OCTOBER 2009

# Broadcast Engineering

www.broadcastengineering.com

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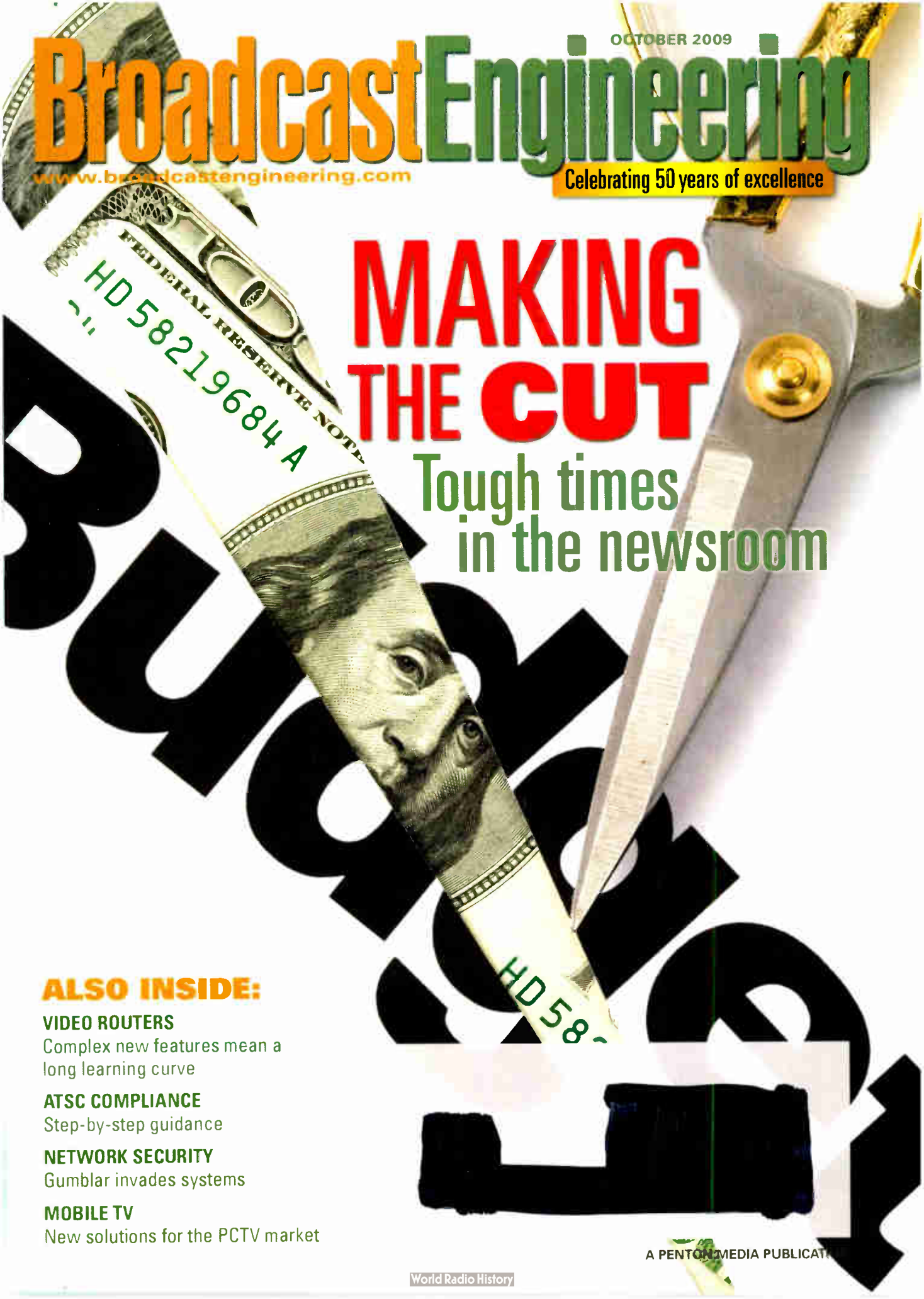


# MAKING THE CUT

## Tough times in the newsroom

## ALSO INSIDE:

**VIDEO ROUTERS**
Complex new features mean a long learning curve

**ATSC COMPLIANCE**
Step-by-step guidance

**NETWORK SECURITY**
Gumblar invades systems

**MOBILE TV**
New solutions for the PCTV market

A PENTON MEDIA PUBLICATION

World Radio History

the **Platform** of **Choice** is **Expanding**

- More than 20 openGear partners
- Over 200 core processing solutions
- The winner of 4 prestigious industry awards
- New 2RU 20-slot rackframe
- 3Gb/s Fiber products

The Ross openGear 3 Gb/s Fiber line offers a range of optical / electrical conversions with unsurpassed density offering up to 40 conversions in 2RU.

The Fiber line has been designed with all active components on the front module making the rear I/O passive, eliminating the need to ever access the back of the frame.

**New!**

**See the openGear 3Gb/s Fiber line and these other New Ross Products at www.rossvideo.com**

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Live Production Technology

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**New!** OverDrive GlobalView
**New!** Vision Octane 8 MLE Production Switcher
**New!** XPression 3D HD CG & Motion Graphics
**New!** openGear Fiber Products

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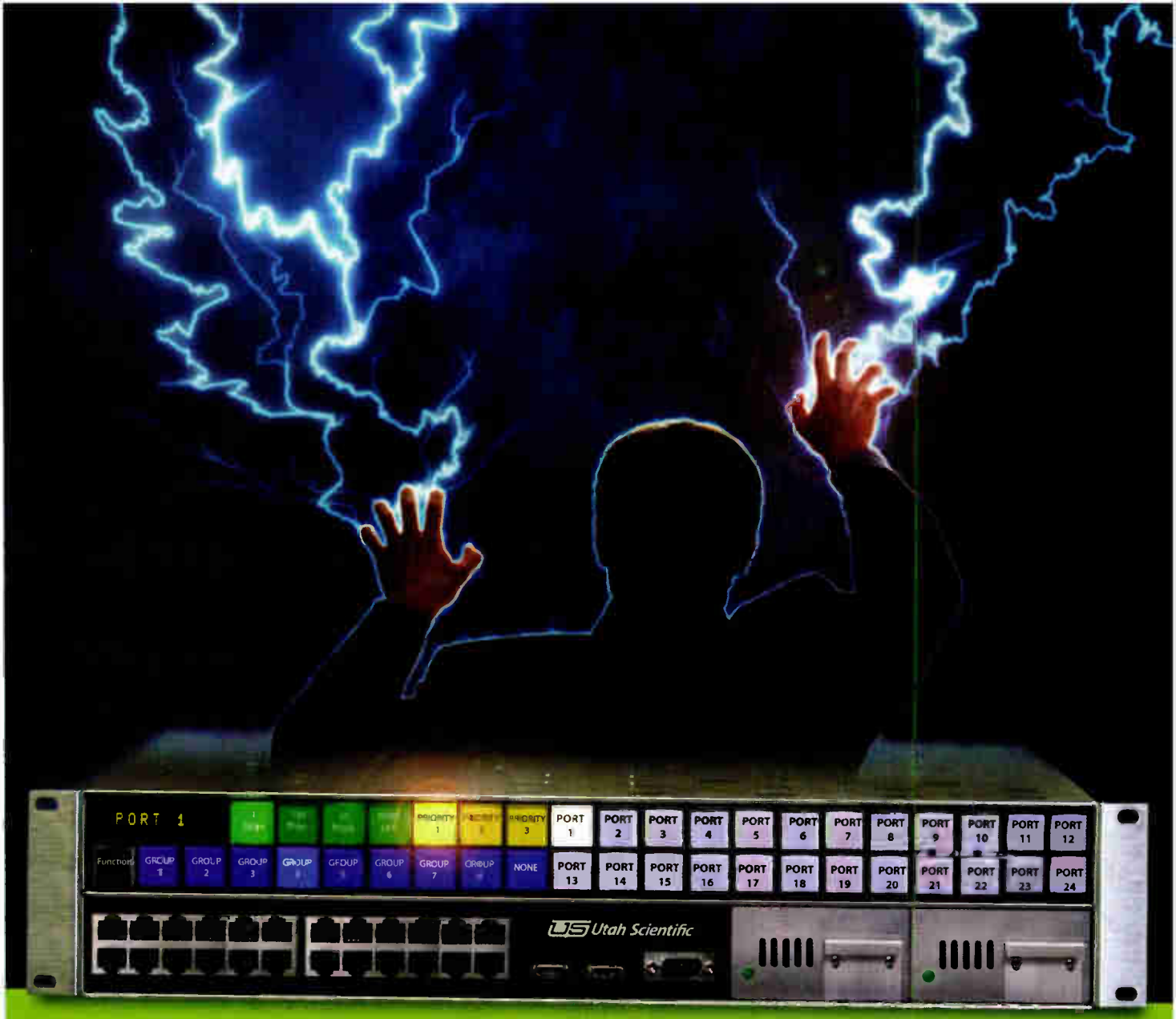


# The UTAH-400 iP Router Gives You the Power.

## What you do with it is up to you.

Real-time, on-the-fly control of your Ethernet network. Impossible? Not with the UTAH-400 iP Workgroup Router.

The breakthrough UTAH-400 iP is the Gigabit Ethernet Router for broadcasters. It gives you the power to control your IT infrastructure the same way you've always controlled your broadcast routing — with the push of a button. This patent-pending control method allows you to change port priorities, security groups, and port speed at will. Instantaneously re-allocate bandwidth so that when you need video delivered now, you know it gets there.

The impossible is exactly what you'd expect from Utah Scientific. After all, we've been delivering the most advanced, dynamically controlled switching infrastructures for three decades.

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10 Year WARRANTY

Utah Scientific

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# Avid HD news will

Explore these 10 ways:

1. Increased **productivity** from staff and systems
2. Reduced editing suite **time** and costs
3. More web-based **revenue**, same headcount
4. Money-saving system **consolidation**
5. Advanced third-party **integration**
6. Support for more formats, **workflows** & users
7. Dedicated, expert **support** teams
8. Smarter **storage** management
9. Lower production control **costs**
10. Avid-quality and assurance

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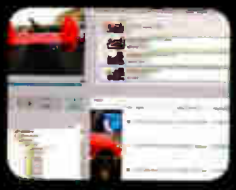
# save you money

Avid HD News is just the beginning. Be sure to check out these other great money-saving Avid solutions:

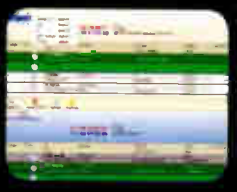
## Deko

Get the graphics integration, power and speed you need



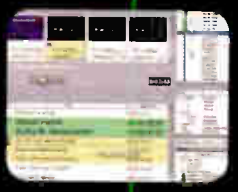
## Interplay

Wherever you are, there it is. Gain the workflow advantage



## Sundance Digital

Keep the drama on the screens, not behind the scenes



## iNEWS

Connect to newsroom production, communication and control

For all of the details on our Top 10, and for more on how Avid can save you valuable time and money, go to avid.com/HDSmart

avid.com

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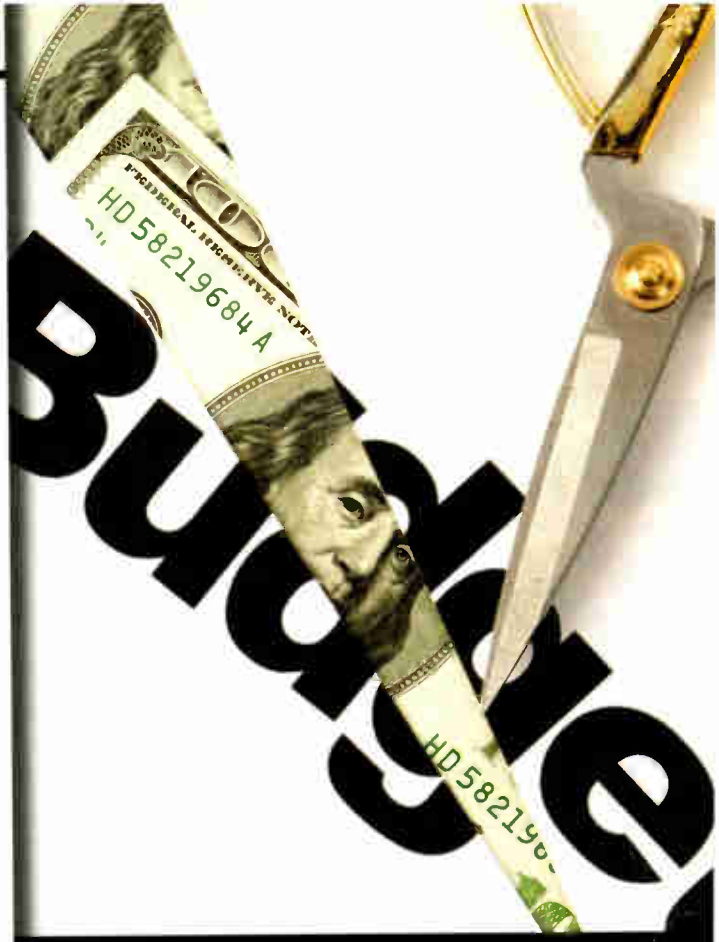
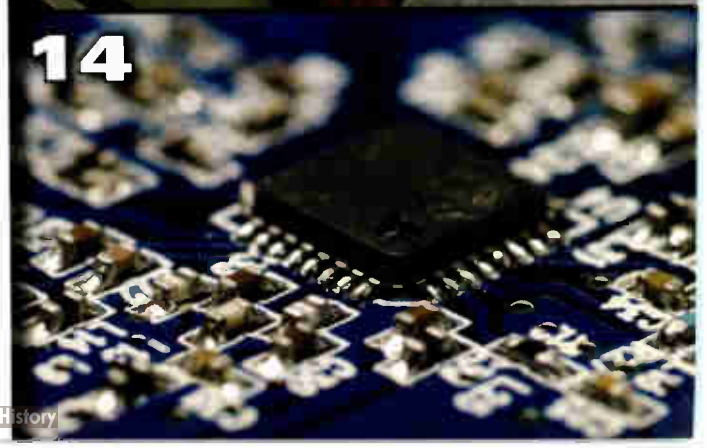



**ON THE COVER:**
As TV stations slash budgets, news technologies such as file-based workflows, centralization and control room automation help them stay on top.




## GET CONNECTED!

Have a burning question? Go to *Broadcast Engineering*'s Forum and ask questions of fellow experts. Or join our online community on Facebook.

**Learn more at *http://community.broadcastengineering.com/forums***



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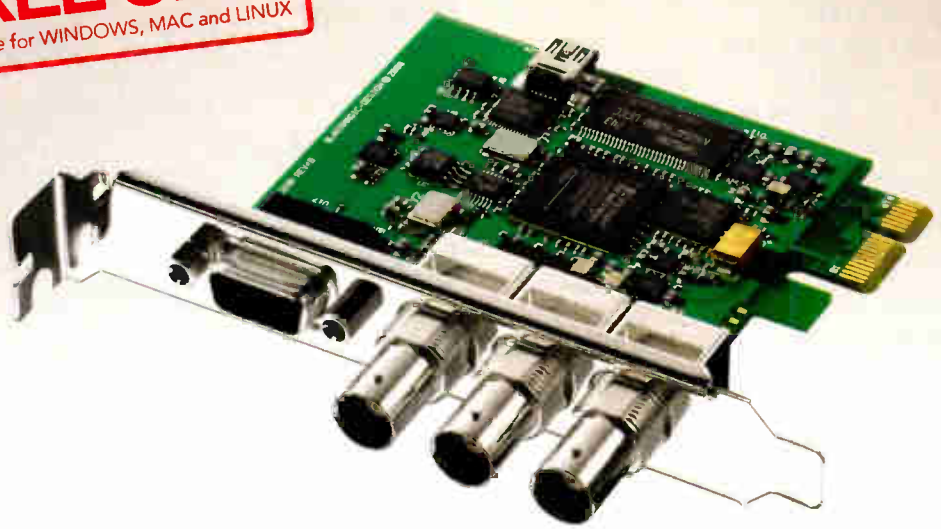
**FREE SDK**
Available for WINDOWS, MAC and LINUX



# The new DeckLink SDI gives you true broadcast 10 bit HD/SD-SDI capture/playback for $295!

For less than the cost of a box of videotapes, the new DeckLink SDI is the world's most affordable and smallest capture card ever! DeckLink SDI works in true 10 bit SD and HD plus includes RS-422 deck control and reference input. Now you get a fantastic solution for editing, paint and design that meets tough broadcast technical standards.

### Connect to any SDI Deck or Monitor

If you're looking for an SDI solution that's perfect for use with SDI decks, or large facilities with SDI routers, then DeckLink SDI gives you incredible 10 bit quality SD/HD-SDI capture and playback on Windows, Mac OS X and now Linux computers. DeckLink SDI also includes blackburst/tri-sync compatible reference input and 8 channels of SDI embedded audio.

### Choose Your Video Quality

DeckLink SDI gives you the freedom to choose the compressed or uncompressed video file format best for the work your doing. Easily work in JPEG, DVCPRO HD, ProRes(Mac), DV, HDV Playback and even perfect quality 10bit and 8bit uncompressed codecs!

### Built in SD Keyer

DeckLink SDI includes an internal SD keyer that lets you layer RGBA images over the live video input. You can also use the included Photoshop plug-ins for broadcast graphics! Use the free developer SDK to access all the DeckLink SDI features for Win, Mac, and Linux.

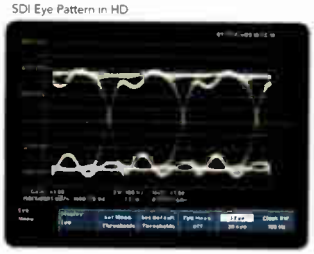
### Windows™, Mac OS X™ and now Linux™!

DeckLink SDI is fully compatible with Apple Final Cut Pro™, Adobe Premiere Pro™, Adobe After Effects™, Adobe Photoshop™, Fusion™ and any DirectShow™ or QuickTime™ based software. DeckLink SDI instantly switches between 1080HD, 720HD, NTSC and PAL video formats.

DeckLink SDI
**$295**

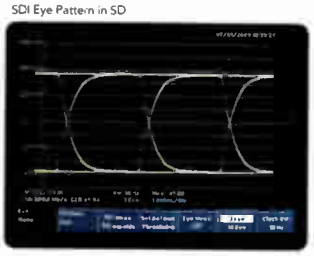
### Meets Tough Broadcast Specifications

SDI Eye Pattern in HD

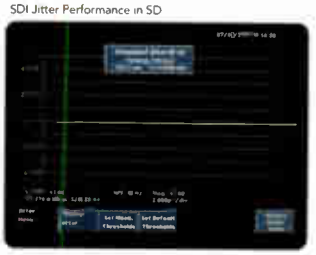


SDI Jitter Performance in HD

SDI Eye Pattern in SD



SDI Jitter Performance in SD



Learn more today at **www.blackmagic-design.com**

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## SEE IT ONLINE!

Check out Brad On Broadcast, editor Brad Dick's blog, for industry insights. A recent post discusses how broadcasters must transmit 3D.

**Learn more at *http://blog.broadcastengineering.com/brad***

## LATEST NEWS!

On Oct. 13, the RTNDA, the Radio Television News Directors Association, will change its name to RTDNA, the Radio Television Digital News Association.

**Learn more at *www.broadcastengineering.com***

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# Beauty on the outside.
# Beast on the inside.

It's easy to be enticed by the alluring good looks of the Niagara® 7500 – the newest HD streaming solution from ViewCast. On the outside, its sleek, innovative design and responsive touch-control interface will excite you. Its brilliant high-resolution HD display will dazzle you. But on the inside, it's a beast.

The Niagara 7500 devours your HD video and easily transforms it into high-quality streams for delivery to IP and mobile networks. Its powerful video pre-processing features streamline and simplify your workflow. Inverse telecine, closed caption extraction and rendering, de-interlacing, scaling, cropping and bitmap overlay are just a few of its standard features.

You can switch on-the-fly between HD or SD video, and with ViewCast's SimulStream® technology, you've got the power to stream simultaneously in multiple formats, bit rates and resolutions from a single SDI video source.

The Niagara 7500 from ViewCast. Beauty on the outside... a beast on the inside.

Speak with one of our streaming experts today at ***800-540-4119***, or visit us on the Web at **viewcast.com\be** to learn more.

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# Not me, said the giants

Apple and AT&T recently found themselves in hot water with the FCC when Google complained about its Voice application not being allowed on Apple's iPhone. "Contrary to published reports, Apple has not rejected the Google Voice application and continues to study it," claimed Apple vice president Catherine Novelli in a letter to the FCC. AT&T similarly denied responsibility, saying it didn't control what applications made it onto Apple's iPhone.

According to the Web site TechCrunch.com, Apple is increasingly concerned about the number of iPhone applications that are powered by Google technology. The list includes the search engine, maps, YouTube and other applications. Besides the iPhone browser, Apple has little of its own programming left on the company's premiere product except for the phone's core, contacts and calendar features.

The Google Voice application would replace Apple's Visual Voicemail by routing calls through a separate Google Voice telephone number where voicemail would be stored. This would prevent a user's voicemail from being stored on the iPhone. Also, Apple claims that Google Voice's SMS feature could take contacts from the iPhone and transfer them to Google's servers, "... and we have yet to obtain any assurances from Google that this data will only be used in appropriate ways," Apple said.

Allowing Google Voice on the iPhone would give users another incentive to abandon their iPhone number and use Google Voice. To outside experts, it appears Apple's key concern is that Google is already gaining too much presence on the iPhone. That, according to some, is why Apple pushed back on the Google application.

So, why should broadcasters care about this battle? Broadcasters should follow this issue because their burgeoning desire to be able to transmit (and charge) for the delivery of live video to millions of cell phones could be in jeopardy — all based on an FCC ruling. The business model broadcasters may use to get video on mobile receivers remains not clearly defined; however, any ruling on the Google/Apple/AT&T issue could affect what service providers and cell phone makers can do with regard to third-party applications and functions.

Broadcasters can deliver television to anything, and anyone who thinks this industry doesn't need the cell phone TV audience is sorely mistaken.

Should service providers like AT&T be allowed to prohibit or charge users for free broadcast content? Will cell phone manufactures like Apple be permitted to act as the master gatekeeper, holding at bay any applications it doesn't want on its devices? Can application makers like Google build virtual shortcuts around a service, like mobile OTA, to keep users from accessing a potentially free service so they can charge for their content?

This particular battle is most likely a huge and expensive trial balloon by both giants to see just how much they can get away with when it comes to implementing their propriety version of a customer's experience. Apple rightly wants to protect the unique iPhone environment (with AT&T's cooperation), and Google wants to expand its software domain.

These vendors are likely guilty of just trying to protect their turf, but the outcome of this battle could affect broadcasters. The public is best served by a level playing field where OTA video can be delivered and new business models explored. Will they get it? You tell me. BE

Brad Dick

EDITORIAL DIRECTOR

Send comments to: editor@broadcastengineering.com



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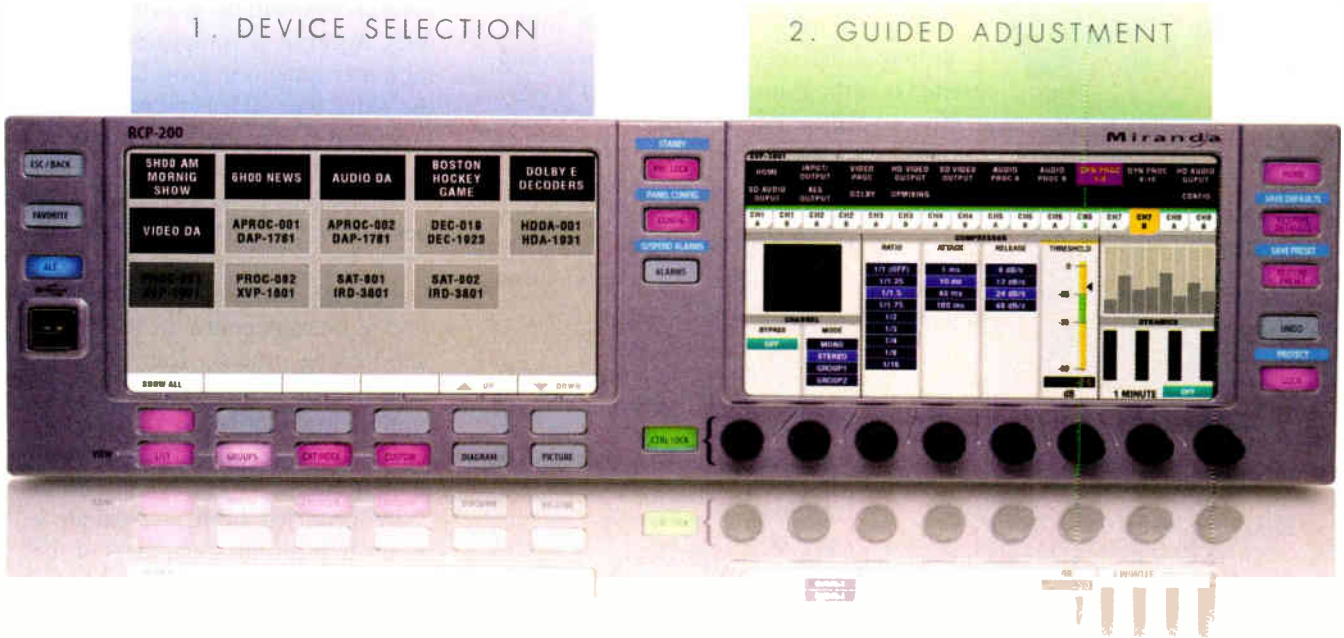


# **Rethink** infrastructure control

Now you can have instant control of complex routing and signal processing infrastructures from a single panel. Our RCP-200 allows much faster and more accurate control of key tasks, like incoming feed processing. Its rich, graphical interface features two touch screens for rapid device selection, and guided adjustment. It's time to rethink what's possible.

Miranda

**Rethink** what's possible

www.miranda.com/RCP-200

World Radio History

## *Broadcast Engineering* hits the big screen

*Dear editor:*

I took my daughters to see "Cloudy With a Chance of Meatballs," and I saw a copy of *Broadcast Engineering* (or so it appeared) in a scene with the weather videographer reading it in the helicopter-car! Very cool!

