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VOLUME 25, NO. 5 • MARCH 7, 2007

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Opera and HD: Making Beautiful Music

by Ken Freed

NEW YORK

Shortly after Peter Gelb became general manager of the New York City Metropolitan Opera in August 2006, Met marketing director Julie Borchard-Young approached him with a groundbreaking idea that's now making television history.

Gelb was accustomed to shaking things up. The son of former New York Times Managing Editor Arthur Gelb, he had already transcended traditional boundaries as the publicity director for the Boston Symphony and later as the

OPERA, PAGE 16



Race for White Space Intensifies

FCC prepares to test prototype transmitter

by Deborah D. McAdams

WASHINGTON

The first prototype device for use in taboo TV channels should be in the hands of the FCC by now. Thus begins the testing phase of the commission's proceeding to loose consumer transmitters into TV spectrum traditionally left fallow to prevent co-channel interference—roughly 6

MHz swaths between licensed broadcast channels, aka "white spaces."

The long-awaited mystery gizmo should be able to sniff out TV signals, then shut down or jump to a vacant channel if any are detected. Dave Donovan, head of the Association for Maximum Service Television, is itching to get a look-see.

"Is it representative of what's going into the market? Is this a

real device," he said, "or an experimental thing for the purposes of testing?"

Donovan is particularly solicitous about what goes into the TV bands because of the potential for interference. He's also aware that the technical complexities of the DTV transition are often lost in law-making.

His lobby spent significant energy ensuring stations had a final DTV channel designation

before Congress pulled the plug on analog television. With those issues settled, political pressure shifted to opening broadcast spectrum for personal devices, which may not have to be licensed by the FCC.

Two U.S. senators have introduced bills to open the spectrum before Feb. 17, 2009, when analog transmitters are shut down and TV signals become exclusively digital.

RACE, PAGE 19

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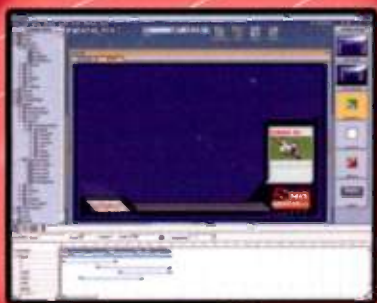
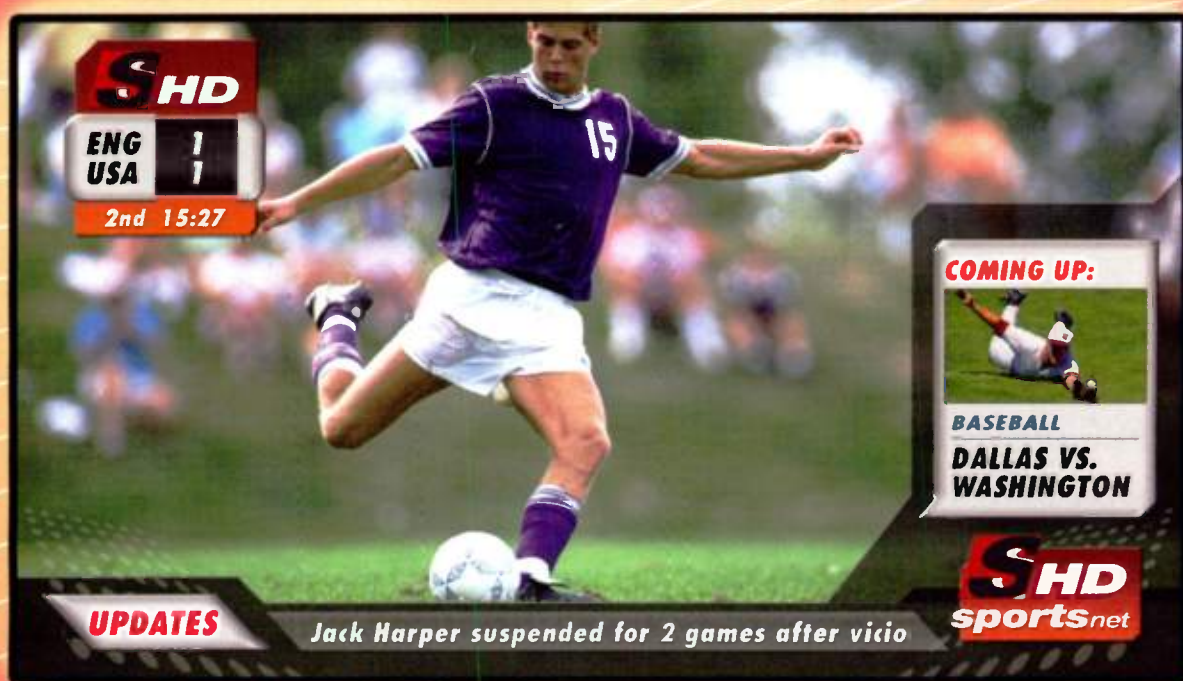
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On the cover: Elizabeth Futral as Princess Yueyang, Wu Hsing-Kuo as the Yin-Yang Master and Placido Domingo as Qin Shi Huang in Tan Dun's "The First Emperor," which was shown in 111 HD-equipped theaters on Jan. 13. Photo by Ken Howard, Metropolitan Opera

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CBS preserves its past



CONTRIBUTING WRITERS

Wes Simpson

Video Networking



Errors happen. That's a fact for any kind of network, whether optical, electrical or wireless. To deal with the errors, it's important to understand what causes them, and how IP networks react to them. This column is the first in a two-part series. Here, we'll... p. 24

Andy Ciddor

Let There Be Lighting



I know that politics and television are in no way connected. I certainly wouldn't be foolish enough to suggest that the determinations of the FCC are related to any political machinations. However, there may just possibly have been some occasional pieces of legislation... p. 28

Randy Hoffner

Technology Corner



Now that I have your attention, I don't really think that broadcast television is becoming less relevant. Recent developments do, I think, call for a closer look at how HDTV is, or is not, being used by broadcasters in the digital television broadcasting age. Nor are... p. 37



FROM THE EDITOR

The White Space Debate

Broadcasters could face an uphill battle in the ongoing debate over the use of unlicensed devices in the so-called "white spaces" of the broadcast spectrum. In fact, the debate strikes at the very heart of what makes broadcasting so relevant. Despite the oft-mentioned canard that only 15 percent of the U.S. population gets its television only via over-the-air signals, broadcasting is still a very relevant and influential force in the United States and worldwide.

Some, however, want to get their hands on the unused spectrum of the broadcast band to operate devices that won't be subject to FCC licensing. In the debate over this subject, the broadcast community has been well represented by the Association for Maximum Service Television and others. Charlie Rhodes, a longtime columnist for **TV Technology** and a well-respected figure in the broadcast industry, has provided detailed reports on his investigations into the consequences of using such devices in the broadcast spectrum.

But there's another ally that is weighing in on the controversy, and could greatly influence the outcome of the

debate—the manufacturers of wireless audio equipment. As Robin Berger reports on p. 12 in this issue, these companies, led by Shure and several end users including the Grand Ole Opry, are hitting the Capitol Hill lobbying circuit to warn lawmakers that offering up such spectrum for unlicensed devices could interfere with wireless microphone transmissions, which use the same band. While technology such as "spectrum sensing" is being developed to deal with such interference, some say a solution is still several years away.

Use of wireless audio technology is common, particularly in big events such as awards shows and sporting venues such as the Super Bowl. And when it comes to spotless communications in events like these, producers don't want to leave anything to chance.

The FCC is about to begin testing a prototype device that could be used in this portion of the spectrum. As **TV Technology** Managing Editor Deborah D. McAdams reports in her article on p. 1, the device "should be able to sniff out TV signals, then shut down or jump to a vacant channel if any [broadcast signals] are detected," according to its backers. It's hard not to be skeptical

of such claims, so we'll wait and see. And despite the fact that only one filing has been submitted to the FCC, the companies behind the filing—Intel, Microsoft, Dell, HP, Philips and Google—are CE/Internet powerhouses.

Whatever the outcome, the FCC and lawmakers have a responsibility to maintain the integrity of broadcasters' signals and protect the signals from undue interference.

We'll be watching.

* * *

We like to recognize when a member of the **TV Technology** family gains added stature in the broadcast technology community, so we pass along a hardy congratulations to Bill Hayes, director of engineering for Iowa Public Television and writer of the monthly "Digital Journal." Bill was recently appointed president of the IEEE Broadcast Technology Society. Well done, Bill!

Tom Butts
Editor
tbutts@imaspub.com

LETTERS

Send to Editor, **TV Technology** at e-mail tvtech@imaspub.com

Another View on HDTV

Dear Editor:

Frank Beacham's recent article on HDTV ("How HDTV is Being Botched," *The Big Picture*, Jan. 24), held lot of truth, but I could not agree with everything he said.

I do not believe that most people resort to watching movies on their new HD sets—I believe you will find that a great deal of HD purchases have been driven by sports fans, eager to see football, golf, basketball—even hockey in HD (hockey is a sport that cries out for HD—at last you can follow the puck). Football especially has been a huge driver for HD converts. Quite frankly, once you've watched football in HD, it's very hard to watch it any other way.

As for installations being beyond the scope of the average viewer—perhaps this is true. But so is installing the average dishwasher, or water heater—and those devices only need connections to water, power and a drain—simple, right?

My point is, some people will muddle through the directions and get it up and running, some will call the cable guy and have him (or her) install the new digital box with the HD feeds and not feel overwhelmed in the least, and yes, some people will go it alone and flounder. Installations can be simple—you just have to figure out what you want to do—cable can be as simple as one connection and insertion of a cable card in your new set (as long as the set is so equipped).

Or, the author's experience with off-air reception notwithstanding, securing HD programming can be as simple as connecting an over-the-air antenna to the new HD set. In virtually all markets now, broadcasters have spent hundreds of millions, if not billions of dollars to add digital broadcasting facilities to their markets. Most new HD sets being purchased have tuners in them which means those over-the-air broadcasts are readily available to the set owners with a decent antenna. I'm sorry, using a computer plug-in tuner and the equivalent of rabbit ears to test over-the-air signals in New York City is bound to result in problems—as experienced by Mr. Beacham. I have cable in my market, and I also pull all my local affiliates' HD signal over the air. HD over-the-air broadcasts are really good looking—unlike some of the cable signals I've seen where the HD signal has been converted and degraded.

I do agree that there has been a great deal of misinformation put out regarding HD; statements that "the only way to get HD is through cable or satellite," for instance. I've heard that from consumer electronic store clerks and read it in national publications.

HD hookups may seem more complicated than they have to be because makers of sets have sought to include a wide variety of inputs and outputs for sound and picture... you don't have to use them all, just the ones that will make your HD work.

Guy Serumgard
Pekin, Ill.

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TV Technology (ISSN: 0887-1701) is published semi-monthly with additional issues in April and May by IMAS Publishing (USA) Inc. 5627 Columbia Pike, Third Floor, Falls Church VA 22041. Phone: 703-998-7600. FAX: 703-998-2966. The international edition is published monthly along with the month's second domestic edition. Periodicals postage paid at Falls Church VA 22046 and additional mailing offices. POSTMASTER: Send address changes to TV Technology, P.O. Box 1214, Falls Church VA 22041. Copyright 2007 by IMAS Publishing (USA) Inc. All rights reserved. For reprints contact the author and TV Technology.

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10:06 a.m.

Legal department clears
content of interviews



10:06 a.m.

Assistant annotates on-camera
interviews as they are captured



10:06 a.m.

Editor cuts rough sequence with
placeholders for interviews



10:06 a.m.

Designer previews graphics over
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10:06 a.m.

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World Radio History

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Is SDV Ready for Primetime?

Cable operators slowly adopt switched digital video technology

by Claudia Kienzle

HAMILTON, N.J.

Delivering video, voice, and data services is vital to cable's competitive edge and future growth. For this reason, many major cable operators want to expand their offerings to include hundreds of network choices, including HDTV channels, as well as high-speed Internet, video-on-demand and voice over IP services.

But cable operators face the reality that they do not have ample bandwidth to deliver all these exciting, new digital services, and continually expand their program offerings, over their existing HFC (hybrid-fiber coax) plants.

The reason is that the stretch of coax cable from the local headend to the subscribers' homes—the so-called “last mile”—is limited to just 750 MHz of bandwidth, which is divided up into 6 MHz channels.

To make matters worse, roughly half of those 6 MHz channels are spoken for because cable companies must honor their longstanding commitment to provide dozens of analog channels to millions of basic cable subscribers. So, cable operators have no choice but to deliver all their digital cable services in that remainder of that pipe; and even with digital video compression, they could possibly max out their network's bandwidth.

A NEW KIND OF VOD

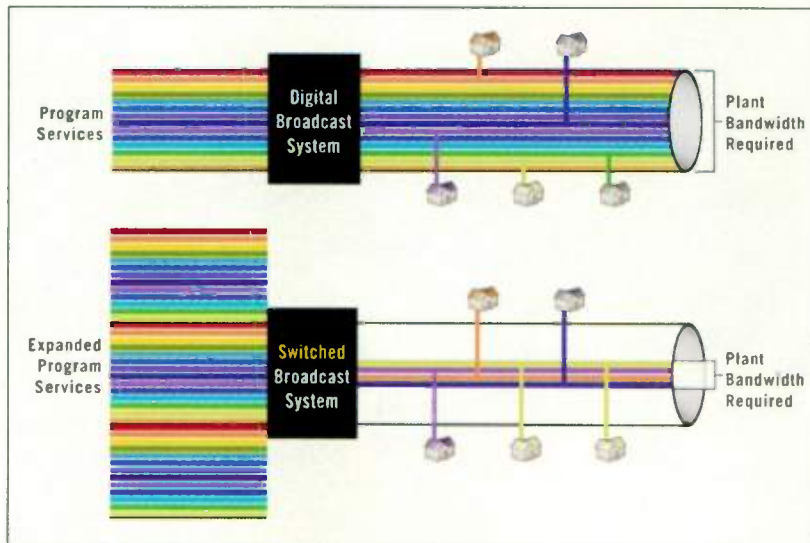
SDV (switched digital video) promises to alleviate this bandwidth-challenged HFC infrastructure by using an innovative approach.

“What's brilliant about SDV is that, in the bandwidth that remains after sending all the basic analog channels, the cable operator can offer up to 1,000

[or more] digital channels without actually having to send them all down the pipe at one time,” said Gerry Kaufhold, principal analyst for In-Stat, in Scottsdale, Ariz., who has published several reports about SDV.

thing else.

“Through intelligent, dynamic bandwidth management, SDV spares cable operators from having to rush into the huge capital expense of replacing all their coax cable with fiber to the home;



This simplified diagram shows the expanded capabilities that switched digital video technology offers for cable and telco operators.

“With SDV, they can dynamically switch channels into those areas in which subscribers are actively requesting them so that only those programs being watched consume bandwidth,” Kaufhold said. “That frees up bandwidth that can be allocated to high-speed data and telephone services.”

Simply stated, if a channel has been selected by one viewer, and another viewer selects the same thing, the newcomer simply joins that existing stream, rather than having a second stream created which further consumes bandwidth. And the moment the last viewer in a service group or node has clicked away from a particular channel, it is no longer sent to that node, and the bandwidth is now free to be used for some-

or putting digital set-top boxes in all their basic cable homes,” Kaufhold said. “Many cable operators have begun testing, buying, and deploying SDV because it allows them to expand their offerings over the existing plant cost-effectively, without compromising the viewer experience.”

Of all the technology providers entering the SDV market, BigBand Networks is in the lead in terms of deploying its offering. Since 1999, when it delivered its first-generation product, the Redwood City, Calif.-based developer of technology for broadband media services has upgraded its SDV technology to its current fourth generation product, which it launched at SCTE Cable-Tec in June 2006.

BigBand Networks' end-to-end platform includes the BMR, Broadband Multimedia Service Router that conditions channels for switching; the BME Broadband Multimedia Service Edge server for receiving and processing programming on the network edge; server software for the set-top box; and a small piece of software in the set-top itself that can recognize a switched channel and interact with the head-end system.

“Our fourth-generation product, which supports HDTV and open standards protocols, is the one currently being deployed at several cable systems operated by two major MSOs. We're also in trials at other cable systems,” said Biren Sood, vice president of marketing for BigBand Networks.

The only company Sood identified as using its SDV technology is Cablevision, the main cable provider to the New York City metropolitan area and the nation's fifth largest cable operator.

“Cablevision is using our fourth generation product to provide its new international programming channel package,” Sood said (see “Cablevision Uses SDV to Deliver International Channels”). “Our adoption of open standards protocols is a key differentiator of our product line.”

BUSINESS CASE FOR SDV

BigBand Networks is not revealing many details about its marketing efforts because the company filed with the Securities and Exchange Commission Jan. 26, 2007 to do an initial public offering.

According to the 176-page filing, BigBand Networks discloses that they have “sold their products to six of the 10 largest service providers in the United States, including Cablevision, Comcast, Cox, Time Warner Cable, Charter and Verizon.”

