD/HD Transmitter



CT2430LD-S  
SD Transmitter

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## CAMERA SUPPORT, ROBOTICS, VIRTUAL SETS

### EXTENDABLE CAMERA MOUNT Telemetrics ECM-BT



Offers immediate camera positioning with quick retraction for unobstructed camera angles; can be mounted above a drop ceiling or lighting grid and also wall mounted to provide vertical positioning to pan/tilt cameras used for studio production.

800-424-9626; [www.telemetricsinc.com](http://www.telemetricsinc.com)  
Booth: C6933

### ROBOTIC AND MANUAL HEAD Vinten Radamec Fusion FH100

Can be used as a standalone system or seamlessly integrated with the Fusion FP145 pedestal; accepts payloads up to 125lbs; works in either manual or robotic mode; features the LF drag system used in the Vector 70, providing familiar drag performance for manual operators.

845-268-0100; [www.vintneradamec.com](http://www.vintneradamec.com)  
Booth: C6414

## CAMERAS, LENSES, ACCESSORIES

### ROBOTIC PAN/TILT CAMERA Canon BU-40H

Features a Canon HD camera equipped with three 1/3in CCDs with a Genuine Canon HD zoom lens with 20X optical zoom ratio; provides genlock input for video system synchronization.

800-321-4388; [www.usa.canon.com](http://www.usa.canon.com)  
Booth: SU3020

### CAMERA CONNECTOR PANELS Canare Hybrid Fiber-Optic Camera Connector Panels

HFO camera connectors with integrated splice enclosures that can be installed in terminal boards or racks; ideal for configuring HD camera-to-broadcast van transmissions; connector units and mounting frames offer the flexibility needed to meet the layout needs of a variety of system configurations; support five-directional wiring: left, right, top, bottom and beneath; connection unit can be detached from main unit for comfortable workability; accommodates male and female HFO receptacles with built-in splice box and tension member support.

973-837-0070; [www.canare.com](http://www.canare.com)  
Booth: SU4805

### VIDEO CAMERA Iconix Video HD-2K CCU

4:4:4 CCU produces 2048 x 1080p images from 23.98Hz to 30Hz; outputs NTSC, PAL, 720p, 1080i, 1080PsF and 1080p from 24fps to 60fps.

805-690-3650; [www.iconixvideo.com](http://www.iconixvideo.com)  
Booth: SU6426

# Marshall Multi-Channel Digital Audio Monitors



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### HD STUDIO LENS Fujinon XA22x7BES



Features a focal length ranging from 7mm to 154mm; well-suited for shooting in tight locations and smaller studios.

973-633-5600  
[www.fujinonbroadcast.com](http://www.fujinonbroadcast.com)  
Booth: C4210

### HD CAMERA Hitachi Kokusai Electric America HV-HD30



Incorporates three HDTV 1/3in, 1.3-megapixel CMOS sensors; provides both 1080i and 720p camera outputs; features a compact box-type camera head, weighing 600g; a wide range of adjustments to be made remotely.

516-921-7200; [www.hitachikokusai.us](http://www.hitachikokusai.us)  
Booth: C5018

### LI-ION V-MOUNT BATTERY IDX System Technology Endura Elite

Designed for ENG/EFP productions; features a 142Wh capacity, a twin power cartridge design that doubles its shooting capability for operation of up to 3.5 hours using a 40W HD ENG/EFP camera and replaceable cartridges; complies with RoHS and aircraft security regulations.

310-891-2800; [www.idx.tv](http://www.idx.tv)  
Booth: C8032

### HDTV CAMERA Ikegami HDK-727

Provides HD and NTSC video simultaneously for the CCU and in both digital and analog form; incorporates next-generation .18 micro ASICs into the CCU; features 14-bit A/D conversion and up to 38-bit internal digital processing circuits as well as 1080/60i, 720/60p, 480/60i and other optional frame conversion configurations.

201-368-9171; [www.ikegami.com](http://www.ikegami.com)  
Booth: C4228

### P2 SOLID-STATE MEMORY CARD Panasonic AJ-P2C064



A 64GB P2 card capable of storing more than four hours of DVCPRO footage or more than two hours of DVCPRO50, AVC-Intra 50, or 64 minutes of AVC-Intra 100 or DVCPRO HD; comprised of its own processor, firmware and RAID controller; can be connected instantly with laptop PCs and major nonlinear editing systems; packaged in a rugged, die-cast frame.

201-392-4127  
[www.panasonic.com/broadcast](http://www.panasonic.com/broadcast)  
Booth: C3512

### HANDHELD HD CAMCORDER Panasonic AG-HMC150



A new addition to the AVCHD product line; features three native 16:9 progressive 1/3in CCD imagers with an optical image stabilization function to ensure stable shooting and a 28mm Leica Dicomar wide-angle zoom lens; offers 1080i and 720p recording at 13Mb/s; offers professional XLR audio input connections and a wide range of data and signal interfaces.

201-392-4127  
[www.panasonic.com/broadcast](http://www.panasonic.com/broadcast)  
Booth: C3512

### HDV CAMERAS Sony Electronics HVR-Z7U and HVR-S270U

Feature interchangeable lens systems, native progressive recording, increased sensitivity for low-light conditions and hybrid solid-state recording; the HVR-Z7U (handheld) and HVR-S270U (shoulder-mount) camcorders use the company's 1/3in three ClearVid CMOS Sensor system enhanced by Exmor technology, which features a unique column-parallel analog-to-digital conversion technique and dual noise canceling; offer sensitivity of 1.5lux.

201-930-7330  
[www.sony.com/professional](http://www.sony.com/professional)  
Booth: SU906

### MULTIPURPOSE HD CAMERA Panasonic AK-HC1800



Features 2.2-megapixel 3-CCDs for native 1080i video capture; delivers high-resolution HD output in 1080/59.94i; incorporates an advanced signal-channel transfer system and spatial offset processing features that reduce aliasing and provide finer resolution.

201-392-4127  
[www.panasonic.com/broadcast](http://www.panasonic.com/broadcast)  
Booth: C3512

### SD/HD CAMERA Sony Electronics PMW-EX1



Records to SxS ExpressCard media; uses 1/2in 1920 x 1080 sensors, and records long GOP MPEG-2 up to 35Mb/s; includes a 14x Fujinon zoom lens; offers IT-friendly MP4 file recording to advanced creative features, such as selectable gamma curves and "Slow & Quick Motion" capability.

201-930-7330  
[www.sony.com/professional](http://www.sony.com/professional)  
Booth: SU906

### ZOOM LENSES Thales Angenieux Digital 26 X 7.8AIF



HD and high-resolution series tele super zoom lenses provide an extended focal range to news and sports production crews; feature a focal range of 7.8mm to 203mm (5.6mm to 406mm with a 2X extender) and an aperture of f/1.8 for the HR version and f/2.2 for the HD version.

973-812-3858; [www.angenieux.com](http://www.angenieux.com)  
Booth: C5323

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## CGs, PROMPTERS, CAPTIONING

### CLOSED-CAPTION DECODER EEG DE280



A professional EIA-708 closed-caption decoder; monitors data quality and standards compliance; accurately displays the advanced style and positioning features defined in the 708 standard; use of the rich 708 feature set makes the decoder ideal for titling (open captioning) applications in post-production or live environments.