It looked like they sampled the cover and inserted it in the animation. The cover is crystal-clear and plain as day in the scene.

It comes near the end when they take off in the plane-car with "the big baby guy," inventor, weather girl and videographer. In the scene, they're flying through clouds of food, bouncing all over the place, and the videographer is sitting calmly reading *Broadcast Engineering*.

Daniel Slentz
Vice president of technology & broadcast operations
KERA TV/FM

*Editor responds:*

Thanks for the head's up! Our staff is looking forward to taking the afternoon off to see the movie and confirm *Broadcast Engineering's* appearance in it.

## Bird slaughter

*Dear editor:*

In your July 20 blog post about birds being kills by broadcast towers, you say, "The University of Wisconsin-Madison states that between 7.8 million and 200 million birds are killed every year by the common house cat. Now, my math says this means cats kill 50 times more birds than all towers combined!"

Now you're down on cats! I want you to know that my two tabbies haven't killed over a dozen birds this year! And, they eat what they kill, thereby making more cat food available for underprivileged felines.

Hey, you want to picture bird slaughter? Think wind farms — particularly, those 400ft coastal blades. On the other hand, my cats would probably love living downwind, getting fat and lazy off minced goose!

After 50 years of fairly intimate contact with broadcast sites, I can count on my fingers the dead birds I have seen. Most are alive and quite happily enjoying the guy wires or convenient lattice nesting sites!

Lawrence Behr

*Dear editor:*

It is about time the NAB starts a research project on exactly how many birds are killed. Four million to 5 million is a lot of birds.

In all the tower sites I have visited in 30 years, I have never seen more than 20 dead birds in that time. Let's stop this now.

Joe Walsh

## Will social media kill television?

*Dear editor:*

In your Aug. 31 blog post, you ask the question: Will social media kill television?

The explosive growth is natural for any completely new enterprise. Social media provides the average man or woman with an opportunity to be heard and to make a difference. This is something completely new and unique, so it should not be surprising that it is taking off. It will change the world.

You contrast the growth of these new services with the growth of older ones. Again, it is completely natural for newer systems to grow faster than the older ones did. How many centuries did it take the human race to develop writing?

Newspapers, radio and TV are old technology. Old technology tends to be entrenched and is slow to improve. The owners and corporate managers tend to be conservative in their decision-making process. They are concentrating on this year's/this quarter's profits and not on where the industry and the world are going. They are slow to innovate.

TV news has been increasingly a means to push the social ideas of the management of the stations and networks and less and less about reporting facts. Little wonder the news budgets have been cut and cut. Gathering facts costs money. It takes investment in personnel and equipment. But pushing an agenda can be done by one person in an office with just a pad and pencil. This accounts for much of the success of the social media. It avoids the slant that news directors want to put on everything. Or at least the individual "slants" get averaged over many, many posts.

But, don't worry. Twitter, Facebook and the others will suffer the same fate somewhere in the near future. And because the process is now faster, that fate will come a lot faster for them than it did for the older media.

I doubt that any of these will ever completely disappear. TV, radio and even newapapers will survive in some form. That form will evolve. Twitter, Facebook, etc., will also evolve and become less relevant to young people, but then there will be something new to take their place. Such is life.

Paul Alciatore



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www.aja.com

# "On every shoot, AJA helps me deliver the highest quality."

Bob Kertesz
Chief Technical Partner, **BlueScreen LLC.**

## FS1

- SD/HD up/down conversion
- SD/SD aspect ratio conversion
- HD/HD cross conversion (720p/1080i)
- Dual HD/SD SDI Inputs and Outputs
- Component Analog HD/SD Input and Output
- Closed Caption Support

## With a 30-year reputation for quality, Bob Kertesz relies on AJA at the heart of his workflow.

As Chief Technical Partner at BlueScreen LLC., Kertesz specializes in high-end compositing of live images. In fast-paced environments his array of AJA converters and the FS1 ensure he can meet whatever format and equipment challenges he faces. "A client shows up with an HD tape for an SD project? No problem," he explains. "He wants to integrate 720p footage into a 1080i show? No problem. He brings a camera with only component outputs and I need digital? No problem."

For a recent series of promotional spots for NBC's Amercian Gladiators, Kertesz created on-set pre-visualization compositing taking a feed from a Vision Research Phantom HD Camera. "Because of the tight turnaround time, and the talent involved, it was essential that we were working with equipment that was reliable and fast. The camera didn't genlock, so we had to have an on-set solution to feed its footage into the HD Ultimatte 11. The FS1 was essential for that purpose."

Find out more about AJA products at - **www.aja.com**

FS1. Because it matters.

AJA VIDEO SYSTEMS

World Radio History

# Mobile TV

## New solutions signal a fresh start for the stalled PCTV market.

BY CAROLYN SCHUK

Television by way of personal computers (PCTV) is the TV industry's Rodney Dangerfield; it just gets no respect. In January, Junko Yoshida wrote on *www.wirelessnetdesignline.com* that adding a broadcast TV receiver to portable gadgets seems superfluous when young people watch what they want, when they want via the Internet.

While the laptop seems like a natural fit for mobile TV, PCTV has been the industry stepchild. One reason is mobile phone TV's reigning position as media darling, sucking up all the air in the room for other mobile devices. A second reason is the limitations of last-generation technology: Bulky external tuners and antennas simply use too much power.

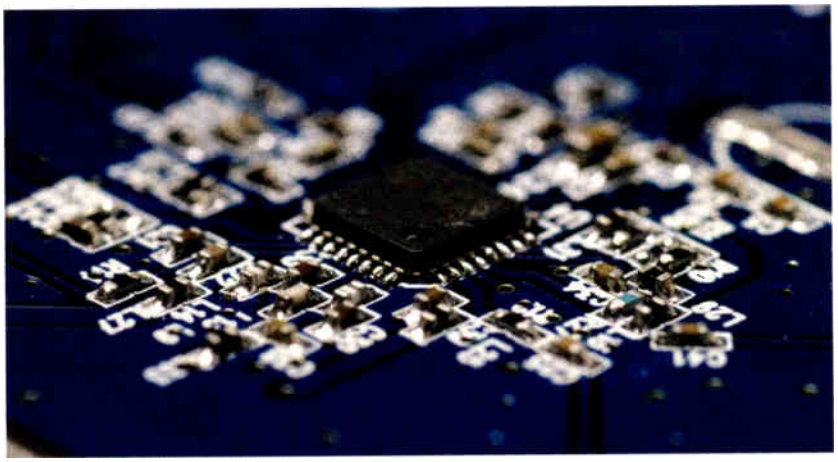
For example, one PC mobile TV solution introduced last year has, in addition to a TV tuner card, six components, two software CDs and a user manual. If broadcast TV made similar demands on early viewers, we'd still be listening to "The Ipana Troubadours" on the crystal set.

But the past two years witnessed a virtuous circle unfolding with the potential to rouse PCTV from its market inertia.

### The third screen

First, the availability of live Olympics coverage on mobile TV services introduced many people to the third screen. Second, the ultra-portable and ultra-cheap Netbook equipped folks with another always-with-you device — one featuring a bigger screen than a phone.

"The use model has completely changed," says Telegent Systems PCTV product manager Sanjay Noronha. "The form factor is so intuitive, light and small that people take them along all the time."



**MaxLinear's configurable MxL5007T PCTV tuner chip supports terrestrial TV standards, including ATSC, DVB-T, DVB-H and DTMB.**

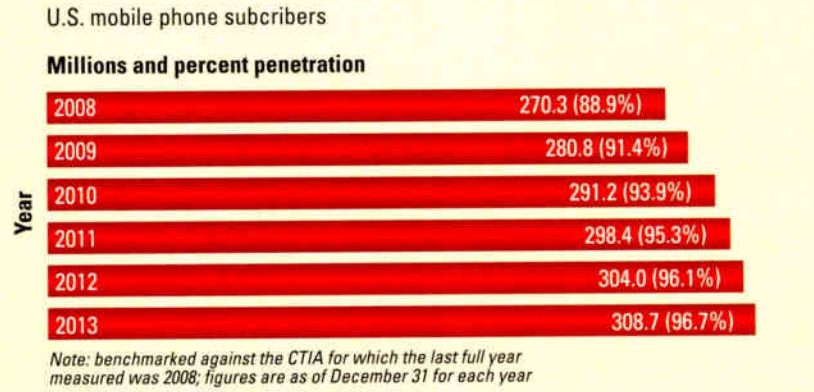
The right technology to perfect this alchemy started falling into place last year with a critical mass of suppliers launching new low-power, sub-$5 TV tuner chips, enhancing existing tuners for new markets, and (most important of all) signing OEM deals that will build the tuners into new laptops and Netbooks in the same way as Wi-Fi cards and DVD players.

In 2008, Telegent introduced the TLG2300 chip, which integrates everything — demodulator; decoder; DSP; stereo FM radio; high-speed USB peripheral; and a DVB-T, PAL, SECAM and NTSC tuner — into a standard 10mm chip. This design

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

**Mobile phone usage nears 100 percent penetration**

By 2013, 96.7 percent of the U.S. population to own a mobile phone




*Note: benchmarked against the CTIA for which the last full year measured was 2008; figures are as of December 31 for each year*

*Source: eMarketer* www.emarketer.com



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# INGENIOUS

Intelligence is relative. Except when it comes to broadcast tools. Consider the **Dolby® DP600 Program Optimizer**, a flexible file-based platform for cable, satellite, IPTV, terrestrial TV, and postproduction environments. With capabilities to rival a full rack's worth of gear, the DP600 can encode, decode, convert, and transcode between a multitude of broadcast audio formats, and supports the next-generation technologies Dolby Digital Plus and Dolby Pulse. Add automated loudness analysis and correction with Dialogue Intelligence™, adaptive upmixing, and other innovations, and it's easy to see why the Dolby DP600 is, quite simply, in a class by itself.

DOLBY

dolby.com/dp600

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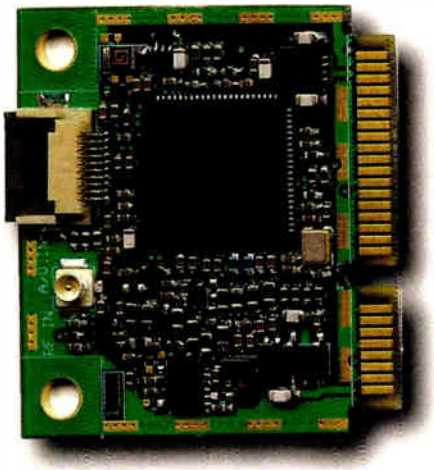


**Telegent's TLG2300 PCTV tuner integrates a demodulator, decoder, DSP, stereo FM radio, high-speed USB peripheral into a standard 0.4in chip.**

offers a large reduction in board space and cuts power requirements 75 percent, according to Noronha.

"You can watch TV on a Netbook for about three hours before draining the battery," Noronha says.

Antennas are another challenge for PCTV, Noronha says.

"Without a receiver that's very, very sensitive, it's been hard to integrate TV into the laptop, so you had to carry around an antenna," Noronha says. "We engineered the solution for very high sensitivity to enable the adoption of internal antennas. We have direct conversion architecture, and our DSP algorithms greatly increase sensitivity and mobility."

Last June, Telegent joined forces with Topstar Digital Technologies to deliver TV-enabled Netbooks and PCs that receive both free-to-air terrestrial analog TV and digital (DVB-T) signals. Both PC and Netbook designs will be available in mass production later this year. Recently unveiled at Computex in Taiwan, Topstar's 18in all-in-one PC was designed from the ground up for hybrid TV, with the entire system optimized for TV performance.

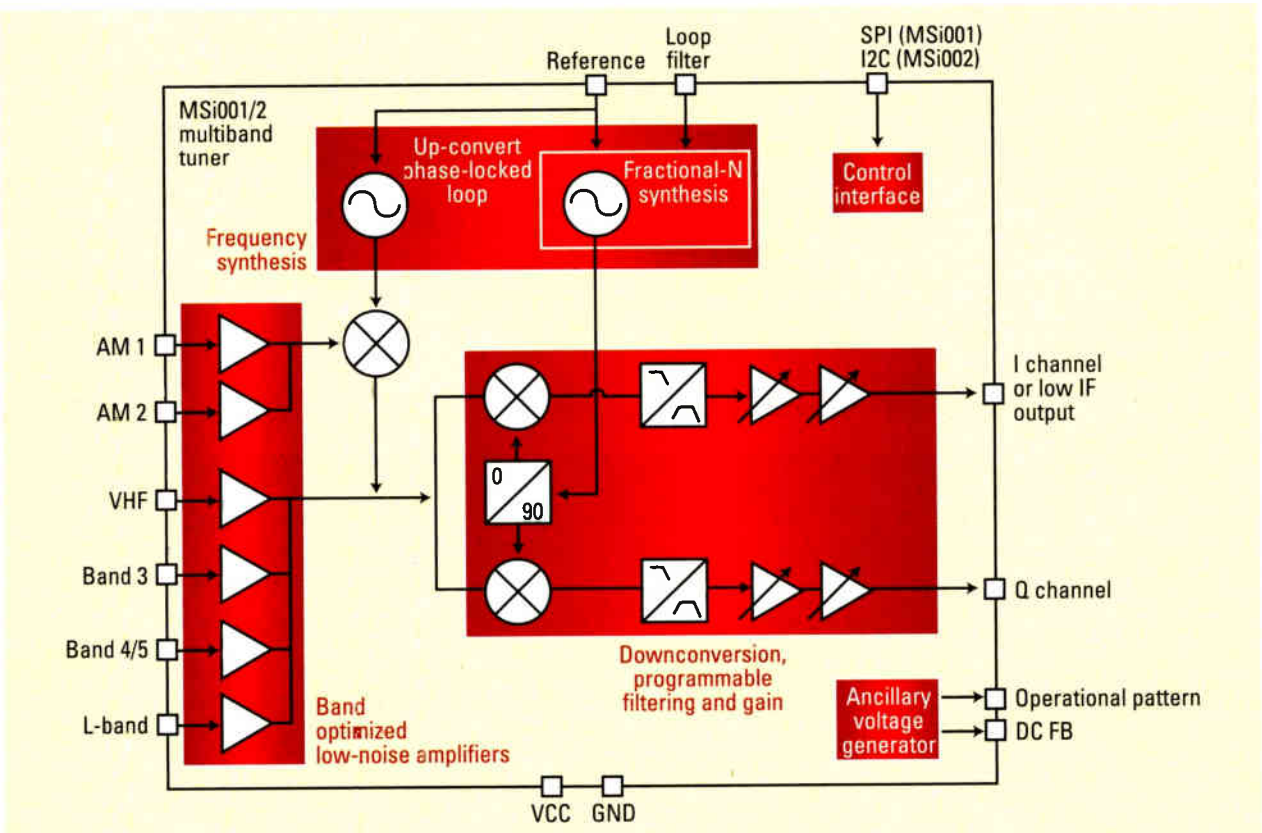
## Software demodulation

Another 2008 entry into the PCTV arena is Mirics Semiconductor, which signed its first OEM deal for its FlexiTV multistandard receiver chip and configurable software demodulator. (See Figure 1.) A host processor-based software system originally targeting dual-core x86 notebooks, FlexiTV is ideal for ultraportables such as Netbooks and mobile Internet devices (MIDs), where maintaining battery life is critical. For example, with ISDB-T 1-Seg, software demodulation running on an N270 Atom processor consumes a CPU load of only 20 percent.

"With a purely hardware solution you have to spin new silicon," says Chet Babla, Mirics product line director. "All we have to do is redevelop the algorithm. You give new software to OEMs, and instantly their product lines are upgraded. With hardware, you're looking at six to nine months."

But software demodulation "isn't easy to do and do efficiently," Babla admits. "You don't want to max out the CPU. We had software and algorithmic expertise within the company — a novel combination of skills."

Mirics leverages DSP-like instruction sets available on the processor




**Mirics' multistandard FlexiTV PCTV tuner features a configurable software demodulator.**



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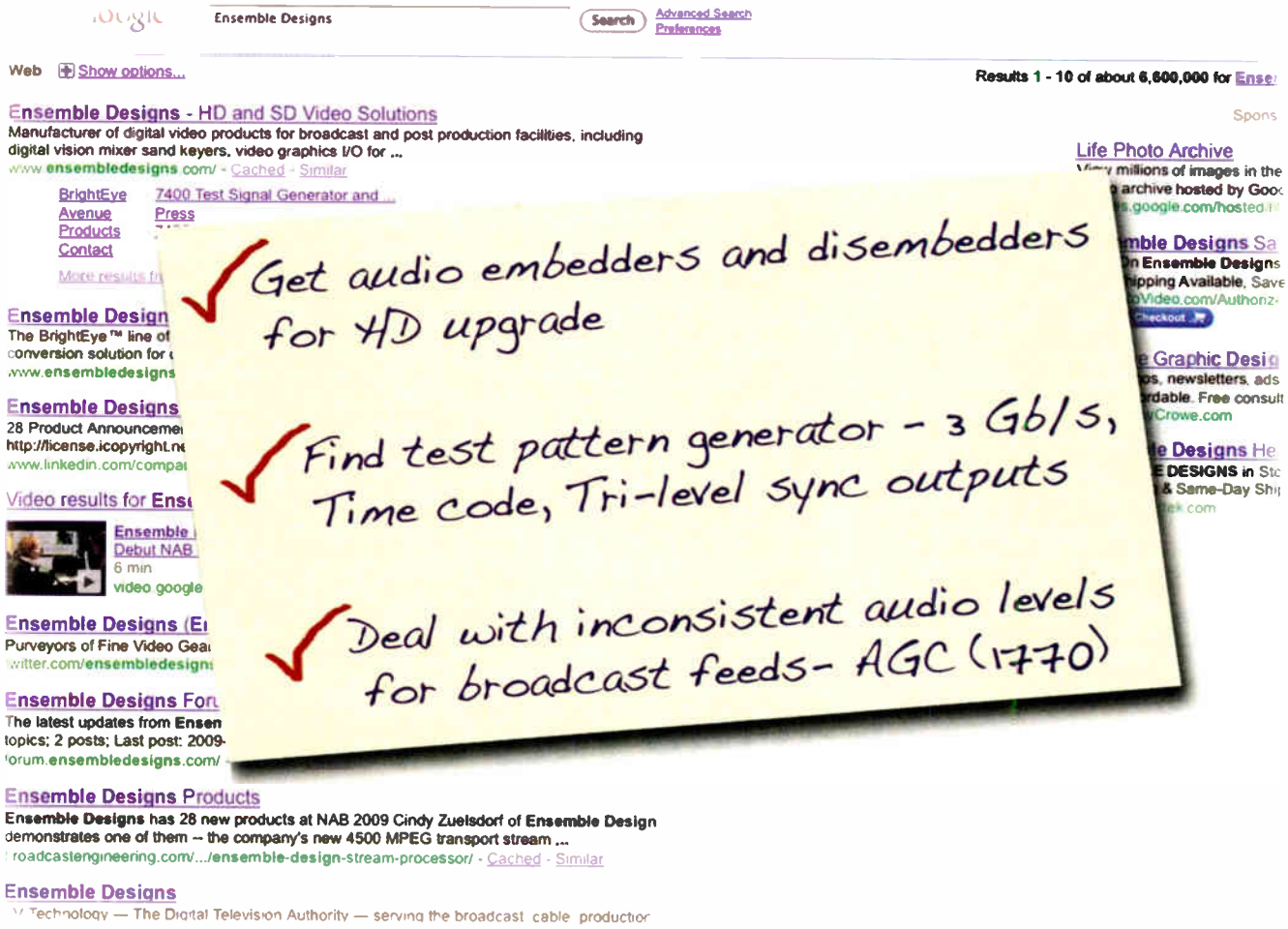


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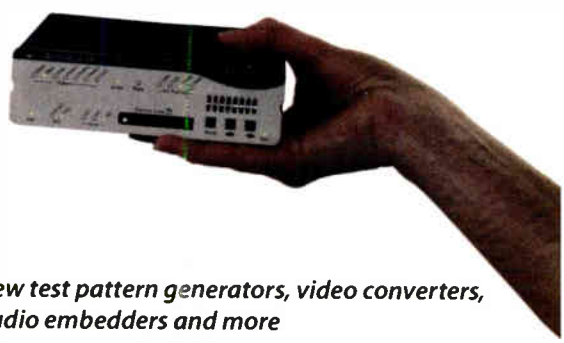

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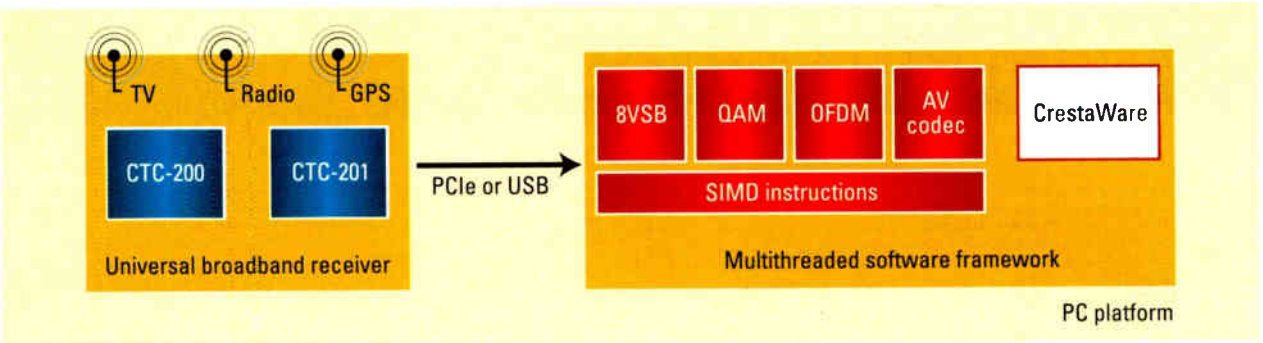


**Figure 2. CrestaTech's CrestaTV software PCTV tuner supports all standards and decides on-the-fly which one to use.**

platform to ensure that the demodulation is efficient. Since then, Mirics has extended FlexiTV to support China's DTTB standard, Japan's ISDB-T (1-Seg), and the Intel Atom CPU and ARM-based platforms. The aim is encouraging both embedded and add-on mobile TV and radio functionality for ultra-portable and low-power Netbooks and MIDs. The strategy appears to have worked. In September, Mirics signed agreements with PCTV accessory makers Quincy Digital of Korea and Skycast of Brazil.

## Multistandard receivers

PCTV got another boost this year from graphics processor company NVIDIA and PC accessory maker Hauppage Computer Works. NVIDIA chose Siano Mobile Silicon's SMS1150 mobile TV receiver chip to provide PCTV on its next-generation Tegra Netbook. The multistandard receiver enables both SD and HD mobile TV, and supports DVB-T, ISDB-T, DVB-H, DAB, T-DMB and CMMB standards — opening up potential market opportunities nearly everywhere in the world except North America.

Hauppauge partnered with MaxLinear to build an embedded PCTV module for the North American (ATSC) market. This is the third generation of MaxLinear's configurable MxL5007T chip, which supports terrestrial TV standards, including ATSC, DVB-T, DVB-H and DTMB.

"The fully configurable architecture means, from an inventory management perspective, you only have one part number, and you configure

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it depending on where you're shipping to," says Stefan Szasz, MaxLinear director of marketing.

Even simpler for OEMs is CrestaTech's multistandard CrestaTV software PCTV tuner, which supports all standards and decides on the fly which one to use. (See Figure 2.)

"OEMs want to build one product for the mass market, not one product for every different market," says Ramon Cazares, CrestaTech marketing and sales vice president.

CrestaTV has its roots in founder George Haber's tech DNA. Haber's guiding axiom is: "If it can be done in software, it will." Almost 20 years ago, when multimedia chipmakers were focused on dedicated video decoder chips, Haber founded CompCore Multimedia and developed the first software video decoder using the CPU's processing power.

CrestaTV scans the entire TV spectrum for analog, digital and cable-in-the-clear signals, Cazares explains. However, the integrated GPS enables a directed, intelligent scan.

"The tuner knows where you are and what channels you should be able to receive," he says. "This directed scan takes three seconds as opposed to 20 or 30 minutes."

This is where the software beats hardware, according to Cazares. In silicon, you need to minimize the number of registers and the amount of memory. Otherwise die size explodes.

"If you do it in software," he explains, "you can make the registers as big as you need — there's no cost penalty — and turn specific algorithms on or off by region."

In order to minimize CPU load, CrestaTV uses a dual antenna system with two tuners.