Regarding the return on investment for service providers, the filing said, “Because our product applications are deployed at the network level, service providers can leverage their infrastructure investment across many subscribers and avoid the hardware and service costs associated with an upgrade of equipment in the homes of subscribers.”

According to Sood, “If you look at the economics of replacing coax with fiber in that last mile to the home, or giving all subscribers digital set top boxes and digital service, it becomes obvious that SDV is a very economically viable way to optimize that spectrum.”

BigBand Networks cites Kagan Research data that 50 percent of U.S. homes are still receiving analog cable

Cablevision Uses SDV to Deliver International Channels

BETHPAGE, N.Y.

In January 2007, Cablevision announced the launch of iO International, a new package of international in-language television channels, expanding its iO digital cable service in the greater New York area. This new international channel package, which is being delivered using SDV (switched digital video), represents the largest use of SDV ever in a single cable system, according to Cablevision.

Using SDV technology from BigBand Networks, Cablevision is delivering a mix of television chan-

nels from around the world, presented in nine languages, including Spanish, Russian, Italian, Chinese, Korean, and Japanese.

“With BigBand's SDV, we can significantly increase the number of channels we can provide to customers over our existing HFC cable network,” said Patricia Gottesman, executive vice president of product. “We see [SDV] as an important tool in our efforts to deliver new choices for our diverse and growing customer base.”

Another major cable MSO using SDV is Comcast, in Philadelphia. While the company would not dis-

close details about its plans, a company spokesperson issued this statement to **TV Technology**: “Comcast's rebuilt fiber network has capacity that will last well into the future. SDV is one of the ways that we can manage bandwidth and expand capacity to meet all of our customers' needs, including more HD channels. We are conducting switched digital broadcast trials in the first half of this year and expect to roll out our switched digital [capability] more broadly in the second half of the year.”

—Claudia Kienzle

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THE NEW WAY OF BUSINESS™

'Diamonds in the Rough'

CBS collects, preserves television's past

PART I

by James E. O'Neal

NEW YORK

Interest in capturing and preserving television images began not long after researchers first demonstrated workable television systems in the 1920s.

Low resolution recordings were made on 78 rpm phonograph disks as early as 1927. As technology moved television away from a mechanical platform in the 1930s, image quality went up and attempts were met with varying degrees of success to capture these very ephemeral and fleeting images on film. Videotape arrived 20 years later.

To the delight of researchers and archivists, some of these earliest recordings still exist. However, this is not always the case, even for much more contemporary television recordings. Most of us remember last year's revelation that NASA had misplaced many hours of video recordings made during the first manned lunar landing in 1969.

Scattered around the country are literally billions of feet of newsfilm, kinescope recordings and early videotapes. Some of these have been very carefully cataloged and stored, while others are

simply stacked in back rooms or pushed under piles of junk. Some find their way to yard sales and eBay.

To the relief of many historians (and also content syndicators), some serious efforts are being made to collect, catalog, salvage, restore and preserve television recordings.

CBS NEWS FOOTAGE

Most content collections pale next to that of a major network that's been around practically since the dawn of television. The News Division of CBS Broadcasting Inc. has been generating content on a daily basis for almost 60 years.

News archiving operations are conducted in a climate-controlled 60,000-square-foot operation dedicated solely to the storage and preservation of CBS news footage. It's located opposite the main network building on 57th Street in Manhattan.

According to Roy Carubia, news archives manager, CBS embarked on a regular archiving program in 1954. From that year onward, all news-related material has been preserved.

"We have some 350,000 hours of film here," Carubia said. "We've also got something in excess of two million video cassettes."

Carubia estimates that about 250 hours of material is screened every

seven days, and that a total of 3,500 tapes are ordered and returned each week by various CBS News units.

"We have 29 fulltime employees working here on a 24/7 basis," Carubia said. "Videotape and film are preserved by copying to a D2 master, with a Betacam SP circulation copy for the news units."

Most of the group's work is directed to network requests for historical footage, but some of it is repurposed in other ways.

"We did a deal with the BBC six years ago," Carubia said. "They are the global sales agents for CBS archival material. They license the footage and have put us on a global front."

News footage acquisition is an evolving process and this has not made the lives of Carubia and others who must deal with the "format of the month" club especially easy.

"We have to have equipment to accommodate all formats," Carubia



A small portion of the 350,000 hours of film footage stored in the CBS News archives.

said, who noted the problems inherent in servicing older equipment. "And tape usually outlasts equipment," he said.

The network provides maintenance technicians especially skilled in quadraplex video to keep the operation's 2-inch tape machines in tiptop shape.

"There are very few instances when we can't get something to play," said Carubia.

The operation has two Ampex AVR-1 quads in daily use and an additional machine is retained as a spare. There are also a couple of Ampex VR-2000s. Six one-inch machines are kept in

DIAMONDS, PAGE 20

SDV

CONTINUED FROM PAGE 6

programming, and that of the average three set-top boxes in the home, only 1.5 are digital.

"So it becomes a challenge for an operator to recoup the analog channels... because as you remove analog channels, you reduce the competitiveness of your offering," Sood said.

END-TO-END SOLUTION

Motorola also has an SDV solution ready to deploy sometime in 2007, but it is right now still in a trial phase with no current plans to announce specific customer deployments.

According to Bruce Bradley, director of product marketing for Motorola in Horsham, Pa., the company's first step is to re-architect the cable network for SDV, but the "last switch to throw" will be to download a new version of the electronic program guide software to the cable system's installed base of set-top boxes, which will enable them to support SDV.

"This new software enables the set-

top box to report channel requests upstream to the headend so that the channel lineup can be dynamically reconfigured," Bradley said. "Channels are switched onto the network and sent to the home in just a fraction of a second, but that requires a lot of complicated communications behind the scenes."

The Motorola end-to-end solution is comprised of the Motorola Digital Headend, an SDV Manager that receives the channel change messages from the set top box; ERM1000 Edge Resource Manager; and the new SVM1000 Switched Video Manager.

"These components work together to ensure that programs are sent to the right node and that bandwidth is dynamically allocated between different services, such as video, high-speed data, VOD, and telephone," Bradley said. "At a certain time of day, a neighborhood that is predominantly businesses might want more bandwidth for high-speed data services; while a residential neighborhood might want family channels or VOD. Any channel request can be 'voted in' by a single viewer in each node."

PAINLESS EXPANSION

When SDV solutions first appeared on the market a decade ago, many were based on proprietary protocols that ensured a reliable end-to-end solution but locked customers into buying products from a single vendor. Since then, companies have been striving to provide open architected solutions based on open standards, said Jeff Taylor, director of product strategy and management for Scientific-Atlanta, a Cisco company in Atlanta.

"In our latest, next-generation SDV solution, the communications protocols have been opened up and published," Taylor said. "So if a customer preferred to use another vendor's component, such as a QAM modulator, within our solution, as long as that vendor has implemented our published protocols and interfaces, their equipment should plug right into our architecture."

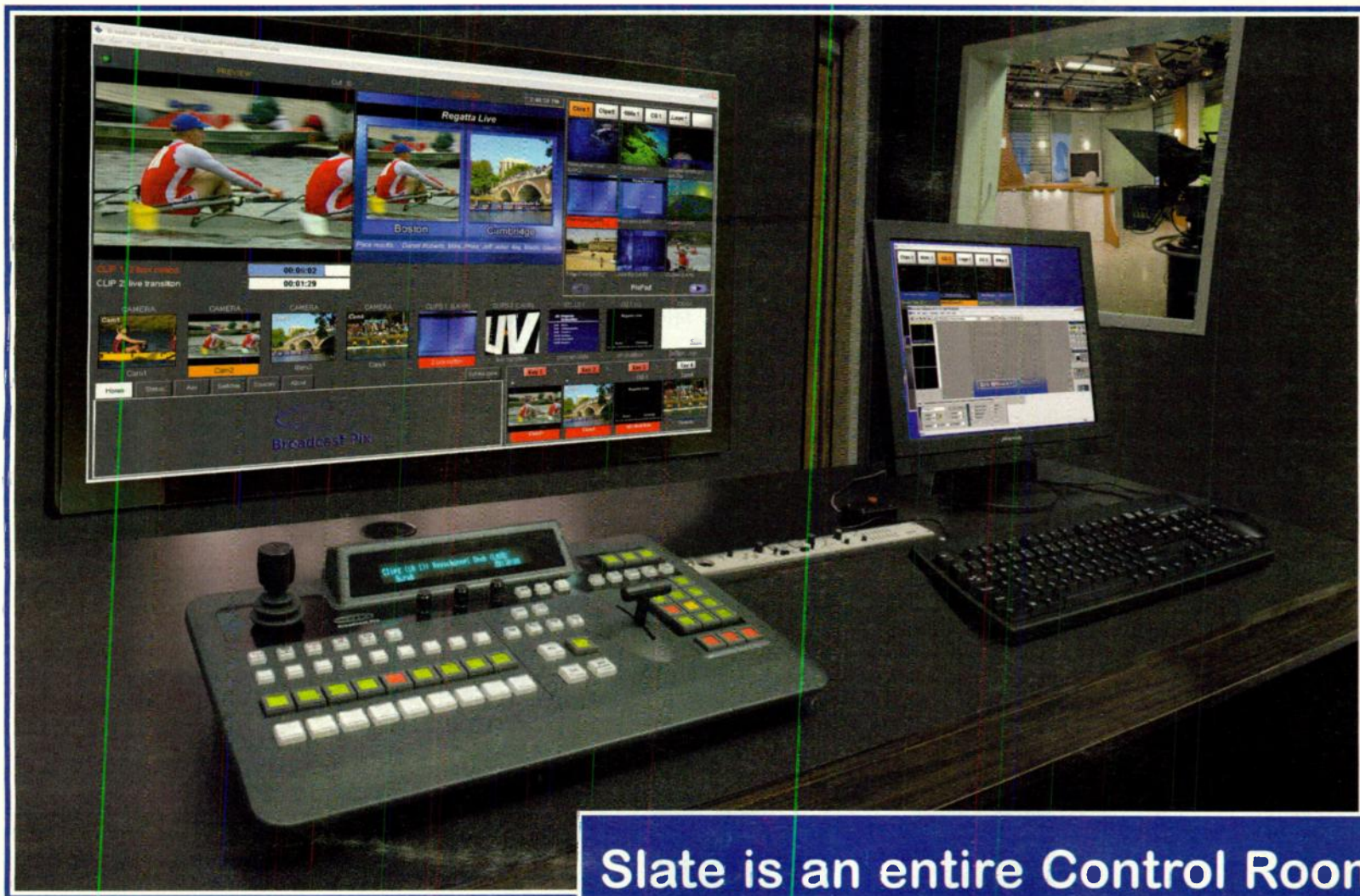
Scientific-Atlanta is currently installing its SDV solution at three of the five major MSOs, but would not disclose which ones. The Scientific-Atlanta solution is designed for use with any of its Explorer Series set-top boxes, including the Explorer 8000

Series with built-in DVR and HDTV capability.

"Over the last five years, the cable industry has spent \$100 billion dollars overall to upgrade their infrastructures to support their new digital cable services," Taylor said. "Now they're at the point where they still need additional bandwidth to expand their offerings again—to offer more HDTV content, ethnic channels, and new service levels for their high-speed data service. And they don't want to go back to Wall Street to seek additional funding, or assume more debt to upgrade again. SDV allows them to use the pipes they've already got, and it costs less compared to doing another expensive plant upgrade."

Lastly, SDV can also be used by telephone companies to deliver their digital video services, and is being used already by Verizon's FiOS. But because of cable's legacy obligation to maintain analog channels for its basic subscribers, vendors said that the cable TV industry has a more pressing need for SDV technology to manage and maximize the limited bandwidth on their HFC networks. ■

The Switcher Redefined



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World Radio History

The Future of TV: Secure, but Different

More platforms, more interactivity, more revenue

by Anna Mae Sokusky

BROOKLYN, N.Y.

The consensus among many of the panelists at the Future TV Show North America here last month is that when it comes to the future of TV and the opportunities derived from digital advancements, the glass is half full.

Keynoter David Poltrack emphasized the positive aspects of the move to digital for traditional broadcast networks, highlighting CBS's digital strategy that focuses on the segment of "fully connected" viewers—that growing number of households with both digital television and broadband connections.

EXPANDED REACH

Poltrack, chief research officer for CBS and president of CBS Vision, a year-old division of the Tiffany network tasked with researching new technologies, chided those who fear the demise of television.

"Every time a new medium comes along in the television marketplace, the feeling is that it's going to knock out the old and that we should be threatened by this new technology," he said. "Instead, as content providers, we see great opportunities from this for ourselves and also for the advertisers that use our medium to communicate to their consumers."

The behavior of this upscale and fully connected audience contradicts the notion that only young people are involved in new media viewing, Poltrack said. Access to the technology is more relevant than age; in fact, the "fully connected" viewers are now the highest consumers of the top ten network television programs.

CROSS-PLATFORM VIEWING

Since CBS made its primetime shows available on the Internet last fall, online viewing has taken off. Poltrack said streaming has increased tenfold on a monthly basis and is continuing to grow. Not surprisingly, CBS's top-rated shows, including "CSI" and "Survivor," as well as ABC's "Desperate Housewives" and "Grey's Anatomy" and Fox's "House" are also the top-rated programs for online viewers.

Poltrack said that downloading primetime programs are also prompting viewers to watch them on the television screen as well.

"After watching programs on the Internet, people are as likely, or more likely, to watch these shows on televi-

sion," he said. "There is no real cannibalization by the Internet of regular programming. In fact, it actually contributes to regular television viewing."

A majority of viewers use the new platforms to catch up on their favorite shows, but Poltrack reported that more than half of the people this year who streamed television programs sampled new programming like "Jericho" and "Heroes" before they saw it on a television network. This momentum helped networks overcome the difficulty of increasing awareness and sampling for new shows and ultimately helped build the TV audience for those shows.



Rick Mandler, vice president of Digital Media Advertising for Disney/ABC Media Networks.

Most panelists supported Poltrak's belief that advertiser-supported models will continue to be the principal revenue drivers in television, broadband, and eventually on mobile. Poltrack believes that the current pay-for-video model for mobile content is a barrier to mobile video growth.

Rick Mandler, vice president of Digital Media Advertising for Disney/ABC Media Networks also sees the expansion of new platforms as a complement, not a competitor, to the more traditional network models for viewing and revenue. In May 2006 ABC was the first network to launch an ad-supported Internet streaming network with a limited number of its primetime programs.

The offerings have been greatly expanded. Cast as a premium environment for the sponsor, each episode is essentially owned by the sponsor and includes billboard sponsorships with three net commercial pods in a one-hour drama.

Mandler said the ad breaks present "a rich experience," and urged adver-

tisers to think in interactive terms.

"If you don't take advantage of [interactivity], you're not maximizing the opportunity," Mandler said. "We're asking advertisers to create something more interesting than the 30-second spot."

HIGH EXPECTATIONS

Mandler credited the adoption of HDTV as a significant driver in flattening the erosion in network television viewing and added that network investments are paying off.

"HD is a real driver of viewing habits and to the extent that broadcast networks have been creating early entrants into HD and creating

"what I want, when I want it, wherever I want it."

The evolution of the medium was summed up by Chris Pizzurro, vice president of Digital, New Media Advertising Sales and Marketing for Turner Entertainment.

"The definition of TV is changing," Pizzurro said. "Let's take an iPod, which was an MP3 device a year ago. When you put video on that device, it becomes a television. So I make the case that TV is actually growing to other devices. It's because of the programming, it's the quality, it's the story line. It's all those things we associate with television programming. 'TV' was never the box—it was the program-

"If you don't take advantage of [interactivity], you're not maximizing the opportunity. We're asking advertisers to create something more interesting than the 30-second spot."

—Rick Mandler, Disney/ABC

large amounts of HD programming, this leads me to believe that's pulling viewers back into the broadcast viewing experience," he said.

Mandler also predicts HD viewers will carry their high expectations for quality to other platforms, creating pressure for comparable viewing experiences on other platforms including broadband, mobile and handheld devices.

THE USER IS KING

Most panelists concurred with Mandler's assertion that consumers now play a bigger role in determining availability of content.

"Last year, I would have said content is king," he said. "But I think we now have a more sophisticated view and we understand that it's more than about creating content; it's about creating a great consumer experience."

Seth Murray, general manager of Search & Discovery for Comcast, crowned the user as the king who is in control of time, place and programming; the one who is looking for

ming that was on the box. So that now that you see TV-level, quality programming going onto broadband or onto an iPod, I'll argue that 'television,'—the definition—is now broadened and actually growing."

Bob Liodice, president of the Association of National Advertisers, acknowledged that, when it comes to future revenue opportunities, many advertisers and agencies are bedazzled and confused by the new platforms and are trying to find what models best suit their needs.