**516-293-7472; www.eegent.com**  
**Booth: SL11215**

## GRAPHICS, ANIMATION PRODUCTS

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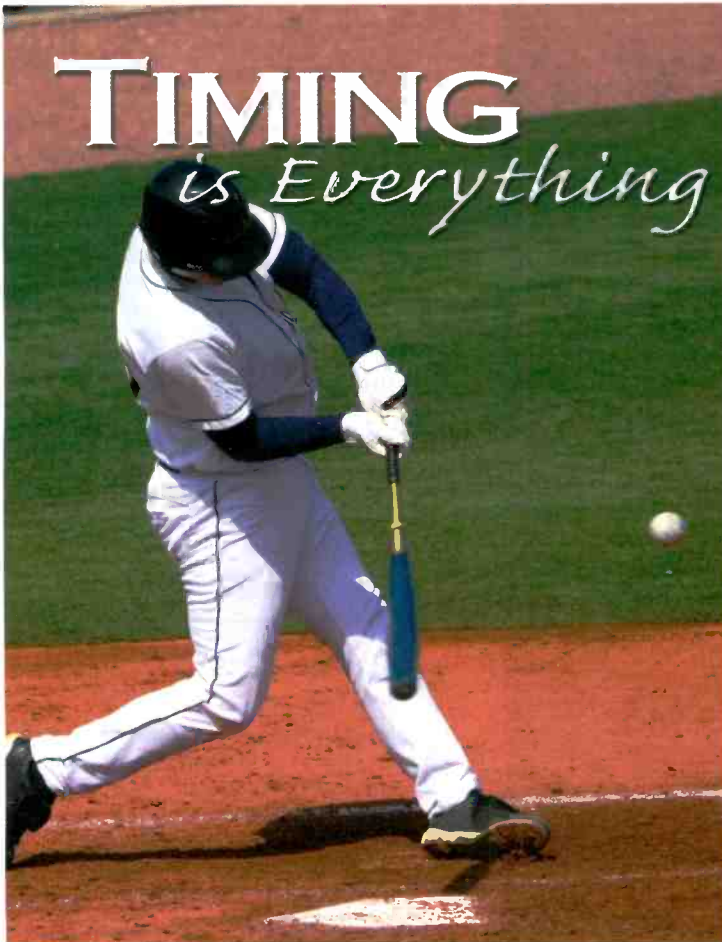
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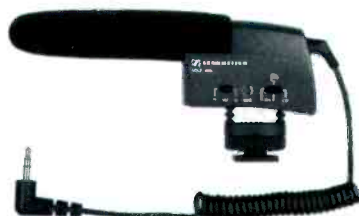
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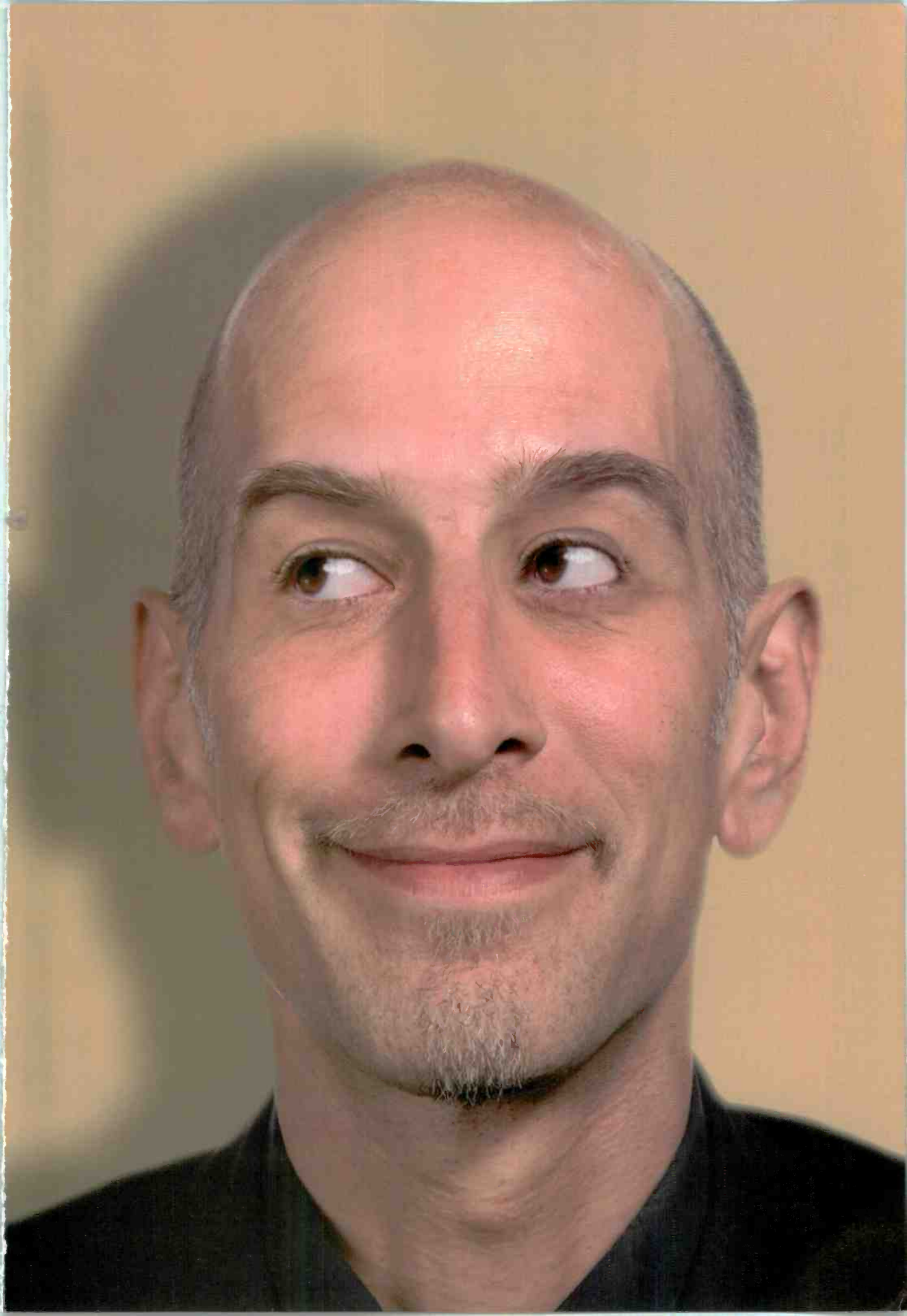
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information is gathered into composite program guides for satellite and DBS service providers. Although the FCC has not addressed this extended part of the issue, it is clear that only over-the-air reception will be helped by the FCC's December mandate without further rules that are sure to be resisted by other service providers.

### Adding BXF to the mix

This underscores the tight integration that will be required in master control between traffic, automation, PSIP and complex devices in the program chain. It also makes clear that it is no longer possible to think of a modern DTV origination system without automation. For decades, there has

been a vigorous and valid conversation about whether MCR needs to be automated or not and whether alleged cost savings are real in markets where labor costs are low. However, as the complexity of the systems grows and the number of live actions that must be taken increases, it is becoming impractical to operate manually.

At least there are some positive developments in the industry. The SMPTE work in the standards committee (S22.10) on communication between devices and systems in the station control and automation loop, the Broadcast eXchange Format (BXF), can provide a key method of communicating information in real time. BXF is XML-based and supports transport of single instruction messages between compliant applications. For example, if a spot is sold late in the day, mes-



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**It is no longer possible to think of a modern DTV origination system without automation.**

sages can be passed to automation at any time to add it to the active playlist and add it to the dub list.

Similarly, the reconciliation process no longer needs to be an offline, after-the-fact process, but rather can be done as each event is completed. The XML code is passed back to traffic after every event. This is the key to making real-time changes in air content transparent to traffic and ultimately to PSIP. Messages to other devices could be passed in the same way, allowing for the setup and execution of complex commands like those discussed earlier. BXF could become a critical part of implementing the increasingly complex structures that stations require.

**BE**

*John Luff is a broadcast technology consultant.*

? Send questions and comments to: [john.luff@penton.com](mailto:john.luff@penton.com)



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# MC automation

## BXF could be critical to future systems.

BY JOHN LUFF

It is an interesting era for automation and equally challenging for master control. In the broadcast industry, dynamics are at play that converge on both of these topics and force consideration of how they affect one another. Let me explain.

### The DTV transition

The DTV transition comes with some implied changes in operation. The number of items that must be controlled is inexorably going up. DTV encoders and multiplexers will require control if the makeup of a broadcaster's multiplex changes during the day, as it does in many stations. Since automation lists are almost universally generated by traffic systems, the issue propagates back into traffic, which must include enough information to provide timed sequences of events needed to set up the emission encoder. The most obvious is the number of playlists sent from traffic to automation, but moreover, there has to be coordination of the setup and teardown of virtual channels in the multiplex and how they are configured.

For example, at a public broadcasting station, the HD programming may run principally during prime-time hours. The rest of the day that channel should not be left running and empty, absorbing bandwidth and limiting quality in the other virtual channels. So at the time of transition, the appropriate commands must be sent to automation, which must then issue the technical commands to effect the change. But what if the HD programming is a cooking show with little movement in the screen when compared with sports? It would make sense to specify the bit rate that will optimize the quality of the full multiplex, assuming the station is not using statmux in the emission chain.

Also, if one of the channels is a local weather channel, it would require

a low bit rate for acceptable quality because so much of the screen is essentially static. As with the previous example, that control may need to start in traffic.

### Updated program guides

There is another issue affecting automation and master control that came up in the FCC's Dec. 31 third periodic review report and order FCC-07-228. The FCC heard complaints from consumers about program guides not being up-to-date, specifically if a live event extends, as happens often with major sports.

The FCC has determined that: "The updated ATSC PSIP standard ... requires broadcasters to populate the EITs with accurate information about each event and to update the EIT if

update each field if more accurate information becomes available."

The effect of this ruling appears to be a requirement that real-time changes in program content be reflected in PSIP as they happen. Of course, information about live event changes is not available in traffic systems, because the connection between the two databases is one-way and not live. Rather it's done on a scheduled basis in almost all cases.

To make matters worse, few stations populate PSIP from the traffic system, which does not contain detailed program descriptions. Instead they populate PSIP from services like Tribune Media. It is not clear how this can be changed, especially in the timeframe indicated, which appears to mandate the change as quickly as mid-2008.



**WNIN-TV, a PBS station in Evansville, IN, replaced all of its legacy analog equipment and streamlined its workflow with a complete master control and monitoring upgrade. The upgrade includes multiple screens displaying multiple outputs from a Miranda Kaleido-K2 multi-image processor.**

more accurate information becomes available. We expect broadcasters to fully implement PSIP to the extent that ATSC A/65C requires ... We remind broadcasters of the need to be consistent at all times and locations. ... [B]roadcasters must accurately fill the contents of the fields and the descriptors of each event ... and shall

New ways to generate PSIP changes using information derived from real-time data available only in automation systems will likely be required. Implementation will be at best difficult and at least require changes in station workflow.