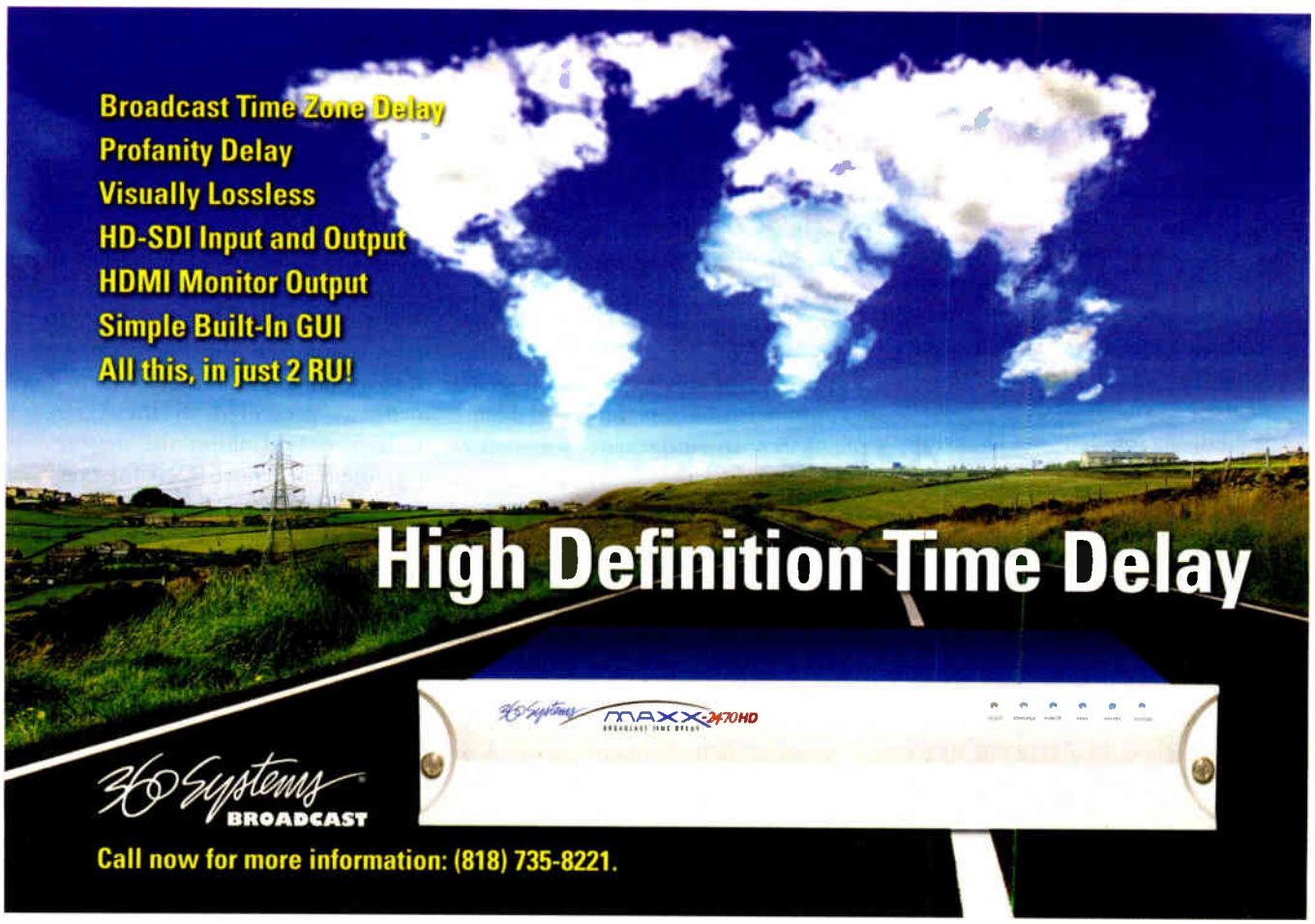
"We take the output of one tuner and loop it back to the other tuner, and send the optimal signal to the CPU for demodulation," Cazares explains. "Our benchmark is to be 50 percent of the [CPU] load or less — similar to a DVD."

Power use is likewise comparable to a DVD player, he adds.

While these solutions have yet to appear on retailer shelves, Noronha sees a big opportunity when they do — possibly later this year.

"With Netbooks, a huge adoption of these devices is in emerging markets," he says. "Consumers, who previously didn't have access to computers, now have access because of the low price. TV is ubiquitous — it needs no introduction. And in the developing world, TV is the main conduit for information. And, this feature has received tremendous interest from focus groups by tier one manufacturers. People have been screaming about this feature, not a fingerprint sensor." BE

*Carolyn Schuk is editor of* Broadcast Engineering *Mobile TV Update.*



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# New Form 323

## The FCC will require anyone with an attributable interest to provide an FCC registration number.

BY HARRY C. MARTIN

In May, the FCC ordered changes in the ownership reporting procedures for commercial radio and TV stations, expanded the reach of its reporting rules and ordered its Media Bureau to come up with a Form 323 for broadcasters to use as soon as the new ownership reporting form is approved by the Office of Management and Budget (OMB). A copy of the Bureau's proposed form can be found at *www.commlawblog.com/2009/08/articles/broadcast/revised-form-323-revealed/*.

### New Form 323 requires FRN

The most striking proposed change — a change not mentioned by the FCC in any of its notices — is that the new Form 323 requires that every person or entity holding an attributable interest must have an FCC registration number (FRN), which must in turn be reported in the new form. Those with attributable interests include officers, directors, LLC managers or members, general partners in limited partnerships, 5 percent or greater shareholders, and individuals or entities whose interests exceed certain levels under the "equity-debt-plus" standards.

This means that as early as 30 days after the new form is approved by the OMB, a new universe of people and entities will have to sign up for their own FRNs, which in turn means that they will have to provide the FCC with their social security numbers (SSNs), employer ID numbers (EINs) or taxpayer ID numbers (TINs) — which are required by the CORES system in assigning an FRN.

Of course, this assumes that the OMB will approve the new form. It is possible that the new FRN requirement, or other new reporting requirements, could be rejected by the OMB. If this happens, the FCC could postpone its universal biennial report filing date for many more months.

If and when the new form is approved, the number of FRNs applied for and issued by the commission is likely to balloon beyond the agency's processing capabilities. At this point, a Form 323 generally requires only a single FRN — the licensee's. If the proposed form is approved, the FCC will suddenly become a repository of a vast trove of sensitive information — SSNs, EINs and TINs for tens of thousands of individuals and other attributable owners. In view of the ever-present and increasing threat of identity theft, one would think that federal agencies would be reluctant to collect such data. Additionally, reporting entities — licensees and their various officers, directors, stockholders and others — will have to keep track of the multiple FRNs they are required to include in their reports.

Plus, the new form requires that all FRN information be consistent among all reports, i.e., if an individual or entity listed in one report provides a particular FRN, then that same FRN should be used in all other reports in which that individual or entity happens to be listed. The unstated problem here is that, historically, the FCC has not limited FRNs on a one-to-a-customer basis. As a result, an individual or entity might have several different FRNs. In order to achieve the consistency mandated by the new form, respondents will have to take pains to use the correct FRNs and will have to hope that all other respondents do likewise.

The commission appears not to have recognized the likely impact of this change. In defense of its new form, as presented to the OMB, nothing is said about the new requirement to report FRNs for every attributable interest holder. In fact, the FCC summarily concludes that "[t]here is no need for confidentiality with [the revised Form 323]," and the revised form "does not address any private matters of a sensitive nature." BE

*Harry C. Martin is a member of Fletcher, Heald and Hildreth, PLC.*

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

## Dateline

- For noncommercial TV stations in Colorado, Minnesota, Montana, North Dakota and South Dakota, the biennial ownership report deadline is Dec. 1.
- Dec. 1 is also the deadline for TV stations in Colorado, Minnesota, Montana, North Dakota and South Dakota to electronically file their broadcast EEO midterm reports (Form 397) with the FCC.
- Dec.1 is the deadline for TV stations licensed in the following states to place their annual EEO reports in their public files: Colorado, Minnesota, Montana, North Dakota and South Dakota.
- The FCC has indefinitely suspended the previously-announced Nov. 1 deadline for submission of biennial ownership reports for commercial TV stations in all states and territories. Licensees will have a minimum of 30 days to prepare and file their reports once the OMB approves the new Form 323.


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# ATSC compliance

## This tutorial covers the key ATSC documents and practices to maintain DTV transmission compliance.

BY ALDO CUGNINI

For many years, compliance in the broadcast industry has meant conducting a successful FCC proof of performance, and the technical requirements for compliance were clearly spelled out in the FCC's rules and regulations. With the advent of digital broadcasting, the rules have been revised and augmented, and while some video transmission requirements have become obsolete, the new requirements for the transmission of ATSC-encoded video are more complex and can be found across many documents. Here, we'll take a look at where much of that information is found.

**The new requirements for the transmission of ATSC-encoded video are more complex, but can be found across many documents.**

### Out-of-channel spectrum emissions

The FCC rules were developed to ensure various approved operating conditions — basically, protection of stations from interference and compatibility with receivers. In order to prevent harmful interference to other stations, a broadcast station must carefully control its emission spectrum. Several documents are available to assist in the measurement of in-band and out-of-band emitted power. One such document is ATSC A/64B, "Recommended practice: Transmission measurement and compliance for digital television." The FCC rules for NTSC service allow for an average power variation ranging between 80 percent (-1dB) and 110 percent (+0.4dB) of total authorized power. In order to not compromise the DTV noise threshold for fringe area reception, A/64B recommends that the DTV transmitted signal power should be kept within 95 percent and 105 percent of authorized power (+/-0.2dB). Because of the variations possible with different measuring equipment, it's recommended that stations calibrate their power meters using a calorimeter-type power meter.

The allowed limits for out-of-band DTV emissions are specified in Section 73.622(h) "Digital television table of allotments" of the FCC rules for full-service DTV stations and in Section 74.794 for low-power stations. This DTV emission mask is illustrated in Figure 1 on page 24. Note that the "in channel" power spectral density is -10.6 dB when measured in a 500kHz bandwidth. (This figure is derived by accounting for the 8-VSB signal effective bandwidth of 5.38MHz and by including the pilot signal power.)

It has been recognized that the techniques required to measure the spectrum of a digitally-modulated transmitter are generally unfamiliar to the broadcast industry, resulting in significant variations in the results obtained by various observers. To remedy this, techniques have been developed to produce accurate and FCC-compliant measurements. The IEEE Standard 1631-2008, "Recommended practice for measurement of 8-VSB digital television transmission mask compliance for the USA," covers the theory, techniques and procedures for measuring the spectral characteristics of 8-VSB transmitters in frequencies near assigned channels. The standard explains characteristics and measurement procedures that

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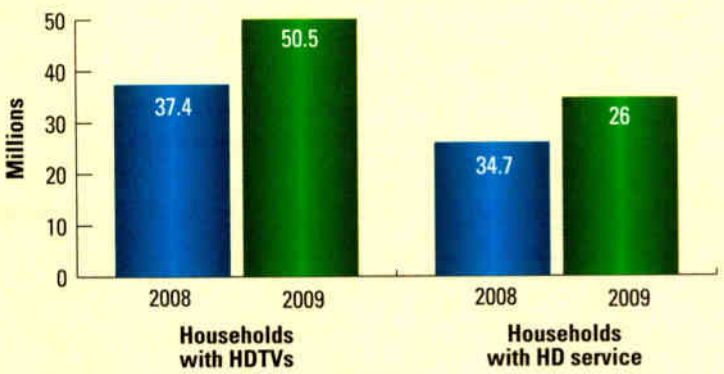


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ensure measurement uniformity across different users. Hopefully, this will form the basis for a new generation of measurement equipment, perhaps even integrated in the transmitters themselves. And while broadcast stations may opt to have contractors carry out the detailed measurements described in these documents, a familiarity with the procedures is invaluable to an understanding of where potential problems can occur.

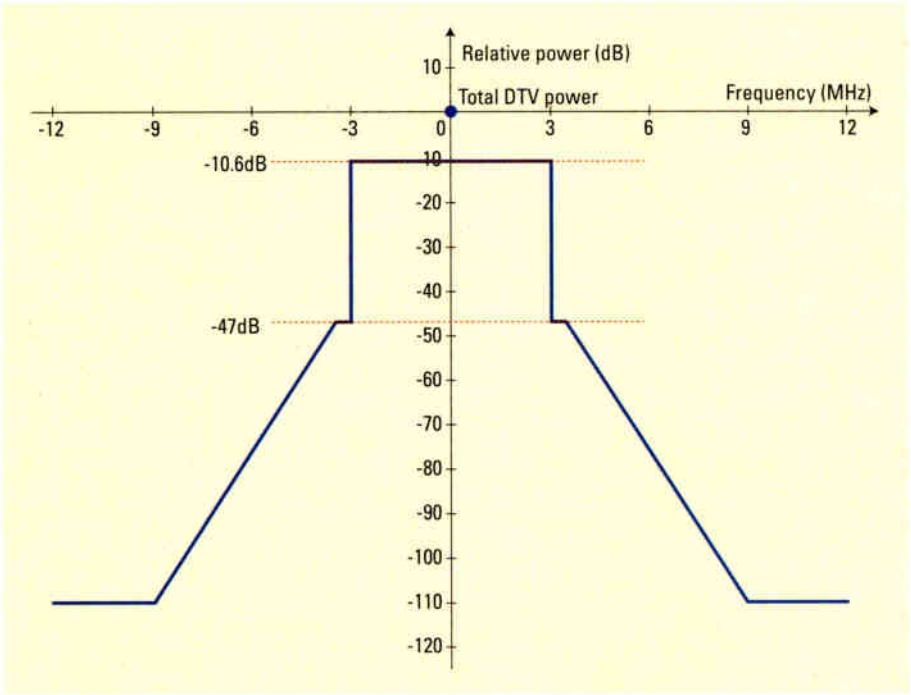


**Figure 1. In this DTV emission mask, the "in channel" power spectral density is -10.6dB when measured in a 500kHz bandwidth.**

## ATSC bit stream compliance

In addition to the RF emission characteristics, the FCC rules require digital television broadcasters to comply with the specifications set forth in three key ATSC standards:

- ATSC A/52: "Digital audio compression (AC–3);"
- ATSC A/53: "Digital television standard" (except for compression format constraints); and
- ATSC A/65C: "Program and system information protocol for terrestrial broadcast and cable."

The commission also encourages broadcasters to consult:

- ATSC A/54A: "Recommended practice: Guide to use of the ATSC digital television standard;" and
- ATSC A/69, "Recommended practice PSIP implementation guidelines for broadcasters."

While compliance with A/52 and A/53 will ordinarily be met by using compliant equipment, there are sometimes outlying circumstances or parameters that can be problematic. At the transport level, some of these conditions can be appreciated by consulting ATSC A/78A: "Recommended practice: Transport stream verification." This document categorizes various errors that may result in any of the following: transport stream off-air, program off-air, component missing, poor quality of service or technically nonconformant stream. Stress bit streams are available from various sources to assist in identifying and rectifying many of these conditions.

Compliance with A/65C — commonly called PSIP — is required by the FCC rules, and details are not specified in the latter, but the commission's Report and Order (FCC 07–228) describing the rulemaking does spell out some specifics about compliance. For one, broadcasters must populate the required PSIP tables and descriptors with the correct information to help receivers assemble functioning guides. The standard also mandates completing tables and descriptors that require one-time setup to be set correctly, including the transport stream identifier (TSID), short channel names, service type, modulation mode source ID and service location descriptor. The TSID information should also be consistent in the terrestrial virtual channel table (TVCT) and the program association table (PAT).

Broadcasters must populate the event information tables (EITs) with accurate information about each event and update the EIT if more accurate information becomes available. Although no update rate is specified in the ATSC dtandard or in the rules, the commission has encouraged stations to update the EIT as soon as possible when overages or other circumstances result in changes to scheduled programs. ATSC A/65C also requires that the EITs contain the caption service descriptor to facilitate a DTV receiver's search for closed-caption information.

ATSC A/69 spells out errors that are common in many PSIP implementations, such as:

- missing tables, particularly the system time table (STT) and EIT;
- a major channel number set to the DTV RF channel number, rather than the associated (legacy) NTSC channel number;
- TSID set to zero or one, the NTSC TSID, or another station's TSID, or not set the same in the three required places; and
- the system time missing or set to 00:00:00 on 1/6/1980.

In order to facilitate receiver handling of different aspect ratios, the broadcast community has developed the active format description (AFD), which is described in A/53


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and elsewhere. The FCC does not require broadcasters to use AFD, but broadcasters that choose to use it must adhere to A/53. (The commission does, however, encourage television manufacturers to implement the CEA-CEB16 "Active format description (AFD) & Bar Data Recommended Practice" into their TV sets.) The broadcaster's handling of AFD in the plant is defined in SMPTE 2016-1, "Format for active format description and bar data," which specifies the carriage of the AFD code in the facility SDI links and provides guidance on how the code should be set in encoders and transcoders.

## Encoder performance

To evaluate how well an ATSC-compliant encoder performs, complex suites containing specialized and artificial test patterns have been designed to stress various aspects of processing and to force failure modes. On the receiver side, transport streams are available from various sources that exercise different modes of AFC, closed captions, audio/video synchronization and ratings systems. These are often used by receiver manufacturers in developing and testing their products.

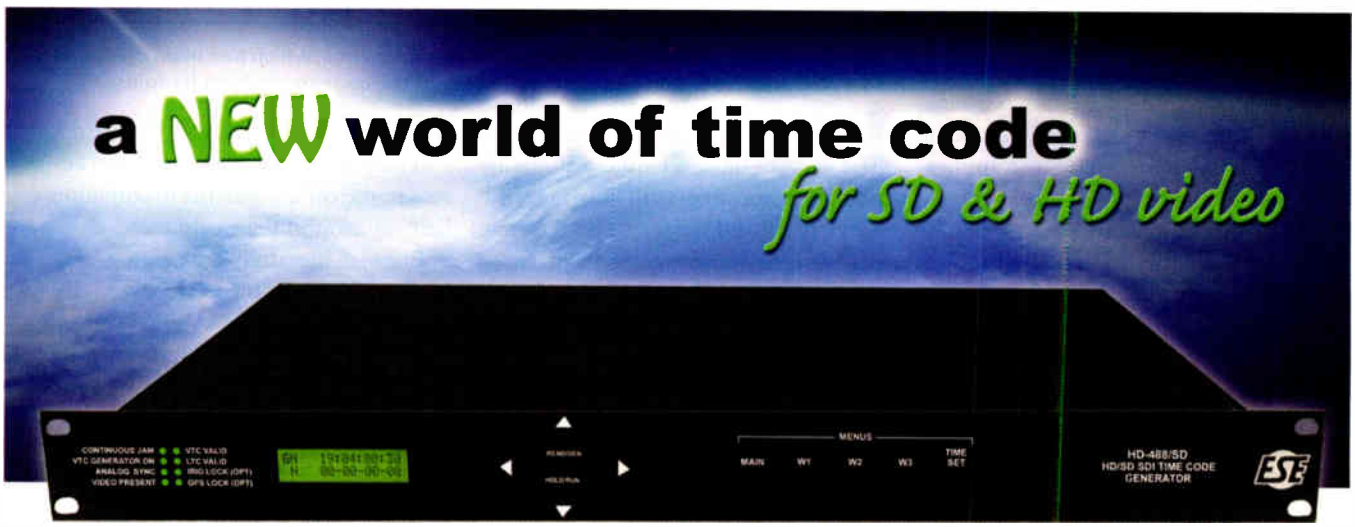
**Consult the right authorities to ensure FCC compliance!**

The ATSC standard (and the FCC rules) have no specific compliance requirements on audio/video synchronization, in part because the problem is quite complex and is still not completely understood. Recently, EBU and SMPTE have been finalizing a set of recommendations to help update synchronizing and time labeling standards for broadcast and other content. This work describes detailed standardization needs and suggests practical, cost-effective timing and synchronization approaches in media creation and broadcast technologies that will be useful for the foreseeable future. At press time, a report was due at IBC. Expect more work in this area as solutions emerge.

This discussion is not intended to replace an understanding of the legal requirements for compliant broadcasting, but serves as a technical summary of some of the relevant issues. Make sure you consult the right authorities to ensure FCC compliance! BE

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

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

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# Network security

## Protect your broadcast facility from becoming the Gumblar virus' next victim.

BY BRAD GILMER

A broadcast engineer's number one job is to keep the facility on the air. When it comes to security, our focus has been on how to acquire the advantages of networking technology without introducing security risks inherent in connecting computers together.

I want to spend some time talking about a new threat to your facility: the Gumblar virus. Usually, I hesitate to cite specific security issues, but in this case, I personally know the threat is credible. It's important to take steps to protect your facility.

If you have read this column over the years, you know that I operate several servers on the Internet. Occasionally, bad guys probe one of my servers, and then launch attacks meant to exploit weaknesses based on knowing what sort of OS and applications I am running. The best protection from these sorts of attacks is to lock down your server so that it gives up as little information as possible about what it is doing, disable any unnecessary applications, run the latest versions of your server software and applications (for example, PHP), and use a secure log-in method.

### A new type of security threat

Over the last year or so, the feel of the reports coming from my security logs changed. I can't tell exactly what is different, but I can tell you that the attacks are more deliberate and specific. I started to see probes that were clearly targeted at hijacking my Web servers — getting access to tools that allow the attacker to alter the content of Web pages. I can hear you asking, "What does this have to do with the broadcaster?" Keep reading.

Not long ago, several colleagues reported that their servers had been hacked. They told me that the content on their servers appeared normal to end users, but that a garbage code had been added to their Web pages. (See Figure 1.) At first, it was not possible to determine what this garbage code did because it consisted of jumbles of characters.

Further analysis and some searching on the Web revealed that this code surreptitiously redirected viewers of the Web pages to other servers without the end-user's knowledge. The servers have a Chinese domain, but are associated with Russian and Latvian IP addresses. These servers were delivering code from servers in the UK. Here is where things get interesting — and a little scary. The servers were installing code on the user's computer. The code does several things, from exploiting holes in popular software to redirecting the user's computer to sites that look like a popular Web site but actually are controlled by the attackers. But the most serious threat to the broadcaster is that the code loads a keystroke logger on the end-user's computer. Once loaded, the keystroke logger sits quietly in the background, periodically sending logged information back to the bad guys' servers on the Internet. What you type may be logged without your knowledge, including usernames and passwords.

You have probably already taken steps to prevent people from using a Web browser to look at outside Web sites on on-air systems, and that is a good thing. You have also probably limited connectivity to the on-air network so that people cannot connect unauthorized computers. But what about your computer? What about computers that are used to maintain your on-air networks?

Do you browse Web sites with the same computer you use to maintain the on-air network? Do you access servers on the on-air network remotely from home or from your desk on a business LAN? If you do, you may have unwittingly granted access to the on-air systems to someone halfway around the world.

```
(function(jil){var
xR3p='%';eval(unescape(('var"30a"2d"22Sc"72ipnEn
gi"65"22"2c"62"3d"21"56ers"...
```

**Figure 1. Above is a code snippet from the Gumblar virus, which had been uploaded to a Web site. Note that I have altered some of the code to render it harmless.**

Because the attackers can log keystrokes, they are able to track activity on your computer. If you use a username and password to log in to your system, this information is sent to the attackers. Using usernames and passwords harvested from tens of thousands of computers, the attackers are not just accessing Gmail and Yahoo accounts, but also they are targeting you and me — people who maintain servers on their networks. Once they have usernames and passwords for your servers (logged as you type them in while doing maintenance on your systems), they use these credentials to launch attacks on the servers, compromising them and then uploading code, which further spreads the attack.

This security threat is particularly serious for several reasons. First, it


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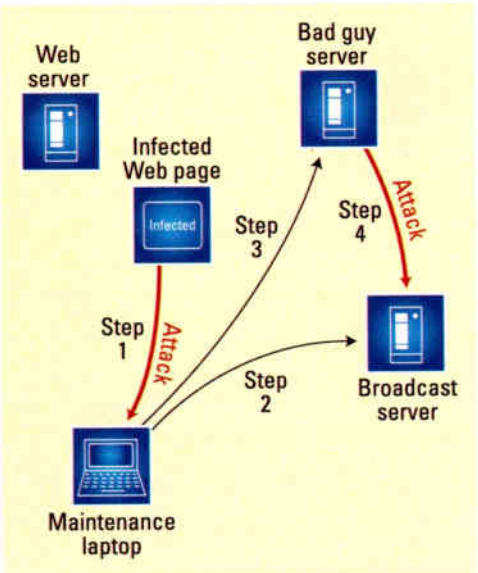



**Figure 2. A Gumblar attack starts when you log into a Web site and view an infected Web page (step one). The infected page loads a keystroke logger on your computer. When you log into a server to do maintenance (step two), usemame and password information is sent to a server operated by the bad guys (step three). The bad guys use this information to attack your server at a later time (step four).**

creates two groups of compromised computers — end-user systems and servers. Second, by gaining access to servers, even if this attack is eventually squelched, if there are system administrators who do not change passwords on their servers, it is easy for attackers to launch a different attack at a later time using the network of compromised servers they control. Third, because many servers on the Internet host multiple domains, a single compromised server may lead to hundreds of infected Web sites. Fourth, this attack specifically seeks to gain information from system administrators. Because the attack has been successful, even if it is eventually put to rest, the attackers have learned that it pays big dividends to attack your computer, because as the administrator of your facility, your computer is used to gain access to critical systems on the network.

Figure 2 sums up how this attack works. First, attackers load garbage code on compromised Web sites. Second, the code loads keystroke logging software on your computer. Third, when you log into the servers to do maintenance, your username and password are logged and sent to bad guys' servers. Fourth, the bad guys use this information to compromise your servers.

Remember: You are the target of this attack because, as a broadcast engineer, you have access to server credentials that control the on-air network. If they gain access to these credentials and they can figure a way to get to your on-air network, things could get bad in a hurry.