He noted that improved accountability and targeting opportunities of the new platforms are particularly appealing. But perhaps the best news for content providers came with his conclusion that "video, in its totality, whether big or small screen is something that is high on the list of all marketers and advertisers. There is no way in heaven that I could ever foresee that revenue base going down across all particular platforms. I would be absolutely stunned if that were the case." ■

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World Radio History

White Spaces Aren't Quite White

Wireless mic manufacturers respond to RF spectrum initiatives

by Robin Berger

WASHINGTON

Government proposals to award so-called white spaces of broadcast spectrum for unlicensed devices has put wireless mic manufacturers between a rock and a hard place.

Most feel the term "white space" is a misnomer. The auxiliary broadcast activity laid out by the FCC in Part 74 of Title 47 of the Code of Federal Regulations belies any notion that this space is truly "unused."

"Broadcasters, film producers, and professional entertainers have been using 'unused' local TV channels for years for major news, political and sports events," said Joe Ciaudelli, Sennheiser's team leader for Professional Products. "They wouldn't be able to operate reliably if the spectrum was flooded with new devices."

As for the hard place, Shure's vice president of engineering, Jeff Krull, estimated, "We're at least three to five years away" from a technological breakthrough in spectrum sensing that might lead to peaceful coexistence between the new entrants and Part 74 licensees.

Thus, wireless mic manufacturers have developed a three-pronged strategy to face this dilemma: communication, investigation of proposals to the FCC, and innovation.

COMMUNICATION

In January, representatives from Shure, the Professional Audio Manufacturers Alliance, the Grand Ole Opry and various end users met with influential Congressional politicians and FCC commissioners. They expressed concerns about proposed legislation from Sens. John Kerry (D-Mass.) and John Sununu (R.-N.H.), which would allow fixed and portable devices into the white spaces before the DTV transition ends in February 2009.

Portable applications compound problems because these devices are even harder to track than fixed ones. The group vowed to follow January's meeting with one in March or April, Krull said.

The industry will also continue its comments to the FCC, letter writing campaigns to Congress, and education initiatives to end users. Initial comments to the FCC from Audio Technica in 2004 included suggestions to "set strict and very low-power limits for unlicensed devices" and designate "a frequency coordina-

tor or clearinghouse."

Shure's most recent comments, filed Jan. 31, urged the FCC "not to schedule the introduction of personal/portable devices into the TV band at this time."

Moreover, the group felt the FCC's spectrum set-aside proposals understate its needs.



Could the use of unlicensed devices in so-called broadcast "white spaces" interfere with audio at high profile events like Prince's performance at the Super Bowl? Without new technologies to protect the spectrum, opponents to such a proposal say yes.

"When you get to something like the Republican or Democratic National Convention, you wind up covering almost 30 channels of the spectrum," Krull said. In its 2004 comments, Audio-Technica estimated that the number of channels used by the Super Bowl, Grammys or Olympics "often exceeds 40."

A 'BUBBLE' OF PROTECTION

Krull believed the optimal solution would focus on spectrum sensing—the ability for wireless systems to detect and avoid other signals—faster processing, and better audio compression.

Following the FCC's May 2004 proposal that opened the door to unlicensed devices, Shure began advocating a "beacon" system that would be operated by a large event wireless microphone user. As explained in a November 2005 abstract to the IEEE, this approach would create a "bubble of protection" for the wireless mics as long as the mic operator bought and deployed the beam and unlicensed devices detected the beam and responded appropriately.

"A local beacon transmitter operating in an unoccupied TV channel

could broadcast information to unlicensed devices operating nearby," the abstract stated. "The unlicensed devices would need to scan for the beacon and avoid operating on TV channels marked as being in use by wireless microphones."

The IEEE's 802.22 working group is investigating ways to enhance

smart beacon detection and identification.

In the meantime, the new entrants advocated smart radio technologies, such as "listen before talk," a method that minimizes collisions caused by simultaneous transmission by multiple radios.

"We're constantly looking into the smart wireless technologies—claims are out there, but the technology isn't," Krull said.

In its January comments, Shure dismissed LBT as too elementary to be efficient, indicating that the devices must be networked and relegated to more stringent parameters.

protect against interference unless the unlicensed device "has access to an accurate database."

Until all TV stations, translators and low-power licensees have all moved to their final DTV channel designation, the applicable FCC database will be in flux.

INNOVATION

"It really falls on the microphone companies to develop something more effective long term," Krull said. His counterparts agree.

Audio Technica has "systems under tests right now" that would work in other spectra, said Bob Green, director of the company's Global Wireless Product Strategy.

According to Sennheiser's Ciaudelli, "Some of the innovation that you're going to find in our product will be better filtering—finding a clean slice of the spectrum to operate in."

And Ciaudelli said spread spectrum transmission looks promising, if latency can be reduced.

Cognitive Radio—a software-defined variation—has also attracted attention.

"Rather than have a bunch of discrete, electronic hardware components to form your radio link, you can have software running on some type of processor that does it," Krull said. But he estimated that the technology is about five to 10 years from

"We don't know the full extent of the FCC's testing regimen."

—Jeff Krull, Shure

Dell, Intel and Microsoft have pledged to develop prototypes of spectrum-sensing systems to be tested alongside set-top box receivers and wireless microphones. Although Shure proposed a test plan and is providing microphones, Krull said, "We don't know the full extent of the FCC's testing regimen."

He said full details of the test may not be known until the final set of rules emerges in October.

Other suggestions were also seen as problematic. In Shure's January comments with the FCC, the company dismissed the use of control signals transmitted by a broadcast station as "impractical." And geolocation (mapped frequencies in a specific location), it stated, doesn't

being a reality.

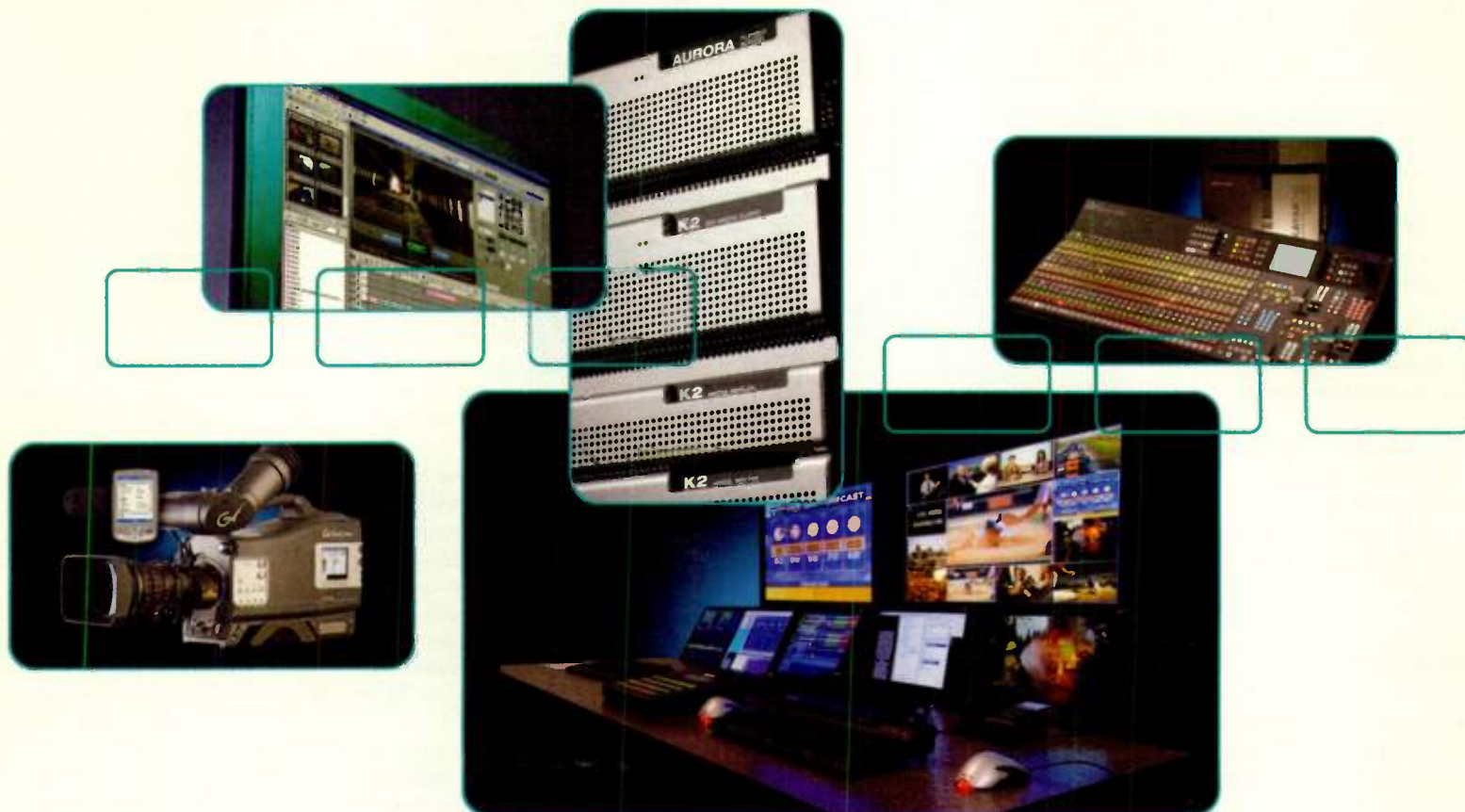
Product design is a tall engineering order, said Bruce Jones, vice president of marketing for Lectrosonics, a Rio Rancho, N.M.-based developer of professional wireless microphone systems. Such designs would have to encompass "antenna efficiencies, battery power and the ability to navigate around in, verify, utilize and adapt to spectrums as they change," he said.

Given time, said Ciaudelli, this could all be sorted out.

"Washington is hearing these concerns, so there's not going to be a radical change soon—it will probably be an evolution rather than a radical change," he said. "That will give us more time to refine some of these innovations." ■

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Wow 'em With Weather

Stations to see influx of new HD weather tools

by Susan Ashworth

SAN FRANCISCO

Out the window, a heavy rain is bouncing off the concrete, making small pools on the walkway and causing you to worry about whether your new leather loafers will make it safely out to the car.

And that's just what you may be seeing on a television screen in the near future—though the picture won't always be of what's happening now, it'll be a graphic representation of what to expect tomorrow afternoon, complete with tiny, ricocheting droplets of rain that look as real as the deluge outside.

That's one possible future for weather graphics technology, a high stakes medium designed to lure viewers into the morning and afternoon weather programs that have become the eye-catching staple of local television news.

MORE WEATHER

For years manufacturers have trumpeted the fact that local weather is the No. 1 rated segment for viewers. That's often why they turn local news on; it's often why they sit through the entire newscast.

That scenario isn't likely to change. "The No. 1 content is weather," said Linda Maynard, vice president of marketing for WSI in Andover, Mass. But what really has manufacturers and stations excited, she said, is the "wow" factor that HD weather is continuing to elicit from focus groups.

"The graphics are beautiful in SD, but when you watch them in HD, it's stunning," she said. "If I could see this in HD," Maynard quoted from a recent focus group, "then I would actually watch more weather."

The industry is banking on that, and is rolling out options to take advantage of that hopeful promise, such as WSI's TrueView HD and Titan HD weather systems. TrueView is up and running in markets such as Las Vegas, Philadelphia and Orlando, and debuted on NBC's Today Show in January. Titan HD is set to premiere at NAB2007 next month.

TrueView HD has found success, Maynard said, from features like high-resolution satellite mapping and 3D versions of warnings for possible extreme weather. The platform delivers both 1080i and 720p resolutions, and is able to deal with what most stations are focusing on now: how to address both an HD and SD audience.

With two-thirds of Americans still unaware of the pending analog cut off, this could be a golden opportunity for broadcasters.

"If you know that your No. 1 content is weather, you've got a wonderful new opportunity to cultivate a whole new audience, frankly," Maynard said.

HD affords stations a brand new way to present material, and Maynard



Accuweather will introduce a 3D hi-def weather graphics system at NAB2007.

thinks more stations ought to be taking advantage of that. Take for example the system's ability to create step-through predictions, which allows the presenter to stop an animation hour by hour through the forecast and reference important details. TrueView HD also creates 3D visualizations of a local metro area, complete with animating textures and terrain overlay.

A REALISTIC VIEW

Giving viewers a realistic view of what's about to happen outside was also a key goal of AccuWeather, which plans to introduce a new HD weather graphics system at NAB 2007. With a code name of TNT, short for "The Next Thing," this as-yet-unnamed technology is designed to operate in native HD and SD, and offer full 3D graphics animation with cinema-quality graphics, said Lee Rainey, vice president of marketing for AccuWeather in State College, Pa.

"This is a very comprehensive weather data system that is different ergonomically," he said.

At the newly designed console, a meteorologist will see three, separate flat screens with different data. The new design was created to help meteorologists build a more comprehensive weather picture when putting together their local weather programs "based on how meteorologists actually develop weather presentations," Rainey said. The left screen provides historical data and computer models, the center screen offers a tool kit designed for the creation of graphics, and the right screen allows the meteorologist to see in real time what the graphics output will look like.

"This gives them a powerful meteorological tool designed to allow someone to make the best forecast possible," Rainey said. The system is designed to

allow local meteorologists to juggle two main priorities: "[Meteorologists] are in the entertainment business, so graphics have to be eye catching. But they are primarily scientists who take their job very seriously when it comes to effectively warning the community."

This system, he said, is designed to allow local forecasters to simultaneously act the role of scientist, educator and showman.

The HD aspect of the system, he said, only intensifies its effectiveness.

"You can create a sheen of rain falling on the street, you can create raindrops glistening," he said. Individual microclimate scenarios can be created for different sections of an urban area, he said.

"The goal is to be able to show the viewer what the weather will look like—exactly—on the street tomorrow," he said.

The system is set to ship in the third quarter of 2007.

RENDERLESS

Tracking the trajectory of storms in HD is another key goal of local meteorologists, and Baron Services is addressing this need with its VIPIR HD system, one of three high-definition weather systems from the Huntsville, Ala.-based company.

A live 1080i storm tracking system, VIPIR HD is a renderless system that offers timely updates by allowing meteorologists to change their shows on the fly. A feature within VIPIR—known as "MicroTrac"—automatically zooms into a severe storm cell and graphically follows the track each storm will take, highlighting local communities and landmarks in harm's way.

"MicroTrac works very effectively on community-relevant detail alone, but it delivers even stronger impact when coupled with Baron's 1 meter aerial mapping," said Bob Baron, president and CEO of Baron Services. The system operates in native HD resolution, and does not require upconversion, ensuring the image is as detailed and crisp as it was when it originated in VIPIR, he said.

Known colloquially as a weather center in a box, the VIPIR HD integrates forecast data, live weather graphics, sensor data and radar display with

storm tracking into one presentation. A dual-head display allows one monitor for a workspace and one monitor for VIPIR mapping and display.

The company's other HD weather solutions include FasTrac HD and StormWarn HD.

"Both VIPIR HD and FasTrac HD eschew traditional rendering in favor of a real-time architecture," Baron said. "That means viewers get a live look at what is happening in a specific location with a crisp quality that will take them to the center of the storm."

QUICK REACTIONS

Being able to interact quickly and in real time with quickly changing weather data was a key goal of Weather Central, whose LIVE family of weather products include several HD options, including 3D:LIVE, for everyday weather and forecasting graphics; ESP:LIVE, a severe and stormy weather coverage system; and 3D:Traffic, a combination traffic and weather system.

The systems are designed to operate at user-selected resolutions in an effort to ease the ongoing migration to HD. The systems are also designed to ensure smart branding when it comes to creating a specific look for a station.

"Our systems freely accept common graphic file formats so HD elements can be instantly displayed on our systems," said Steve Smedberg, director of marketing for Weather Central in Madison, Wis. "Not only does this improve workflow but it assures consistency of the look, feel, and branding of all the station or network's graphics."

Features include user-selectable 1080i or 720p output, the ability to mix and match SD and HD video inputs, real-time graphics creation and a technology known as MagicTRAK that allows the presenter to click and browse to camera sources on-the-fly.

"We enable television meteorologists to spend more time on the forecast and less time creating graphics," Smedberg said.

All the systems are optimized for HD and yet offer features found within SD models.

"A key difference Weather Central offers is the ability for talent to interact, on camera, with the weather graphics and data," Smedberg said. "Not only is this interactivity fully available in HD, but also it is enhanced. Due to the higher resolution of the images, you can actually present more detailed, hyper-local storytelling and forecasting than possible in SD."

The solutions are being used by ABC's "Good Morning America," WLS-TV in Chicago, KHOU-TV in Houston and WFAA-TV in Dallas. ■

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Opera

CONTINUED FROM PAGE 1

worldwide head of Sony Classical Records. Under his guidance at Sony, Yo-Yo Ma recorded country music and classical singer Charlotte Church entered pop music.

These ventures were a prelude to where Gelb has now taken the Met.