To make matters more complicated, downstream program guide

a shot from the onboard Flir camera system and also have the motorcycle shot from Sutro Tower, which had its own dedicated intercity relay to the studio. This enabled the technical director to have motorcycle and helicopter overview shot in double boxes.

The HHR car transmitted on digital channel 3 to Sutro Tower, which

Mt. Diablo receive site and then via an intercity relay feed to the studio.

### Benefits

While usage of RF Central equipment and services afforded KRON 4 the means to finally achieve the type of comprehensive race coverage it had been seeking, the station also maximized cost- and time-ef-

the Tuesday prior to the Sunday race — where they remained throughout the week, assisting with equipment setup and demonstrating equipment applications.

Sharing its expertise with KRON, RF Central served as broadcast forecaster, evaluating the coverage location and identifying issues of concern, which included potential risks for interference. Rather than being reactive, the support staff implemented proactive measures, bringing in reinforcements by adding superpower filters to avoid issues with audio signal obstruction sparked by unknown, outside sources.

### Final results

When the three hours of live continual racing action came to a close, viewers were afforded an all encompassing perspective of the “ING Bay to Breakers” 12K race like never before. In bringing the experience along the bay home, RF Central empowered KRON to reach its goals without missing a step, uncovering the hidden tools and methods necessary for achieving comprehensive race coverage.

**BE**

*Bill Rinker is assistant chief engineer for KRON.*

**Combining high-quality with portability and simplicity cut down assembly time and the number of engineers needed for operating gear. Additionally, the equipment was lighter, resulting in more productivity.**

was sent back to the station via its own intercity relay. This supplied the studio director with instant and full access to all on-site coverage and more camera options.

The station's helicopter was outfitted with two down-looking pancaked antennas mounted on the skids of the Bell 206. The antennas' cables were run into the RF Extreme RMRTD dual-diversity receiver with its analog output feeding the aircraft switcher into the analog channel 10 helicopter transmitter which was received at

efficiency along the way. Combining high-quality with portability and simplicity cut down assembly time and the number of engineers needed for operating gear. Additionally, the equipment was lighter compared with that of prior systems used by the broadcast team, presenting a more tolerable experience in equipment and resulting in more productivity among engineers. Serving as an extension to the KRON team, several members of RF Central's professional staff were dispatched on-location

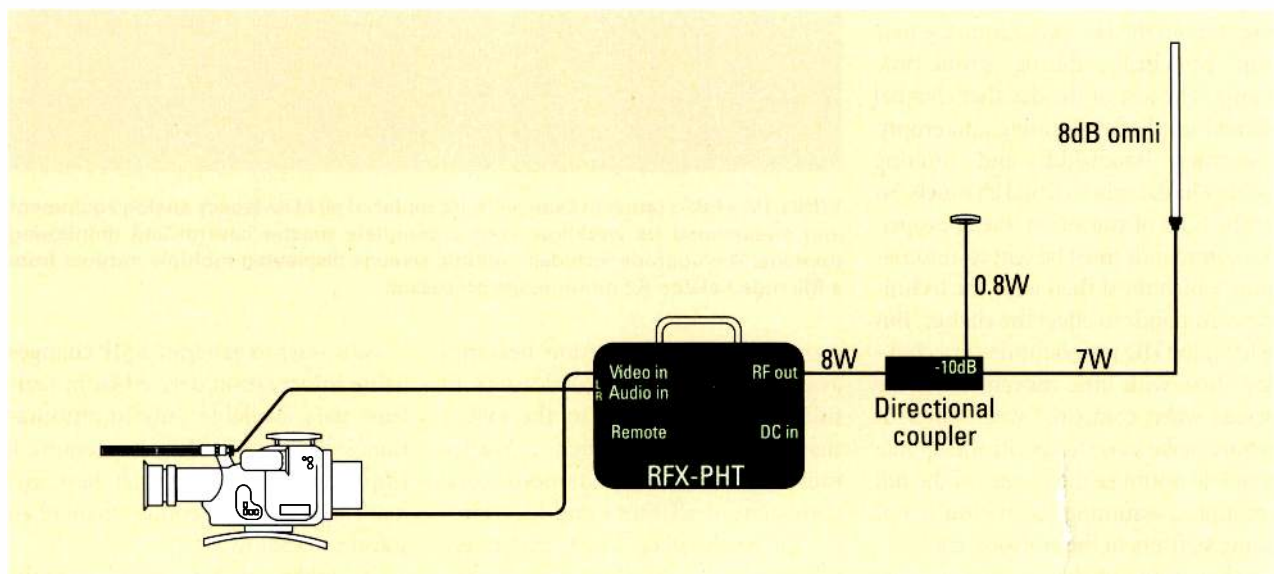


Figure 2. KRON's motorcycle RF system for race coverage

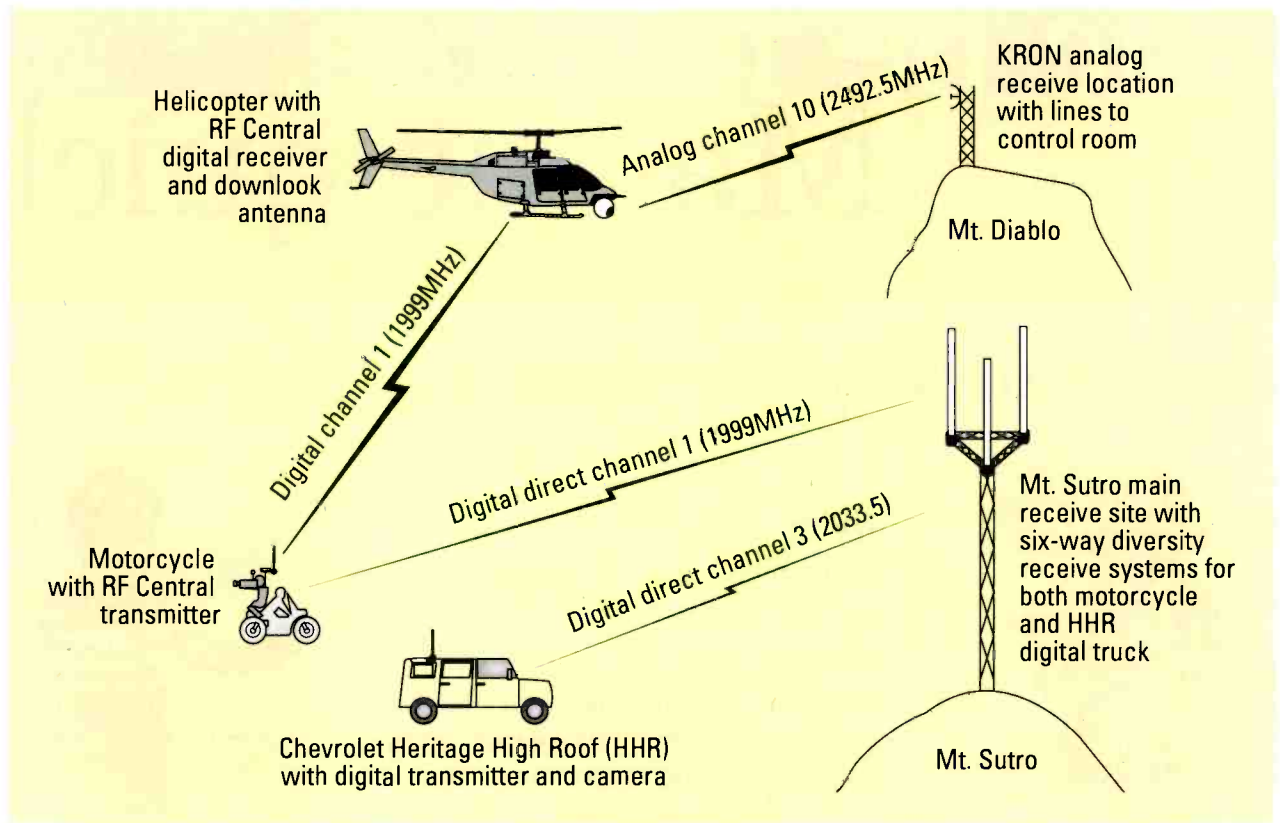


Figure 1. An overview of KRON's coverage of the "ING Bay to Breakers" race

runners had yet to yield an adequate visual signal for the producers of the show. This resulted in more work among studio producers, directors, engineers and on-air talent who were not on location, but were left sifting through limited live options.

### The solution

Equipping the broadcast crew with the technology needed to capture footage from above the build-

way diversity receivers with fan-beam antennas were installed, and digital channel filters for channels 1 and 3 were mounted 640ft up the Mt. Sutro Television Tower. (See Figure 1.) Three fan-beamed antennas were placed on the east face of Sutro Tower, and the other three were placed on the west face for optimum reception for the diversity receivers. For the first time, KRON was in a position to provide coverage of both

age for televising the women's leaders. The men were captured with a portable high-power transmitter, RFX-PHT, which was attached to a custom motorcycle equipped with two antennas mounted onto a pole. (See Figure 2.) The bike was driven by one person, while a second rider operated the camera and talent rode in the motorcycle side car to give an up-to-the-second progress of the race.

**The men were captured with a portable high-power transmitter, RFX-PHT, which was attached to a custom motorcycle with two antennas mounted onto a pole.**

ings and trees, RF Central employed maximum ratio combining, a diversity combining method in which signals from each channel are added together.