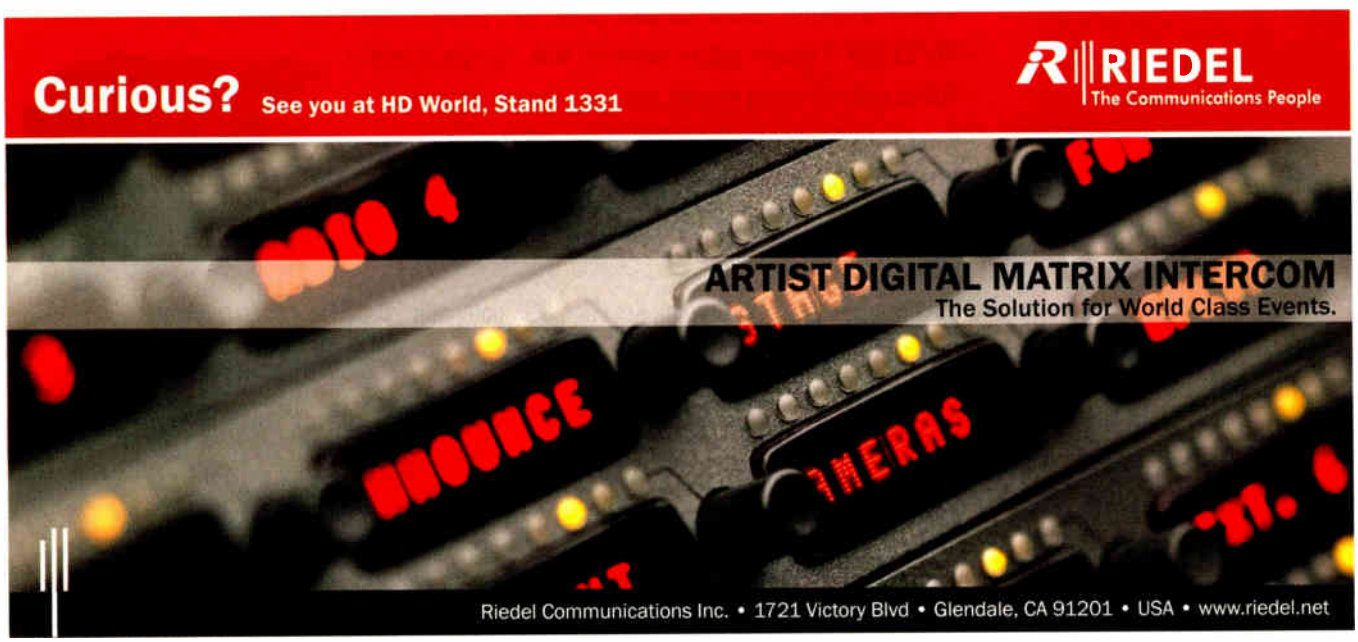
## Avoiding this attack

You have already taken the first step in avoiding this attack by reading this article. If you understand that anything you type may be logged and sent to attackers, you can take steps to avoid an attack. Here are a few specific things you can do:

- Change the passwords on your servers now — especially root passwords. Better yet, go to some other log-in authentication scheme, and get rid of usernames and passwords all together.
- Check any computers used for system administration for the Gumblar virus. You can find out how to do this by using a Web search engine to look for information on the virus. Note that not all antivirus software detects this virus.
- Read your server logs — every day, all the time.
- Do not use a computer that is normally connected to the Internet as a maintenance computer for your on-air network. Laptops are particularly bad offenders. BE

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

? Send questions and comments to: brad.gilmer@penton.com





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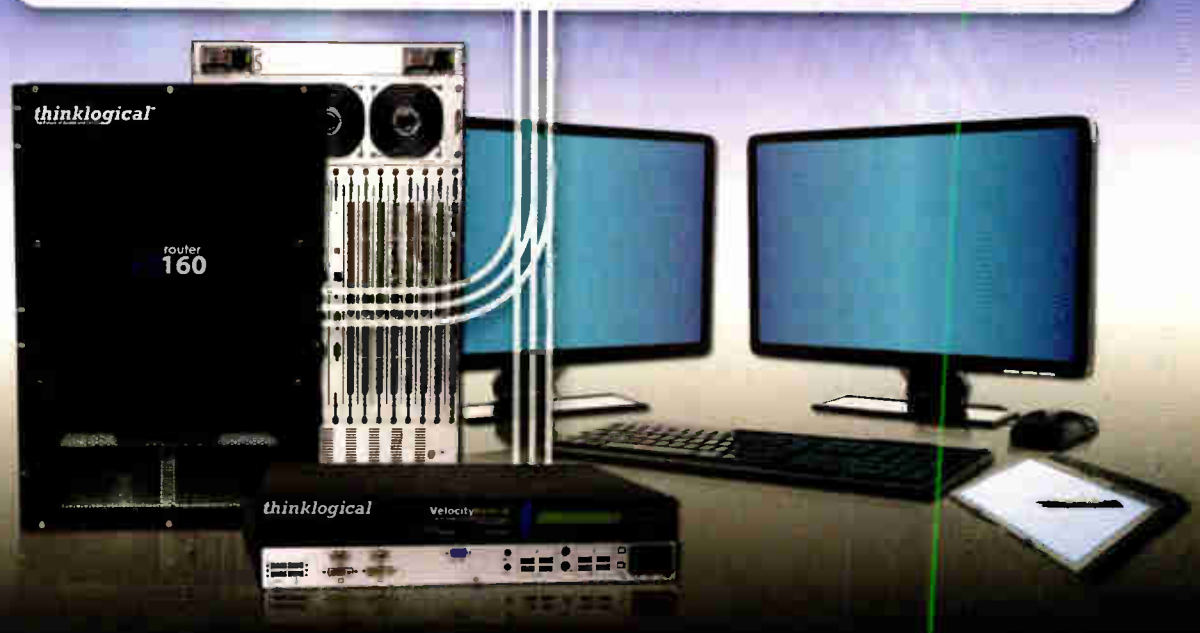


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# Signal conversion

## Effective motion compensation is key to quality signal conversion.

BY GERARD PHILLIPS

The broadcast distribution network is becoming ever more complicated due to the ongoing proliferation of acquisition, processing and distribution standards. Departing from the model of simple network-to-home TV transmissions, today's media marketplace allows consumers to choose from an immense range of delivery mechanisms, display equipment and support media. In providing this wealth of options, media companies face added challenges in maintaining the quality of their assets and services.

Every link in the distribution chain carries the risk of compromising the quality of content. Poor quality not only reduces the value of content, but also undermines satisfaction. However, with careful attention to video processing at every point in the distribution chain, content owners, aggregators, service providers and infrastructure managers can preserve the best possible image quality and, in turn, maintain their own efficiency and profitability.

### Keying in on conversion

Signal distribution in the broadcast environment typically includes the ingest of media, editing or repurposing of that content, as well as archiving and/or delivery over-the-air or via cable, satellite, IPTV service, Web portal, or mobile network. In any version of this distribution chain, the broadcaster's ability to meet high-level requirements depends on accurate and efficient signal management and processing. Synchronization, maintenance of signal levels, contribution and storage compression, clean switching, and transparent conversion all contribute to the value of the end product. Among these, conversion is particularly important because it is present — visible and invisible — in so many areas of the signal distribution chain.

The multitude of high-resolution, low-resolution, progressive scan and interlace scan picture formats used across the global broadcast market are reconciled through a variety of conversion processes. Across the distribution chain, deinterlacing, format conversion, standards conversion and aspect ratio conversion occur at many easily identifiable points.

Most conversion processes involve manipulation of interlaced material. Even a simple aspect ratio conversion is best performed in the progressive domain, after a high-quality deinterlace.

Interlaced video provides a compromise between data rate, temporal resolution and vertical resolution, and this compromise can be seen as a primitive form of compression. The upside is the potential for higher spatial resolution of still images. The downside is that as soon as anything in the picture moves, there is ambiguity between vertical resolution and temporal motion. As a result, the quality of any conversion process — and a number of other image restoration and enhancement operations — depends on an understanding of the true motion in the picture, and this understanding is achieved through motion compensation.

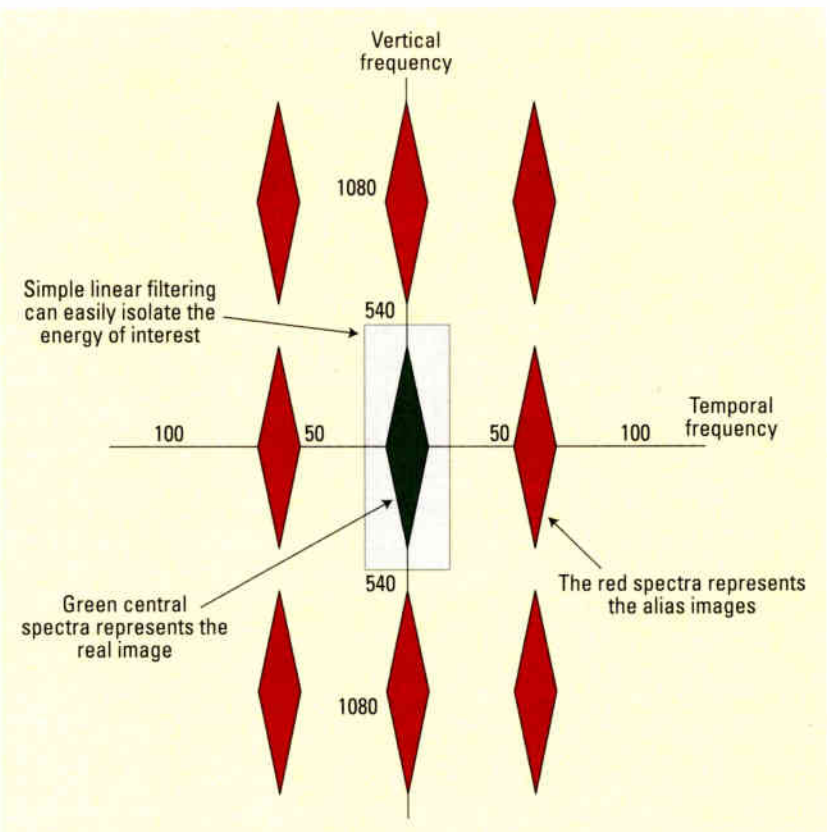


**Figure 1. Vertical/temporal energy distribution for a typical low-motion 1080p video frame**



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## Addressing the issue of motion

Motion compensation is best thought of as being a method by which the relevant filtering can be skewed to match the motion of the picture. The application of motion compensation to standards and format conversion can make a much better job of some of the processing that traditionally has been the preserve of linear or motion-adaptive filtering. An illustration of vertical tilt frequency response, at rest and at critical speeds, demonstrates why linear filters cannot distinguish between vertical detail and motion. In essence, it's because the spectrum skews.

Figure 1 on page 30 shows the vertical/temporal energy distribution for a low-motion, vertically detailed 1080p video sequence. In this case, a simple 2D vertical temporal linear filter (grey box) can easily isolate the green "real" image for further image processing.

Figure 2 shows the same graph for a high-vertical-motion, vertically detailed 1080p video sequence. The simple 2D vertical temporal linear filter (grey box) can no longer easily isolate the green "real" image for further image processing without losing some of the green spectra or including some of the red. Motion compensation allows a skewed filter aperture to be fit to the skewed energy spectra, in turn enabling effective isolation of the "real" image again.

Effective motion compensation, without unsightly artifacts, hinges on the accuracy of the motion vectors generated for an output picture. Phase correlation is a motion-compensation technique that measures "true motion" in the scene rather than aiming merely to identify matching blocks between frames.

## Measuring motion accurately

Phase correlation improves on block-matching techniques for motion compensation by actually measuring the speed and direction of moving objects rather than estimating, extrapolating or searching for them. While block-matching techniques excel in identifying areas of similarity, they fail through their assumption that these areas of similarity are the same area, but moved between frames. Thus, used purely for compression, in which motion vectors don't need to be correct, block matching is an effective tool. However, with deinterlacing or standards conversion, these vectors do need to be accurate, as they are used to move pixels to make entirely "new" pictures.

In taking on challenging material, such as repetitive structures or small, fast-moving objects like scrolling credits or a putt on a golf green, phase correlation succeeds because it can match pixels in each field precisely with their counterparts in adjacent fields. The resulting images yield the smooth motion portrayal that is essential to high-quality conversion.

Phase correlation performs a spectral analysis on the two successive fields (frames) by using a Fast Fourier Transform (FFT) and passes the output through an inverse FFT to generate a correlation surface. This surface uses the difference in phase information from field to field to reveal the pixels whose positions correspond to detected motion between the fields. Thus, the distance and direction of the motion are measured accurately, and application of a subsequent object matching process creates the actual vector field for each pixel.

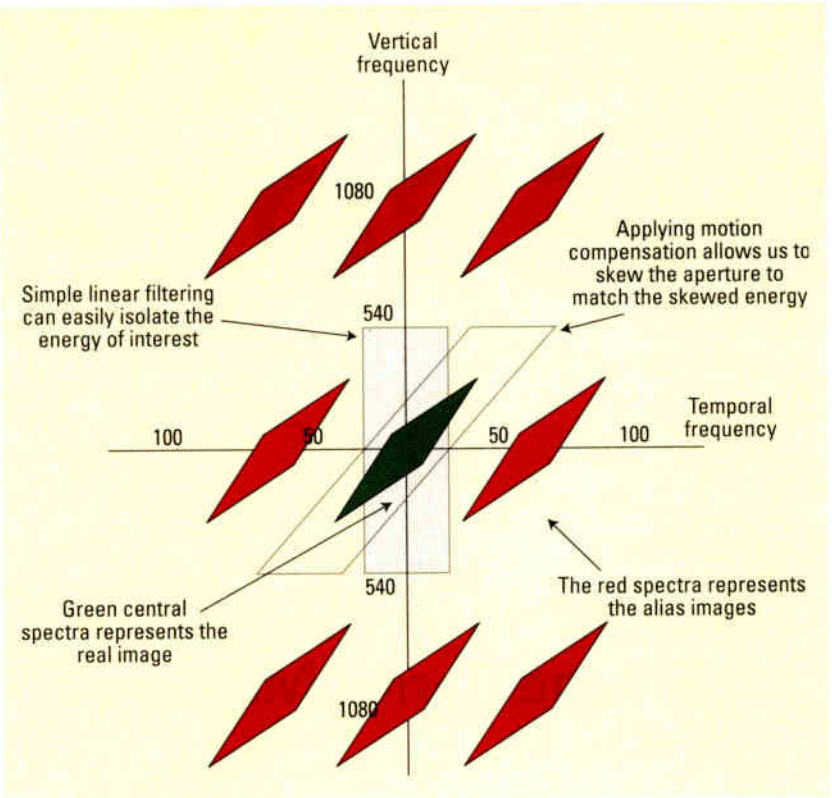


**Figure 2. Vertical/temporal energy distribution for a typical high-motion (vertical tilt) 1080p video frame**

## Enhancing service quality and efficiency

While the subjective quality of converted images is key to ensuring customer satisfaction, the technical quality of conversion has a direct impact on the quality of compression and, in turn, the efficiency of the distribution chain. Good compression enables cost-effective transport and storage of high-resolution material, reducing the amount and cost of bandwidth required for signal distribution.

Material flawed with conversion artifacts puts a greater burden on compression than does cleanly converted material. Because bits are unnecessarily dedicated to these


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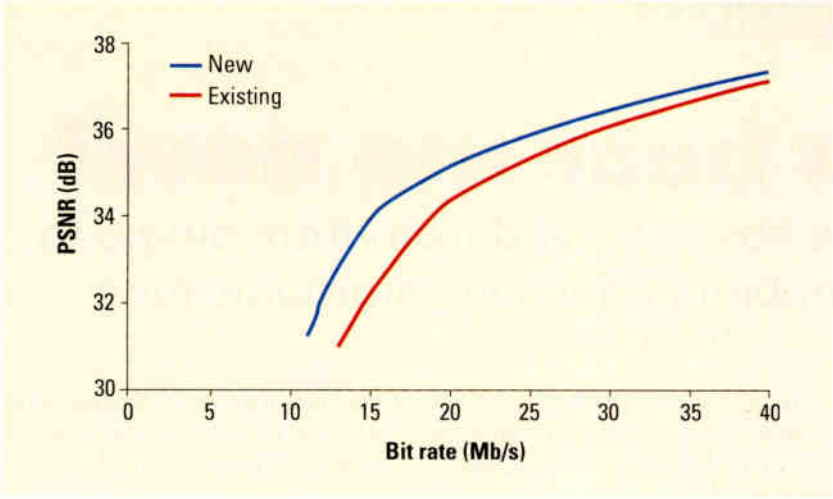


**Figure 3. Downstream compression performance**

artifacts, the compressed material requires more bandwidth and/or suffers from degradation in picture quality. As further processing takes place along the distribution chain, these issues are amplified.

Figure 3 demonstrates the difference that high-quality motion-compensated conversion can make in the efficiency of a downstream encoding system. A sports clip full of action was standards-converted both with a phase correlation motion-compensated converter and an alternative converter. Long-GOP MPEG-2 encoding was performed on each.

As the graph illustrates, the clip converted using phase correlation motion compensation yielded improved downstream compression performance of significant proportions. Such bandwidth efficiencies can enable greater cost savings or make room for the provision of additional revenue-generating services.

## Conclusion

The multiple conversions inherent in the links of processes from content production to content consumption can lead to degradation of quality. This results in dissatisfaction not only on the part of the consumer, but also the service provider carrying the programming and the advertiser, who expects a better-looking vehicle for messaging. Through the technologies of phase correlation motion compensation, the best possible quality can be preserved within standards and format conversions. BE

*Gerard Phillips is general manager — conversion with Snell.*

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# Can you hear me now?

## Modern intercoms have evolved from from single to multichannel, enabling effective communication.

BY JOHN LUFF

This is supposed to be a communications business. We build visual and audio communications with our viewers. Everything behind the scenes is done to get the artistic vision of a producer on the screen. And to do that we have to communicate with each other. Timely communication today consists of Twitter, e-mail and texting, but in a production environment, we rely on voice communications.

### The evolution of intercoms

Early productions adopted the same communication system in use for consumers: effectively telephone operator headsets. Using carbon granules, which change resistance depending on pressure on a flexible membrane, a microphone was simple and effective. Earpieces were equally simple and demonstrably uncomfortable. When I Googled "carbon headset," I got bicycle parts first, showing my age mostly. But for many years, good communication that worked in noisy environments was elusive.

Then, in about 1973, Clear-Com introduced remote headset amplifiers that could clip onto a belt. Multiple beltpacks could be chained together and shared a remote power supply. By 1975, RTS was in the game with similar products, including multichannel systems, all remotely powered. Using an audio hybrid, high-quality and less susceptibility to feedback was achieved in these products. Over the next few years, the range of portable and permanently mounted desk and rackmount user stations were developed by both companies. Within a few years, having an intercom in your production truck became a necessity for entertainment shows.

The simple beltpack grew over time to be a family of communications products, initially entirely based in analog audio. By using mix-minus techniques, it was possible to put many users on a common channel and enable them to be heard superbly.

The single-channel beltpack in the early 1970s systems evolved into the multichannel systems of today. Three-, six-, 12- and even 24-channel systems have become common. For example, lighting can have its own channel, but the lighting director can bridge on more than one channel to keep in close communication with the rest of the production staff, including video and the director, relaying messages to his operators without putting multiple operators on one channel. Replay producers or assistant directors may have direct communication with each operator while maintaining partyline capability for speed and urgency. Video operators can isolate their communication with a cameraman without interfering with critical production communication.

**The single-channel beltpack in the early 1970s systems evolved into the multichannel systems of today.**

A camera operator may speak privately with a dolly operator while still hearing everything the director is saying. In a news production, the technical director might speak privately to an engineer checking in remote feeds, or a graphics room might communicate with the producer about the graphics needed for a live production. Master control might monitor all of the producer's and director's communication to anticipate when breaks will roll, but may not want the rest of the production chatter to fill the channel. A full matrix system allows these listen-only open mic circuits to be set up efficiently for each use.

## FRAME GRAB

*A look at the consumer side of DTV*

**Cable networks are thriving despite the recession**

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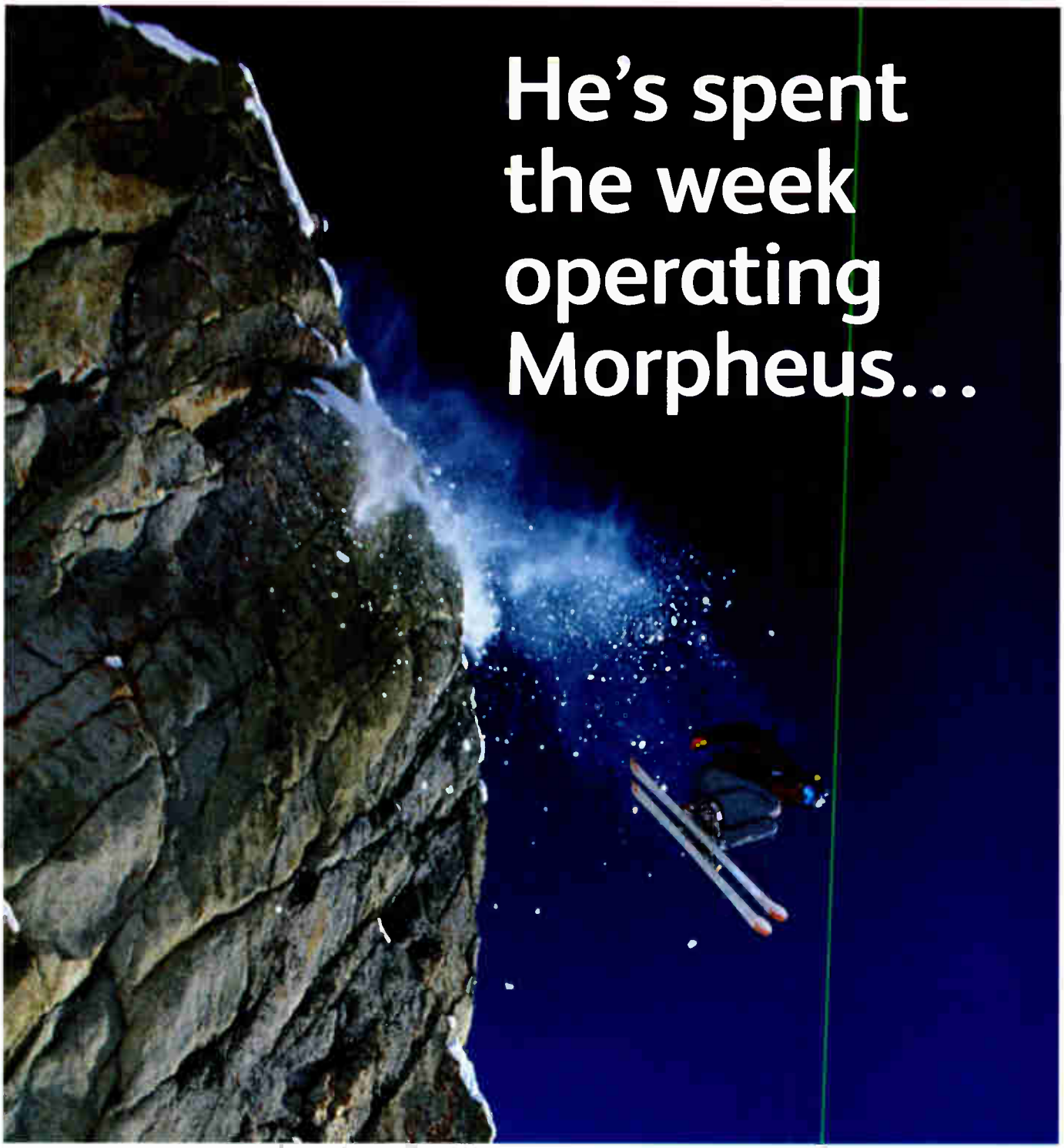


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Morpheus is the most flexible and powerful automation solution on the market today. It is capable of managing everything from simple server playout, to complex channels where schedules are changing regularly and unpredictably. Format and device independent, Morpheus offers a robust and resilient content distribution mechanism that's ready to integrate new devices to meet future demands.

## Flexible device management ensures that resources can be dynamically deployed where and when most needed.

At the core of Morpheus is the unique MediaBall™ technology, this allows complex sequences of events to be packaged together, instantly providing simple presentation for the operator and easy manipulation within a schedule.

Maximizing revenues from advertising requires outstanding flexibility from an automation solution. Morpheus supports last minute schedule edits, allowing commercials to be changed literally seconds before air.

As a fully scalable solution, Morpheus can effortlessly grow in line with future business demands regardless of the system's complexity.

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## Automation

A powerful and scalable database engine is the driving force behind Morpheus, configured to provide resilience and redundancy on many levels. From this central core, known as the Ever tstore, applications and services are run to provide the most flexible automation system available today.

Operators are presented with a consistent and common user interface removing the need for detailed understanding of the technology. Clear, easy to understand icons show users the status of the overall system at a glance.

Device Management enables automatic substitution of devices in the event of failure or loss of connectivity which greatly reduces the need for human intervention. Dynamic resource allocation ensures all devices are operated at optimum capacity, providing highly cost efficient inventory management.

Whatever the device, content or workflow Morpheus Automation can manage it efficiently, effectively and reliably.

## Media Management

In the broadcast industry the value of media is realized through the capability to deliver that media wherever, whenever and in the format that is required.

Using state-of-the-art technology, Morpheus manages the acquisition and movement of content throughout the enterprise. Complete flexibility enables content to be sent to a wide range of delivery platforms including linear broadcast, web, mobile and VOD.

Morpheus manages the acquisition and movement of content throughout the enterprise.

Content and metadata can be ingested, moved and delivered as the enterprise demands. Interfacing to external business workflow tools and scheduling systems on both a local and remote basis is handled transparently, ensuring all elements of the operation are synchronized and status aware.

Wherever your system content is needed, whatever platform it's needed on, Morpheus will deliver to meet your deadline.

## Meeting Business Needs

The design philosophy at the core of Morpheus is to reduce ownership costs. Building on the premise that automation systems need to evolve to accommodate the demands of new services and delivery platforms, a standard set of rules have been applied to cover common functionality. As a consequence, development costs to add new facilities are kept to a minimum and time to market is dramatically reduced.

Morpheus minimizes disruption and costs associated with integrating new delivery methods or physical devices. With Morpheus there are no fiscal surprises. In addition Snell's world class dedicated support teams are there to assist, providing a broad range of services, including 24 hour coverage, on site support, spares, remote diagnostics and in-depth technical advice.

The combination of a fully scalable, reliable and resilient device independent architecture, complemented by world class support, ensures Morpheus provides users with future-proof automation that is resilient and highly cost effective.

**Operations staff can manage more channels**

- Lower personnel & operating costs

**Commercial revenues increase**

- Sell & present commercials close to air-time

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Routing
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Continued from page 34.