SATURDAY AT THE MET

From December 2006 through April 2007, "Metropolitan Opera: Live in HD" is broadcasting performances in real time on six Saturday afternoons to select theaters worldwide (including one theater in Tromsø, Norway, just south of the Arctic Circle). All of the theaters are equipped with satellite-based digital high-definition projection systems.

The primary U.S. distributor is National CineMedia network, a joint venture of AMC, Cinemark and Regal Entertainment Group (Regal Cinemas, United Artists and Edwards). Encores are shown at all of the theaters, which are edited for broadcast over-the-air on local PBS stations.

The number of participating the-

aters has increased incrementally: 56 theaters on Dec. 30 presented a live performance of "The Magic Flute" by Wolfgang Amadeus Mozart; 87 the-

The number of theaters increased for the Feb. 24 presentation of "Eugene Onegin" by Peter Ilyich Tchaikovsky. The program will con-

time in many years that opera is back on PBS, which airs productions within a 30- to 75-day window after the live broadcasts in theaters, even if there's an overlap between a theater encore performance and the PBS airing," she said. "The local PBS stations are taking an active role in promoting the theater events."

Other promotional partners include the local classical music radio stations that have carried Saturday radio broadcasts from the Met since 1931. A more recent partner is Sirius Satellite Radio, which last year began broadcasting four live performances per week as part of the Met Opera Channel (Channel 85). The Met also streams productions on RealNetworks.

Borchard-Young conceded that watching a wide movie screen is not as compelling as seeing an opera live on stage, "but in some ways, watching in a movie theater is better because the camera lets you get up close and personal with the artists in stage, much closer than the orchestra seats allow."



Peter Mattei performs as Figaro in "The Barber of Seville," one of the Met Opera productions being shown in HD-equipped digital theaters worldwide.

aters on Jan. 6 presented "I Puritani" by Vincenzo Bellini; 111 theaters on Jan. 13 showed "The First Emperor" by Tan Dun.

clude with the presentation of "Il Barbiere di Siviglia (The Barber of Seville)" by Gioachino Rossini on March 24, and the April 28 presentation of "Il Trittico" by Giacomo Puccini.

Tickets for the live HD performances in the U.S. are \$18 for adults and \$15 for children. Tickets at the Met itself range from \$15 for standing room only to often more than \$300 for orchestra seating.

"The Magic Flute" sold 91 percent of the available seats and its January encore sold 67 percent of capacity, according to Borchard-Young. "I Puritani" sold 68 percent of its seats, which totaled 16,000 seats in one day. "The First Emperor" sold 64 percent of capacity, but with 111 theaters, the total was the highest at 25,000 seats. "Our house capacity at the Met is only 4,000 seats," she noted, "so that's like selling out six productions at once."

A HISTORY OF HD

The Metropolitan Opera telecast its first live performance in HDTV to Japan in 1990, said Borchard-Young, and in 2001 the Met did its first "PlazaCast" in the outdoor plaza of Lincoln Center as a benefit for 9/11 families. A second PlazaCast took place in 2002, and Gelb produced a third live HD PlazaCast for opening day in 2006 with a 32-foot screen at Lincoln Center plus displays on the giant screens in Times Square.

Given Gelb's background, Borchard-Young said, "he was enthusiastic about the idea of doing live HD broadcasts to local movie theaters."

PBS stepped up as the series coproducer, she said. "This is the first

SIGNAL PROCESSING HURDLES

Behind the scenes stands Mark Schubert, the engineer in charge of the media department at the Metropolitan Opera. For the "Live in HD" series, his main facility provider is All Mobile Video, a New York City-based mobile production company, which is providing its Titan production truck and B unit tender along with an uplink operator.

"The hardest part of the production is providing a signal in the various forms that people need it," Schubert said. "We have to output live HD video with and without English subtitles at both 29.97 frames per second for most theaters and at 25 frames per second for the receivers in theaters with digital projection gear using the European rate. Some theaters are receiving the live transmission by satellite, and some by fiber, which affects what we put out. We also have 28 different video recordings of differing specifications for the encore theater presentations, PBS, and the home video market."

Audio output with stereo and 5.1-channel surround sound is equally complex.

"Movie theaters with surround sound have different requirements from PBS stations," Schubert said. "Audio that works great in a living room can lose its intelligibility in a large movie theater, with surround sound speakers all around the audience. This is why the PBS stations need a different audio feed from the movie theaters. The broadcast radio stations also require their own spe-

OPERA, PAGE 22

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Race

CONTINUED FROM PAGE 1

Either bill would override the current FCC effort to establish technical specifications for the devices, whatever they are.

CLAP ON...

Until just a few weeks ago, only vague descriptions were floated: The devices would be low powered—no more than 100 mW. They would facilitate wireless broadband—the *raison d'être* for opening the spectrum—or they might just move files around *ye olde* McMansion.

Little else was known, which vexed Donovan, who wanted something for lab tests. Would these things really extend broadband to underserved areas, or would they be glorified Clappers that turned off the lights through the wall? He remains skeptical.

"The great fallacy in this debate is that this is for rural broadband," he said. "It's for personal portable devices and in-home wireless networking. Those are the things that are going to cause most of the problems."

Not so, said Scott Harris, managing partner of Harris, Wiltshire and Grannis, the Washington law firm representing the prototype's creators—Microsoft, Intel, Dell, Hewlett-Packard, Philips and Google—in the FCC proceeding.

"We believe broadcasters need to be protected," Harris said, "and we believe we can do it. It's up to us to prove to the commission that we can protect broadcasters."

The coalition proposes using spectrum-sensing technology to steer clear of broadcast signals. Harris noted that such technology is already used to protect military radar in the 5 GHz band; military radar being far more stealthy than TV signals.

However, the Institute of Electrical and Electronics Engineers in its FCC filing noted that protecting radar is actually easier than protecting TV signals because radar transmitters and receivers are co-located. TV signals emanate from a transmitter to multiple receivers scattered willy-nilly.

Radar signals are also pretty darn strong compared to a TV signal on the edge of its coverage area. Even relatively close to a transmitter, the strength of a TV signal can vary with respect to the surroundings, bouncing between buildings or off the ground. Technology robust enough to sense DTV signals and immediately jump to other frequencies would have to be highly sophisticated, but Harris said it has indeed arrived.

"Anything that a TV receiver picks up, this technology can sense," he said.

The filing authored by Harris and his colleagues for Microsoft, et al, provides some general characteristics of the proposed white-space devices. They will not rely on global positioning systems as proffered by the FCC, but rather the spectrum-sensing technology previously mentioned. Their signal-detection threshold will exceed the established dynamic range of DTV receivers and they'll have fixed, gainless antennas that can't be pried off and replaced by the user.

PROPOSED SPECS

The coalition favors spectrum sensing because GPS would be too clunky with its reliance on satellite links and locational data for every TV transmitter. With regard to dynamic receiver range, the group proposes a -114 dBm threshold for establishing channel vacancy—about 30 dBm below that of a DTV receiver.

The devices would have affixed receive and transmit antennas with no capacity to intensify signals (0 dBi), compared to 6 dBi suggested by the FCC. A transmit power control range of 20 dB is proposed, rather than the 6 dB used by personal devices in the 5 GHz band. (A 20 dB power control range means the power level of a device in the TV band would drop by 10 dB when a TV signal is detected.)

Finally, the coalition opposed the 10-second interval put forth by the FCC to recheck for TV signals.

"In light of the 'always on' nature of incumbent licensees, a recheck requirement on the order of one minute is more appropriate," the group's filing said.

It went on to say that the described power parameters would overcome landscape-induced anomalies in DTV signals, as well as protect other professional gear sometimes operated in TV bands, such as wireless mics. (The IEEE said a 2-second recheck interval was necessary for wireless mics, which operate intermittently.) It also indicated that the -114 dBm sensing threshold combined with the 20 dB power control range would allow devices to

operate in spectrum immediately adjacent to TV channels.

Many broadcast engineers, including **TV Technology** contributor Charlie Rhodes, are dubious about adjacent-channel operation because signal power tends to "leak" out of assigned channels. This power leakage can also combine in such a way to produce interference on channels far above or below where the offending transmissions are taking place. It's this phenomenon that concerns Byron St. Clair, president of the National Translator Association.

The nearly 5,000 translators in the United States convey broadcast signals beyond stations' established coverage areas to regions that otherwise could not receive free TV. St. Clair said the far-flung nature of the translator system makes it more vulnerable to interference.

"Say you have a station on Channel 22 and Channel 26," he said. "If you overload some circuit someplace, it will produce unwanted distortion products four channels above 26 and four up and down from 22."

Potential interference problems will only be worse if the proposed devices are unlicensed, St. Clair said.

"If someone can buy a device and use it without having to register with the FCC," he said, "they have nothing to compel them to follow the rules."

When the FCC initially opened the white space proceeding in December 2002, it was for the express purpose of unlicensed devices. Only in a Further Notice of Proposed Rulemaking issued last October did the commission seek feedback about licensing. Dorothy Robyn of the Brattle Group, a Washington law firm representing Qualcomm in the proceeding, said licensing white spaces will spur innovation because the resulting devices will have greater protection from the FCC. Harris contends the opposite is true, because spectrum license auctions would limit the number of participating companies.

"If you give the spectrum to one company that decides what service will be used and what devices," he said, "will that lead to more innovation than if you have spectrum available to anyone to use it for anything and any type of device they want?"

So far, however, the number of parties angling for the space, licensed or otherwise, is relatively limited—to the coalition.

"After four years of people saying there's demand," Donovan said, "there's one filing." ■

(For more news on this subject, read "White Spaces Aren't Quite White," p. 12)

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—Michael Drazin, Engineering Consultant



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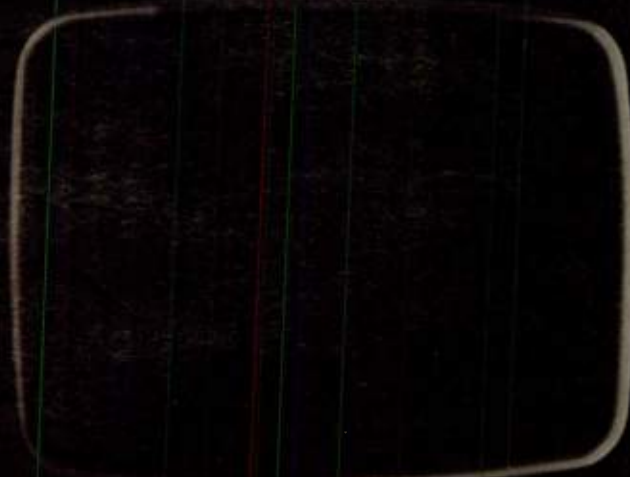
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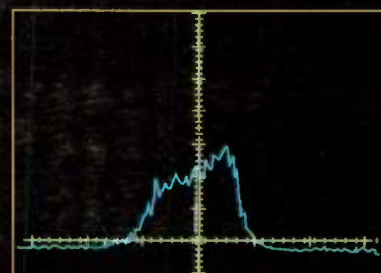
An off-the-shelf option, the SpecTroll Viewer uses existing communications links, and does not require any communications upgrades or additional phone lines to deploy.

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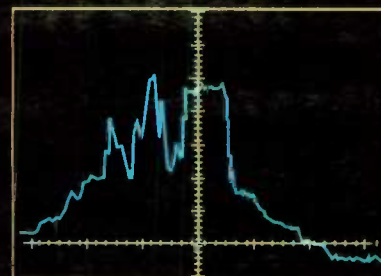


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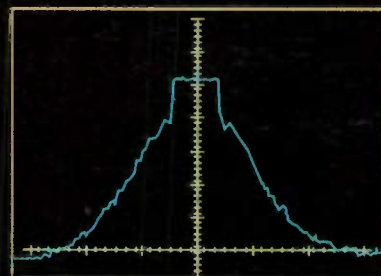
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CONTROL YOUR WORLD



Diamonds

CONTINUED FROM PAGE 8

repair for type "C" playback and there are numerous U-matic 3/4-inch machines, as well as models for most any other format that was used for recording news content.

"Whenever the network decides to get rid of a tape machine, we've had

first dibs," said Carubia.

A Rank Cintel machine is used for film transfers, and the operation keeps some Movieola flatbed editing machines in shape for screenings and preparation and repair of film. The Movieolas also provide a means for recovering magtrack audio from double system recordings. In addition, the archiving operations keep several tape cleaning machines busy.

NO BEST FORMAT

When asked about the choice of D2 and Beta SP for dubbing of content, Carubia explained that these formats worked best for CBS News' purposes.

"There is no one format that will solve all of an archive's problems," he said.

When content is being transferred from its original format, archivists also bring along any metadata included

with the footage and index key words describing content scenes. These key words are stored in the operation's EOS library system to make it easier to locate content in the future. The D2 tapes become the "golden" masters and the Beta SP tapes are used by the news units and producers.

To make life all the more interesting, some of the news material for a single story may exist on as many as 20 separate cassettes or reels. All of this content has to be evaluated, indexed and transferred. Carubia sees life being made a bit easier with a move to server-based storage technology.

"It's an exciting time for us now as we are about to go digital at the News Center," he said. "We're already working on workflow issues."

However, Carubia doesn't want to rush into new technology just because it's available.

"The longer we wait to make the digital jump, the better it is for us. We'll be in a better position to see what works and what doesn't," he said.

What sort of content does Carubia and his staff deal with?

The entryway to the operation is crowded with stills depicting such events as President Kennedy's ill-fated trip to Dallas, a distressed Walter Cronkite reporting the aftermath of that day, 1960's anti-war demonstrations, a gunned-down student at Kent State University and a burning World Trade Center. It's not all gloom and doom, as there are also pictures of the Beatles with a smiling Ed Sullivan, and shots of several comedians who appeared on the network.

Carubia says that the oldest archives footage is a 1948 edition of "Douglas Edwards with the News." In the fall of 1956, Edwards' evening newscast made history as it was the first television program to be aired on videotape. Surprisingly, the earliest tape footage logged in the archives is a story on Fidel Castro from January 1959.

When asked about unusual finds within the millions of feet of film and tape, Carubia said that his group is always discovering "diamonds in the rough." He was particularly fond of some footage shot at about 5 a.m. with Edward R. Murrow interviewing Louis Armstrong on the steps of a Paris nightclub.

Even in the aftermath of the 9/11 disaster, Carubia says that he is not that concerned about such a concentration of rare and historical footage under one roof.

"It's very convenient for us, and it works," he said. "It makes it very easy to move material right across the street to where it's needed in the news operation. ■"

In the last of this two-part series, we'll look at how Walter Media Works a two-year old Michigan company is preserving news archives from local stations.

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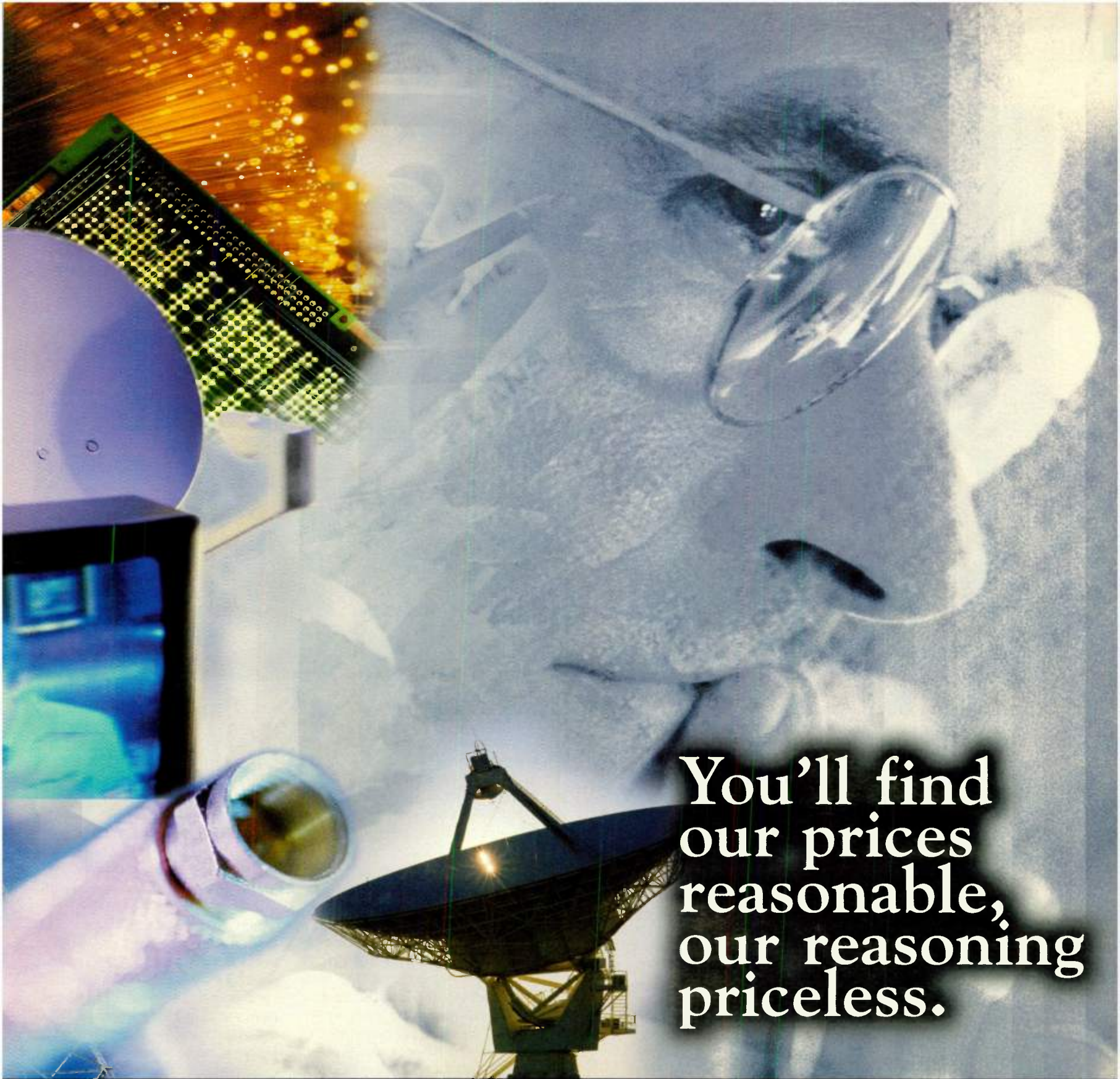
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Opera

CONTINUED FROM PAGE 16

cialized feed, as does Sirius Radio and Real Networks."