Making typical obstacles a thing of the past, two RFX-RMR-X6 six-

women's and men's leaders during the race, instead of having to limit coverage to only the men as it did in prior years.

A Chevrolet Heritage High Roof (HHR) vehicle was custom built to outfit an ENG transmission pack-

The footage acquired by the motorcycle team was fed through a directional coupler to provide 1W power to an uplink pancake antenna for the helicopter receiver and 7W of power to an omni antenna for direct reception at Sutro Tower. The motorcycle transmitted on digital channel 1 to the two locations, streaming footage to the helicopter while simultaneously shooting to Mt. Sutro. Offering the motorcycle shots to both locations, the dual transmission gave the station more options in that it could have the helicopter get

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# KRON-TV's big race

The San Francisco station overcame broadcast hurdles with RF Central technology.

BY BILL RINKER

**W**hile runners seek the optimum speed during the annual "ING Bay to Breakers" 12K race, KRON-TV station engineers confront a similar challenge as they strive to provide live, continuous coverage of the race from start to finish. For past races, the station used various equipment and services to determine the most effective way for delivering uninterrupted coverage of the three-hour trek through the streets of San

Francisco, CA. During the May 2007 run, the station discovered key solutions using digital microwave technology provided by RF Central.

## The situation

To provide fluid television coverage of the race, the station had to conquer microwave transmission hurdles, such as tall buildings in the downtown financial district and the many trees in Golden Gate Park. Improvising to the best of its abilities in

years past, the station compensated for such issues by relying on multiple ENG vehicles and equipment, requiring more preparation, manpower, receiver sites and use of telco fiber lines. Additionally, years of experimenting with various methods to provide motion capture of the

**The station had to conquer microwave transmission hurdles, such as tall buildings and the many trees in Golden Gate Park.**



To cover the "ING Bay to Breakers" race, a motorcycle was custom-equipped with a portable high-power transmitter, RFX-PHT, and two antennas mounted onto a pole. The motorcycle carried cameraman Jack Uhalde and reporter Vernon Glenn along the race trail.

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Input/Output Chart

INPUT FORMAT	OUTPUT FORMAT						
	HDV1080i	HDV720p	DV	COMPONENT	DVI	SD-SDI	SD-SDI
HDV1080i	0	0	0	0	0	0	0
HDV720p	0	0	0	0	0	0	0
DV	0	0	0	0	0	0	0
COMPONENT	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0
HD-SDI	0	0	0	0	0	0	0
SD-SDI	0	0	0	0	0	0	0

VC-300HD/VC-200HD VC-300HD

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## DTVMARKETPLACE

NAB PREVIEW

### ACTIVE STORAGE SYSTEM

#### Omneon Media Grid v. 2.1

A small, affordable, entry-level system; uses multiple intelligent, interconnected-yet-independent storage servers to combine grid storage and grid computing to retrieve digital media quickly; scalable in capacity, bandwidth and processing power; new features include the ability to create storage reservations so users are guaranteed a minimum amount of storage, tail-mode FTP to support active workflows in conjunctions with non-Omneon servers and more robust monitoring and reporting.

408-585-5140; [www.omneon.com](http://www.omneon.com)

Booth: SU9620

### WORKFLOW MANAGEMENT SYSTEM

#### Xytech Systems Enterprise Version 11

Provides an end-to-end solution for the creation, management, scheduling, tracking and delivery of physical and digital media assets; automates and streamlines media business operations, including business workflow, resource scheduling and media asset management.

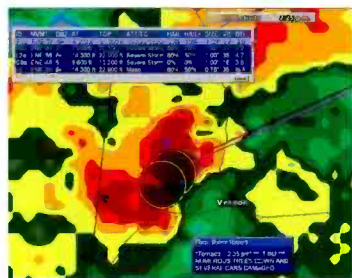
818-303-7800; [www.xytechsystems.com](http://www.xytechsystems.com)

Booth: SL4326

## WEATHER/DATA SERVICES

### TORNADO DETECTION TECHNOLOGY

#### Baron Services Baron Tornado Index



Provides a scale of 0-10 to gauge the likelihood of a tornado; available to customers subscribed to the Advanced Data Service Package; included in the VIPIR 5.0 release and will soon be available in FasTrac.

256-881-8811; [www.baronservices.com](http://www.baronservices.com)

Booth: C9422

## WIRE, CABLE, CONNECTORS

### AES/EBU DIGITAL AUDIO CABLES Belden Brilliance Part No. 1353A



Combines ruggedness, flexibility and installation efficiency with superior digital and analog sound performance; ideal for use in permanent installations of balanced-line analog or digital audio.

800-235-3361; [www.belden.com](http://www.belden.com)

Booth: C8828

### SUPERFLEX CAT 5E CABLE

#### Clark Wire & Cable CAT5-FLEX



Exceeds TIA 568B Cat 5e NEXT & Return Loss specifications; maintains a maximum plug-to-plug channel rating of 70m; features a rugged, sunlight and oil resistant and pressurized jacket.

847-949-9944; [www.clarkwire.com](http://www.clarkwire.com)

Booth: C7519

### EXTENDER

#### Avocent ECMS4000

Can operate on a point-to-point Cat 5e cable or on a switched GigE network; consists of a transmitter that connects externally to each remote computer with dual DVI-D video connectors and a user station with dual DVI-I connectors, USB connectors and audio ports; supports digital video up to 1920 x 1200 at 60Hz.

954-746-9000; [www.avocent.com](http://www.avocent.com)

Booth: SL13016

### HDTV CONNECTORS

#### Fischer Connectors 1053 series

Combine the technology of Fischer broadcast triax connectors with the technology of Corning UniCam fiber-optic contacts; simple, convenient and economical for assembling HDTV camera connectors in the field in only 30 minutes.

800-551-0121

[www.fischerconnectors.com](http://www.fischerconnectors.com)

Booth: N3837

**TRANSCODING SYSTEM****Omneon ProExchange v.1.1**

Now supports Windows Media VC-1 and Flash Video; runs on MediaGrid active storage system; provides a scalable and efficient grid-based transcoding platform; handles a wide variety of audio and video formats, including H.264; conversion and rewrapping between wrapper formats supported with preservation and accurate placement of all metadata.

408-585-5140; [www.omneon.com](http://www.omneon.com)

Booth: SU9620

**ASSET MANAGER****ScheduALL Media Manager**

Provides media, entertainment and broadcast industries an effective way to group, categorize, organize and track media assets; facilitates, streamlines and tracks dynamic workflows; allows a facility to capture asset information and location as it moves through the workflow process; seamlessly manages work orders, shipping and duplication areas of the system.

954-334-5406; [www.scheduall.com](http://www.scheduall.com)

Booth: SL2308

**MAM****Vizrt Viz Ardome 4.6**

Handles media management and archiving tasks; offers increased HD support; fully integrated with all major newsroom computer systems, including Avid's iNEWS, AP's ENPS, Avstar and QNews; enables users to produce an audit trail — a series of records of computer events that monitors system activity; facilitates such tasks as automatic detection, acquisition and archiving of essence and metadata.

+47 5590 8080; [www.vizrt.com](http://www.vizrt.com)

Booth: SL4805, R129

**WORKFLOW MANAGEMENT SOFTWARE/HARDWARE****Thomson Grass Valley ContentShare2**

Features a task-based user interface; handles content and assets as well as workflow and administrative processes; new IT-centric architecture uses industry standard technology to support administrative and trafficking activities, as well as individual programs, an entire day's worth of scheduling for multi-platform repurposed content and the management of technical resources.

800-547-8949; [www.grassvalley.com](http://www.grassvalley.com)

Booth: N1313

**HD/SD VIDEO CARDS****Blackmagic Design DeckLink HD**

Lets users instantly switch between HD and SD video connections; connects to 270Mb/s SD-SDI and 1.485Gb/s HD-SDI equipment; also connects to SD analog equipment such as Betacam SP decks or HD HDV cameras and component monitors.

408-954-0500

[www.blackmagic-design.com](http://www.blackmagic-design.com)

Booth: SL10920

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## DTVMARKETPLACE

NAB PREVIEW

### FIBER-OPTIC TRANSPORT LINKS

MultiDyne HD-1500-3G series



Provides fiber-optic transport and distribution of digital signal from 5Mb/s to 3Gb/s; supports SMPTE 424M 3GSDI, SMPTE 292M 1.485Gb/s, SMPTE 259M with operation from 143Mb/s to 360Mb/s, SMPTE 310M 19.4Mb/s, M2S or DVB-ASI 270Mb/s, SMPTE 344M 540Mb/s and SMPTE 305M SDTi rates.

800-488-8378; [www.multidyne.com](http://www.multidyne.com)

Booth: SU3411

### MEDIA MANAGEMENT SOFTWARE

Microsoft Interactive Media Manager



A collaborative media management solution that extends Microsoft Office SharePoint Server 2007 for media and entertainment companies; builds on existing technology investments; helps companies create an end-to-end content production system accessible by everyone; integrates with Microsoft business intelligence tools.