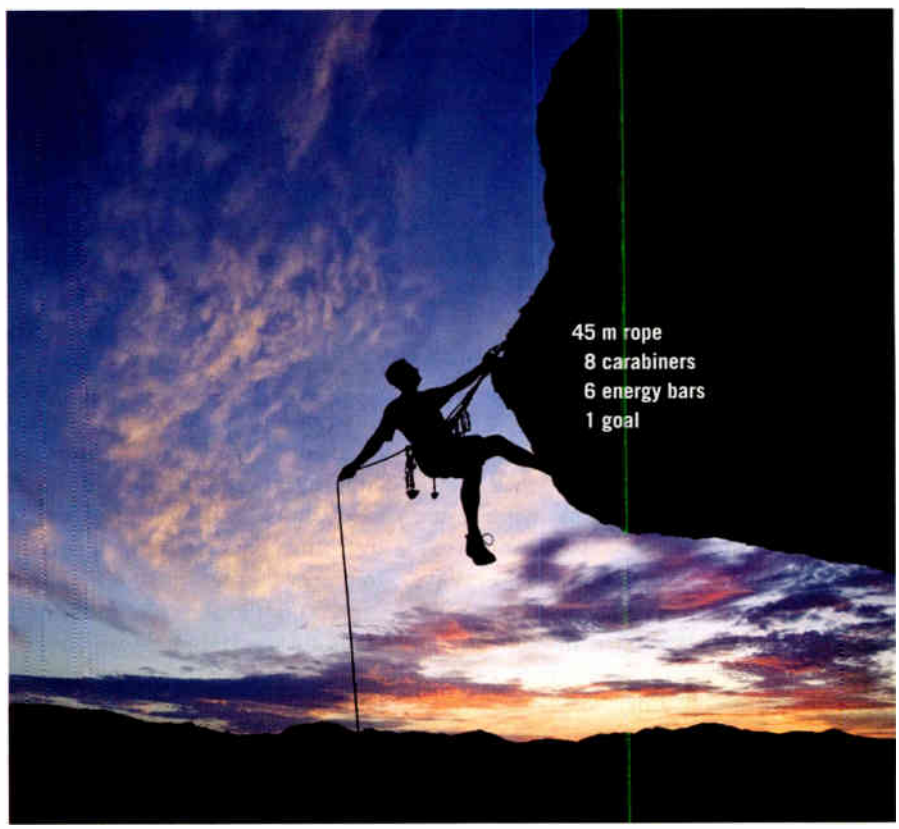
## A peek inside intercoms

Beginning in analog, and now available mostly as digital systems, these complicated communications systems matrices work on four-wire approaches, where sending and listening are done by connecting output and input to separate busses in a matrix approach, summing all parties speaking to each output individually. When two-wire stations, such as beltpacks, are connected, an audio hybrid (or active two-four wire converter) is used to extract the separated talk and listen signals. (See Figure 1 on page 36.) The technique works in a manner similar to mix minus in an audio console from a user's standpoint, with some side tone from a user's microphone added back into the listen signal fed to the earpiece of the headset.

In matrix systems, each user can be assigned, or choose from their user interface, every source they will hear and to which other users they will speak. For example, a buss might be set up for all operators to share like a partyline, but the director can separately and privately speak to any member of the crew he desires on a selectable basis. Individually, levels both talk and listen, for each crosspoint connection can usually be established in software from a GUI or perhaps from the user's own station.

The programming software is often capable of storing and recalling multiple setups. This makes setting up for a program that happens regularly simple. It can allow a person's name to be assigned to a channel, simplifying and personalizing the labeling on the panels. By crafting and storing a master setup and then making incremental changes to customize the setup for each program, one can make complicated setups more understandable. As in all things, there are trade-offs with some system programming software. Each vendor's capabilities are subtly different, and it is wise to ensure that reprogramming a single panel does not take the entire system offline. Even if it is for a few moments, it can make small changes difficult to schedule when reprogramming for an upcoming production while even a portion of the system is in use.

As might be expected, the range of options creates its own set of issues, principally the growing complexity of the user interface needed to make access to the multiple features available. The RTS801 Master Station of the late 1970s and early 1980s had a hidden panel with a row of listen levels associated with each buss. While that was effective, it required someone who was not technically challenged, and more than one producer had his hands slapped by a tech manager who asked him to stop creating problems. Digital technology has provided some

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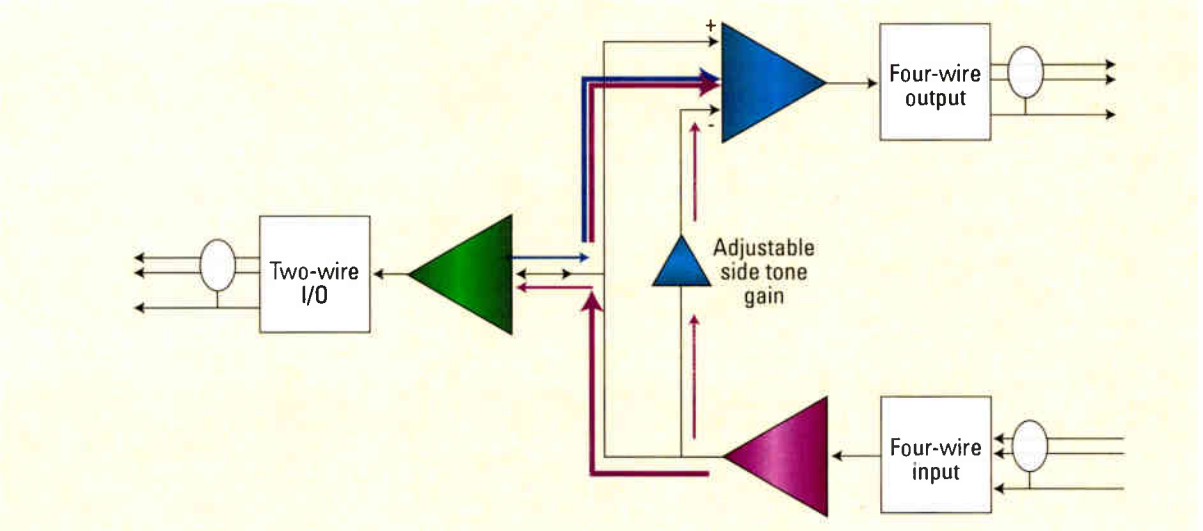


**Figure 1. When two-wire stations are connected, an audio hybrid is used to extract the separated talk and listen signals.**

isolation between finger gepoken and the underlying software control of the matrix driving a user's panel. Often today, panels have programmable legends on switches allowing each program to have its own detailed setup with the names of the personnel called out clearly on the panels.

As the sophistication of intercoms grew, it became possible to add direct communication to talent headsets using IFB (interrupted feedback). IFB user stations can't communicate bidirectionally like other user stations, but can be connected to a buss with program audio or a mix-minus feed, with the ability of producers, directors or others to interrupt the sound to speak directly to them. Common in news and sports broadcasts, IFB is a minimum price of entry for live production today. I have often used IFB channels to allow stations overseas to communicate with talent doing live news shots thousands of miles away by connecting a remote IFB output to the local program audio input, but preserving the ability of local technicians to speak directly to the talent during lineup of the remote shot.

It is, however, often useful to consider simple systems, for example in an ENG van. A simple two-wire, beltpack-based system might suffice where cost and complexity are issues. Most camera CCUs allow connection to an external intercom, often four-wire. Crafted carefully, a system might have a two-wire interface for the technician in the truck and four-wire to the camera. By using a small matrix system, IFB and connections to the studio are often simplified. Though more expensive than a simple two-wire system, a small matrix can offer benefits worth considering. But if the budget will not allow even a small matrix, this can also be accomplished by using a four-two

World Radio History

wire converter and VoIP carried over the digital ENG microwave between the studio and the remote. This allows the remote to be fully integrated into the studio environment, even enabling remote mix minus for IFB to be integrated tightly between the control room and remote.

Digital matrices often provide other features, which — while not applicable to small installations — provide capabilities critical to large installations and particularly ones spread out over large local or remote campuses. Multiple matrix frames can often be connected together to create much larger virtual systems. In a large production center, each studio might have a matrix of its own that is interconnected to a master frame where all operationally separate units can be combined to facilitate large productions needing more facilities. A newsroom in New York and another in Washington can work on the same production and communicate as if they are just down the hall. This might be built out using VoIP channelized technology, or a dedicated high-speed link that connects the busses in related products together. VoIP can also allow connection to a private branch exchange (PBX) system for bringing remote personnel in the field into the production, or feeding IFB to remote talent. All systems also allow dial tone lines to be connected using telephone hybrid options.

## IP influences

Modern intercom user interfaces allow many useful options developed for IP-based industries. Some current matrix systems offer color LCD display options, which hold the promise of rich user interfaces with clear and understandable displays of critical user information about available connections. As new developments in IT technology become available, intercom systems will adopt every innovation that enhances deployed communications systems. For example, we might see interface text-based systems popping up on communications panels with a beep indicating "you have mail," allowing messages with less sensitivity to be aggregated onto a fewer number of user interfaces.

Such messaging enhancements would be simple to integrate in IP-based systems, perhaps even showing up as script notes in a cameraman's viewfinder. Merging cutting-edge communication and networking tools into production communication could help make the latest generation of production personnel comfortable with our time tested verbal communications systems. BE

*John Luff is a broadcast technology consultant.*

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# DTV broadcast routers

## As routers grow in complexity, engineers need to understand the many possible options.

TODD RIGGS

On the way to station consolidation, router sizes have exponentially grown. The model of sharing resources and talent within a single site or across multiple connected sites has the ultimate goal of technical efficiency, which includes minimizing the equipment footprint.

In-house routing systems are unique in this movement because they continue to grow in size. This article outlines the main reasons for this trend and discusses considerations for users as they make buying decisions for consolidated facilities.

### Budget trends

The recession gripping the globe has impacted broadcast equipment purchases, but there is good news for those in the market for a new router. A down economy means fewer broadcasters are spending money, and end users are looking for attractive pricing and packages. This is especially true for projects requiring large routers.

End users are centralizing physical plant equipment, which means they are erring on the side of caution and buying bigger frames than they require right now. This provides enough space to expand sections of their routers for HD as more sources and destinations become available within the facility. Alternatively, broadcasters can use this additional space to house multiple formats in the same frame as they transition from a hybrid facility to a purely HD plant.

### Multiviewer requirement

One of the biggest trends in routing over the last several years is the integration of functions and capabilities that have not been traditionally a part of the in-house router. Advances in both router hardware design and applications within hardware and software control panels have resulted in end users being able to control processing functions such as gain and EQ settings, among others. In addition, with the proliferation of multiviewers now available on the market, broadcasters

**Ascent Media is an example of a broadcast/production facility that has integrated the multiviewer element within the core house routing system.**



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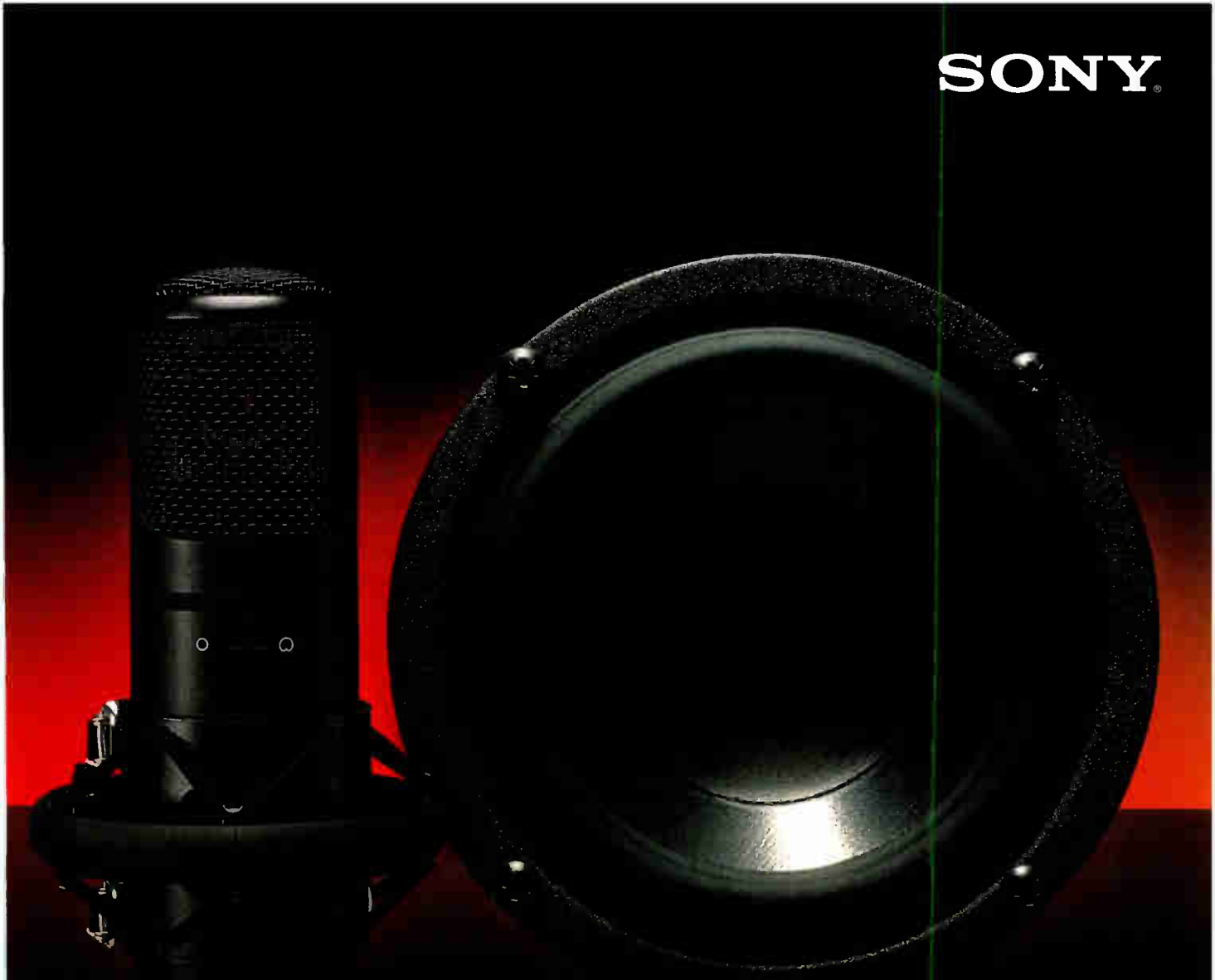
SONY



# A Perfect 10

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are evaluating router purchases in tandem with new multiviewers.

Multiviewers have been a major factor in the increasing size of routers. Most new or rebuilt/updated facilities include at least one multiviewer in the design. When combined with the performance and operational costs of plasma displays and LCD panels, multiviewers offer the ability to modify layouts and provide tremendous flexibility for display in master control and production.

The multiviewer has affected router design in several ways. Two primary ways to physically connect a multiviewer to the routing system are internally within the router frame, or housed in external frames and fed via router outputs.

There are design considerations for both options. A multiviewer physically located inside the router frame is the most compact, cleanest and simplest option in terms of physical space, power and cabling. Operationally, this enables multiviewer picture-in-pictures (PIPs) to be switched as router outputs. This means that changing a source within a particular PIP is the same as routing a source to a standard router output. This is achieved via a standard router control panel, resulting in fast, simple and standard operation. When choosing this solution, end users should make sure the router frame is big enough to handle any increased multiviewer and/or router needs.

**A multiviewer physically located inside the router frame is the most compact, cleanest and simplest option in terms of physical space, power and cabling.**

The other option is to locate multiviewers outside the router and feed them as external outputs. This option can be used in applications where cost is a primary concern, such as in simple quad splits or when a large number of screens are required, but only a minimal amount of sources require display. The design parameters when implementing this solution include being certain enough router outputs exist to feed the required number of multiviewers. This increases the overall number of router outputs, as well as space requirements for the external frames and extra cabling needed to physically connect the systems.

Broadcasters expect tight integration of the router control system, its hardware and software panels and the multiviewer, regardless of the physical layout. This allows the operator to treat the router and multiviewer as a single, integrated platform. Operations staff is often stretched thin, so router switching, multiviewer layout manipulation, PIP switching and "statusing" need to be possible from single control points, so multiple panels and software applications are most effective.

## 3Gb/s

No discussion on router trends would be complete without mentioning 3Gb/s and its impact on broadcast facilities. 3G routers are being considered for several reasons, including the fact that sources capable of delivering signals at this data rate are becoming more common. This

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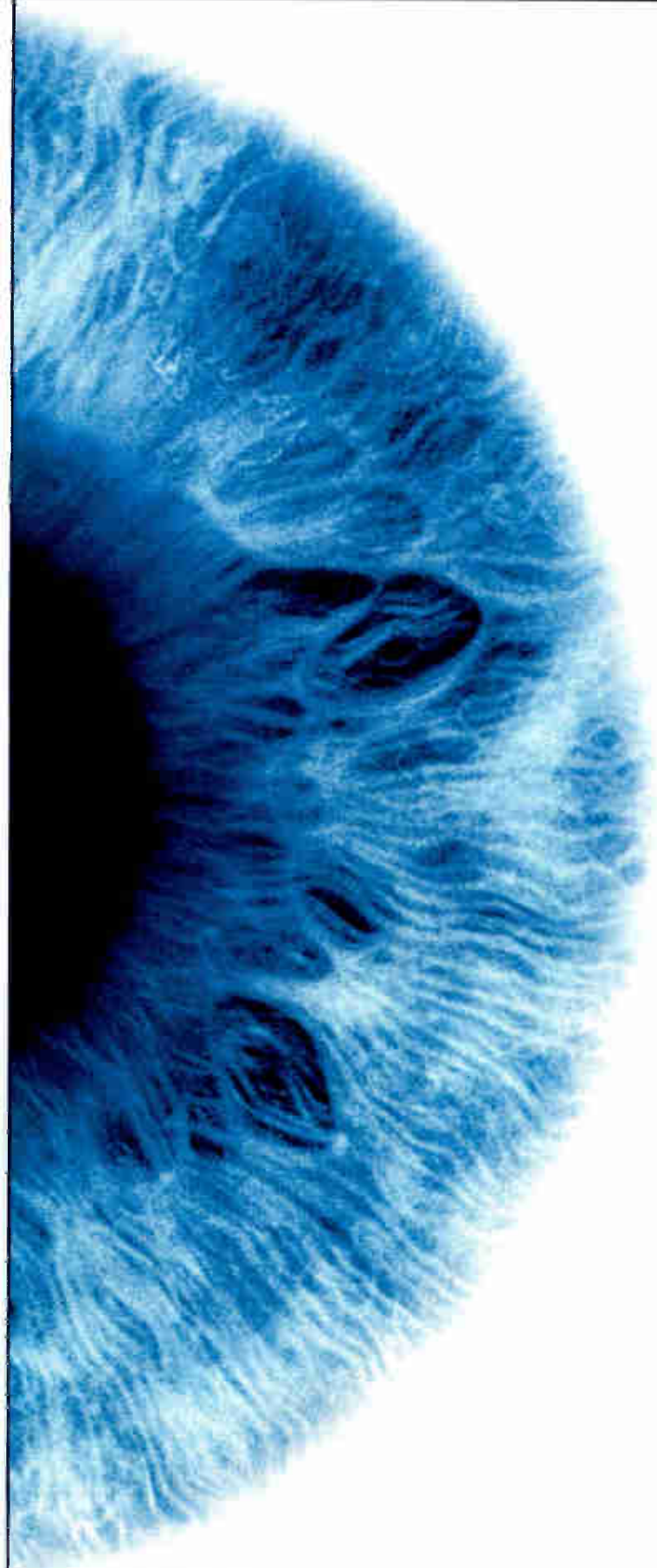

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could be a single-link 3Gb/s signal (Level A, higher-quality signals) or two 1.5Gb/s signals multiplexed into one physical connection (Level B).

Many facilities are beginning to also consider 3-D technology. A 3Gb/s-capable router is an important consideration for 3-D because these signals will require a higher-bandwidth system than traditional 1.5Gb/s systems. While there is no official standard for 3-D, the most prominent standard discussions involve the maximum data rates for 3Gb/s; therefore, a 3Gb/s-capable router will be able to support whatever standard emerges.

testing routers for 3Gb/s performance. Tests should be done across a sampling of all of the router's internal trace paths because the lengths vary within the system. It is inaccurate to assume that shorter paths will automatically pass if the longest path does. Each path will have slightly different characteristics, so it is important to gather a sampling of inputs to outputs to achieve accurate assessments of bit errors using 3Gb/s color bars and pathological signals.

Newer waveform monitors generally have higher bandwidth capabilities, so a broadcaster can receive different results based on equipment used. Viewing them through test gear will provide a good indication of the router's performance. Independent tests have been performed on most systems, and manufacturers can validate the performance of their products to assuage any potential concerns. Most can provide screen-shots of waveforms using the high-end oscilloscopes that are used in the design of the products. These will show even more accurate descriptions of jitter, rise and fall times, overshoot, undershoot and eye pattern opening quality.

cessing integration is both the most exciting and the most challenging task. The integration of processing equipment (modular, card-based equipment) into the routing system has finally moved from discussion to reality. Almost every major router vendor is at least talking about it, and many have implemented the concept in some way. Some are already delivering products, and broadcasters are reaping the rewards.

Audio has been the initial focus, with manufacturers implementing technology to mux and demux audio coming into and leaving the router embedded within a video stream.

**Beyond multiviewers, the integration of modular processing equipment — including mux and demux capabilities for audio embedded within a video stream as it comes into and leaves the router — into the routing system is a significant design trend.**

The other reason to consider 3Gb/s is that there are several vendors who offer 3Gb/s support at no price premium over 1.5Gb/s HD. Given the drive from camera, server and graphics manufacturers to support both 3Gb/s and 3-D equipment, it makes sense for broadcasters to buy equipment that can support these signals even if there is no current requirement for its use.

The bottom line is that most new HD-capable routers claim to support 3Gb/s, and a variety of test equipment can validate those claims. As a rapidly developing area in the industry, there are several things to consider when

## Processing integration

While budget trends and multiviewers have been embraced, pro-

Many of the questions and issues such as whether to implement an embedded or discrete plant and how to manipulate and shuffle previously embedded audio have largely been resolved, and the flexibility and troubleshooting advantages make this new technology appealing for both operations and engineering staff.

As efficiency increases, so does router control. As complex, multichannel audio continues to develop, the question of simple control for users is growing in significance. The manipulation and adjustment of parametric signal settings such as gain, summing, phase inversion and


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swapping are all accessible from single control surfaces, further reducing the possibility of human error.

This is just the beginning in terms of adding functionality. It is easy to foresee the integration of frame syncs, conversion gear, audio encoding and decoding, and other signal-processing components into modern routing systems. Intelligent, fast and intuitive workflows and interfacing are absolutely critical as more broadcast facilities experience a reduction in staff. The integration of new devices into a routing system is nothing short of a complete shift in how a broadcaster designs a facility or system.

This is a paradigm shift in more than just operations, because these systems also take up less rack space and use significantly less power, which reduces cooling requirements for equipment rooms; cabling requirements are also drastically reduced. This has practical benefits for just about every market segment, but especially in environments like mobile applications where weight, space and temperature are critical.

**Routers continue to grow in complexity as more features come to the surface, and broadcasters need to both understand the various options and accept the learning curve that may come with them.**

Broadcasters have a lot of factors to consider when purchasing a router that will work today and be ready for tomorrow. Routers continue to grow in complexity as more features come to the surface, and broadcasters need to both understand the various options and accept the learning curve that may come with them. More crosspoints and I/O per rack unit of space, with expanded feature sets including parametric control and integrated multiviewer support and integration, bring more for the operator to comprehend beyond simple switching. And with manufacturers charging an HD price for a 3Gb/s router, there is more reason to upgrade, especially with 3-D right around the corner. BE

*Todd Riggs is a product manager for Harris Broadcast Communications.*

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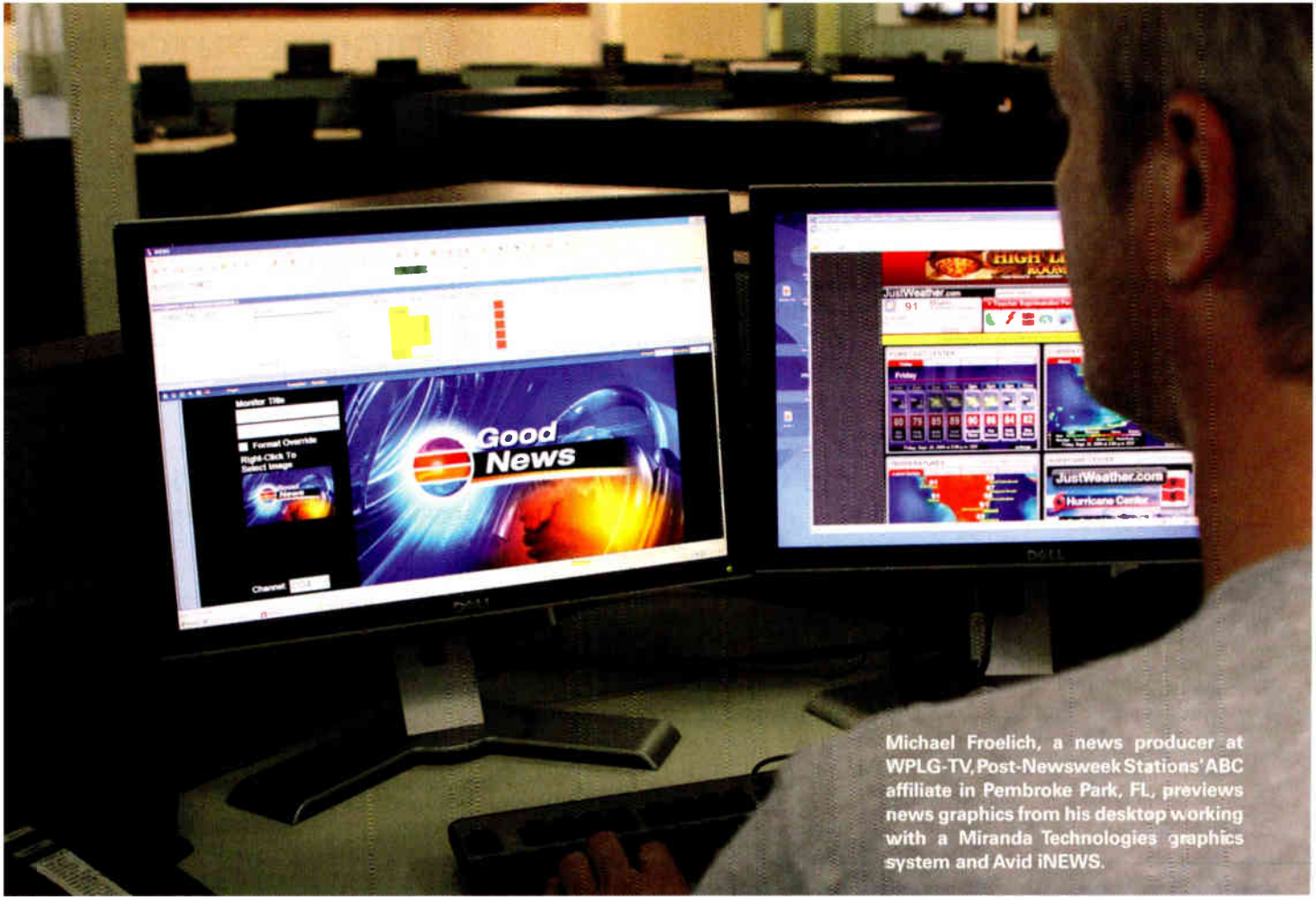


Michael Froelich, a news producer at WPLG-TV, Post-Newsweek Stations' ABC affiliate in Pembroke Park, FL, previews news graphics from his desktop working with a Miranda Technologies graphics system and Avid iNEWS.