The Met transmits HD video at 1080i/29.97, 1080i/25, and 720p/59.94 with PCM, MPEG Layer 2, and AC-3 audio coding at different data rates. Video data rates vary such

vary considerably from the content for video, so the Met assigned Associate Director Karen McLaughlin to serve as the intermission coordinator between the radio shows and video directors.

If a segment on the radio side finishes before TV is ready, McLaughlin may ask announcer Margaret Juntwait to fill time until the two shows can join up again.



The Metropolitan Opera launched its HD theater presentations with "The Magic Flute" on Dec. 30.

as uncompressed video at 1.5 Gbps over Verizon HD circuits for the PBS stations, to 57 Mbps, 52 Mbps and 19.8 Mbps for some theaters. Live performances are satcast to the cinema network and the Franco-German Arte HD network over transponders on the AMC-5, Nimiq-2, AB-1, W-3, Sirius-2 European, and Sirius-2 Nordic satellites.

Within the Met, Schubin said, the productions are shot in 1080i/29.97 with up to 14 Sony HDC-950/1000/1500 cameras. The same video goes out to all of the theaters, but the recorded video going to PBS stations has more close-ups inserted for the smaller home screen.

Atlantic Cine Equipment, a Baltimore-based provider of specialized camera mounting equipment, provides the camera robotics.

"The Met stage is busier than Grand Central Terminal and there's no room for a remote control booth," Schubin said, "so the only place available is under the stage, which already contains so much equipment that it looks like the inside of an aircraft carrier."

Adding further complications is the opera intermission. Since the two TV directors, Brian Large and Gary Halvorson, both wanted a break during the intermission, Tony Marshall was brought in as a third director in a separate control room to handle the live backstage interviews with the stage and artists and staff, as well as prerecorded packages.

Intermission content for radio may

"Sometimes the video signals carry only her voice," Schubin said, "and sometimes it carries both her voice and face."

ATTENTION TO DETAILS

Eric Duke, president of All Mobile Video acknowledges that the Met "does have some demanding specifications."

"Our engineer in charge, Lee Blanco, must pay constant attention to all details, such as camera lens configuration and tape configuration. He has to ensure that live productions are distributed immediately to the theaters and subsequently to PBS. He has to make sure the B unit trailer is properly packed and organized so the crew can quickly grab whatever is needed on the fly, like a replacement tripod or a dolly. He has to make sure the equipment maintenance shop within the B unit always has everything needed to keep gear working on location."

Blanco also must deal with ongoing innovation. Duke said the Met has deployed a prototype low-profile camera for the front edge of the stage that's able to follow the stage action. "That system is still evolving," he said.

"We've been working with the Met for a number of years," Duke said, "so we're pretty much able to anticipate what's coming at us. That's why this complex 'Live in HD' series is not as difficult as we expected. The Met team is very professional, so it's easy to work with them." ■

RF TECHNOLOGY

Doug Lung

Evaluating Alternative DTV Distribution

In the January RF Technology column, I looked at three USB tuners that offer an inexpensive way to monitor ATSC signals. While the software of two of the three displayed EPG data, specialized software was needed to display PSIP and stream information. I described Rob Hewitt's TSReader software in August 2005. Since then, Rob has added new features and now offers TSReader Pro. At a cost of \$399 versus \$99, it isn't cheap, but it provides features approaching those of analyzers costing several times that much.

TSReader now supports a wide range of hardware and can view digital cable PSIP data when used with the AutumnWave tuners. If you want to decode EIA-608 and EIA-708 closed-captioning data in TSReader, you'll need the Pro version. All closed-caption fields are displayed.

More expensive ATSC stream analyzers can provide detailed reports of PSIP table problems. Rod Hewitt has added a similar feature to TSReader

Pro. While the current may not provide the same level of detail as these ATSC stream analyzers, the display on TSReader Pro provides an easy way to see common problems, and I expect its capabilities will increase. See Fig. 1 for

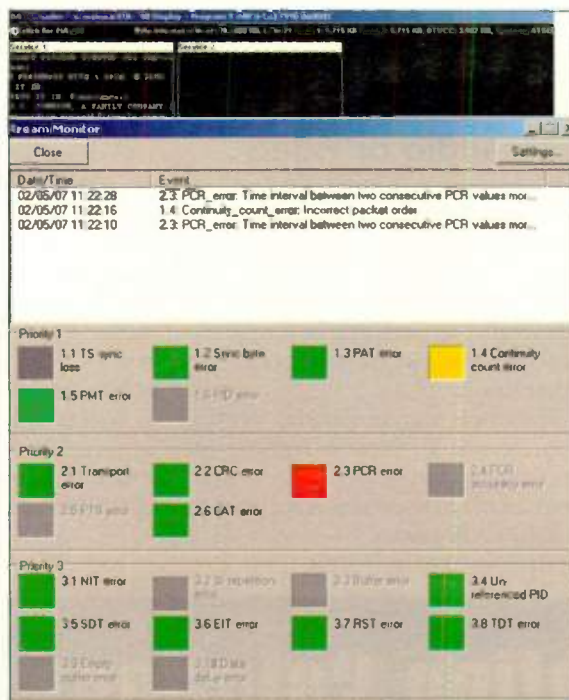


Fig. 1: Stream Monitor CC2

a screen shot of the stream monitor and closed-captioning data from KNBC-DT. I induced errors on the recorded transport stream to show how they are displayed.

Another new feature, available in

both TSReader and TSReader Pro, is the ability to remotely monitor TSReader and provide data and pictures over a network or the Internet. There are many ways to do this, ranging from JPEG thumbnails to streaming HD. See www.coolstf.com/tsreader for a description of the options.

TSReader will not only decode MPEG-2 streams, but also MPEG-4 and VC-1. At NAB last year, I was able to view the unencrypted MPEG-4 programming that USDTV was transmitting on a local DTV station. At CES in January, I was able to view and capture the transport stream on KVWB, DTV Channel 22, that Samsung was using to demonstrate A-VSB. More on that later!

STREAMSLEUTH

In my last column, I incorrectly called AutumnWave's receiver TSReader Pro package "SignalSleuth." The correct name is "StreamSleuth." As of late January, the cost of the package was the same as the cost of the receiver and TSReader Pro separately, although it is more convenient and you are sure the two products will work together.

The technical support manager for AutumnWave told me developers had been asked to create a large signal-level/SNR window similar to that offered in DVICO's Signal Checker program. AutumnWave is looking into adding closed-captioning support to their software. Since closed-captioning data is already available in TSReader Pro, it

seems AutumnWave and Rod Hewitt should be able to work together to bring closed captioning to AutumnWave's "OnAir HDTV" program.

ATSC tuners were everywhere at this year's Consumer Electronics Show in Las Vegas, although they weren't always obvious. As of March, FCC rules require that all TV sets and devices with off-air reception—such as VCRs and DVD recorders—have ATSC tuners, so it was hard to find



Fig. 2: ATSC portable TV screen

analog-only TVs. I saw one Asian manufacturer showing small, inexpensive, analog-only TV sets. AudioVox had an ATSC receiver in its small screen under-counter DVD and TV sets. I didn't find any handheld ATSC receivers other than the Samsung prototype. Super-Union Multimedia Corp., however, was showing a mock-up (using a cardboard frame, of a portable ATSC receiver. See www.sumc.com.tw/ for more information. Fig. 2 shows a picture of it. Perhaps we'll see this system in a consumer product next year.

Zenith/LG and RCA/Thompson were both showing ATSC set-top boxes. The Zenith set-top box combines the fifth-generation demodulator and other circuitry (except the

DISTRIBUTIONS, PAGE 25

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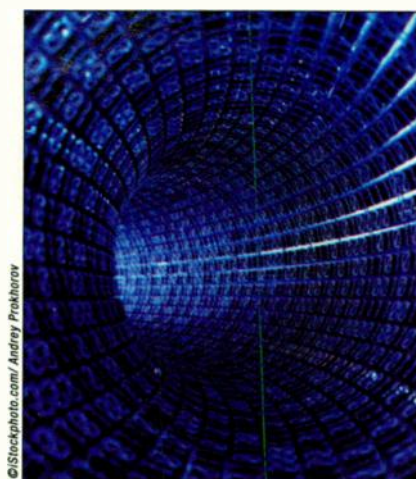
WES SIMPSON

Anticipating Errors In IP Networks

Errors happen. That's a fact for any kind of network, whether optical, electrical or wireless. To deal with the errors, it's important to understand what causes them, and how IP networks react to them. This column is the first in a two-part series. Here, we'll focus on the errors and their causes. In the next installment, we'll focus on how systems can be designed to work around network errors.

There are two main categories of errors that occur on IP networks. The first concerns packets that become missing or damaged in transit. The second concerns packets that arrive at time intervals different than when they were sent. All types of data transmissions are affected by the first category; the second category only affects real-time signals like video and audio.

When packets containing video or audio data don't arrive at their destination, problems occur, due to the real-time nature of the signals. In many



networks, there isn't time to send a request back to the source for a retransmission of the missing data.

Many video networks are specially designed to minimize errors, but they can never be completely eliminated. Even short-haul digital fiber-optic links have an intrinsic error rate,

Data that consistently arrives too early or too late can... severely corrupt audio or video sequences.

although the rates can be extremely low (less than one bit error per year in some cases).

Bit errors can be random, or they can occur in a repeatable fashion, just as TV signals can be affected by random interference or a specific source, such as a leaky CATV system.

Note that wireless packet networks (such as WiFi) have a much higher bit error rate (on average) than wired or optical connections, due primarily to interference.

In a packet network, bit errors can cause packets to be deleted entirely, or simply change the contents of a packet. All IP packet headers contain a checksum along with critical data such as the source and destination IP addresses. This checksum allows each device that receives the packet to check the header data for integrity. If a checksum error is detected, then the packet is destroyed immediately. This is done to avoid having packets with bad addresses or other corrupted header data circulate any farther through the network.

If a bit error happens in a part of packet other than the header, the packet may or may not be destroyed in the network. One popular protocol that rides on top of IP, UDP (User Datagram Protocol) provides an optional checksum for an entire data packet; this feature is often not used in video and audio applications because these streams often include information that allows simple bit errors to be corrected.

Several different kinds of network interruptions can also cause packet losses. Hard network failures can cause complete signal failures. In protected

ERRORS, PAGE 36

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Distribution

CONTINUED FROM PAGE 23

tuner) on one IC, reducing manufacturing costs. While the set-top box is not available now, DVD recorders with fifth-generation chipsets are now available. Both Zenith and RCA were showing set-top boxes hooked up to early color TV sets with rotary-dial tuners, assuring customers that come February 2009, they won't have to

with a sixth-generation demodulator design incorporating Auvitek's patent-pending FADE (fully adaptive demodulation and equalization) technology looks interesting.

I've often said portable and perhaps mobile reception of broadcast DTV is important for the future of over-the-air TV. With home TV sets hooked to cable or DBS, broadcasters have to compete with a hundred or more programs, and an increasing number are becoming available in

HD. For wireless reception, broadcasters, with 19.39 Mbps of bandwidth per channel, are in a stronger position. Will these sixth-generation designs be sufficient to allow reliable portable and mobile operation? Perhaps additional training data, like SRS in the proposed A-VSB standard, will help.

At CES, Samsung transmitted an A-VSB signal over KVWB on Channel 22. Fig. 3 shows a screen capture of TSReader Pro displaying PSIP and stream information. Note that due to the mapping of the SRS (supplemental

reference signal) and turbo stream at the packet level, the data rates in Fig. 3 will not reflect the A-VSB overhead. I had a chance to play with one of the handheld receiver prototypes while riding around

Las Vegas in Samsung's demo bus. Fig. 4 shows the receiver and the image it was receiving inside the bus, in motion, with both antennas collapsed.

The robustness of the signal was amazing—I had to hold it near the floor of the bus, antennas collapsed, to freeze reception for a few seconds.

Is A-VSB the solution? Perhaps, but the SRS and quarter-rate coding on the 750 Kbps MPEG-4 stream in the demonstration consumed a significant part of KVWB's DTV bandwidth. The SRS can use as much as 2.89 Mbps. After subtracting the bandwidth required for one robust channel (3.3 Mbps) and SRS, a bit more than 13 Mbps remains for other programming. While this may be enough for HDTV, it doesn't allow much room for other multicast channels.

Additional testing is being done on A-VSB. New demodulator chips may

allow adequate performance with less bandwidth devoted to SRS. Perhaps less robust encoding can be used on the turbo stream. We should know once the testing is completed.

Overall, I was encouraged by what I saw at CES this year. Over-the-air ATSC reception was available in more devices. ATSC development seemed robust, not only with breakthrough technology like Samsung's A-VSB but

from manufacturers committed to improving ATSC reception, and OEMs like SUMC offering interesting products like their portable TV design. It will be interesting to see how much of this new technology makes it into consumer products at CES2008.

As always, comments and questions are welcome. E-mail me at dlung@transmitter.com.

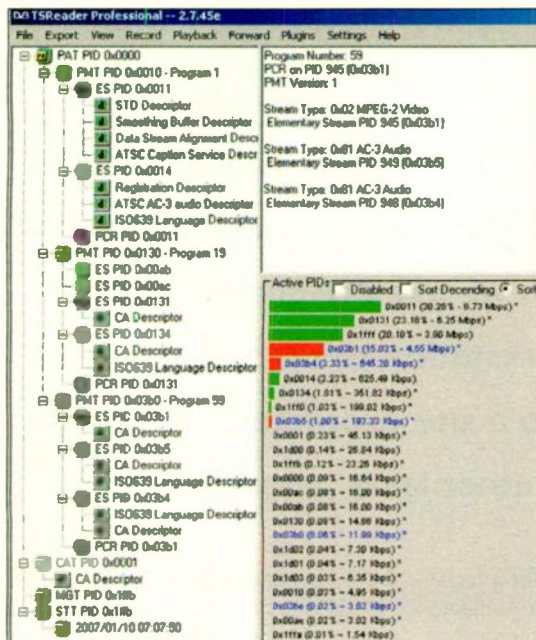


Fig. 3: KVWB Samsung demo

throw out their old TV. RCA said their set-top box would initially cost \$200 but expected the price to drop to \$50.

Although LG announced a sixth-generation ATSC chipset before CES, they weren't talking about it in their booth. Thomson implied the new RCA USB tuner, that I described earlier in my RF Report on CES, would work better than the Pinnacle HD Stick Pro fifth-generation tuner, but couldn't say what chipset was being used. I hope to receive a unit to test and will report on the performance after I've had a chance to try it in a few different cities. Unlike the tuners I reviewed in the last column, the RCA USB tuner will include closed captioning. It is also supposed to work with processor speeds down to 1.5 GHz. It includes an antenna with a 6 dB pre-amplifier, which should improve performance.

Micronas introduced a line of ATSC demodulators last year and showed a smaller, better and cheaper design this year, but so far, except for one PCI tuner, I'm not aware of them being used in any products available now. The Auvitek AU852x series of chips



Fig. 4: KVWB Samsung demo receiver shot

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INSIDE PRODUCTION **Walter Schoenknecht**

Getting Clips to Clients: For Your Approval

I'm a little short on leisure time these days. I used to get a couple days off from a project while waiting for feedback from the client—time enough to open the mail, do some billing, clean the tape heads—but no more.