800-642-7676; [www.microsoft.com](http://www.microsoft.com)

Booth: SI5520

## VIDEO STORAGE, ARCHIVE SYSTEMS

### SCALABLE SERVER SOLUTION

Avid MediaStream 8000 v3.01

Comes with native HD/SD storage and playout capabilities as well as built-in up/downconversion; can be configured from a few channels using a standalone server and to up to 100 simultaneous channels using a SAN; supports interoperation with Avid products as well as many third-party broadcast solutions.

978-640-6789; [www.avid.com](http://www.avid.com)

Booth: N/A

### VIDEO SERVER

360 Systems MAXX 6T



Provides reliable RAID-6 protection of stored program material; features more than 700 hours of storage at 12Mb/s; includes redundant power supplies, dual AC mains and redundant cooling; features hot-swap drives with front access; performs file import and export over GigE; includes DV video, TARGA graphics, advanced playlisting and as-run logs; workstation software creates remote stations for ingest, edit, playlisting and playout; includes one input with frame sync and three outputs.

818-735-8221; [www.360systems.com](http://www.360systems.com)

Booth: N/A

### NEWS CATALOGING SYSTEM

Crispin NewsCat

Digitally archives stories after airing and provides a method to easily locate material at a later date; links archived video clips to a database containing all script information from the newsroom computer system; includes an extensive search function, allowing users to search for a story using traditional parameters such as date, slug, script information or keywords.

919-845-7744; [www.crispincorp.com](http://www.crispincorp.com)

Booth: SU5408

### CONTENT MANAGEMENT SYSTEM

EMC EFDm

Combines content management software, content transport systems, content storage systems and best practices to help manage content securely; facilitates communications between hardware, software and partners; ingests, manages, stores and transforms any type of rich media for distribution to any type of venue, including IPTV, mobile and the Internet.

508-249-6207; [www.emc.com](http://www.emc.com)

Booth: SU7820

### TAPE DRIVE

IBM System Storage TS1129

Designed for applications that need high capacity, fast access to data or long-term data retention; supported in IBM tape libraries, IBM frames that support standalone installation and in an IBM 3592 C20 frame attached to a Sun StorageTek 9310 library; uses IBM 3592 cartridges, which are available in limited capacity (100GB) for fast access to data, standard capacity (500GB) or extended capacity (700GB).

919-517-0411; [www.ibm.com/media](http://www.ibm.com/media)

Booth: SU3614

**DIGITAL ROUTING SWITCHERS**  
**Utah Scientific UTAH-400**

Include a new frame for large routers up to 528 x 528 with fully automatic internal crosspoint redundancy, and a second new frame that extends the UTAH-400 family's functionality to even larger matrix sizes; the new UTAH-400/528R frame allows users to install a full 528 x 528 router in just 20RU using standard 75Ω BNC coaxial connectors; frame offers the option of a redundant crosspoint module for service reliability in mission-critical applications for large routing systems.

801-575-8801; [www.utahscientific.com](http://www.utahscientific.com)  
**Booth: N3531**

**HD VIDEO PROCESSOR**  
**TV One C2-7310**

Offers HD-SDI multichannel audio processing; allows the user to mix, route and delay 16 SD/HD-SDI embedded stereo channels from the two HD-SDI inputs and 16 inputs of AES3-*id* stereo audio channels, process them, and output as AES3-*id* stereo audio or embedded into the two HD-SDI outputs.

800-721-4044; [www.tvone.com](http://www.tvone.com)  
**Booth: N1725**

**DIGITAL ROUTING SWITCHERS**  
**Utah Scientific UTAH-400 series**

Family of switchers includes HD and SD digital video switchers and AES/EBU digital audio switchers in all matrix sizes; features a wide selection of frame sizes, from 32 x 32 to 288 x 288, for all signal types; offers a full range of I/O options, crosspoint redundancy option in all matrix sizes, redundant power supplies and controller cards, signal-presence detection, and low power consumption.

801-575-8801; [www.utahscientific.com](http://www.utahscientific.com)  
**Booth: N3531**

**ROUTER**  
**Broadcast Microwave Services TCII Media Router**

When paired with the company's Truck-Coder II, provides high-speed IP communications over a unidirectional microwave radio link from ENG vans; a 3G broadband wireless modem is used as the return channel, which provides a low-speed constant network connection; allows for file transfers using traditional methods such as FTP.

800-669-9667; [www.bms-inc.com](http://www.bms-inc.com)  
**Booth: C2329**

**HD/SD-SDI SWITCHER**  
**Kramer Electronics VS-41HD**

Switches one to four inputs to two identical outputs; features Active Input Indication reporting function that lights up each input button when an active signal is detected at the input connector; provides signal reclocking and equalization for each input to compensate for long cable runs.

908-735-0018; [www.kramerus.com](http://www.kramerus.com)  
**Booth: S14305**

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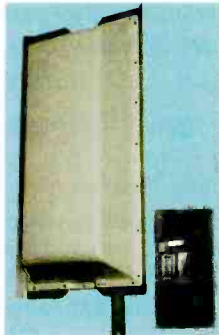
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Users can choose between 2.5kW, 5kW, 10kW, 15kW or other options; features versatile air-cooling and multiple regulated power supplies; includes intuitive advanced diagnostics and an extensive monitoring system designed to simplify maintenance; fits in 10kW of power in 25sq ft.

**303-665-8000; www.larcen.com**  
**Booth: C2618**

**PANEL ANTENNA SERIES**  
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Comprises four horizontally polarized and four vertically polarized dipoles; features dual-input (two 2.5KW inputs) functionality and high power-handling capability up to 2500W; can produce circularly polarized signals, mixed or elliptical signals or independent vertically and horizontally polarized signals; offered in 470MHz-558MHz bandwidth.

**203-630-3311; www.rfsworld.com**  
**Booth: C2321**

**VIDEO EDITING SYSTEMS**

**NOISE ERASER**  
**FOR-A DNE-2**



Uses image processing with motion compensation to remove noise-filled signals without harming the quality of the original video; supports HD-SDI input and output.

**714-894-3311; www.for-a.com**  
**Booth: SU5220**

**FINAL CUT PRO PLUG-IN**  
**AJA Video Systems Io HD**



Supports Apple's ProRes 422 codec in hardware, enabling 10-bit video editing; offers SD/HD analog and digital I/O (including HD-SDI and HDMI), balanced analog and digital AES audio, RS-422, genlock with loop-through, and LTC time code connections.

**530-274-2048; www.aja.com**  
**Booth: SU7105, SL1413**

**EDITING SYSTEM FEATURE**  
**Sundance Digital Publish to Sundance (P2S)**

Enables seamless migration of finished content directly to the play-to-air server, complete with its metadata; incorporates the functions of Sundance Digital Titan and FastBreak NXT, Avid Interplay and its Media Services Engine, and Avid ProEncore using the Telestream or Agility Any-stream transcode engines.

**972-444-8442; www.sundancedigital.com**  
**Booth: N/A**

**CRAFT EDITOR**  
**Thomson Grass Valley Aurora Craft**

Offers tapeless workgroups complete QoS and bandwidth protection against bottlenecks while giving each user unfettered deterministic access to materials.

**800-547-8949; www.grassvalley.com**  
**Booth: N1313**

**VIDEO ROUTING**

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**Harris MPH**

Allows stations to deliver digital ATSC-compatible content to portable media; can transmit other ATSC digital services using the same slice of bandwidth, allowing broadcasters to multiplex TV services into a single transport stream for OTA transmission.

**513-459-3400; www.harrisbroadcast.com**  
**Booth: N2502**



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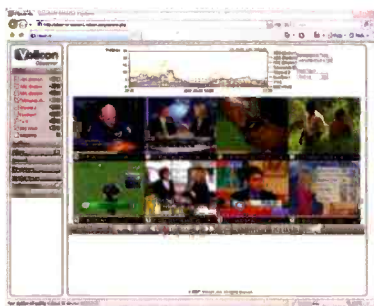
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### VIDEO MONITORING AND LOGGING SOLUTION

Volicon Observer HD 2.0



Provides HD signal logging and monitoring capabilities; offers support for Dolby 5.1 sound; enables recording on two or four channels, with storage for 30 days or longer; version 2.0 extends Dolby 5.1 capabilities to support capture of SDI content; other new features include HD capture of CEA-708 closed captions (EIA-608 transport extraction), support of bit rates higher than 3Mb/s, alerting support through SNMP and GPI contact closure upon alert.

781-221-7400; [www.volicon.com](http://www.volicon.com)

Booth: N2514

## TV TRANSMITTERS, FEEDLINE, ANTENNAS, TOWERS, SERVICES

### HD ENG/OB TRANSMITTERS/RECEIVERS

Nucomm 7 series



SD can be upgraded to HD via software key; features multiple modulation modes and dual/tri-band RF outputs; consists of Channel Master TX7 portable transmitter, Channel Master RX7 portable receiver, Newscaster VT7 ENG/OB van transmitter and Newscaster CR7 central receiver.

908-852-3700; [www.nucomm.com](http://www.nucomm.com)

Booth: C6622A, OE432, C3007

### SOLID-STATE TRANSMITTER

Axcera Innovator HX

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724-873-8100; [www.axcera.com](http://www.axcera.com)

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### PANEL ANTENNA

Dielectric Communications TUM Antenna

A high-power, broadband UHF elliptically polarized panel antenna with variable polarization ratio from 0 percent to 100 percent while maintaining a good axial ratio.