# Tough times in newsrooms

## Stations look to news technologies to produce efficiencies and cut costs in the face of sharp revenue declines.

BY PHIL KURZ

The year 2008 was a horrible one for TV journalists as unprecedented staff cuts made the jobs of those still lucky enough to be employed that much more stressful.

The numbers clearly tell the story. In 2008, about 1200 jobs in television news, including all job titles, were lost in the industry, says Bob Papper, a professor of journalism at Hofstra University in Long Island, NY, and the man responsible for the annual Radio-Television News Director Association survey of broadcast news staffing.

"Last year was the worst year I've seen in the 15 years I've been tracking this, and 2009 is not going to be a good year either," he says.

These cuts are a direct response to the dreadful advertising market that has sent station revenue plunging. For the first half of 2009, advertising dropped by more than 15 percent in the United States across all media, a pullback of $10.3 billion compared with the same period last year, the Nielsen Company reported in September. While some TV categories fared better than print media, overall television took a severe hit, with spot TV in the top 100 DMAs declining 32 percent for the first two quarters of

**For the first half of 2009, advertising dropped by more than 15 percent in the United States across all media.**



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2009 compared with Q1 and Q2 2008 and network TV advertising falling 7 percent for the period.

Ironically, while there was a sharp decline in the revenue stations rely upon to pay for newsgathering, there appears to be no significant decline in the public's appetite for television news. Results of a survey conducted by The Pew Research Center of the People & the Press released in mid-September revealed that TV continues to dominate other news sources among the public. More than 70 percent of those responding to the survey

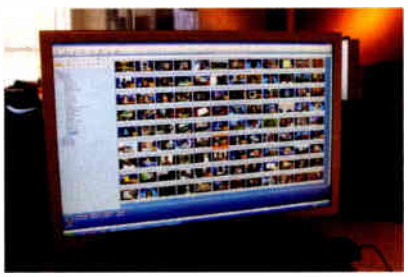
**Control room automation at WFTV, the Cox Media Group station in Orlando, FL, is helping the station realize greater staffing efficiencies and produce tighter newscasts.**

said they get most of their national and international news from TV. TV news also dominates locally. According to the survey, 44 percent say local TV stations do the most to report local news — compared with 25 percent who identified local newspapers as doing so.

Technology has answered the call, to a degree, in helping news management balance budgetary realities, resulting in fewer newsroom positions with the continued strong demand for television news. Several technologies, including file-based workflows, centralization and control room automation, as well as a growing interest in one-person news crews are helping newsrooms maintain their level of news coverage with fewer people.

## Heydays for VJs — sort of

Call it "video journalism," "backpack journalism" or "multimedia journalism." Whatever the name, the concept is the same. Outfit journalists with small digital cameras, laptop computers running NLE software,



**Joumalists at the six Post-Newsweek Stations around the country draw on news graphics from the asset library at the group's graphics hub in Pembroke Park, FL.**

**A playlist in WPLG-TV's control room chronicles events for playback.**

and everything else needed to shoot, write, edit and contribute a story.

While this is nothing new for smaller market stations, the concept has gotten more buzz at midsized and larger market stations, as newsroom managers look for practical ways to generate more content without adding personnel.

"Obviously, video journalism cuts costs enormously," says Michael Rosenblum, founder and president of Rosenblum TV, a pioneer in training stations and others in using affordable digital video gear for video journalism. "You can cut the bottom line by 30, 40 or even 50 percent with video journalism, and in the long run it will be the stations that can cut costs without hurting quality that will survive."

However, among call letter stations in the United States, acceptance of VJ methods has been lukewarm, he says.

"We see two or three VJs in a station — usually young kids out of college," Rosenblum says.

Often these VJs are looked upon as a sort of proof-of-concept by more established journalists in the newsroom who typically are reluctant to do video journalism themselves.

Papper's research backs up Rosenblum's observation. There is "a fair amount" of one-man-band journalism going on at stations; however, in 2008 just as many stations dropped video journalism as added it, Papper says. But that doesn't mean video journalism isn't on the minds of news directors.

"What's interesting is every year more news directors say they are looking at it and thinking seriously about it," Papper says. "That number keeps growing, but not the number that are actually doing it."

The tapeless acquisition formats and laptop editors that help fuel video journalism are just another facet of the technology that's transforming newsrooms from old linear tape to efficient, collaborative news production environments supporting on-air, Web and mobile distribution.

File-based workflows are the backbone of efficient news production in today's TV newsrooms. Starting at the assignment desks and flowing through the entire editorial process to the final newscast runlist driving the control room, digital files rather than videotape have produced efficiencies and savings, helping stations weather today's economic climate.

In particular, many have realized significant personnel savings in the control room over the past few years via news automation systems that let a single operator switch newscasts, run



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**KGTV video journalists, such as Bob Lawrence, practice one-person newsgathering and thus help extend the reach of the San Diego station in the field.**

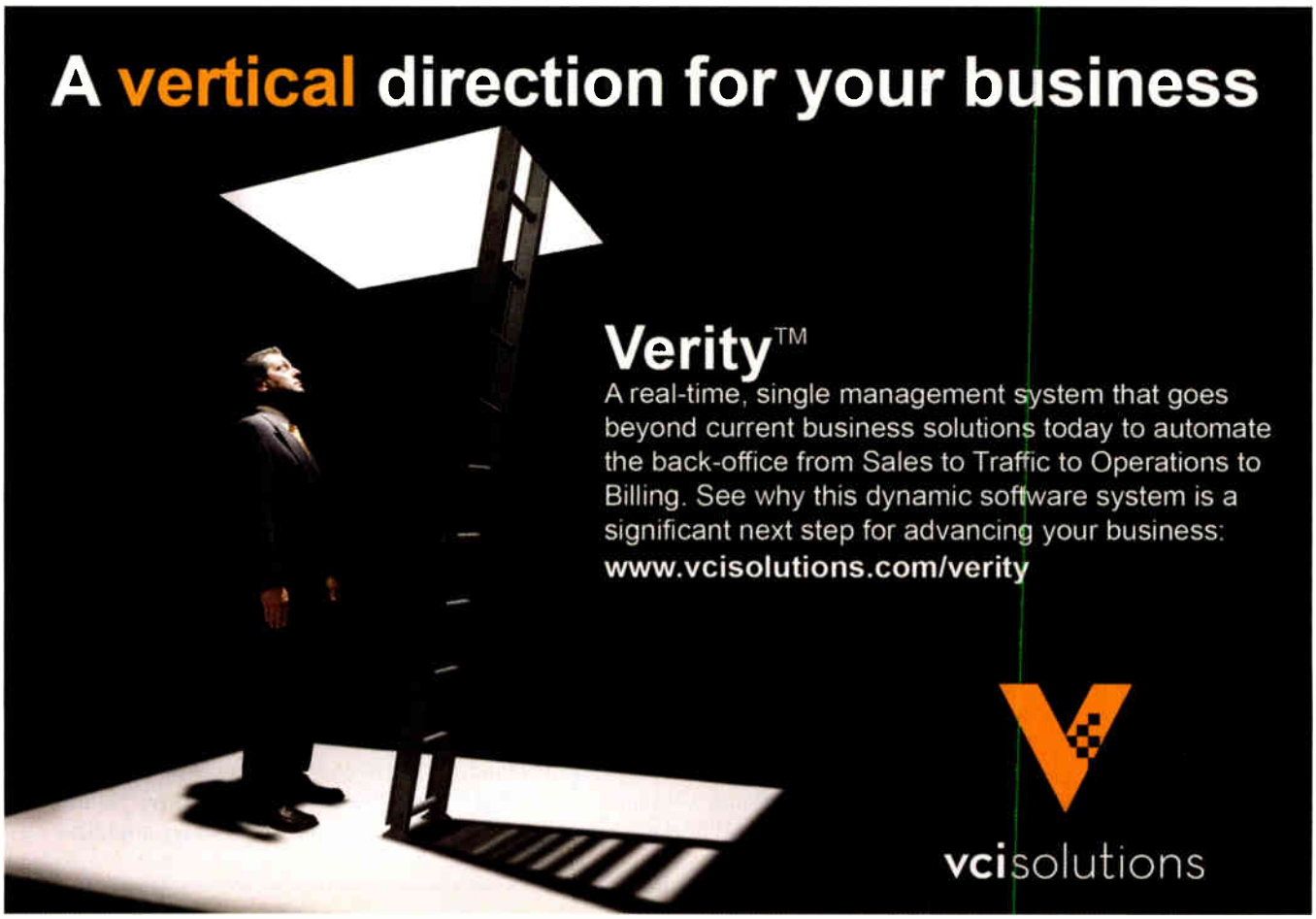
the audio board and control studio cameras. Helping to make this level of automation possible is overall reliance on servers and files as opposed to tape machines and paper runlists.

Beyond the walls of individual stations, too, file-based workflows promise to help stations reduce news costs further, says Michael Smith, founder and president of research consultancy firm SmithGeiger in Los Angeles. Today's trickle of competitive stations establishing news cooperatives to pool resources and cover run-of-the-mill news events more efficiently could turn into a tidal wave without a significant recovery in revenue. Making that possible will be file-based content management systems that support VJs and news crews contributing footage and edited stories from around a DMA, he says.

"A content management system will have to allow people to stop by, plug in and download video and feed audio," Smith says.

Other digital efficiencies in the newsroom relate to greater centralization of news functions, such as graphics creation, he says. For instance, within the past couple of years, the industry has seen at least two prominent broadcast groups — Gannett Broadcasting and Post-Newsweek Stations — centralize the creation of news graphics. In the case of Gannett, the approach centers on software-as-a-service and cloud computing. At Post-Newsweek

**Beyond the walls of individual stations, file-based workflows promise to help stations reduce news costs further.**



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# For modern newsrooms, the workflow is the message

BY JAN WEIGNER

Newsrooms today operate under enormous pressure. They feel pressure from management to hold down costs, as well as reduce staffing and production expenditures, while often at the same time producing more content for more programs and for multiple distribution platforms. They also feel pressure from their competition: a need to get the news on the air or on the Web quickly, instantaneously in some cases, or risk seeing a competing news organization report a story first.

To cope with these pressures, more news organizations are embracing newly-developed workflow solutions. These workflow technologies promise dramatic reductions in costs and increases in productivity by automating routine tasks and by eliminating or vastly reducing the role of videotape in newsroom production processes. Newsroom media is instead acquired, reviewed, edited, archived and aired in file formats.

There are many advantages to this new file-based paradigm. One is that it makes the newsroom a more collaborative environment. Media assets can be accessed simultaneously by several people, who can then work together in crafting a story. Under the old system, news production was a strictly linear process with access to media limited to whoever had the source videotape. One of the chief beneficiaries of this change is journalists. Reporters can now edit stories at their desktops. While that is no substitute for a skilled editor, journalists are no longer dependent on access to an editing suite to begin to shape their stories.

In news production today, picture often precedes text. In the past, the opposite was almost always true: A story was written, and video was added later. Newsrooms now receive news feeds via satellite, or from reporters posting video to FTP sites, or from the public via Twitter and YouTube. And the imperative is often to get stories on the air fast. In a traditional workflow, that can be difficult. The news feed has to be recorded, dubs have to be made, the story has to be edited and so on. In a new workflow, all this can be done in minutes. For example, a reporter covering a news conference can be preparing a highlight reel even as the event is ongoing, and the story can be ready for air as soon as the press conference is over.

Or consider the case of obituaries. In the past, it has been common practice for news organizations to prepare retrospectives of prominent personalities so as not to be caught flat-footed should a celebrity meet with an untimely accident. With the new workflows, that is no longer necessary as obituaries can be produced on the fly. Not only are media archives stored in digital format immediately accessible, they can include metadata that can be used to quickly search and identify needed assets. Simply type in "Michael Jackson," and off you go. Pull clips from the 1970s, 1980s and 1990s, cut it together, add voice-over, and you are ready for air.

Newsrooms that continue to rely on tape-based workflows often have trouble repurposing content for the Web and other distribution platforms. The problem can be especially vexing for organizations that keep their broadcast and Web departments separate. In such instances, it's not unheard of for Web staff to record their own station's broadcast signal to repurpose as Web content because they have no direct connection to the broadcast side. Again, the new workflows eliminate this problem by providing direct, simultaneous access to media assets to everyone in the organization. Additionally, routine and redundant processes such as reformatting content for the Web or mobile platforms can be automated, relieving staff of these mundane chores.

Similarly, the new workflows make it easy to update or amend news stories. That can be especially valuable for late night or early morning newscasts as fresh content can be produced with a relatively small master control room staff. With a searchable system, content can be quickly amended and some steps, such as titling and graphics, can be automated, yielding fresh content with a minimum of fuss.

The logic behind the new workflows is only going to grow more compelling. Video content plays a greater role in news programming than ever before, a trend that is sure to continue. Delivery platforms will become more diverse and more tightly integrated. Workflows developed 20 years ago will simply not be able to meet the needs of tomorrow's media-centric newsroom. New automated, file-based workflows are the obvious solution, a fact that smart news organizations have already figured out.

*Jan Weigner is managing director for Cinegy.*



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Stations, reporters and news producers rely on a template-based approach to streamline the process.

Whatever the specific approach, in the view of Smith, these examples may just be scratching the surface of where news graphics centralization ultimately is headed.

"We might even see combinations of owners of different stations now joining mutual hubs of graphics, back-end traffic and news content management with one giant server serving a multitude of stations within multiple groups of owners in multiple markets," Smith says.

**KGTV reporter Joe Little, one of the San Diego station's video journalists, helps expand the station's newsgathering resources by shooting, reporting and editing his own stories.**

## Fade to black

Greater reliance on technology to help stations continue to put news on the air in the face of declining revenues is viable to a point. But if it means cutting newsroom personnel to the degree that stories and graphics are recycled throughout the day, the audience will notice, and the station doing so will pay a price, Papper says.

"The personnel cuts in 2008 were pretty much all visible to the audience," he says. "We are not talking about efficiencies that the audience isn't going to notice. I don't believe that for a minute." BE

*Phil Kurz writes* Broadcast Engineering's *"News Technolcgy Update" e-newsletter.*

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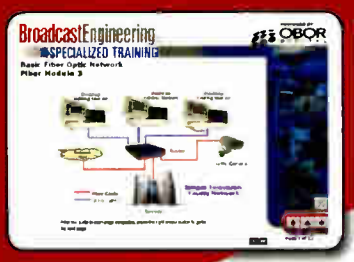

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# A letter from the publishers

Television news has long represented broadcasters' primary means of fulfilling their obligation to serve the local needs of their communities. Yet, powerful economic forces, technological change and evolving media consumption habits by viewers are pushing many news operations into uncharted territory.

Asked to provide more news content for a greater number of platforms with fewer people, newsrooms of many broadcasters are stretched more thinly than at any time within recent memory. In the year 2008 alone, about 1200 TV journalists were laid off by the 770 stations producing local news. This year promises more cuts.

Seeking answers for how to do more with less, many broadcasters have looked to technology, instituted new workflows and formed business arrangements aimed at achieving this seemingly mutually exclusive goal.

Some of the strategies being pursued include more efficient approaches to newsgathering; greater reliance on automation in news control rooms; centralization of certain tasks, such as the creation of news graphics for entire broadcast groups; forming news cooperatives with local competitors; and consolidating news operations. While not every facet of this strategy is appropriate for every broadcaster, taken together they are producing tectonic changes in local TV news.

To help engineers and newsroom managers better equip themselves for these changes, *Broadcast Engineering* and *Broadcasting & Cable* magazines are jointly hosting the News Technology Summit in Atlanta. Their goal is to explore how broadcasters are responding to today's TV news reality and examine where all of these changes are headed.

We hope that these efforts help to identify avenues broadcasters can take to ensure they maintain vibrant local news operations and fulfill their mission of service to their local communities, even amidst today's challenges.

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Group Publisher
*Broadcast Engineering* and *Radio* magazines

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Group Publisher
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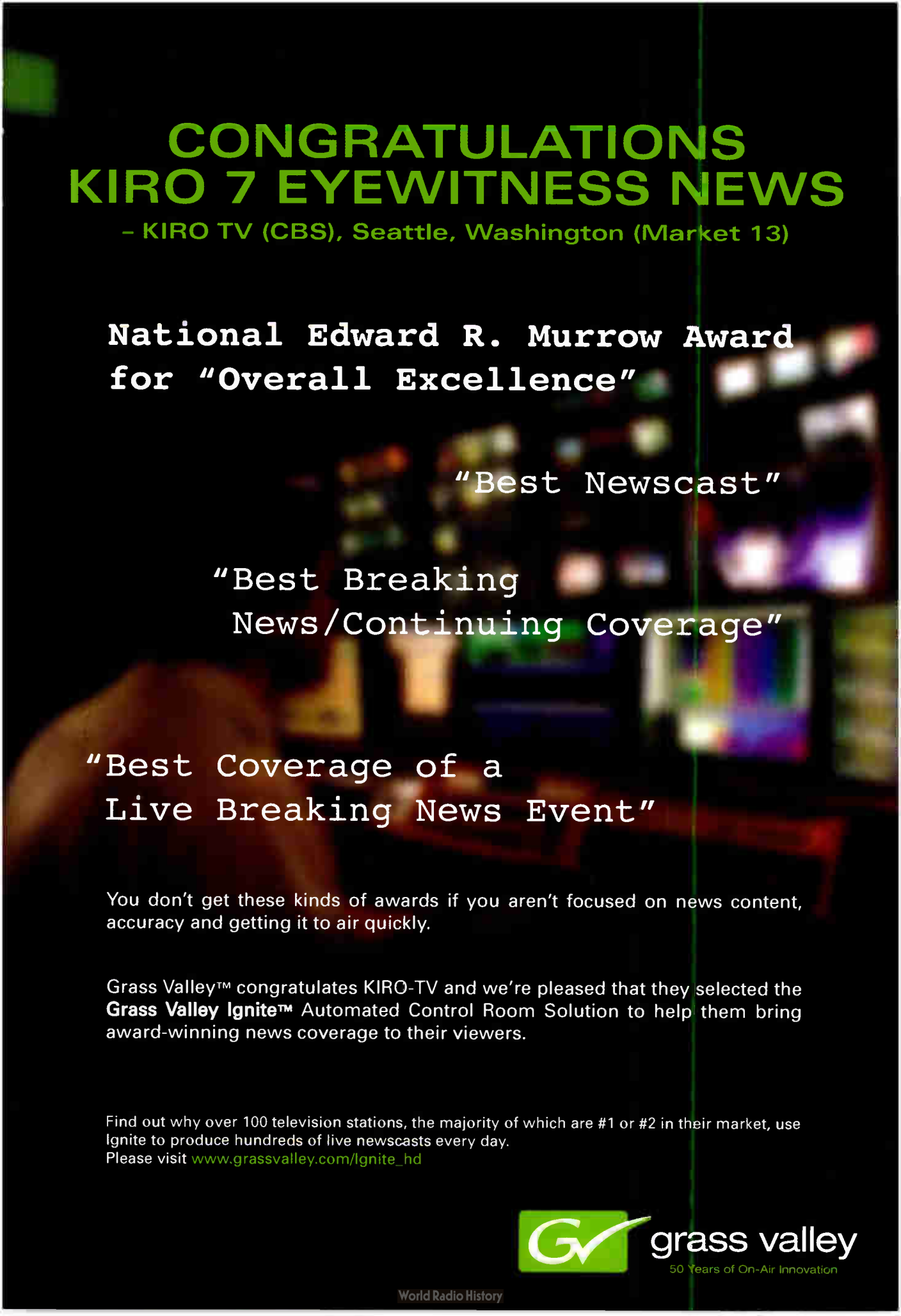
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# Finding success amidst change

## Innovation enables local TV news to survive in an evolving digital media environment.

Innovation is the key to meeting most of the challenges facing television news today — from changing consumer media consumption habits to shrinking newsroom budgets and staffs, says Vince Sadusky, president and CEO of LIN Television Station Group.

Sadusky, who is delivering a keynote speech at the 2009 *Broadcast Engineering* and *Broadcasting & Cable* News Technology Summit in Atlanta, says technology and the recession are converging in a perfect storm to create a dangerous mix of changing audience habits and declining revenue. This is shaking up long-standing formulas broadcasters have relied upon to establish dominant local news organizations.

"For the longest time, LIN TV and several other top broadcasters have not done much in the way of disrupting our news organizations because they have been so successful," he says. "Historically, things like news research, coaching, technology, marketing and promotions have been the keys to success."

But those tools alone won't continue to deliver without innovation, Sadusky says. One area of innovation for LIN TV is newsgathering.

"We are outfitting reporters fully cross-trained in multiple functions with laptop editors and cameras," he says. "The reporter can operate the camera, download data right to the laptop, sit in the car at a Starbucks, type up the story, go back to the TV station, edit at his or her desk, and submit the package to a content management system where it is immediately available to the TV station, Web site and for airing. That reporter then writes text for the Web."

This approach streamlines the news production process, making it more efficient, timely and better suited to viewers' evolving media consumption habits.

"This is probably the most significant example of how we have innovated and changed," he says.

Another is through employing integrated production control room automation technology.

"We've programmed literally thousands of shots and get many more looks than we could with two cameras," Sadusky says, describing the remote studio camera control functionality of the system. "We've also been able to use it to reduce personnel costs."

Automation and streamlining, however, aren't confined to the control room. Closely related are efforts to consolidate back-office processes. By establishing a centralized technical operations center, including master control and traffic, in a single location for multiple stations, it is possible to realize operational efficiencies and cost-savings, as well as improve what the viewer sees at home.

"Technology centers running multiple TV stations out of a single location offer huge economies of scale," Sadusky says.

Those economies of scale can easily be extended beyond merely leveraging the efficiencies produced by centralizing operations in a hub serving an individual station group.

"The industry needs to think more and more about third-party servicing organizations to handle traffic," Sadusky says. "For years, TV stations ran their own technology departments, master controls, traffic, customized them and did those things because they could. Nowadays, there are better solutions through centralizing and IP."

Vince Sadusky, president and CEO of LIN Television Station Group, says one innovation broadcasters can employ is integrated production and control room automation technology.

Increasingly, broadcasters will not be able to afford the luxury of being self-contained for these functions.

"Today, thousands of TV stations pull down feeds from networks, take in syndicated program feeds, handle trafficking of spots and generally do things in a very labor-intensive way," Sadusky says, "but the economics will force the industry to think differently because margins will continue to be squeezed."

Realizing savings and efficiencies from these innovations will help broadcasters find the resources necessary to capture the attention of viewers turning to the Internet and mobile devices to feed their evolving media consumption appetites.

While Sadusky is bullish on the Web, mobile platforms and DTV subchannels, he says the key to exploiting these opportunities will be doing so in an efficient, cost-effective manner. "How best can we be attractive beyond our core product?" he asks rhetorically.

The answer is clear: innovation.



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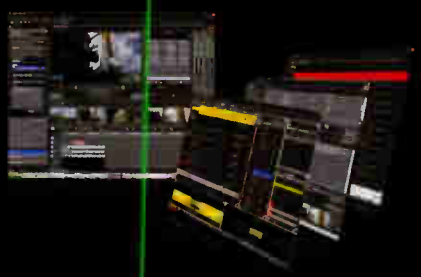

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# Embracing the future

## The demographics of viewers have long favored TV news, but the rise of an Internet-savvy generation demands TV newsrooms make strategic decisions today that position them for future success.

Television newsrooms must come to grips with how people are consuming media as well as their changing expectations about news if they wish to remain a valued source of information that can attract an audience, says Ron Stitt, vice president digital media for the Fox Television Stations Group.

According to Stitt, one of the keynote speakers scheduled for the *Broadcast Engineering* and *Broadcasting & Cable* News Technology Summit in Atlanta, grappling with these issues has taken on added urgency as audiences change.

"We've had the demographics on our side for quite a long time, even as new technologies were taking hold," says Stitt, who comes at television news from a marketer's perspective. "But we are now dealing with core demographics that were really weaned in the Internet age, and frankly, even the media behaviors of the older audience are starting to change as well."

The Internet has transformed the relationship people have with content. Rather than relying on an audience to come to the content, TV newsrooms must take steps to maximize the chances their content will find the audience. This demands a rethinking of content distribution from a strategic point of view, Stitt says.

The key to being discovered in today's media environment is relevance, and that depends on recognizing that content consumption is driven by the user's agenda, not an editor's, Stitt says.

"We are used to being a destination for content, but we now have to be equally focused on the idea that we are a source for content and that content is being consumed in many different places."

It's no longer sufficient simply to be a news destination, whether it's on the dial or on the Internet. To exploit opportunities of the digital realm fully, stations must distribute their content widely, Stitt says.

"The content cannot just be on your Web site or in your broadcast. It's got to pop up when someone types in a search, or someone is browsing a Web site about a particular topic and you produce content on that particular topic," he says. "I want to make sure I have a way to make our relevant content available to that user who's expressing an interest in the topic and not get lost in a general mass of news information."

According to Stitt, search engine optimization is a component of a successful strategy, but there's a catch.

"Currently, most video is rather opaque. It's not really discoverable by search engines," he explains.

However, significant progress is being made to resolve the problem.

"I think broadcasters have to be keenly aware of those developments and be ready to embrace them," he says.

The other component of success is making it easy for people browsing the Internet to come upon station content that matches their interests and, therefore, is important to them.

According to Ron Stitt, vice president digital media for the Fox Television Stations Group, the Internet has transformed the relationship people have with content, and TV newsrooms must take steps to maximize the chance their content will find the audience.

"We have a lot of material they will find relevant," Stitt says. "We just have to make sure they encounter it in the natural course of their online activities."

Changing demographics and viewer expectations about news make the need to develop strategy for the future an urgent one. Fortunately for newsrooms, where this is all headed is much clearer today than in the early days of the Internet, Stitt says.

"People are going to watch what they want, where they want, when they want, and we can't stop that. We shouldn't pretend that we can," he advises.