It wasn't that long ago when, on a near-daily basis, we'd send out VHS screeners and approval dubs of programs at various stages of production, and await a response. Later, when visiting the client, I'd see the tapes stacked on a windowsill: The Tuesday rough cut; the Thursday p.m. revision; Monday's cut with music added; and the final version, sent Wednesday night. A full week's worth of waiting. Practically speaking, there wasn't much choice—a quick, cheap VHS dub was the only game in town.

While the rapid time-to-adoption for the DVD format has radically changed our distribution methods, it hasn't really impacted the client approval process; a physical deliverable has to be transported to someone, whether across town or across the globe, and that takes time. Sounds like a job for... the Internet!

Ahhh... not so fast. By itself, the mystical, magical Internet offers no particular solution for showing clips to the client. First, the clips are generally too big to be e-mailed, especially

to corporate clients with strict message-size quotas and even stricter firewalls. Then there's the FTP proposition—three letters with absolutely no meaning to most non-

tions: "Right-click on the file name, and choose 'Save target as...,' with predictable results. Not elegant nor particularly efficient; in fact, a serious time-waster for all involved.



technical civilians. Ask them if they've got an FTP client, and they'll tell you, "No, but we've got a couple of C.O.D. clients."

Undaunted, we pushed ahead with a system—no, "system" is too strong a word; maybe "harebrained scheme"—in which we use FTP clients on each edit workstation to upload approval movies to a site protected by a single, rather lame password. We then e-mailed a link to the client, with idiot-proof instruc-

And so the search began for a high-tech, low-maintenance way to facilitate the kind of instantaneous, interactive collaboration we've all heard so much about. We were led into the murky world of asset management, where a mere mid-five-figure investment will allow you to store and index tens of thousands of clips, at various resolutions, for simultaneous use by hundreds or thousands of clients. It's a dream-come-true for a worldwide net-

work news organization, but for us, with a few dozen clients and even fewer clips to show them, it's an unspeakable burden. No way.

HOMEBREW NO-GO

We knew that using staff resources, we couldn't easily whip up some HTML code (or Flash, or Java, or even PERL) which would do what we wanted. One by one, I downloaded a half-dozen CMS applications—content management systems, which reside on your Web server and provide prepackaged portals. Since

Undaunted, we pushed ahead with a system—no, "system" is too strong a word; maybe "harebrained scheme"—in which we use FTP clients on each edit workstation to upload approval movies to a site protected by a single, rather lame password.

they're generally open-source endeavors, there are hundreds of user-created plug-ins and extensions available for a variety of purposes, and I installed and tested anything which appeared even indirectly related to browsing media clips, all to no avail.

Finally, through a photographer acquaintance, we stumbled upon a solution. Sam Bogoch, working as a systems integrator in the visual arts field, had spent years installing feature-laden "enterprise-scale" digital asset management systems, but customers were mostly interested only in browsing assets through a Web interface.

"It struck me that these customers were only using 10 or 20 percent of their big digital asset management system, and most of the time, the IT aspects got in their way," Bogoch said. "They just wanted a Web tool to communicate with their clients."

His experience led him to develop an affordable, intuitive, Mac-based Web browsing system for client review and approval, which he called SeeFile. And while the market for \$25,000 to \$250,000 digital asset management systems may have numbered in the thousands, the potential user base for a just-right-sized product might be a hundred times bigger, he felt.

"It's clear that this is a very different market from the entrenched digital asset management market," Bogoch said. "If we could build an affordable product, and target those customers, we felt we could be successful."

Although SeeFile's first users were

APPROVAL, PAGE 30



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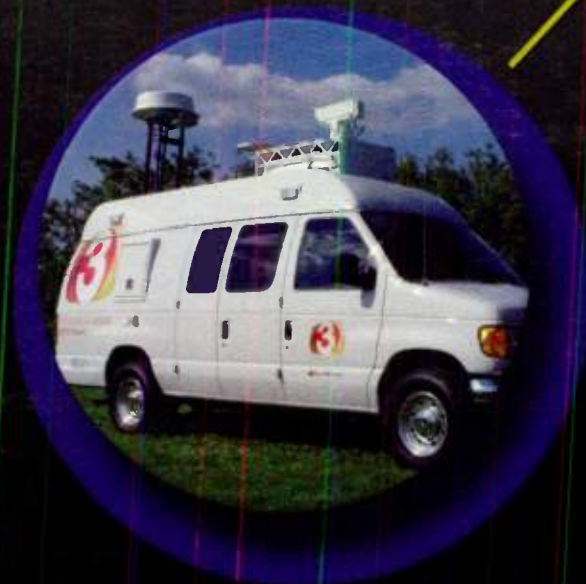
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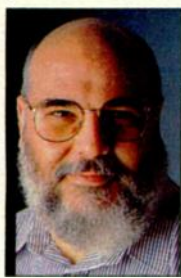
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LET THERE BE LIGHTING

Andy Ciddor

How Many Bulbs Does it Take to Change a Law?

I know that politics and television are in no way connected. I certainly wouldn't be foolish enough to suggest that the determinations of the FCC are related to any political machinations. However, there may be occasional pieces of legislation that are more about political aspirations than making a useful contribution to the community.

The first example that springs to mind involves a hypothetical Northeastern state that enacted legislation treating mercury like nuclear reactor waste. Rather than collect and recycle this expensive resource, and preventing it from getting loose in the environment, this legislature progressively eliminates mercury from light sources on sale in the state. While reducing the potential for mercury in the ecosystem, this has also limited the use of such energy efficient light sources as most metal-halide lamps and of course, that high efficiency, long life domestic lamp—the compact fluorescent.

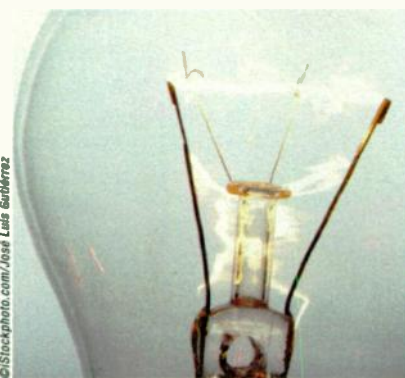
It's a sad indictment of voters that their legislature can't trust them to follow the same recycling guidelines as the rest of the country. However, the rise in sea levels due to global warming from using inefficient lamps will probably inundate this coastal state long before anyone notices the reduction of mercury in the food chain.

ILLEGAL LIGHTING

That brings us to the most recent piece of political theater—performed this time by the good folk of the Happiest Kingdom of Them All. Only in such a place could an ambitious state assemblyman propose the “How Many Legislators Does it Take to Change a Light Bulb Act” to ban the incandescent lamp, without considering the ramifications of the proposal.

Apparently, someone (possibly a lobbyist

from a compact fluorescent lamp manufacturer), showed this legislator a CF and told him how it would save power in a domestic environment. This gave him a platform to build a national media profile. At the time of writing, no actual draft legislation had been put forward—and may not need to be, since the publicity has achieved the goal of raising the politician's profile—but there have been suggestions of banning the sale of incandescent lamps in that state. Like the banning of mercury



instead of recycling it—in its most fundamental form, this is an absurd idea.

The adoption of energy efficient light sources in the majority of domestic and commercial applications where appropriate is an excellent idea, and could help to keep a considerable amount of carbon from entering the atmosphere. There is no doubt that CFs and the new generation of LEDs are more efficient than incandescent lamps in terms of the raw lumens of light produced per watt.

Having said that, there is a range of specialized applications where the compact size of an incandescent filament allows the construction of optical systems that would be utterly impossible with the very diffuse light output from LEDs or CF lamps.

For example, it would be ill-advised

to hold your breath while waiting for the arrival of a CF/LED equivalent of a 2 kW studio fresnel spot. A very nice Italian engineer once tried to sell me on his prototype of a focusing CF-powered spotlight (a sort of CFL-powered Blondie) at a tradeshow. The fixture was totally underwhelming in performance and output. Unsurprisingly it didn't ever appear in the company's catalog.

Although there are high Color Rendering Index, compact-source metal halide discharge lamps that could act as

There have been suggestions of banning the sale of incandescent lamps... this is an absurd idea.

higher efficiency stand-ins for many filament lamps, there are some serious problems with their wholesale adoption as a replacement.

TRIGGERING A DISCHARGE

All discharge lamps require some form of control gear for starting the discharge and limiting the current, and this is where the problems begin. Control gear generally needs to be kept well away from the light source to avoid being cooked and thus, the entire fixture would require re-engineering. Add to this the unsuitability of discharge sources to smooth, full-range dimming, and their use in entertainment production becomes quite problematic.

An environmental audit of a discharge source that considers manufac-

turing, disposal and the harmonic distortion produced in the power distribution system by the control gear may demonstrate the incandescent lamp isn't always such an evil thing after all.

Regarding energy consumption by lighting—an entire studio full of incandescents would consume a fraction of what could be saved by the viewing audience turning off the bathroom light at the end of the commercial break or putting CF lamps in the porch light that's left burning until the last member of the family gets home.

SOUNDS GOOD IN THEORY

To put my comments in context, I was fortunate enough to have had a high school chemistry teacher who, in 1969, pointed out that the fossil fuels we use were originally plants and animals that grew at a time when the earth was much warmer and had an atmosphere rich in carbon dioxide. He then proposed the perfectly reasonable hypothesis that if we burned those fossil fuels we would release all of the carbon back into the atmosphere, thus re-creating those original excellent plant growing conditions.

It was a little later, during my brief sojourn as university student, that I learned of such consequences of climate change as the dislocation to agriculture and the rising sea levels.

At the time this was treated in a matter-of-fact way by a scientific community, which seemed to pin its hopes on the notion that we would find a technological solution that would reduce our consumption of fossil fuels. In the early 1970s, there was still the optimistic view that clean, safe and nearly free nuclear power was just around the corner.

PLANT A TREE

When that didn't work out, the simple answer was to both rationalize our consumption of fossil fuels and grow lots more trees to lock the carbon back into the earth, as fast as it was being liberated. Our response of course, was to build more automobiles, raise our energy consumption, have more children, and cut down the existing trees at an ever-increasing rate.

Unlike too many of the world's politicians, I'm not a climate-change denier and I didn't need a PowerPoint presentation from a failed presidential candidate to explain the issue. On the contrary, I accepted the concept before there was any kind of movement. My views are simply those of a technologist who acknowledges that despite the urgency for us to respond to what we have allowed to become a crisis, we should do so in a way that is both rational and practicable.

Andy Ciddor has been involved in lighting for more than three decades as a practitioner, teacher and writer. You can reach him via e-mail c/o TV Technology.

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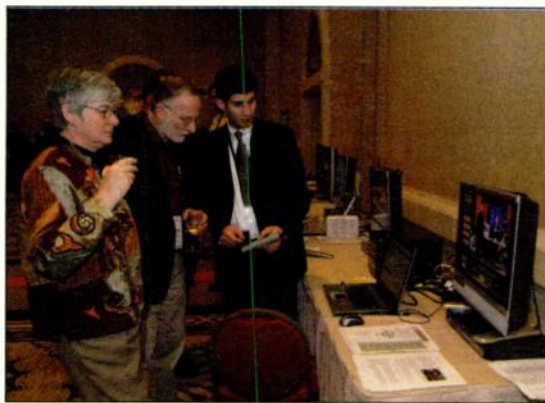
Jerry Whitaker

ACAP Demonstration Project Underway

ATSC has launched an ambitious project to demonstrate the capabilities of the Advanced Common Application Platform for interactive television. The first phase, a working demonstration of ACAP applications and interoperability, was unveiled at the 2007 Technology Retreat.

Sponsored by the Hollywood Post Alliance, the annual Technology Retreat in Palm Springs, Calif., has become a focal point for advanced video technologies. Again this year, ATSC sponsored a half-day seminar, focusing on the ACAP standard in general, and the demonstration project in particular.

Interactive television, or iTV, enables broadcasters to enhance programming with features such as voting/polling, games, sweepstakes entry, interactive ads, e-commerce and more. Creating a common standard for publishing iTV applications enables economies of scale



Dan Berkowitz of NBC Uni talks to Graham Jones of NAB and his wife, Linda at the 2007 HPA Technology Retreat held in February in Palm Springs, Calif.

where one application can run on multiple TV platforms.

ACAP is an iTV standard developed by the ATSC in conjunction with CableLabs that is optimized for terrestrial broadcast and compatible with

cable industry methods of iTV carriage. The ACAP standard is the result of a landmark harmonization effort between the ATSC DTV Application Software Environment and the CableLabs Open Cable Application Platform, OCAP, specifications.

This standard, ATSC document A/101, is the culmination of an extensive effort by a dedicated team of specialists from dozens of

diverse organizations.

ACAP defines the technical details needed by content providers, broadcasters, cable and satellite operators and consumer electronics manufacturers to develop interactive services and products. ACAP is important because it provides a single method of delivering interactive applications to terrestrial receivers and cable set-top boxes.

To move iTV applications forward, the ATSC Planning Committee last year launched a major demonstration project of the ACAP iTV system. Led by Dan Berkowitz of NBC Universal, the project is designed to illustrate how ACAP can be used to enhance the viewing experience. The project has been divided into two major elements:

Phase 1, a standalone demonstration of ACAP applications "broadcast" to and run on ACAP and OCAP receivers

Phase 2, a field trial in select market(s) of ACAP applications broadcast over the air, distributed on cable systems and picked up by ACAP and OCAP receivers

A developmental lab has been set up at NBC's 30 Rockefeller Center headquarters in New York to facilitate development of iTV applications and to test the interoperability of ACAP- and OCAP-enabled set-tops. Seamless interoperability is critical for content producers, who need to know that their iTV applications will play as intended on television sets receiving signals over the air and from cable. Interoperability with satellite systems is being studied.

The goals of the field trial were to raise awareness of content and business opportunities, and to demonstrate the interoperability of ACAP and OCAP. The Technology Retreat demonstration, held Jan. 31 through Feb. 2, showed several iTV applications developed by broadcasters in conjunction with software developers using the ACAP standard. Three program excerpts were shown with related iTV content—"Reality Remix" (Fox); "Deal or No Deal" (NBC); "The NewsHour with Jim Lehrer" (PBS).

Active participants in the project included Aircode, Alticast, Ensequence, Fox, LG, NBC, Pace, PBS, S&T, Softel-USA, SysMedia, Samsung, Unisoft, and Vidiom Systems. Live field trials are planned for later in the year.

One side benefit of the ACAP project is that it has identified elements of the ACAP standard that may need to be refined to provide optimum end-to-end performance. So far, the project team

ACAP, PAGE 38

the way we see it...



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Approval

CONTINUED FROM PAGE 26

mostly photographers and graphic designers, it wasn't long before video creatives asked Sam to support clip browsing as well. At the urging of his customers, Bogoch added video-friendly features, like animated thumbnails drawn automatically from the file's contents.

"Video was a natural for us, technologically, on a Mac platform and with QuickTime," Bogoch said. "It seemed like a logical thing to do."

Today, the mature SeeFile application boasts a long list of features, including individual password-protected pages for each client, and Web-based selection and manipulation tools. Best of all, uploads can be managed from the same interface, streamlining the process for editors and artists... no more clunky FTPs.

SeeFile is offered for several numbers of concurrent users, and in two configurations—one for use on remote servers, and one which is hosted in your own facility, where it can have share-level access to all your most recent files, guaranteeing that current versions are always available.

While it's too early for us to declare SeeFile a total revolution in client approval, the odds are stacked in its favor, especially considering the never-ending stream of tweaks and enhancements from Sam and his team. Best of all, I can stop wasting time searching for a solution, which is a good thing—because the clients are approving their jobs much more quickly these days, and I'm a little short on free time.

Walter Schoenknecht is a partner at Midnight Media Group Inc., a New York-area digital production facility. You can reach him via e-mail at walter@mmgi.tv.

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MEDIA SERVER TECHNOLOGY Karl Paulsen

Bandwidth Basics: A 3D Perspective

The introduction of Gigabit Ethernet connectivity and networked storage into video server technologies opened the door even wider to a newer generation of multiformat video delivery and content storage capabilities. With 300 GB-plus hard drive capacities and technologies including perpendicular recording, and a market driven push toward high-definition content delivery, the challenges of mixing real-time playback in HD and SD servers are now merged into higher performance and wider bandwidth networked video servers.

Current generation GbE (Gigabit Ethernet) connected systems offer improvements over heretofore expensive and cumbersome Fibre Channel systems. GbE offers better data moving capabilities for handling local and distributed storage. These IP-based technologies provide a path to high-availability systems—a crucial element in getting a file to play on demand, synchronously and isochronously. Important factors to obtaining high-availability include redundancy, fault tolerance and resiliency.

Storage resiliency for online, near-line and disaster recovery are key aspects of a system's design. For true storage resiliency, a system must prevent errors and system failures; and be able to recover quickly and unobtrusively from those errors and system failures. Such systems typically utilize early detection methods and

self healing processes, core elements in what's considered "under-the-hood" in server/storage architectures.