800-341-9678; [www.dielectric.com](http://www.dielectric.com)

Booth: C1918

### DVB-T AND DVB-H TRANSMITTERS

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Broadcasting Technologies

Offer SFN/MFN capability, adaptive precorrection and dual-mode functions; available in ATSC and DVB-T/DVB-H standards.

888-522-0012; [www.screen.it](http://www.screen.it)

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### TRANSPORT STREAM MONITOR

Tektronix MTM400A



Features a new FlexVuPlus™ user interface that leverages the measurement capabilities of the MTM platform to deliver simplified DTV monitoring and diagnostics; provides a configurable common user interface for both confidence and diagnostic monitoring that improves communication handover between operator and engineer; enables a faster understanding of initial fault reporting, accelerating time to overall problem resolution.

800-833-9200; [www.tektronix.com](http://www.tektronix.com)

Booth: N2520

### VIDEO OVER IP CROSSLAYER ANALYZER

Sencore MIP 1860

Designed to provide high-performance IP and MPEG measurements; provides an acquisition device that records and analyzes hundreds of MPEG/IP streams at full GigE speeds; an ideal test solution for design and verification of all MPEG over IP equipment, systems or networks; includes an embedded TAP for nonintrusive monitoring of the network anytime without disrupting service.

800-736-2673; [www.sencore.com](http://www.sencore.com)

Booth: SU12108, N1122

### PLUG-IN MODULE

Hamlet FlexiScope plug-in



Adds the capability to generate high-precision test signals, including alphanumeric identifiers and embedded audio in SDI and HD-SDI; gives access to a comprehensive range of measurement displays on the return signal; slots straight into the FlexiScope; works with the MicroFlex; can be used as an identity module in the MonitorScope and the DigiScope 9000 series.

856-442-6538; [www.hamlet.us.com](http://www.hamlet.us.com)

Booth: N1531

### TEST AND MEASUREMENT SYSTEM

Harris Videotek AVM-717-3GB

Provides a complete video and audio monitoring system for the broadcast and cable engineers; supports all existing HD formats, including 1080p through 3Gb/s solutions, as well as SD-SDI and optionally, composite analog; includes all the functionality of the TVM family, a 17in LCD monitor and internal speakers for audio monitoring.

513-459-3400; [www.harrisbroadcast.com](http://www.harrisbroadcast.com)

Booth: N2502

### COMPLIANCE RECORDER

Masstech MassLogger D.I.Y.

Logs years of broadcast content accurately; features easy-to-install software; allows logged content to be viewed via a standard Web browser, so users can search and retrieve content from any location; features automatic comparison between as-run and traffic logs to display differences and easily identify any missed advertising or programming.

905-886-1833; [www.masstech.com](http://www.masstech.com)

Booth: SU13813

### QUALITY ASSURANCE SOLUTION

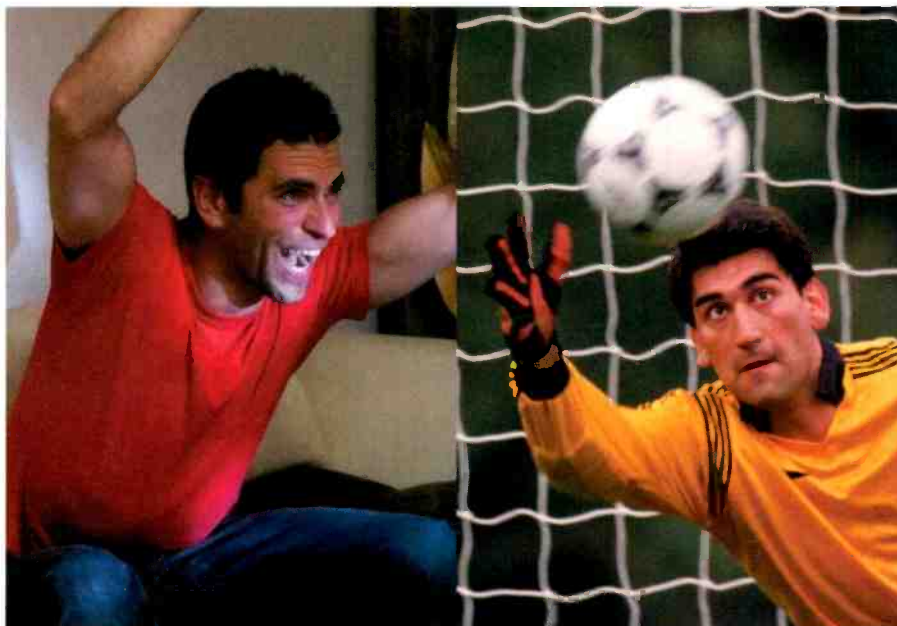
Triveni Digital StreamScope EM-40



Detects, localizes, analyzes, isolates and remedies faults impacting video services based on predefined rules; generates alarms when a transport stream has fallen outside a specified configuration; features integrated trend analysis enabling engineering staff to analyze past issues.

609-716-3500; [www.trivenidigital.com](http://www.trivenidigital.com)

Booth: SU5605



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508-754-4858; [www.telecast-fiber.com](http://www.telecast-fiber.com)

Booth: SU4227

**FIBER ACCESS TERMINAL**

**ADC OmniReach 4x3 MST**

Enables carriers to optimize the deployment of FTTP services; incorporates hardened connector technology, providing a durable, reliable and cost-effective plug-and-play service connection in the outside plant/drop segment of the network.

952-917-0279; [www.adc.com](http://www.adc.com)

Booth: N4124

**IPTV TRANSPORT SYSTEM**

**ENENSYS GigaCaster**

Allows simultaneous MPEG-2 transport stream encapsulation and de-encapsulation, independant FEC schemes, easy NMS integration through native SNMP support and real-time monitoring.

949-226-8056; [www.enensys.com](http://www.enensys.com)

Booth: SU1111

**TEST & MEASUREMENT EQUIPMENT**

**SPECTRUM ANALYZER**

**Bird Technologies Group SignalHawk, SH-36S**

Provides fast, accurate and sensitive 100kHz to 3.6GHz spectrum analysis, with a -135dBm noise floor; features a large high-resolution display that is full color and indoor/outdoor viewable; features intuitive menus and one-button setup.

866-695-4569; [www.bird-technologies.com](http://www.bird-technologies.com)

Booth: N6138

**EXTENDER BOARD**

**Elma Electronic AMC Extender Card**

Extends the signals out of the card cage area so an AMC can be tested/debugged; supports all fabric connectors in the AMC.x and MicroTCA specifications; complies with MicroTCA.0, AMC.1 R1.0, AMC.2 D0.96A.

510-656-3400; [www.elma.com](http://www.elma.com)

Booth: N/A

**BROADCAST TESTER**

**Rohde & Schwarz R&S SFE**

Combines an RF modulator, a universal real-time coder and base-band signal sources in one instrument; can generate broadcast signals in the frequency range of 100kHz to 2.5GHz in real time; includes a noise generator and BER tester.

410-910-7800; [www.rohde-schwarz.com](http://www.rohde-schwarz.com)

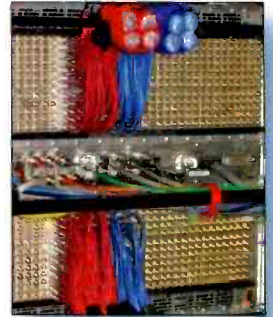
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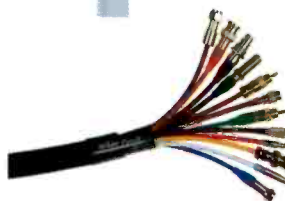
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**Snell & Wilcox Quasar Ph.C**

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818-556-2616; [www.snellwilcox.com](http://www.snellwilcox.com)

Booth: SU4220

## MULTIRATE TRANSPONDER/CONVERTER

**Network Electronics MR-TR-3G**

When used with Flashlink's DWDM multiplexer, transmits 40 uncompressed single-link 3G HD signals on a single strand of fiber; full add/drop capabilities allow for optical-to-electrical and electrical-to-optical conversions of two independent signals.

800-420-5909

[www.network-electronics.com](http://www.network-electronics.com)

Booth: SU10814

## HD/SD-SDI EMBEDDER

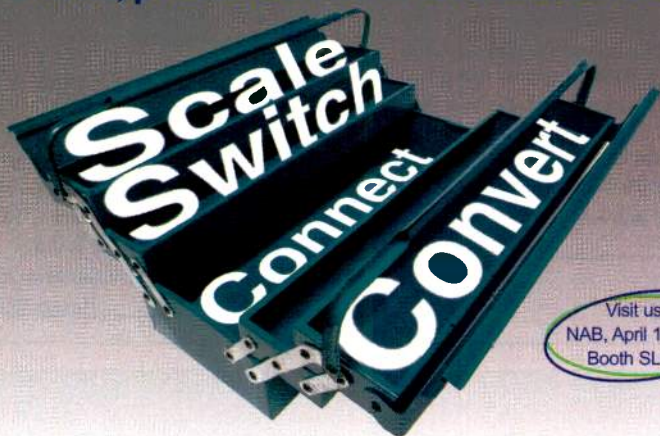
**Cobalt Digital COMPASS 9323**

Offers sample rate conversion, audio level, channel phase inversion, channel mapping and video level controls; features audio processing at 24-bit with 16 AES inputs, eight analog audio inputs, 16 AES outputs with 16 channels of audio de-embedding and embedding, with 16 channels of SRC.