However, that does not diminish the value of what broadcasters do best: transmit content simultaneously to an unlimited number of viewers.

"The question is what we want to do with that given that a lot of content viewing will be on demand in the future," Stitt says. "I personally think the ability to broadcast that content will be a huge asset in 2015, but we are going to have to take a hard look at what we are doing."



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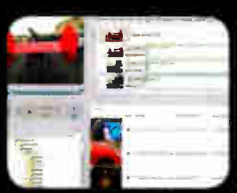

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# News: the ROI equation

## Leading broadcasters are turning to technology to restructure personnel demands, enhance workflow efficiency and improve the quality of their newscasts.

BY PHIL KURZ

**The ROI of control room automation extends beyond news and reaches into master control if it is used to roll commercials during newscast breaks, says Jim Ocon, VP of technology for Gray Television.**

Gripped in the clutches of a recession that's produced breathtaking declines in ad spending, many local broadcasters have scrambled to find greater efficiencies and cost savings in the production and presentation of their local news.

Technology in the form of control room automation and a rethinking of how news graphics are produced and integrated into newscasts are helping. Not only do both deliver substantial personnel savings and workflow efficiencies, but also they are allowing stations to put together tighter newscasts with fewer mistakes and a better on-air look.

While these advances pre-date the onset of the recession, their implementation has taken on a higher degree of urgency as broadcasters look to survive and thrive in today's economic climate.

## Control room automation

KVVU-TV, the Meredith Local Media Group-owned Fox affiliate in Las Vegas, rolled out control room automation in late June and immediately began benefiting from significant staff savings.

"We have reduced the workforce by 11 people, including the CG graphics operator, audio person, TD and camera men in the studio," says Jack Smith, station director of engineering.

For the past two and half years, Meredith has been rolling out control room automation at its stations around the country.

"There are locations where the impact on staffing has been slightly



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less, and others where it's been more," says Larry Oaks, Meredith Group VP engineering & technology. "But the bottom line is con-

In use since late June, a new control room automation system at KVVU-TV in Las Vegas has produced significant personnel savings, says Jack Smith, station director of engineering.

trol room automaton has had a significant impact in terms of cost reduction."

The return on investment in control room automation doesn't necessarily have to be confined to staff reductions only related to news, says Jim Ocon, VP of technology for Gray Television. Gray, which so far has rolled out control room automation at three of its 36 stations, has identified staff reductions in master control as well.

"Traditionally, the control room hands off commercial playback to the master control room during breaks," Ocon says. "Why shouldn't we be rolling the breaks directly from the news control room? The TD should be running this from the control room."

In the view of Sterling Davis, Cox Media Group VP of technical operations, control room automation is about more than simply cost savings.

"We do use a lot fewer people," Davis says. "But that results in a better, tighter newscast because you have fewer people to communicate with. It makes it a lot easier to manage the newscast."

For example, last-minute changes to a newscast rundown are easily handled in an automated control room because shuffling story order, inserting a new package or removing a story requires far less last-minute interaction and coordination among multiple people in the control room.

Thanks to the Media Object Server (MOS) communications protocol, the pieces of a story, such as a media file, graphics, titles and teleprompter text, can be preproduced and inserted into a rundown as a package that's easily moved, deleted or modified. In a sense, MOS is an enabling technology for control room automation that liberates discrete story elements, such lower thirds, from being managed by a dedicated person in a control room.

Despite its advantages, some broadcasters express concern about implementing this strategy in their control rooms because they believe newscasts are too complicated to be turned over to automation. The experience of KVVU is typical.

"There was a lot of apprehension about it (control room automation)," Smith says. "Many said it would never work because we do fairly dynamic newscasts with a lot of live shots."

However, the new automation system has met every expectation, he says.

According to Joe Snelson, VP engineering at Meredith, a key to succeeding with control room automation is examining a station's news production workflow, understanding it thoroughly and selecting a system that matches that station's workflow requirements.

"While we were evaluating news automation in the group, we had to consider which one we should choose," he says. "At the end of the day, they do the same thing, but the workflow for each is different. Some will feel more comfortable with one or the other."

**The drive to improve efficiency and make better use of personnel isn't confined to control room automation.**

## Graphics

The drive to improve efficiency, make better use of personnel and present a more appealing consistent look to viewers in TV news isn't confined to control room automation, however. Over the past few years, major broadcasting groups, such as Gannett Broadcasting and Post-Newsweek Stations, have rethought how news graphics should be created and put in place new technology and workflows.



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Post-Newsweek Stations' new centralized news graphics hub in Pembroke Park, FL, is one approach to maximizing return on investment.

"We have six stations in our group," says Marcus Williams, Post-Newsweek VP, engineering. "To find an ROI with six stations, you have to look closely, and graphics hubbing is a clear ROI. Most people understand requesting graphics, but there are several other aspects to this approach that make it successful."

One is relieving graphic artists from routine tasks. For example, prior to establishing the hub, a journalist receiving a mug shot or image from a viewer would have to request a station artist to resize and save the image in the correct format before it could be used.

"We wrote a program that allows the journalist to open the graphic and save it in the right format and be sized properly," Williams says. "That was huge."

A fundamental component of the new approach to news graphics is what Williams describes as "super templates" that are customizable to the specific need of an individual journalist via pull-down menus. Relying on these super templates distributes ordinary news graphics creation duties to journalists at stations working on a specific story, thus freeing up graphic artists at the hub for special projects and requests.

Prior to deploying the hub, news directors and news producers at the group's stations supplied input that led to the creation of two individual on-air graphics looks from which each station could choose. Each look has its own set of about a dozen customizable super templates instead of the hundreds of templates commonly used by stations relying on templates. Limiting the selection process, but allowing customization in effect gives the group's journalists the best of both worlds — simplicity and flexibility to tweak graphics to suit their specific needs.

The benefit of templates extends beyond television to the Web.

"Prior to this, our Web people had to wait for the broadcast graphics and grab them," Williams says. "Now they can create any graphic they want in our same style to ensure a consistent look from broadcast to Web."

**Relying on these super templates distributes ordinary news graphics creation duties to journalists at stations working on a specific story.**

For Cox Media Group, the concept of centralizing news graphics is less appealing, Davis says. First, news graphics generally are created on any given day for local stories. So creating a central repository of local graphics from which an individual station can draw in many instances would not satisfy the need to be locally relevant, he says.

Then, there is the expense.

"Moving graphics and accounting for them also takes a whole lot of overhead in terms of capital investment and a team to operate. We are very thin on graphics people currently, and the benefits of doing something like that don't appear to be cost-effective given our capital restraints at the moment," Davis says. "I think we are headed towards something that's best described not as centralized graphics, but rather graphics sharing. In this model, a station could dip into a pool from another station and pull out a given graphic when it's appropriate."

## And that's the way it is

Control room automation and changing approaches to news graphics are simply two of the most visible signs of the changing currents in news technology. They are significant examples of efforts being made at stations to tap into new efficiencies, produce greater ROI and present a higher quality on-air product to viewers. They also illustrate the lengths to which broadcasters are going to deal with the new economic realities of broadcasting.

To be sure, stations employing these technologies have reassigned some employees who formerly worked in the control room or in local graphics departments to other tasks, but they've also eliminated positions and reduced costs.

There is a balance that's being struck between personnel savings and how to assign employees who have been displaced by these technologies but are chosen to stay on. That varies from station to station, Snelson says.

For example, Meredith's implementation of control room automation retains a prompter operator in each station's studio.

"That person serves a couple of roles," he says. "The prompter operator is a live interface for the talent and is the only person in the studio other than the talent."

When guests enter the studio, it's the prompter operator's duty to mic them.

"There is still some human element involved," Snelson says, adding with a laugh, "I suppose we could ask the guests to mic themselves and have Max Headroom for talent, but I think we still need a human element."


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# The big squeeze

## Shrinking ad revenues require TV newsrooms to rethink how they gather, create and manage news.

Consolidation of competitive TV newsrooms, cooperative news resource pooling and newsroom staff wearing multiple hats — including reporter, shooter and editor — will continue to accelerate over the next few years. As a result, the way local TV news is created and distributed will be dramatically different from the long-lived status quo in place as few as 18 months ago.

That's the view of David Smith, president and founder of Los Angeles-based research consultancy firm SmithGeiger, who is presenting a keynote speech at the 2009 *Broadcast Engineering* and *Broadcasting & Cable* News Technology Summit in Atlanta.

"For years, we have been thinking one or two TV stations per market would probably have the strength in ratings to continue. We have finally reached that point in time where the third, fourth and fifth newscasts have fallen below the line in profitability, and there is going to have to be a solution," Smith says. "It looks like that solution is going to be multifaceted — everything from news sharing agreements to the collapse of actual news departments into one content gathering organization serving two or three stations. That means technology is going to have to follow."

Smith identifies several distinct ways technology can advance the goal of more economically sound newsgathering operations, including simple acquisition and editing technology to support one-person news crews, uniform content management systems, centralized news graphics creation, and combined back-office operations.

Often called multimedia journalism, video journalism or even mass media journalism, the one-man-band approach to TV newsgathering is in its ascendancy, he says. Long employed at smaller market stations, one-person crews multiply a station's newsgathering resources without additional staff — a boon to news managers demanding more content but being squeezed by stagnant or declining budgets.

"I think we're going to see a strong drive to mass media journalism where folks shoot, report and post online," he says. "We've seen the early phases of that, and I believe that will be a wholesale effort as we move forward."

Acknowledging some initial discontent among reporters and photographers asked to adopt one-person newsgathering, Smith says these journalists are coming around to the notion that learning new skills enhances their ability to do their jobs and gives them added job security because they can produce more content.

Beyond acquisition and editing, the rise of mass media journalists will require new approaches to content contribution and management, Smith says. The fact that mass media journalists are likely to be working for a competitor that's part of a news cooperative demands a common, uniform standard content management system that's known and understood by all users. Such a system must be available at numerous locations across a DMA.

"A content management system will have to allow people to stop by, plug in, and download video and feed audio."

News graphics is another area where technology can help make things efficient and cost-effective. According to Smith, it is likely news departments will take over all graphics productions, and the graphics function will be centralized in a hub serving all journalists within a newsroom or even journalists at various stations within a broadcast group or beyond.

David Smith, president and founder of Los Angeles based research consultancy firm SmithGeiger, says the way local TV news is created and distributed will be dramatically different from even just 18 months ago.

"We might even see combinations of owners of different stations now joining mutual hubs of graphics, back-end traffic and news content management with one giant server serving a multitude of stations within multiple groups of owners in multiple markets," he says.

The cause of these changes is the deteriorating economic model for TV news, which like most other media is struggling to deal with declining ad revenue. That translates into leaner newsrooms, which by Smith's reckoning will reduce head count by 10 percent this year and another 5 percent next year.

"I think the economics now are going to have the most dramatic reorganization effect on news and the equipment that's required to cover news that any of us have seen in our careers," Smith says.



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# Calrec's Alpha and Sigma

## CBS Sports employed the audio consoles to cover the Augusta Golf Classic.

BY EDWARD SOLTIS

At the Augusta Golf Classic in April, I had the opportunity to realize an idea that I have been championing for more than six years — a large-scale delivery of quality audio signals over almost an entire TV compound using MADI. CBS Sports has televised this tournament for 54 years, and it ranks as one of the premier sporting events of the year. So, the opportunity and the challenge were both immense. I have been fortunate enough to have worked for CBS for 10 years at this event, and the differences in technology from my early days to last April are truly amazing. Broadcast has gone from analog to digital, SD to HD, stereo to 5.1, tape to X-file servers, and so on.

MADI is not new technology. It was first introduced to me in the mid-1990s, along with the first digital consoles. The SSL Aysis used MADI streams to connect its hub-router to the outside world.

What struck me as peculiar was that even after years, few people knew how the transportation of signals took place. MADI was that reliable; it never failed, so few knew it was even there.

Over time, MADI devices became more available. The big break came in about 2007, when router frame interface cards started to appear. At about the same time, Calrec was offering a two-channel rack unit for interface to its Alpha audio console. Now all I needed was someone who would take my ideas and integrate them in a mobile unit design.

My break came during the construction of the mobile units designated HD-12 from NMT. Thanks to the trust and support from so many people at CBS, NMT and VSG, I was able to contribute to the build process and audio design of the mobile units that CBS Sports now uses for its golf and NFL coverage.

### CBS golf events

On a week-to-week basis, NEP SS-10 (formerly NMT HD-12) moves from remote to remote televising the PGA. Every week, six single coaxial cables, along with two backups, are all that are needed to connect the "B" unit main mix position to the "C" unit submix position and Adder II modular audio, intercom and data multiplexing system from Telecast Fiber Systems.

**CBS Sports could use Calrec's Sigma to provide additional copies of individual signals, giving the mixers a level of flexibility and a supply of signals they had never seen before.**

This meets all audio needs. That is up to 384 signals or 192 AES pairs. There are none of the old analog artifacts like hum, buzz or bad pairs. Each cable delivers up to 64 signals (32 AES pairs) as a send or receive, and they are all or nothing. This means that if the stream is working, it arrives intact. If it doesn't, then simply change the cable, and off you go.

### The Augusta Golf Classic

This remote is huge, requiring 16 mobile units involved in different capacities. Many require massive amounts of audio signals to be delivered to them. Figure 1 on page 72 is a single-line schematic of the signal flow around the compound. Requirements for each mobile unit are unique. The main or back "9" truck requires almost every signal in the compound, while the truck labeled "ESU" distributes and receives signals to and from the international broadcasters.

There are mobile units set up as additional tape support, and these require their internal router to be populated with all course effect mics, as well as programs from various other trucks and other VTR sources. CBS employs a "QC" position where a mixer needs to be able to listen to all on-air sources in the compound and, if necessary, set the tone for level and EQ so that the different outputs from other units sound similar.

In addition, this year, CBS supplied coverage for the entire par three event held on Wednesday, in effect adding an additional nine holes — another half of a golf course — to the mix. There were two submix trucks, each doing about half the course. Each mixer was responsible for upwards of 75 sources, in addition to seven announce towers and a "Butler Cabin Studio set."



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Add to that the Internet and highlight shows, and you begin to see how large this event's setup was. If this was not complicated enough, signals came and went in analog and digital formats, as well as embeds, e-streams and now MADI.

## MADI defined

The specification provides for the serial digital transmission over coaxial or fiber-optic lines of a sequence of 64 channels of digital signal contained in a frame numbered 0 to 63. Sampling rates range from 48kHz up to 96kHz (48kHz being the sampling frequency used by CBS) and resolution of up to 24 bits of audio per channel — delivered in this case on a 75Ω BNC connector and coaxial cable. The basic data rate is 100Mb/s of data using 4B5B (four bits/five bits) to produce a 125MHz physical baud rate.

As sample rate changes, non-return-to-zero inverted data rate stays constant; transmitter and receiver are asynchronous. Each channel consists of 32 bits, of which 24 are allocated to audio. A further four bits represent the validity (V), user (U), status (C) and parity (P) bits of the two-channel AES3 interface, with a further four bits allocated for mode identification.

The assets included four mobile units equipped with MADI interfaces, some with both the MADI I/F R/U interface and router interface card connections, and some with only the MADI I/F R/U interface. To round out the plan, I employed some SDI DAs and a 5RU Cobra Net system. The combinations were the tricky part — when to send to a router interface, when to send peer to peer to another console, which streams to duplicate for DA distribution and, of course, what should populate each MADI stream. The assets broken down by mobile unit are illustrated and annotated below:

- *NEP SS-10B*: Eight MADI-to-router interfaces (eight send/eight receive); two Calrec MADI interfaces for each two-channel (two send/two receive) for a total of four send and four receive from the Calrec Alpha.
- *NEP SS-10C*: Two Calrec MADI interfaces, each two-channel (two send/two receive), for a total of four send and four receive from Calrec Sigma.
- *NEP SS-24B*: Two Calrec MADI interfaces, each two-channel (two send/two receive), for a total of four send and four receive from a Sigma.
- *Corplex Iridium*: Three MADI-to-router interfaces (three send/three receive); two Calrec MADI interfaces, each two-channel (two send/two receive), for a total of four send and four receive from the Alpha. Note that Iridium uses the MADI highway as its default connection between its Sigma and its Evertz router, so I had to repurpose some of its routing structure. But, with the help of its engineers, this was accomplished with relative ease.

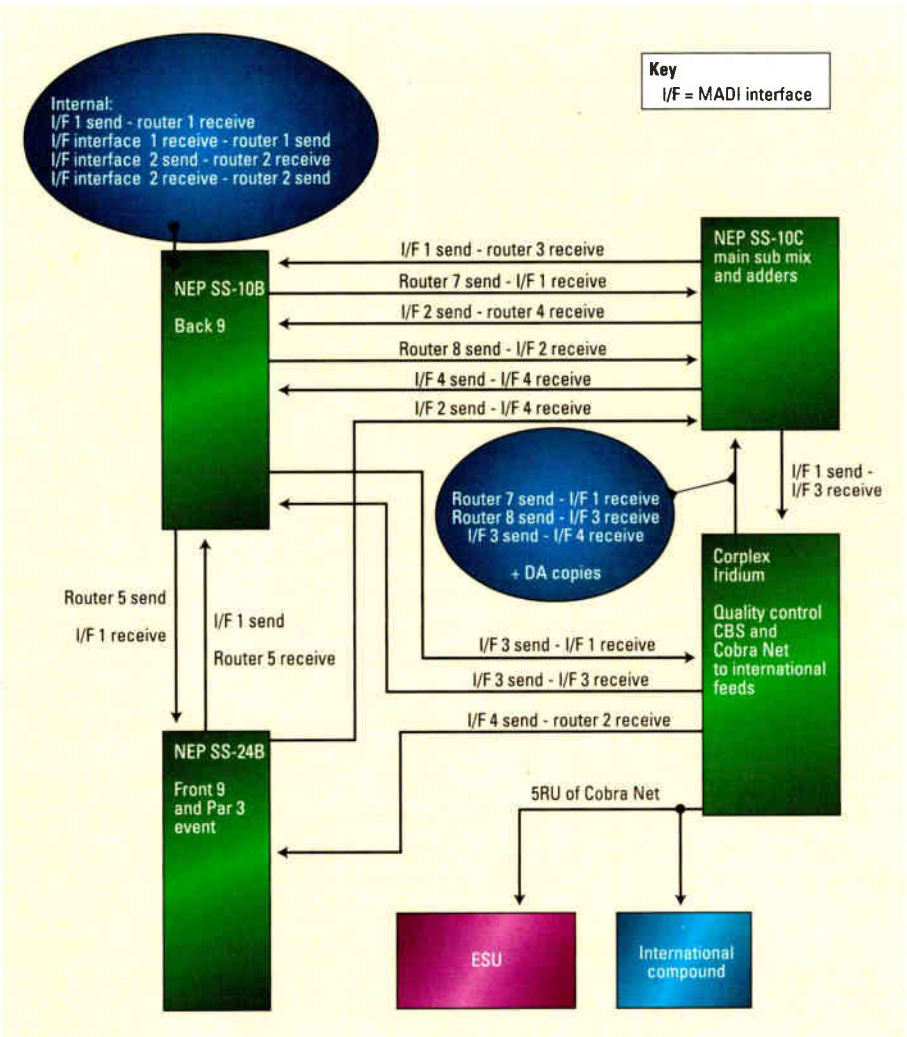


**Figure 1. Single-line schematic of the signal flow around the compound**

## The plan

The goal was to move as many signals around the compound as possible using MADI. We decided that two main streams would be created and designated as Ping 1 and Ping 2. These 128 paths (64 AES pairs) would be where all of the main signals for the tournament would reside, and we filled these streams entirely.

NEP SS-24, the front 9 truck, shipped its course effects via MADI to NEP SS-10C, the back 9 sub truck. The Adder IIs, carrying many of the signals from on course, also resided in 10C. Those signals were also integrated into the MADI architecture to


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create the bulk of the signals in the streams. All these elements were then sent via MADI to NEP SS-10B, where they were interfaced directly into its router. Once Ping 1 and Ping 2 were created, they were DA'd and sent to the other mobile units for integration into their routers.

Very quickly, we had the four main mobile units all confirming that all the signals had arrived in fine fashion, and the fax went so quickly that I almost missed it. In all the years I have been involved in large remote broadcasts — including Super Bowls, World Series, the PGA, major golf tournaments and AFC Championships — audio setup had never been so ahead of the curve.

Next, we started to establish connectivity on a peer-to-peer basis between the consoles in the mobile units so that the mixers could begin to send and receive the signals particular to their assignments. Everything from course effects mics to dry IFBs, hot mics, mix-minus programs, net return, VTRs and their router outputs were sent back and forth with complete success.

The Calrec console displays an input and output page for MADI, so it was easy to see what was sent and received. Even the mixers who had no experience with MADI picked up on it very quickly and were routing and receiving in no time.

My next focus was to set up quality control in the Corplex Iridium. This would be the place where many of the crucial signals could be shaped and monitored. Because MADI can be DA'd, it's no problem to send copies of the streams to the same place. If you need to send two copies of the 32 AES pairs that comprise the MADI stream, all you need is one additional coaxial cable.

One stream was interfaced with the Corplex router, and the copy was sent to the Sigma audio desk. The router contained the signals that would eventually go to air, and the desk contained the copy that could be used to check signal integrity, without ever interrupting feeds to air. In addition, the Sigma could be used to provide additional copies of individual signals, giving the mixers a level of flexibility and a supply of signals they had never seen before.

Corplex was the origination point for a build of the feeds that went to the international compounds. This was accomplished by using a Cobra Net network. Five rack units were integrated to provide a total of 60 AES pairs worth of signal, which turned out to be barely enough. My experience with Cobra Net has always been positive. It is rock solid, and its ability to move that many signals on a single Cat 5 cable speaks for itself.

What would be ideal would be a MADI interface for Cobra Net. Cobra Net connectivity is labor-intensive, as the physical connections soon reach the hundreds. This results in errors and slow troubleshooting times. The good news is that an interface with MADI is possible and has been put on the table. This would be fantastic, especially if the distro side were MADI and the receive side remained AES so that it would be accessible to end users without MADI capability.

## Outcome

The build was not without some small problems. Initially, one of the MADI-to-router interfaces would not talk to the main streams. We eventually isolated it to a single sync issue. In the end, we fixed the problem with the flip of a switch. In short, on the MADI backplane, there are DIP switches for channel allocation, setting the sample rate and choosing to pass through channel status data in its current state, or force it into a known professional state.

According to the users guide for the NV7512 audio router, forcibly adding common, professional status data is called "Channel Status Striping" or C STRIPE. It is useful in instances where the signal channels have been recombined and the channel status data may have been corrupted. If the sample rate of the MADI signals is being changed, the channel status data is automatically removed, and channel status stripping is applied by default.

It would have been nice to have more of the mobile units in the compound equipped with MADI, but there's always next time. In the end, we broadcast the tournament for five days, and the system remained stable the entire time.

Many positive comments were made about the quality of the audio. I noticed a vast improvement mainly because of the fact we converted our signals to digital early in the process, in most cases before they even left the golf course. Those signals went into Adder IIs and were sent back via fiber to the compound. From there, they were sent to mixing desks and routers and eventually out to MADI streams, never having been downconverted or upconverted.

Another positive result I had not foreseen was that because the mixers were not bogged down by buzz, bad pairs or patching errors, they had more time to concentrate on shaping the signals and the overall management of their other systems. This problem-solving does not end after setup; it is a daily routine for mixers because of many factors and failures within a compound inundated with DT.12 and AES looms, where failures are far more commonplace. The AES looms and DT.12 cables were conspicuously absent. They were down to such a minimum that only a few times during the show did I see anyone outside the trucks working on cabling issues.

## That's a wrap

Feedback indicates that the layout we used at the tournament worked well. Everyone involved directly with the MADI had only positive comments for the remote. In short, the use of MADI for bulk audio distribution proved to be a success. **BE**

*Edward Soltis is the audio supervisor at CBS Sports.*



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# Video encoders

## H.264 supports 4:20 and 4:2:2, as well as up to 14 bits per sample for high-quality recordings.

BY JOHN LUFF

It is often assumed that when someone is speaking of encoders, they're referring to MPEG-2. But with the expansion of encoding platforms and video compression algorithms, it's important to note that while the MPEG-2 transport stream and its rich syntax is a part of most compressed transmission systems, the video and audio encoding choices offer variety and performance to match varying applications.

There are reasons for the expansion of options. Manufacturers need to introduce new and improved technology to maintain their sales and profits. If every refrigerator was still in use today, we would have stopped making them decades ago. Obsolescence is a fact of life, however inconvenient. A client recently showed exasperation with an encoder manufacturer who didn't offer a clear upgrade path without fork lifting the old boxes and replacing them with new ones. In the end, the buyer benefits from better technology, even if the budget gets strained to make it happen.

**Fujitsu's IP-MPEG-4 AVC encoders and decoders offer PacSat, a provider of mobile TV uplinks for news, sports and special events in both SD and HD, high-quality pictures at low bit rates and low latency.**

### Improvements

The improvements in encoders are dramatic. Early MPEG-2 struggled to get decent SD pictures through a 15Mb/s pipe. Now distribution to the home drops to about 10 percent of that early level, while HD content can be delivered at below 15Mb/s, dependent on content, of course. At the same time, MPEG-4 (AVC, Part 10, H.264) delivers great HD at below 10Mb/s and holds the promise of rates approaching 5Mb/s in the future.

Coupled with changes in satellite modulation, including 8PSK and DVB-S2 modulation standards, lower bit rates and less occupied bandwidth in the satellite equate to lower cost for backhaul and transmission to the home. I often hear that we standardized the encoding and emission standards for ATSC DTV too early, but that begs a perfect vision of the future. This much, however, is clear: Encoding will continue to improve, and new algorithms will emerge that offer further improvements in both quality and bandwidth performance.

There is a limit to the reach of the physics and mathematics involved. I won't attempt to predict a quantifiable (no pun intended) number. I remember a paper published a while ago in the EBU Review that purported to mathematically prove video couldn't be compressed in less than 34Mb/s. (In Europe, 34Mb/s is the magic number, as it is the E3 data transmission standard, the equivalent in concept of the North American DS3 standards.) That paper came out as MPEG-2 was in its infancy, but missed the point that perceptual quality has a correlation to bit rate. It is not a hard linear link, but rather a bit of fuzzy logic due to the nature of the complex physiology of human visual systems and the way we see things in motion.