Mitigating business interruptions necessitates having media stored in more than one location. That location may be adjacent to the main store, as in mirrored servers or archives, or off site in a deep archive or disaster recovery bunker. With modern GbE networked storage

environments, database or transaction-type operations.

Media operations require systems that support faster access times, higher data rates and for the transport of larger contiguous file sets between storage subsystems or site locations. Next-generation storage systems employed in video media servers address these requirements by effectively managing file move-

facturers sometimes take those approaches requires a basic fundamental understanding of bandwidth and access. Serving up storage for content delivery might be thought of from a three-axis perspective.

In this model, the X axis defines the amount of physical data needed in a storage subsystem. Storage is typically specified for some number of hours of storage at a given data rate with a definition of video and audio essence capacities. An example of an appropriate specification for storage might be stated as "120 hours at 56 Mbps of high definition, MPEG-2 4:2:0 video encoding with four AES channels (i.e., up to 8 tracks)." Next, the storage requirements should annotate "sufficient VANC data for closed captioning

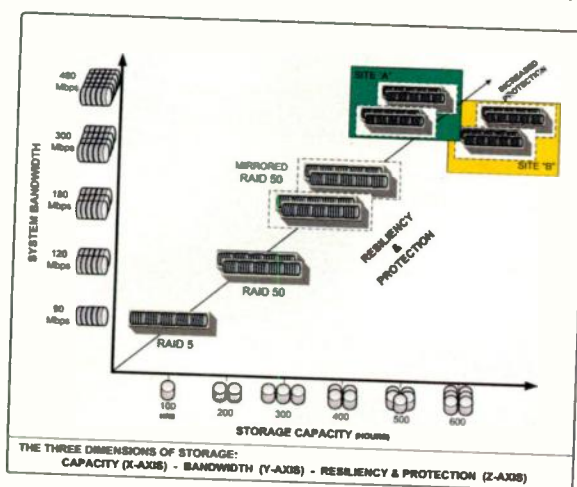


Fig. 1: Three Dimensions of Storage

configurations, the ability to populate those redundant stores becomes easier to configure and manage.

However, IT-systems engineers must understand that managing the isochronous delivery of media files requires different approaches than those employed in traditional office

ment (transfers) between storage elements while at the same time improving bandwidth, access time and content recall for live-to-air operations.

Understanding storage system configurations for file-based media-centric operations; and why manu-

(CEA-708), AMOL watermarking or program content tracking data, a timecode track and metadata, such as to carry information as to the Dolby mode or other private user data parameters."

This specification is provided to the server vendor, who then inquires

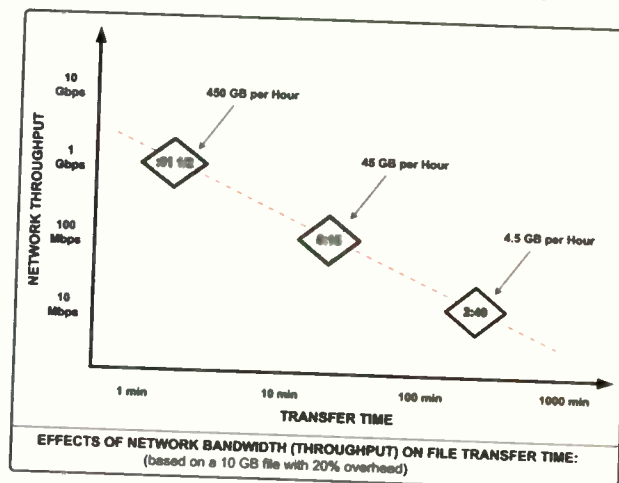


Fig. 2: Transfer Time as a Function of Throughput

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as to the required number of simultaneous play-out and record channels at the defined 56 Mbps high-definition data rate. Storage calculators, specifically configured for the particular model of server and methodology of storage protection (e.g., what RAID level), are then used to estimate the storage requirements.

If the systems is a SCSI-based system the number of LUNs (logical unit numbers), a unique identifier used on a SCSI bus to distinguish between devices that share the same bus, may be stated. The term LUN is used in the SCSI protocol as a means to differentiate individual disk drives within a common SCSI target device like a disk array. A base number of LUNs is provided by the vendor, given that there are no additional service requirements in the base system.

Additional system service requirements would include such needs as FTP file transfers between the main storage system and another server; file transfers into the system from a transcoding server; activities such as archiving or restoring to and from the server, or transfers to or from a remote site.

MIRRORED SERVERS

If the system requires mirrored servers, that number also enters the equation and is applied to operations including load balancing between main and backup, an ongoing agenda item that becomes more complex when both record and play-out functions occur in concert with one and another.

The next dimension, our Y axis in this 3D model, addresses bandwidth and is often referred to the system throughput. Sufficient bandwidth is important when other service activities—such as media movement from server to archive or server to transcoder—must occur simultaneously with storage calls for playback and/or ingest. Think of the bandwidth just like the volume of a pipe—the bigger the pipe, the more volume (of data) that can be moved. Bandwidth can be increased by upping the count of the LUNs, and by providing additional storage arrays to the overall system.

The final dimension, the Z axis addresses the depth of protection and system resiliency. The simplest protection is the most common, the RAID level employed at the individual drive or drive array level. RAID 1 (mirrored) provides duplication of data, but little bandwidth improvement. RAID 3 or RAID 5 both provide parity protection of data, and an element of increased bandwidth. Combining RAID levels (e.g., RAID 50) increases the system bandwidth and at the same time, the protection elements; providing a failover for data redundancy with a modest decrease in performance during that

failure period.

Since data movement and storage is of paramount importance—the time necessary to access that data is always in high demand. The faster the network and the quicker that a server can deliver the media content, the higher the overall performance becomes.

From a scalability perspective, anytime that a system does need to

grow, the balance of all three of these dimensions must be considered. It just isn't simple anymore, given the myriad of file types now used in the industry, the need for transcode and proxy operations, more hybrid codecs supporting HD and SD, and that ever changing need to store media on hard disk drives. With all these elements, the improvements in the design of storage subsystems and

their networking components is helping make it just a little easier to move forward to an all file based operations.

Karl Paulsen is chief technology officer for AZCAR Technologies. Karl is a SMPTE Fellow and an SBE Life Certified Professional Broadcast Engineer. Contact him at karl.paulsen@azcar.com.

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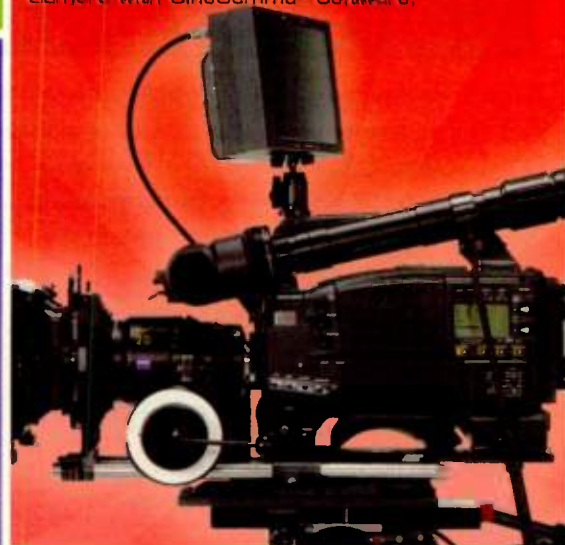
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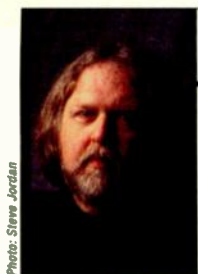
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NET SOUP

Frank Beacham

In YouTube Era, Watch For 'Macaca Moments'

It seems that not a day goes by when I don't receive a link to some YouTube video. Some are curious or just plain funny. A few deal out hard truths rarely seen on America's mainstream media.

Or, at least, these videos give the appearance of truth...that smoking gun "gotcha" moment. Our first reaction is: Wow! Then—on second viewing—doubt creeps in. Some clips, by accident or design, are deceptive. Even the most observant media interpreter is left uncertain as to whether the images reveal truth or distort reality.

What's undisputed is the power of Internet video. Ask former Sen. George Allen of Virginia. During last year's Virginia senate campaign, Allen referred to an aide to his opponent, a young man of Indian descent, as "macaca." The campaign aide just happened to be recording Allen's comment with a video camera. The use of "macaca" was widely interpreted as a racial slur. After the video was posted on the Internet, Allen's campaign tor-

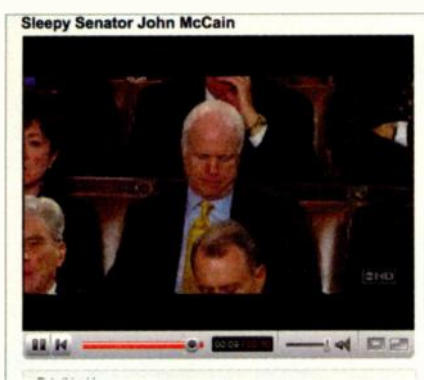
pedoed and never recovered. He lost the election.

Allen's wound was self-inflicted and the video was accepted by many voters as hard proof of his racial insensitivity. However, a recent YouTube "gotcha" with Sen. John McCain of Arizona was far less clear.

McCain of Arizona, a possible candidate for the 2008 Republican presi-

straight to the issue of age and whether McCain is fit to serve as president.

There it was on a widely viewed YouTube video—McCain dozing off during the speech. Even worse, mainstream media critics said, the nap came during the part of the speech on terrorism. The New York Times quoted commentator Tucker Carlson of MSNBC on McCain's apparent siesta.



The next day, a headline screamed, "McCain Eyes Wide Shut During Bush Speech." ... It wasn't true. McCain wasn't sleeping at all.

dential nomination for president, was caught in what appeared to be a moment of slumber during the president's State of the Union address in late January.

DID ANYONE ASK?

Since McCain is 70 years old and would be, if elected, the oldest president ever to take office, the video went

"If you're McCain, who will be over 70 by 2008, you'll want to make doubly sure to demonstrate your alertness and vigor," Carlson wrote in his blog. "You definitely won't want to slump in your seat, out cold, when Bush starts talking about Iraq. And yet that's exactly what McCain did tonight, napping on camera for 10 agonizing seconds."

The next day, a headline screamed,

"McCain Eyes Wide Shut During Bush Speech." The Drudge Report Web site linked to the YouTube video with the words: "Sleepy Senator John McCain."

Turns out there was big problem with all this. It wasn't true. McCain wasn't sleeping at all.

The video was an illusion. The shot of McCain was straight-on. His chin was on his chest. The viewer couldn't see his eyes. That gave the appearance that McCain's eyes were closed.

In fact, McCain, as were many other members of Congress at the time, was simply looking down at a copy of the president's speech and was following the text as he read it.

The same camera angle on other members of Congress who were reading the speech gave the same illusion that they were napping. However, McCain was presumably singled out due to his advanced age and his potential as a presidential candidate.

Unfair, yes. But most certainly a sign of our video-obsessed times. With this level of scrutiny, candidates for president are going to be in for a rough ride over the next two years thanks to the power of video Web sites like YouTube.

Unscrupulous political operatives on all sides will no doubt use the incredible viral power of Internet video in brazen attempts to trap candidates and fool the public. With the prevalence of instant pictures and easy-to-use software to create convincing optical illusions, we are entering a slippery period where truth and fiction in media will be even more difficult to discern.

This, coupled with the lack of media literacy among average American citizens plus the political polarization of many brand-named media outlets, means the potential for manipulation is enormous.

Mainstream media once argued that it would serve as the gatekeeper for the raw, unedited information flowing from the Internet. These media corporations would ensure editorial integrity. That changed over the past decade, thanks to highly politicized talk radio and news outlets, such as Fox News.

Today, the discerning viewer must serve as his or her own gatekeeper—a challenging role that requires the intellectual tools provided only by a well-rounded education.

As sites like YouTube have proven, the Internet has elevated the free flow of information. But, with that freedom, comes a critical need for increased personal skepticism. We must bring our own analysis into the media equation if we are to distinguish fact from fiction.

Our best defense is media literacy—something we must learn in order to function rationally in the brave new YouTube world.

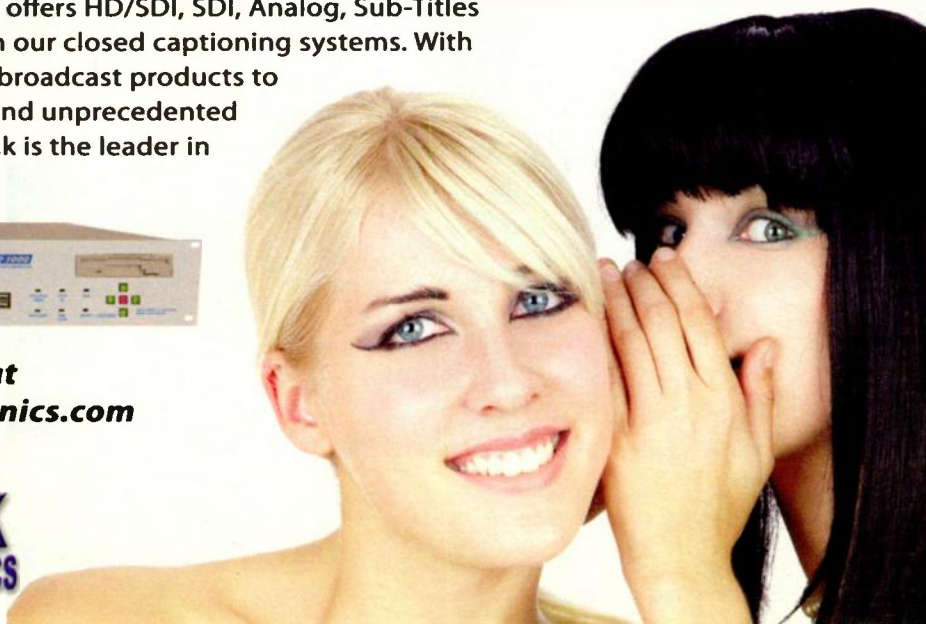
Frank Beacham is a writer and producer based in New York City.

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World Radio History

Approval

CONTINUED FROM PAGE 24

networks (common in most long-haul systems and telco networks) a hard failure can cause an outage of up to 50 ms, which is enough time to eliminate a whole frame of video data or cause a noticeable click in an audio signal.

These errors will show up as a

large number of consecutive lost packets. IP networks have additional potential faults, including packet losses that occur when routing errors are discovered and changes need to be propagated through the network, which can take a significant amount of time.

Overcrowded networks can also cause packet loss. When an IP router has more packets going to one destina-

tion than that link can handle, the router will put all the outbound packets into a temporary buffer (a "queue" or "FIFO") that holds packets until the link is ready for new ones. If they start to fill up, the router may discard some of the packets to prevent the buffers from overflowing catastrophically. On private networks, this process can be controlled to prevent discarding packets with high priorities. However, on the

public Internet, packets are not given priorities, so any type of packet can be discarded.

PACKET TIMING ERRORS

Timing errors in a video signal are damaging in three different ways. First, data that arrives very late can miss the point in time when it was needed to form an image in a video sequence or sound in an audio program, thereby severely corrupting the content.

Second, data that consistently arrives too early or too late can cause the buffers in the receiving equipment to overflow or to run dry, both of which can also severely corrupt audio or video sequences. Third, packets that arrive at time intervals different from the time intervals used at the source can create video and audio timing problems at the destination. These latter packet timing errors are known as jitter.

To understand why jitter is a problem, it helps to know a little bit about clocks and MPEG. Inside each MPEG transport stream is a series of data values called the program clock reference, or PCR. These values count the ticks of a 27 MHz clock at the encoder, and are used by the decoder to accurately recreate the video clock in the output. When the packets containing these values are affected by network jitter, then the video clock is no longer accurate and this can result in frozen or dropped video frames.