800-669-1691; [www.cobaltdigital.com](http://www.cobaltdigital.com)

Booth: N2819

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## CROSSCONVERTER

**Doremi Labs GHX-10**



An HDMI and SDI crossconverter with audio and genlock; features HDMI, DVI and SDI connectors; supports both SD and HD video and features audio support, sync output and genlock; can be used as a computer DVI to HD-SDI converter, a HDMI resolution converter, or as an HD video upconverter or downconverter.

818-562-1101; [www.doremilabs.com](http://www.doremilabs.com)

Booth: SU6026

## SIGNAL PROCESSORS

**QuStream Integrity 600**



Offers high component density and high-level redundancy; features include redundant power supply and optional redundant control plus reference board for two power busses, two Ethernet busses and two reference signals to every card, as well as two sets of fans with individual tachometers for early warning of potential failure.

416-385-2323; [www.qustream.com](http://www.qustream.com)

Booth: N3421

## MULTIFORMAT CONVERTERS

**Edirel VC-200HD and VC-300HD**



Scale any input to multiple resolutions; support full DVI-I input and output; offer bidirectional conversion and scaling between component SD/HD and HDV/DV, DVI-I and SD/HD-SDI with VC-300HD); embed accompanying audio into the DV/HDV stream.

800-380-2580

[www.rolandsystemsgroup.com](http://www.rolandsystemsgroup.com)

Booth: SL10520



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866-782-4622; [www.small-tree.com](http://www.small-tree.com)

Booth: N3937

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920-387-3000; [www.stantronracks.com](http://www.stantronracks.com)

Booth: SU5613

**TBCs, FRAME SYNCs, CONVERSION EQUIPMENT**

**CAMERA-MOUNTED TRANSMITTER**  
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Offers HD upgradeability with low delay; features a variable 6MHz/7MHz/8MHz modulator, 100mw power output and customer-controlled MPEG menu; linear RF amplification technology limits spectral regrowth at full power to less than -35dBc; offered in the 2GHz frequency band.

717-249-4900; [www.rfcentral.com](http://www.rfcentral.com)

Booth: C6622

**CONSOLE FURNITURE**

**TBC Consoles IntelliTrac**

Allows unlimited lateral positioning of critical monitors via front and rear device tracks; features easily upgradeable rack bay turrets and removable vented abs panels; includes a full range of articulating arms for distance, height and tilt control for mounting flat-panel monitors, speakers, phones and task lighting.

888-266-7653; [www.tbconsoles.com](http://www.tbconsoles.com)

Booth: SU2729, SL6709

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

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## 1/3RU PRODUCTS

### MITEQ

Includes block upconverters, block downconverters, test loop translators and 1:1 redundant switchover units; provide flexible configurations for use in many earth station terminals 1RU.

631-436-7400; [www.miteq.com](http://www.miteq.com)

**Booth: C9737**

## ENTERPRISE MEDIA RECEIVER

### WEGENER Unity 550-2

Includes MPEG-4 ABC video coding for SD/HD and DVB-S2 modulation; streams to additional Wegener decoders that are addressable over existing internal IP networks; features COMPEL control that makes product backward-compatible with the company's DVB receivers; provides hands-free satellite downlink operations to remotely monitor and reconfigure Unity receivers.

770-814-4000; [www.wegener.com](http://www.wegener.com)

**Booth: SU7911**

## SATELLITE TERMINAL

### Advent Communications FlyDrive 120



A compact, lightweight, fully motorized satellite terminal designed for rapid deployment; can be used as either a traditional flyaway or as a semi-permanent vehicle-mounted terminal that can be fitted to most roof racks using standard fittings; will fit into two IATA weight-compliant cases.

978-671-5700; [www.adventcomms.com](http://www.adventcomms.com)

**Booth: C1807B**

## STUDIO, FACILITY SUPPORT PRODUCTS

### DIGITAL AUDIO PATCHING

#### Bittree 2 x 32 AES 75Ω

#### Audio Patchbay



Combines bantam audio on the front and BNC connectors on the back; designed especially for AES 75Ω unbalanced digital audio; features patent-pending hybrid bantam (TT) jacks with BNC rear connectors; uses the company's hybrid bantam/coaxial AES 75Ω patchcords; ideal for facilities using AES 75Ω unbalanced digital audio for routers and new-generation VTRs 2 x 32 jack configuration; available in 1RU, 1.5RU or 2RU.

800-500-8142; [www.bittree.com](http://www.bittree.com)

**Booth: C2243**



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### VERIFICATION RECORDER Digital Broadcast MediaView

Provides ongoing verification of off-air feeds and search capability by date and time, scrubbing and burning material to CD or DVD; stores up to a year's worth of off-air feeds per station; simultaneously compares off-air feeds of multiple stations.

352-377-8344; [www.digitalbcast.com](http://www.digitalbcast.com)

Booth: SU6205

### INSTANT-REPLAY SYSTEM Echolab MultiPlayMD

A multidefinition, multichannel instant-replay system; provides continuous recording of up to 32 channels of SD or HD content; every input features an independent key channel; allows operators to switch instantly between live, play and record functions, with instant synchronous playback available on all channels.

978-715-1020; [www.echolab.com](http://www.echolab.com)

Booth: SU9607

### HARD DISK DRIVE Maxell Information Versatile Disk for Removable Usage

A field archive media for the nonlinear professional video workflow; the lightweight, compact, rugged HDD provides a highly efficient offline storage solution; available in 160GB and 250GB capacities; includes a 2.5in drive and rotational speed of 5,400rpm/s.

800-533-2836; [www.maxell.com](http://www.maxell.com)

Booth: C8428

## SATELLITE EQUIPMENT, SERVICES

### CLIENT CONTROL SOFTWARE Genesis Networks IRIS

Provides client control over remote bandwidth provisioning, point-to-multipoint routing and transmission scheduling; enables clients to book, reserve and monitor their network and occasional video services in real time, remotely or locally, from anywhere in the world; serves as a database tied to a flexible provisioning system that automatically reserves the bandwidth, equipment and resources necessary for client broadcast services.

212-962-1776; [www.gen-networks.com](http://www.gen-networks.com)

Booth: N/A

### RECEIVER Scopus Video Networks Integrated Receiver Processor



A new platform for advanced digital turnaround applications; provides rich content distribution capabilities, including DVB-S/S2 reception, full transport stream descrambling and multiplexing, as well as SD/HD MPEG-2/AVC decoding for broadcasters and content providers; a powerful edge processor and receiver for satellite, terrestrial and IPTV operators; when installed at remote distribution hubs, it receives digital content via satellite or IP and processes it for DTH distribution; with multiple ASI and IP interfaces, it can support local content insertion.

609-987-8090; [www.scopus.net](http://www.scopus.net)

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NAB PREVIEW

## HD PRODUCTION SWITCHERS Broadcast Pix Slate series



Streamline live production workflow with a file-base architecture; new models include the Slate 100 HD, a cost-effective live HD video production studio switcher, the Slate 1000 HD with a professional switcher panel, the Slate 3000 HD with a router that provides up to 18 live inputs and more redundancy; each model includes a switcher with up to six keyers and DVEs, multiview monitoring, a Harris Inscribe CG, and a clip store; seamlessly network with content from edit bays.

866-914-9484; [www.broadcastpix.com](http://www.broadcastpix.com)

Booth: SU10605

## LOGO KEYS

Crystal Vision Multilogo



Works with HD/SD; provides storage for three layers of keying from four keyer sources with look-ahead preview; allows three stored still or moving graphics to be independently brought up from a multi-port nonvolatile solid-state store that can read and write multiple images at once; features drag-and-drop software that will autoconvert images of most common file formats to that required by the logo keyer.

+44 1223 497049; [www.crystalvision.tv](http://www.crystalvision.tv)

Booth: N1311

## PRODUCTION SOFTWARE

### EVS IPDirector

Offers a comprehensive suite of software applications to control production workflows from ingest to playout; includes a new production playlist and a new series of tools offering intuitive control of media between XT[2] servers or between XT[2] and third-party craft editors.

973-575-7811; [www.evs.tv](http://www.evs.tv)

Booth: C4911

## TIME CODE READER/VIDEO INSERTER ESE LX-266U



Decodes SMPTE/EBU time code and superimposes the date and time on video signals looped through the unit; displays date and time with 5 x 7 dot matrix characters; available with one channel up to 12; includes size, position, display mode and mask mode settings.

310-322-2136; [www.ease-web.com](http://www.ease-web.com)

Booth: N3121

## MULTIFORMAT DIGITAL VIDEO ROUTING SWITCHER

Sierra Video 1602HD  
Monitoring Switcher



Passes digital video signals, including SMPTE 310M, 259M, 344M and DVB-ASI up to 540Mb/s along with HD serial digital video signals conforming to SMPTE 292M; features input equalization and automatic output reclocking; can be ordered as an HD/SDI-SDI video-only unit or with single-stream (unbalanced) AES/EBU digital audio, two-stream (balanced) AES/EBU digital audio or analog stereo audio.