The complicated nature of the problem cannot solely be modeled mathematically, so it becomes critical that any design include iterative testing by both expert and nonexpert viewers who can verify the results of any new technique. One interesting approach is two-pass encoding. The encoder does a first pass to look at the statistics of the images and the results it achieves with default settings. Then it finds places where the content can be improved if bits were available and steals them from content that is less challenging, using the new parameters to re-encode the final output with optimized results. Multipass encoding is the norm in high-end DVD authoring, where the quality must be maximized on a space-limited medium.

With H.264, the options available to an encoder (the toolkit) are considerably expanded from MPEG-2. Block sizes are variable, multiple motion vectors can be associated with a block, and multiple reference frames can be used for predictions. CABAC and CAVLC coding are used in addition to variable length coding, giving designers more options on an adaptive basis. H.264 supports both 4:2:0 and 4:2:2 as they are in MPEG-2, but also supports higher bit depth — up to 14 bits per sample for high-quality applications like master recording. More profiles have been standardized as well.

### Applications

It's tempting to think of all modern encoders as viable in all environments, but in reality, some implementations are more appropriate for certain business models. For example, latency, or encode/decode delay, has an effect on some applications. In live two-way interviews, it is critical to minimize


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the latency between distant reporters and home studios interconnected by satellite. The roundtrip to a geosynchronous satellite is 240ms-279ms, depending on the geometry of the access. That is difficult enough by itself, though audiences are used to it. But unlike analog equipment, which adds little additional delay, encoders add from 50ms to several seconds! Why so large a range? Low latency uses the lowest performance profile (SP@ML, i.e., Simple Profile @ Main Level), and HD content might be encoded with two-pass encoders to achieve the highest quality. Those are different processes. Two-pass encoding must have at least a couple of GOP groups in memory to compare encoding statistics, leading to longer latency, and making a process unsuitable to live interviews.

Encoders intended for a high degree of flexibility are often chosen for SNG operations. They can offer SD and HD encoding, and normally include the modulation for transmission as well. And encoders with satellite modulation modules would not be appropriate for an ATSC installation because a portion would never be used.

For an IPTV installation, ASI outputs might not be appropriate, so an encoder with IP over Ethernet might be a better choice. In such a case, an encoder that can simultaneously do MPEG-4 and MPEG-2 might have an application, or perhaps one that can encode an SD stream and an HD stream at the same time.

In systems where more than one encoder is needed, as in a terrestrial multicast, picking hardware that can perform statistical multiplexing is a worthwhile advantage. This allows encoders in the multiplex to free up bits not needed to adequately encode less challenging content and encoders with more complex content to use the additional capacity. The quality improvement can be dramatic.

## Conclusion

At least one encoder manufacturer has tackled the quality lost when encoders are cascaded, as they most certainly are today. Their approach is to identify artifacts that signal things like block edges and then attempt to match the current encode process to the previous methods to minimize the potential quality lost. Nearly all content today has been through at least one concatenation process, so techniques like this can be valuable in preserving the quality of the final product. BE

*John Luff is a broadcast technology consultant.*

? Send questions and comments to: john.luff@penton.com

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### HaiVision Network Video — BARRACUDA

H.264 encoder supports SDI, S-video and composite video inputs; supports advanced features such as HaiVision's HiLo Streaming; compatible with industry-standard set-top boxes; integrates with Video Furnace System 5; available as stand-alone system or in a 4RU chassis for up to 21 miniblade encoders.

**847-362-6800; www.haivision.com**

### Compix Media — OEM Board and Software Kit

Character generator system design generates broadcast-quality HD-SDI, HD-ready, SD-SDI and analog graphics; SD products can operate seamlessly in NTSC and PAL video systems; uses Windows input method editor mulilanguage capability; supports True Type fonts; provides live to on-air capabilities featuring broadcast play-to-air operational logic; can be used in post-production environments to insert characters over offline edited video streams; enables mixing of 256 transparency levels, titles or directly imported graphics in live over incoming video on all Compix CG systems.

**949-585-0055; www.compix.tv**

### DVEO — HD-SDI Master I/O PCIe LP

Single-channel HD/SD-SDI I/O card provides functionality of two cards; supports 1080i and 720p at 50Hz, 60Hz and 59.94Hz, as well as 1080p at 23.97Hz, 24Hz, 25Hz, 29.97Hz and 30Hz; input features include automatic standards detection between 720 and 1080, automatic cable equalization and input monitoring of CRC errors; output mode features tri-level sync input for transmit frame and rate synchronization; includes drivers for Linux, Windows XP, Windows Server 2003 and Windows Server 2008 in addition to DirectShow support.

**858-613-1818**
**www.computermodules.com**

### Anton/Bauer — TM4

Battery charger delivers all the capabilities and efficiency of the InterActive charger series; features MAXX III warranty, 70W power supply output, 100V-240V output, simultaneous charging, seven full-time charge terminations and remote USB software upgrade capability.

**203-929-1100; www.antonbauer.com**

### ARG ElectroDesign — Media Combiner 1900E

Multiprogram transport stream/data network adapter provides transparent DVB-ASI signal distribution over fast Ethernet or GigE IP networks; features E1 access card for DAB distribution; enables up to eight DVB-T program bundles to be combined into a single interface for transport over any STM-1, OC-3, DS3, E3 or IP circuit; includes dual-redundant power supplies; can rate-limit incoming signals and apply two levels of Reed-Solomon error correction.

**203-376-3372; www.arg.co.uk**

### Strategy & Technology — MHEG Presenter 2

Digital text/interactive ad application enables broadcasters to display a variety of objects anywhere on the screen, customize navigation, display pop-ups and define relationships between menu items and a range of visible objects; reads data in the XSD format, and any XML conforming to this data format can be displayed; can be used for information services and interactive ads; features support for VOD, IP-connected CI+ modules and hybrid IP/broadcast receivers with content being delivered via IP and/or broadcast.

**303-926-4993; www.s-and-t.com**

### Clear-Com — Tempest 2400

2.4GHz digital wireless intercom system; base station features four audio channels, up to five full-duplex beltpacks per station and up to 50 on 10 stacked stations, remote antenna capability, frequency hopping, spread spectrum technology, and 2.4GHz frequency band operation; two- and four-wire intercom interface on each channel and auxiliary I/O; beltpack features backlit LCD, vibrate call function, local programmable controls, GPO addressing, and ability to select, monitor, mix and talk simultaneously on two of the four audio intercom channels using the A/B and C/D channel selectors.

**510-337-6600; www.clearcom.com**

### Vector 3 — Vector MultiPlay

Automated playout system product line features MultiPlay MCR for master control room automation and Multiplay VServers, a wide range of next-generation video servers with live branding; can be integrated to create a redundant architecture that leverage the benefits and cost-effectiveness of IT-based technology.

**+34 93 415 12 85**
**www.vectorbox.com**

### Brick House Video — Proteus

SDI standards converter offers fully integrated, adjustable audio delay and synchronization up to several seconds to correct lip-sync errors; features motion-adaptive standards conversion algorithm, 10-bit SDI, composite (NTSC, PAL), component and Y/C in and out, high-quality NTSC/PAL decoder, optional aspect ratio conversion and video and audio processing controls, audio dubbing, and channel swap.

**+44 1962 777733**
**www.brickhousevideo.co.uk**

### NTP Technology — Penta 725

Compact, modular audio routing hardware platform features two high-speed, bidirectional links for connection to NTP 625 or Penta 725 systems and an AES3 monitor output for I/O monitoring; router settings can be controlled via TCP IP or front-panel navigation keys.

**+45 4453 1188; www.ntp.dk**


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### never.no — Community TV

Suite of TV and Internet broadcast applications provides high-quality broadcast integration of content submitted by users; makes it possible to cost-effectively develop and maintain dedicated on-air and online TV channels relying on user-submitted content; includes upgrades to improve template management, paging and filtering to support handling of metadata attached to videos; enables content contributors to add Web links and embedded video to the platform's CommunitySite component.

**+47 22 01 66 20; www.never.no**

### Custom Consoles — EditOne

Desk accommodates desktop editing and graphics workstations; features 2300mm by 1030mm footprint, including a profiled horizontal work surface with optional dual two-unit desktop pod; 13-unit high equipment bay supports the left half of the desk set forward at a 15-degree angle for easy access; includes space for a tower PC; provides easy equipment access from front or rear; desktop height is 720mm; curved at each corner; protected by PVC edging.

**+44 1525 379 909**
**www.customconsoles.co.uk**

### Adtec Digital — HDMI2QAM

Dual-channel, HD/SD MPEG-2 broadcast distribution encoder features built-in QAM modulation and RF upconversion, closed-captioning and support for EAS; automatically detects video and audio; encodes, multiplexes and generates PSIP; then modulates and upconverts two channels for distribution via coax.

**615-256-6619; www.adtecinc.com**

### EditShare — Ark

Tape- and disk-based systems enable users to move backup media to lower-cost storage and create long-term archives; can create safety backups during the editing process; features seamless integration with EditShare shared-storage solutions, simple to use interface, disk-based option for fast nearline storage and retrieval, and tape-based option for backup or long-term archival.

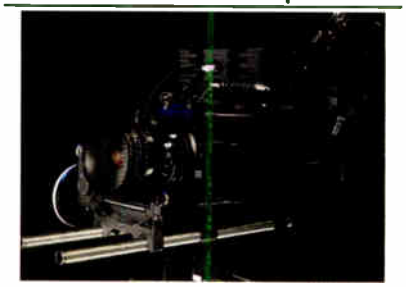
**617-782-0479; www.editshare.com**

### Concurrent Central Data Warehouse

Cross-services data storage and correlation solution offers a 360-degree view of linear, VOD and interactive media consumption across television, mobile and online screens; enables broadband operators to consolidate the collection, storage and correlation of census-level media data; designed with open and standards-based interfaces to support configurable, seamless data exchange with authorized third parties.

**877-978-7363; www.ccur.com**

### Carl Zeiss — Compact Prime



Line of lenses is available in seven focal lengths between 18mm and 35mm; is compatible with all standard digital and analog movie cameras equipped with a PL mount; focusing cable is individually calibrated for each lens; features standardized color characteristics, antireflective coating and aperture with 14 rounded shutter blades.

**800-327-9735; www.zeiss.com**

### RTW SurroundMonitor 10600-PLUS

Display system for monitoring digital stereo, multichannel and surround audio signals incorporates an integrated loudness display according to the ITU BS.1771 guideline; includes a full-screen mode for enlarged display showing individual instruments used, as well as detail enhancements within the featured surround-sound analyzer; existing units can be updated free by replacing the built-in EPROM; PLUS option includes power supply and table stand.

**+49 221 709130; www.rtw.de**

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### Pilat Media — IBMS:Adapt

Customization platform enables users, system administrators and in-house developers to interact with and customize the IBMS user interface, business logic and workflow capabilities; includes a palette of tools to provide maximum control over customization and workflow management; features a customization designer, diagnostic utilities, a graphical workflow designer and a workflow management console.

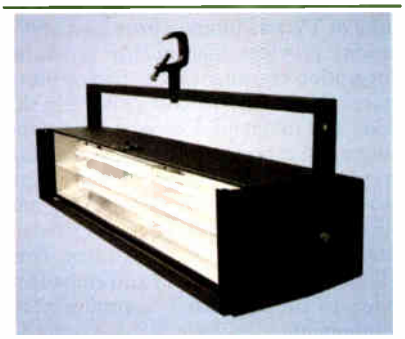
**877-873-4267; www.pilatmedia.com**

### Polecam — FFFS

Filter system enables operators to use high-quality optical filters with compact HD cameras that have no integral filter mount; allows 62mm Tiffen or Cokin filters to be deployed with the 29mm diameter Fujinon TF lens series; includes a Polecam filter holder, five 62mm screw-fitting circular Tiffen filters, a Cokin A121M graduated neutral-gray medium filter and a LensPen lens cleaner.

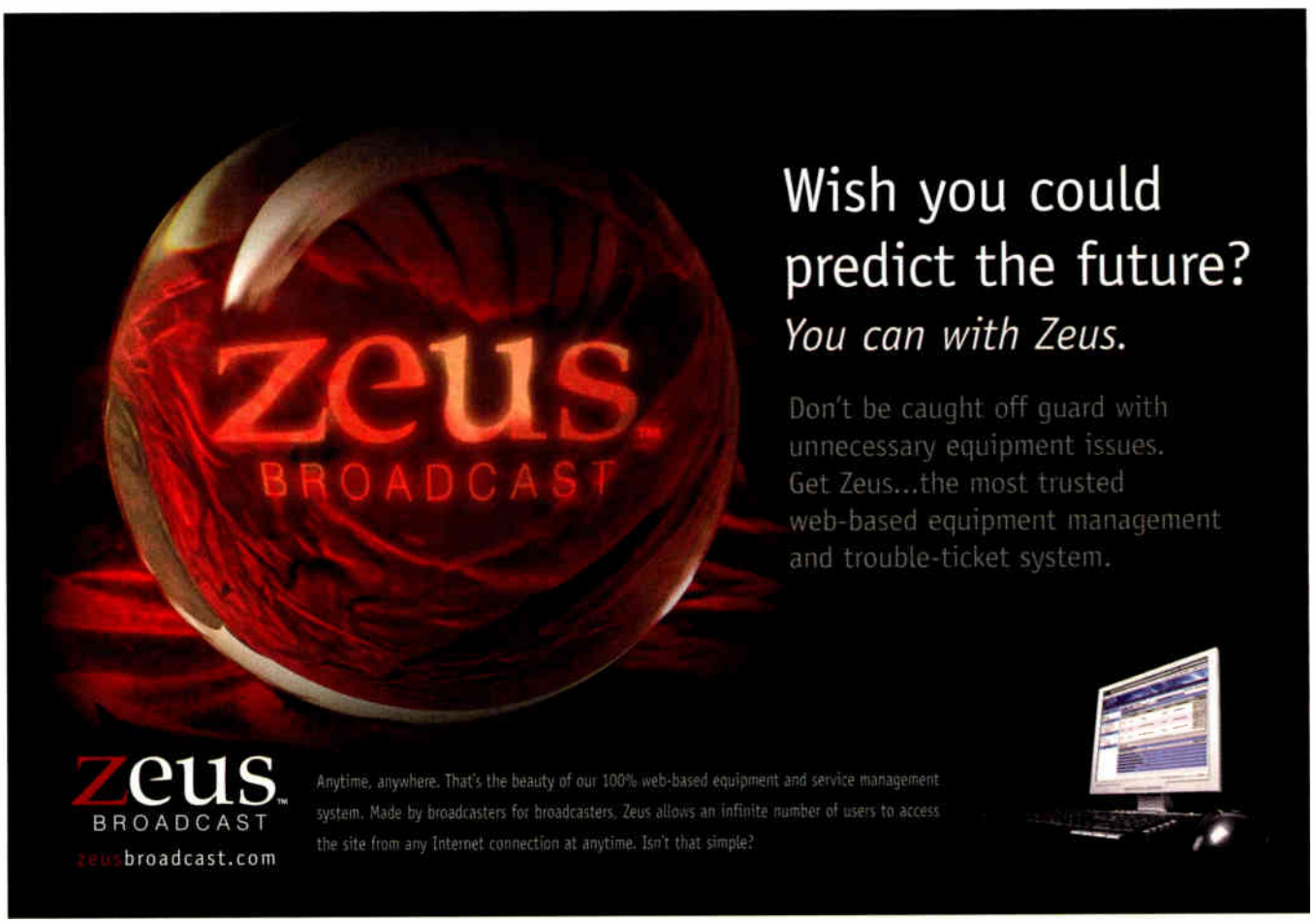
**+44 1234 855 222; www.polecam.com**

### Videssence — POWER CYC



Fluorescent 4ft lighting fixture provides concentrated, even light coverage for studio cycloramas or fill lighting applications; produces 220W with four 55W biax lamps; uses adjustable-beam technology, which enables the lamps to be adjusted separately within the reflector; allows for easy field adjustments with a free range from 60-degree to 90-degree beam spread; casing made of high-purity aluminum with a 95 percent reflectance finish; comes standard with lamps, power cord and C clamp.

**626-579-0943; www.videssence.tv**





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### MultiDyne — COMMS-2000

Intercom interface converts a single channel of standard or TW party-line intercom to four-wire audio while converting call signals to RS-422 data; offers conversion of the signal back to original form; can be used as a high-quality, stand-alone two-to-four wire converter; uses lightweight UTP cables and DC operating current through the party-line connection on pin two of its XLR connector; features call signaling function and amber data LED for status check.

**888-332-6779; www.multidyne.com**

### Gepco — HMS

Modular hybrid fiber distribution rack features internal cable management design with configurable ports for multiple cable formats, including 9.2mm SMPTE hybrid cable, discrete electrical and fiber cables or HDC3R three-channel hybrid cable; includes an internal fusion splice tray for direct fusion splicing to the fiber in the hybrid connector; delivers the lowest attenuation to maximize the loss of headroom of the signal chain; designed for management of larger cables such as 3mm breakout and 900µm tight-buffered fiber; can be spliced with almost any type of fusion splicer and does not require custom jigs or fixtures.

**800-966-0069; www.gepco.com**

### Alcorn McBride — DVM-8400HD

HD video player offers up to 40Mb/s maximum playback rate in a compact chassis that contains no moving parts; stores video clips to CompactFlash cards; clips can be transferred via USB or Ethernet and triggered via contact closures, playlists, real-time schedules, RS-232, Ethernet or GPS; supports audio and video standards including MPEG-2/4, H.264, VC-1, WMA, AAC and Dolby; video outputs include component (YPbPr or RGB), composite (SD), HDMI and HD-SDI (SMPTE 292M).

**407-296-5800; www.alcorn.com**

### Quintech Electronics and Communications — QRM 2500

16 x 16 RF matrix router features Q-ROUTE and Q-SENSE technology, which provide internal/external single-path redundancy and auto reroute capabilities; operates in frequency range covering both IF and L-band; offers manual and automatic AGC modes with a range of -15dB to 16dB in 0.5dB steps, with optional LNB power and individual port control to support all modulation formats; includes front-panel LED display.

**800-839-3658; www.quintechelectronics.com**

### Riedel Communications — RockNet Firmware 1.40

Firmware upgrade makes possible routing in groups of four channels as well as in single channels and ports allowing a connection between any given I/O; provides independent gain function and information about the connection state on each module display; phantom power can be controlled directly through the front panel of the RN.301.MI line/mic input module; can be configured through Ethernet as well as USB.

**818-241-4696; www.riedel.net**

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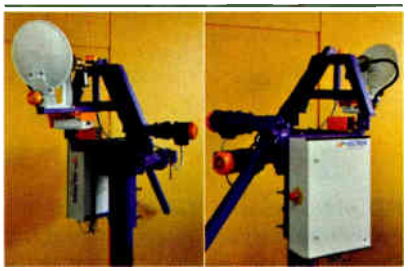
### Hiltron Communications HMAM



Motorized satellite antenna mount is designed for two-way VSAT communication or receive-only downlink applications; three-axis system provides 180 degrees of azimuth adjustment, 90 degrees of elevation adjustment and fully adjustable polarization; features a flexible support plate for the attachment of reflectors with diameters between 1.2m and 3.4m and a rotating pedestal mount; options include a satellite tracking system, inclined orbit tracking, integration of parabolic reflectors according to customer preference, de-ice systems, and a choice of standard steel mounts or nonpenetrating mounts.

**+49 7191 962 660; www.hiltron.de**

### Sound Devices 552

Production mixer contains five high dynamic range, transformer balanced mic inputs with expanded gain and headroom, their own limiters, sweepable high-pass filters, and pre- or post-fade direct output; includes integrated two-track, 24-bit digital audio recorder that writes broadcast WAV or MP3 files to SD and SDHC media; allows for stereo linking of input pairs 1/2 and 3/4 as well as 44.1kHz, 48kHz, 48.048kHz, 88.2kHz and 96kHz sampling rates; features front-panel control of mic/line inputs and phantom status with LED indication of each input.

**608-524-0625**
**www.sounddevices.com**

### Chrosziel MatteBox 456 Academy

Matte box uses three rotating 5in by 5in filter stages to allow the unrestricted use of Cine and DigiCine lenses from 14mm wide angle and up; filter stages are designed to not rotate each time the respective rear stage is rotated; equipped with a combined connector for 15mm rods and the SunShade function with a 130mm clamp adaptor; aligns with RED accessories.

**+49 89 90 10 910; www.chrosziel.com**

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### Element Labs — Cobra System 2.0

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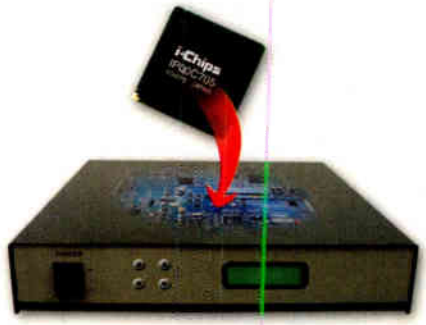

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World Radio History

# The digital era is here

## Are you ready for the virtual trade show?

BY ANTHONY R. GARGANO

Someday history will probably reflect the late 20th and early 21st centuries as the era of the Digital Revolution. And, certainly the life-changing consequences of the Digital Revolution will be viewed as equally impactful to society and as world changing an event as was the era of the Industrial Revolution that occurred in the late 18th and early 19th centuries.

An interesting dichotomy between these two galactic events is that the Industrial Revolution changed the work social order from one that was dispersed in cottage industries to one that was concentrated in factories in cities. The Digital Revolution had the reverse effect. The Bureau of Labor Statistics reports that in 2008, 33.7 million Americans telecommuted for work at least one day per month and that 13.5 million workers telecommuted virtually every day. Welcome to the return of the cottage industry.

Clearly, the digital era has impacted the broadcast industry. It has changed the way we create and produce TV content, and has changed the way that content is distributed and viewed. In Hollywood digital capture, digital special effects and digital distribution have turned the film industry upside down. Other industries have been affected to their core:

- the adoption of digital point-and-shoot cameras and digital single-lens reflex (DSLR) cameras has all but eliminated the film market for still pictures;
- not having developed an effective way to monetize its content online, the newspaper industry is in the throes of basic survival; and
- some magazines have begun to eliminate the print media versions of their publications in favor of electronic subscriptions. And, on it goes.

### Virtual trade shows

At the recent IBC gathering in Amsterdam, ostensibly the second largest broadcast convention in the world, several major companies did not exhibit. Other companies did not exhibit at recent NAB Shows. And, it's not necessarily small companies that have bypassed major trade show exhibits. The likes of Apple, Avid, Panasonic, Snell and Sony are included.

With the cost of floor space, equipment exhibits, staffing, venue advertising and customer entertainment, one of the top companies can easily spend upwards of a staggering $10 million on a single trade show event. A smaller company can spend an entire year's advertising budget at one of these extravaganzas. In the past, some companies justified these huge expenditures because of the volume of orders written at the show as everyone winked at the shell game of sales staff either holding orders or having their customers with orders in hand wait until the show to actually place them. That was a different era, but that was the way the game was played.

Fast-forward to 2009 where the fiscal pressure is on cost reductions, efficiencies and drop-to-the-bottom-line ROIs. For manufacturers, trade shows are no longer primarily viewed as selling events but rather an opportunity to get in front of a customer to demonstrate the latest in products and technology. But, even that activity — given the press of other attendees, technical presentations, group meetings and the like — suffers with inefficiency. On the customer side, expense-driven decisions dictate, as attendance at trade shows has been severely curtailed. A few years ago, one senior broadcast network executive shared with me that he allowed his engineering staff one boondoggle trip a year — his idea of attending a trade show. Well, the boondoggles are gone. In testament are the record drops in attendance at major shows such as NAB and CES. Even the show planners are affected; attendance at this year's Meeting Professionals International Education Congress was down by almost 50 percent.

The tsunami that is the Digital Revolution may be about to affect another major industry: Welcome to the virtual trade show. Are you ready for your avatar to stroll down a virtual aisle as you mouse click on a booth you would like to visit? Upon entering a manufacturer's virtual booth, you can visit various product areas, read booth signage and click on product demos. The more sophisticated virtual trade shows allow you to have interactive conversations with the booth staff and product demonstrators. I visited one virtual trade show wherein the reality experience even included a blend of typical trade show background sounds, such as the chatter of conversations and the music you hear emanating from various booths as you walk the aisles.

From the company perspective, a virtual trade show reduces exhibit costs by half or more, thus driving an extremely favorable cost per visitor reached (a key trade show metric), and materials created for a virtual trade show can be readily repurposed for use on the company Web site. From the attendee perspective, a virtual trade show can be incredibly efficient. But the real bottom line is: How effective is it as part of the process of driving sales? Time will tell. For now, though, going to Las Vegas as an avatar? I think I want my boondoggle. BE

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

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



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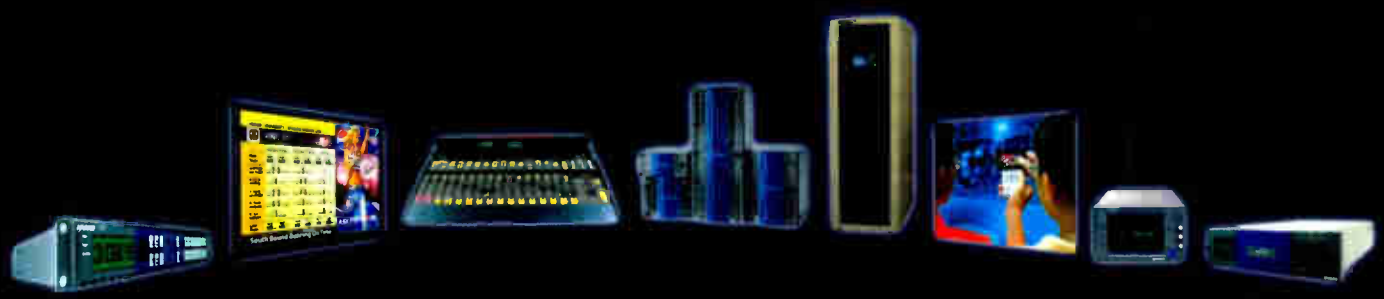

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