530-478-1000; [www.sierravideo.com](http://www.sierravideo.com)

Booth: SL4305

## SD/HD MULTIFORMAT PRODUCTION SWITCHER

Snell & Wilcox Kahuna



New DVE capabilities include Fluid Effects, which allows operators to wrap live video around animated models for a highly sophisticated look in live production; rather than render video and the 3-D model on a separate system, operators can select any real-time source and apply it to any 3-D model that has been preloaded onto the switcher.

818-556-2616; [www.snellwilcox.com](http://www.snellwilcox.com)

Booth: SU4220

**FLIPFACTORY MODULE****Telestream FlipScan**

Scans, analyzes and processes non-standard, user-generated content being uploaded to video Web sites; automates high-volume content repurposing to Web and mobile distribution channels.

530-470-2057; [www.telestream.net](http://www.telestream.net)

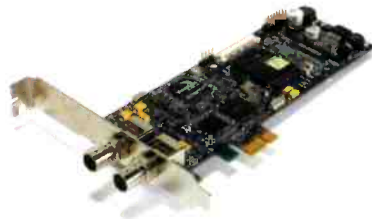
Booth: SL5405

**ENCODERS****Thomson Grass Valley ViBE**

A new range of HD and SD MPEG-4 AVC encoders; take full advantage of the MPEG-4 toolkit and feature a professional-grade compression engine; the ViBE EM3000 delivers high-quality HD in bit rates as low as 4Mb/s; the ViBE EM2000 provides MPEG-4 AVC encoding of SD signals; the ViBE EM1000 is a multichannel SD encoder, designed specifically for IPTV applications where best use of the bit rate is the absolute priority.

800-547-8949; [www.grassvalley.com](http://www.grassvalley.com)

Booth: N1313

**VIDEO STREAMING CARD****ViewCast Osprey-700 Hde**

Streams HD/SD content over IP video distribution and VOD applications; adapts to any incoming SD/HD standard without interrupting the encoding session; uses an array of Designed for Live features that give users greater reliability, logo bitmap overlays and automatic logo sizing and repositioning when switching between any supported SD/HD modes.

972-488-7200; [www.viewcast.com](http://www.viewcast.com)

Booth: SL13109

## PRODUCTION SWITCHERS, VIDEO EFFECTS, KEYERS

**SCAN CONVERTERS****Analog Way Broad Scan range**

Convert workstation, PC or Mac graphic images up to 1600 x 1200 at 60Hz (1920 x 1200 RB) into NTSC/PAL video or HDTV formats; feature genlocks fitted with loop through outputs allowing for device chaining and real-time conversion with high-performance image processing; include LCD screen and computer input format memory.

212-269-1902; [www.analogway.com](http://www.analogway.com)

Booth: SL4623

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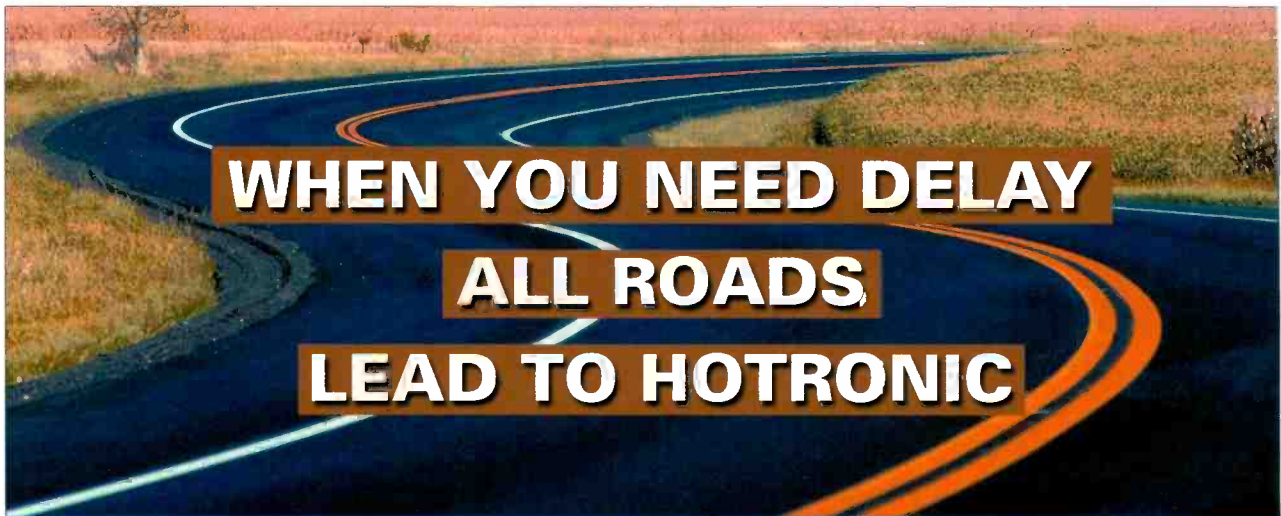
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# Google my TV?

## Combining the Internet and TV is the industry's latest attempt at convergence.

BY ANTHONY R. GARGANO

Panasonic and Google have announced a cooperation that will allow Panasonic to manufacture Internet-enabled flat-screen TV receivers with the capability to access Google Web services, such as YouTube. So, from its incredibly successful roots as an Internet search engine, we now have Google Docs (a free Microsoft Office competitor), Google Phone (the company's reported attempt at developing an iPhone killer), the rumored Google OS and most recently, Google TV.

Does the broadcast industry have yet another competitor in that fierce battle for viewers' eyeballs? The real question is a challenging one: Can entertainment television and Web-based activity coexist on the same living room, media room or rec room large-screen? Google, and presumably Panasonic, believes it has the killer app that will bridge the two mediums to convergence. But does it? Let's take a look at recent history.

### "Killer apps" from the past

With great fanfare, Apple TV, a device allowing the streaming of content from the PC to the TV receiver, was announced in September 2006. Last year, Apple released a software upgrade to enable the streaming of YouTube content. With an incredible track record under Steve Jobs for developing such nifty and highly successful products as iPods, iPhones, and iMac and Mac computers, Apple TV has languished in the marketplace.

Yahoo! Tech picked Apple TV as one of its top 10 worst tech products in 2007. In an attempt to address these disappointing sales, Apple plans to deliver yet another software upgrade, this one designed to enable the streaming of HD movies, which can

be rented through iTunes and viewed on HD displays. Thus, Apple — a superstar in product innovation — continues to search for that convergence magic bullet.

Remember WebTV? Founded by ex-Apple Computer and General Magic engineers, WebTV, according to its then CEO, was supposed "... to make Internet access via TV a low-cost, fun, easy and compelling experience for consumers."

At the opening of NAB1997, Microsoft announced its planned acquisition of WebTV, an action that many people thought signaled the company's plan to enter the TV industry. After three years of minimal consumer acceptance, despite the hype of the behemoth Microsoft marketing machine (household penetration was less than 1 percent), WebTV slowly faded away as Microsoft morphed it into UltimateTV, a DVR platform available through DIRECTV and MSN TV, a collection of TV-oriented services mostly delivered through an entertainment-centric Web portal.

One final "killer app" from the past is Sony's Location Free TV technology. Originally introduced in 2004 as an Internet-enabled two-piece TV receiver, it used a base unit and viewing screen that were connected by the electronic umbilical of Wi-Fi. Introductory prices were in the kilobuck plus range. Today, Location Free TV has been essentially morphed into a \$200 Slingbox competitor.

### The road to convergence

The road to convergence of the Internet and the TV screen is littered with remains of the many previous attempts. Will Google and Panasonic be able to capture the imagination of

the public where others have failed? Is YouTube the "killer app" that will finally open the door to true convergence? I don't think so.

I do think that convergence will happen. The real enabler is still out there, waiting to be discovered. In the mean time, the broadcast industry has the opportunity to continue doing what it has been, which is to aggressively embrace and exploit the Internet as an adjunct to its broadcast service. As the industry does this, these two services will come closer together. And, as the industry melds its delivery services, it will be well positioned for the coming convergence in the home.

### Stick to what you know

Back to YouTube. I can understand the strategy to place YouTube in front of as many eyes as possible, from PC screens to cell phones to TV sets. But I don't think YouTube belongs on my large-screen HDTV.

Google built a tremendous business based on its search engine technology. Tom Peters in his seminal book on management, "In Search of Excellence," had an entire chapter titled "Stick to the Knitting," or stay with the business that you know. Perhaps someone at Google's headquarters should Google it.

BE

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? Send questions and comments to:  
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# Control room design just got easier!

Up to 72 displays...from one chassis,  
with up to 576 inputs



Evertz VIP-X Series Routers & Maestro Control Software

## Control Room Design Checklist:

- The industry's largest range of routers
  - from 32x32 up to 576x576
  - mission critical, high availability
  - true 3Gb/s routing components
  
- The industry's largest multi-image display system
  - up to 72 displays
  - unmatched image quality
  - industry standard control system
  - used by 1000's of broadcasters worldwide
  
- Any input on any display at any time
  - no limit to expansion, no blocking

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