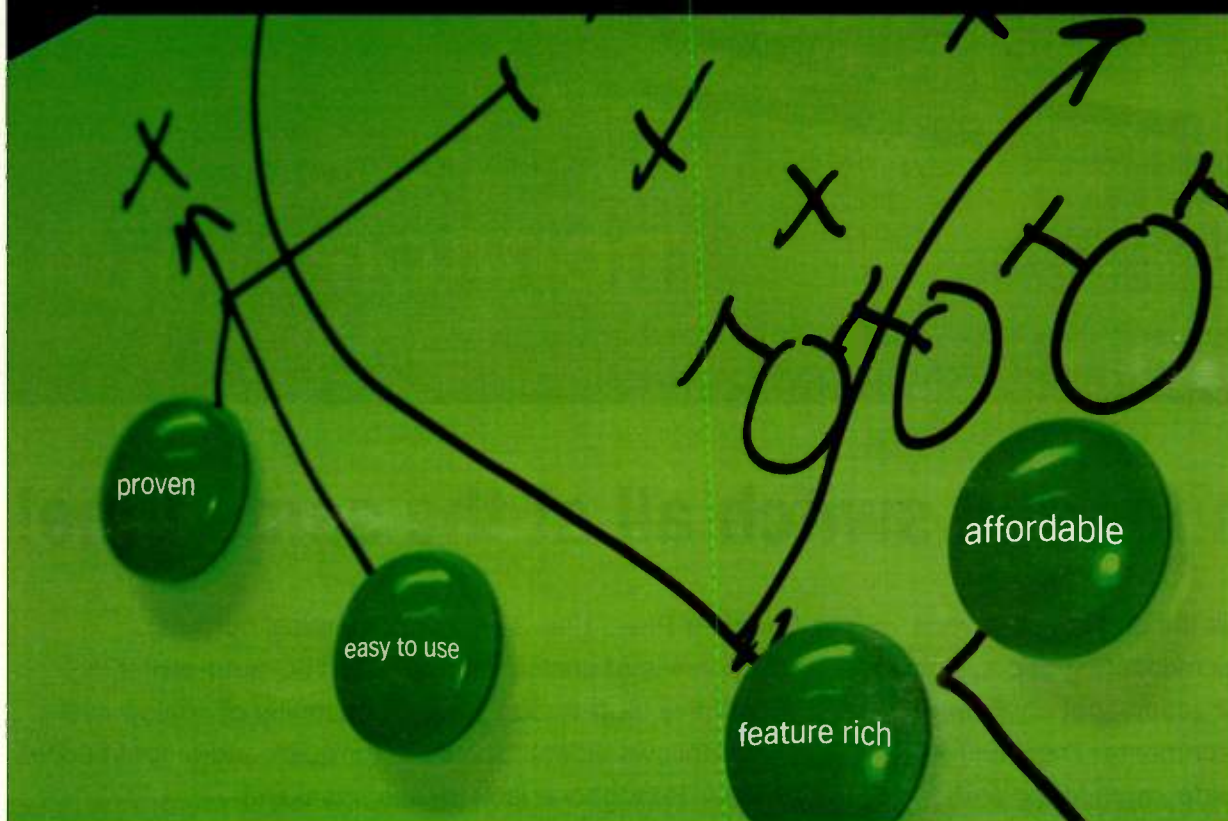
Packet timing errors can be created when packets in a router are forced to wait for other packets to be sent out of the router. This is a very common occurrence—most routers are set up to send out any available packet whenever any output link becomes available. This is good because it allows the link to be fully utilized, but is bad because any packets that have newly arrived in the router are delayed slightly while waiting for the outbound link to free up so they can be sent out. These short delays can add up in a network that consists of several hops, and are a key contributor to packet jitter.

Another source of timing errors occurs when packets from the same stream take different routes through a network. This is fairly rare in most properly engineered networks, when it does happen the destination device needs to sort out the correct order of the packets before creating a video or audio output.

Now that we've discussed the two basic types of packet errors that can occur on IP networks, we need to discuss how we can design a system to work in spite of them. We'll dive into that discussion in the next edition of Video Networking.

Wes Simpson is the author of "Video over IP" and the forthcoming "IPTV and Internet Video," both of which are published by Focal Press. He can be reached at wes.simpson@gmail.com.

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Randy Hoffner

Is Broadcast Television Becoming Less Relevant?

Now that I have your attention, I don't really think that broadcast television is becoming less relevant. Recent developments do, I think, call for a closer look at how HDTV is, or is not, being used by broadcasters in the digital television broadcasting age. Nor are broadcasters solely to blame for the situation in which we find HDTV in early 2007. There is plenty of blame to go around, but HDTV is a vital component in the survival of broadcast television, and broadcasters would do well to realize it while there is time to fix it.

A year-end piece in The New York Times listed HDTV as one-third of "The Hat Trick That Didn't Happen" in 2006. Indeed, it looked like 2006 would be HDTV's year, with flat-panel displays selling like hot cakes and the introduction of HD DVDs.

However, some cold water got thrown onto this vision with the results of a late 2006 survey by Frank Magid and Associates. The Magid survey reports that of people buying the new flat-panel displays, the number anticipating watching television shows in high definition has precipitously declined, from 63 percent two years ago to 47 percent at the time of the survey.

Further, of those who are now shopping for HDTV sets, only 25 percent say that their main reason for doing so is to watch programs in HD; nearly half of those who already own HDTV sets report that this was their main reason for buying a set.

What are buyers expecting to do with their HDTV sets, and what is causing them to eschew HDTV programming? According to the Magid study, some new buyers use their new displays to watch DVDs, and others are using them to play games.

NO BIG HD DEAL

According to the survey, taken in mid-September of 2006, a majority of respondents rated satisfaction with HD programming at seven or less on a scale of one to 10. Some of this dissatisfaction has to do with the fact that, on digital cable tiers, the dozen or so HD channels offered by the typical cable operator are difficult to find, being located in the 600, 700 or 800 channel numbers.

About 30 percent of the HD set owners (which are currently reported to constitute 15 percent of U.S. TV households) have not signed up for HD service with their cable or satel-

lite companies. Some don't wish to pay the perceived or real extra cost: some cable companies charge extra for HD over the cost of the conventional digital tier service, and some do not, but the perception is out there that they do make such

works, who purchase prime time programming at such a high price, must find particularly disturbing. The person in charge of the study stated that the networks have just not done a good job of promoting their HDTV offerings.

A large percentage of display professionals are of the opinion that cable and satellite offer higher quality HDTV signals than broadcasters.

charges. Some don't really know whether they are watching SD or HD.

The person in charge of the Magid study reported that potential buyers are not hearing any word of mouth or "buzz" about HD programming. And most important to broadcasters, many members of the public are simply not aware that the broadcast stations and networks even offer HD programming, a fact that the net-

The reported results of this study are not at variance with some personal experience gained at an annual HDTV conference that has occurred over the past several years. This conference is mounted and largely attended by persons in the high-end display industries, so its attendees are not exactly laymen. Two summers ago, as every year, one of the recurrent themes of presenters was the fact

that potential buyers have too many options, too many remote controls, too many choices to make, and too much confusion about what is available. One speaker summed this situation up by saying, "Guys, we gotta do something about this."

Even more to the point for broadcasters were the results of a poll question asked at this conference two summers ago, to which attendees responded by voting with remote-control type devices. The results were immediately displayed.

One of the poll questions was, "Which service offers the highest-quality HDTV: broadcast, cable, or satellite? I don't remember the precise percentages, but I do remember that broadcast television came in dramatically in third place.

Broadcasters know very well that this is perception, not fact. We know that broadcast HDTV offers the best quality of the three. Yet, a large percentage of display professionals are of the opinion that cable and satellite offer higher quality HDTV signals than broadcasters. This is a perception that is dangerous to broadcasters, and it would behoove them to figure out how to correct it. It would not do for broadcasting to be perceived as a third-tier delivery system as American households move inexorably deeper into the DTV/HDTV milieu. It most especially would not do because it is an inaccurate perception. The message to broadcasters is clear: "Guys, we gotta do something about this."

Randy Hoffner is a veteran TV engineer. He can be reached through TV Technology.

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INSIDE AUDIO

Dave Moulton

What Do We Really Mean by Hi-def?

A couple of months ago, I delivered a public rant about the present-day deficiencies of HD television at a professional audio conference (the Parsons Audio Expo) here in Boston. I ranted about the same things I've been writing about in *TV Technology* for the last six months or so. As I prepared for that rant, it occurred to me that part of the problem we face has to do with the gap between what we production types mean by "high definition" and what our beloved audience expects.

It occurred to me to try, for the purpose of the talk, to come up with a general definition or standard that would work for both parties, so that if we adhered to that standard in our production and transmission efforts, our audiences would have their expectations reasonably fulfilled.

I've already taken you through the sad litany of deficiencies that we experience with the system. I've also noted that we're all contributors to the problem. Us program producers, TV broadcast networks, cable and satellite service providers and viewers all share in enabling the frustrating failure to make HD television viable today.

The gap between the HD television we deliver and the HD television that our viewers perceive lies in the difference in the way we and they think about it. Us production types consider HD to be an objective production definition of a certain level of picture resolution (1,080 lines) and audio (5.1 channels of AAC-treated digital audio).

At the same time, our audience's subjective definition of HD, based in large part on how we've promoted it, is that it is a seamless, engaging, exciting and you-are-there sensory experience equivalent to what they can experience in good movie theaters.



The trick to bridging that gap, I think, is to come up with an overarching

ing objective standard that reasonably encompasses our current objective standards while also giving our viewers what they subjectively desire and expect. After some thought, I came up with a specific minimum resolution standard that I think fills the bill pretty nicely, if we apply it to all aspects of our production. That standard turns out to be surpassingly simple, even modest: all magnitude aspects of production shall be accurate to a resolution of at least 60 dB, or (1,000:1).

Decibels are simply another name

It is not enough to have high resolution some of the time—we need to sustain it for the length of the production.

for ratios. A 1 dB increase in the magnitude of any normal quantity is simply an increase of 12 percent. An increase of 60 dB is a one-thousandfold increase of magnitude (I know I'm skipping

HI-DEF, PAGE 39

ACAP

CONTINUED FROM PAGE 30

has found some subtle differences in the performance of certain ACAP and OCAP devices. This is likely due in some part to implementation choices made by vendors, and changes in the OPAP standard since the original harmonization effort with ATSC. Where updates to the ACAP standard are appropriate, those issues are being logged for future action within ATSC.

The term "interactive television" covers a wide range of applications, including customized news, weather, and traffic information, stock market data, enhanced sports statistics, games, commerce, video-on-demand

and others. There is no shortage of reasons why iTV is viewed with considerable interest. The backdrop for iTV growth comes from both the market strength of the Internet and the technical foundation that supports it. With the rapid adoption of digital video technology in the cable, satellite, and terrestrial broadcasting industries, the stage is set

and others.

for the creation of an iTV segment that introduces to a mass consumer market a whole new range of possibilities. For example, technologies are available that support interactive features for game shows, sports and other programs, interactive advertising, e-mail, and Internet access. Rather than concentrating just on Web services, the goal is to deliver a better television experience.

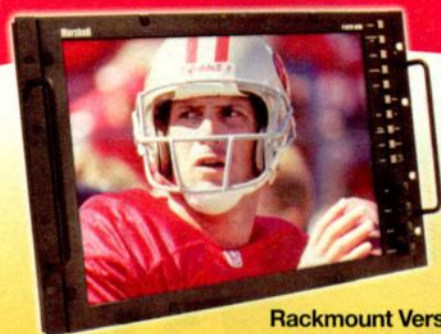
The international aspect of iTV development cannot be overstated. For iTV to be successful, content producers want to build applications that can play on many different platforms without significant modification. The need for iTV application exchange is one reason ACAP incorporated Java and GEM. Java is widely used as a programming language on the Web and in software development. It is based on a virtual machine that can be ported to a wide range of hardware platforms.

For iTV, Java is extended first by JavaTV and then by a set of related standards (MHP, OCAP, and ACAP). The core of these systems is maintained in common—GEM (Globally Executable MHP).

FOR MORE INFO
The ACAP specification can be downloaded at no charge from the ATSC Web site. See: www.atsc.org/standards/a101.html.

Jerry Whitaker is vice president of standards development for the ATSC. You can reach him via *TV Technology*.

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Hi-def

CONTINUED FROM PAGE 38

some important background stuff about dB here—humor me, OK?).

A high-definition picture with 1,080 lines slightly exceeds that 60 dB specification. An audio channel with a frequency response of 20 Hz to 20 kHz. (1,000:1) and a signal-to-noise ratio of more than 60 dB also meets that specification.

So, we can say that our current visual and sonic HD specifications, when we meet them, satisfy my 60 dB standard. The problem is, we don't meet them very consistently, and that's where the audience's expectation is thwarted. So let's consider the implication of a 60 dB or 1,000:1 or 99.9 percent resolution for the magnitude of time. What would it mean?

ALL THE TIME

It would mean that we would have to meet our picture and audio standards 99.9 percent of the time, or for approximately 59 minutes and 56 seconds out of each hour. We could have a total time error of no more than 3.6 seconds (one-thousandth of an hour). At present, we're miles away from that level of consistency over time, especially in broadcasting.

Consider the problem of lip-sync error. To meet our 3.6 second-per-hour error budget, we could have only 10 seconds worth of 10-frame (ca. 330 ms.) lip-sync error, if everything else was perfect. We could be off by one frame for 100 seconds, or about a minute-and-a-half for every hour.

Right now, my guess is that the average lip-sync error, full time, is greater than one frame (which we regard as unperceivable—and that's the point, after all) or approximately 3.3 percent, 33 times the 60 dB standard of .1 percent.

So, just the current lip-sync error would use up all of our time-error budget and then some, just for a trivial audio problem. That means we would have to have zero time tolerance for picture tiling or other signal resolution artifacts/errors.

And that, campers, is what high resolution really means: very few errors, very little of the time.

Unfortunately, the transmission chain and the various cable/satellite service providers add to the problem. DirecTV, for instance, takes about five seconds to change channels (with particularly unpleasant audio artifacts during the change), which definitely isn't HD. It uses up all of our time-error budget just to select a new signal.

Also, there are similar, ongoing audible time errors and corrections during program transitions on several network feeds. These just make it worse. As I said, we are a long way away from being able to sustain HD for any reasonable

length of time, certainly not a length of time that could qualify as HD time.

As I described earlier, we have led our audiences to expect an extremely life-like and realistic sensory experience. I called it seamless, engaging, exciting—you-are-there. I think it's the seamless aspect that gets us here. Every time there is a perceivable error, it distracts us from that experience and reminds our audience that this is only

an illusion, definitely not the real thing. It is not enough to have high resolution some of the time—we need to sustain it for the length of the production.

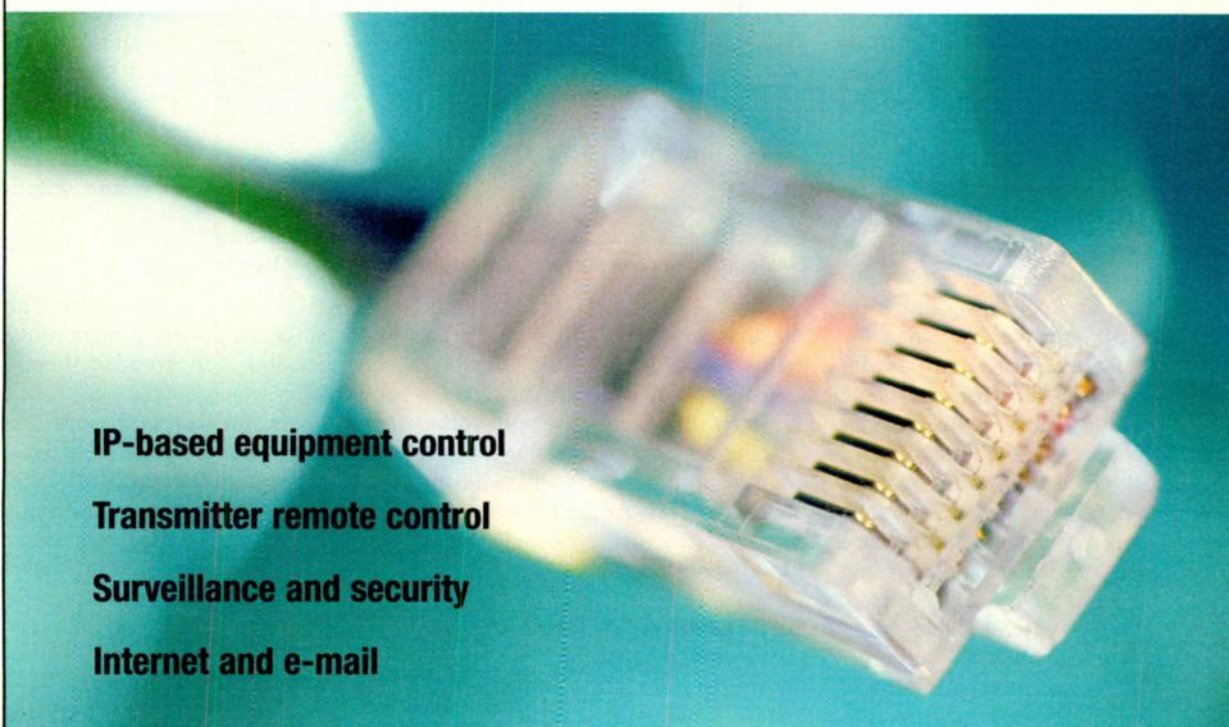
Hence my suggested 60 dB standard. No error shall be greater than .1 percent or for more than .1 percent of the time. If and when we can deliver this to our viewers (as we mostly do with the DVDs that we rent or sell to them), they will almost certainly find

the experience to be seamless and exciting. They also may very well feel drawn in to the production to a point where, well, they are there. Ah, truth in advertising. It's a beautiful thing!

Thanks for listening.

Dave Moulton is, as always, 6 dB short of a full scale. You can complain to him about anything at his Web site, www.moultonlabs.com.

IP network connection...



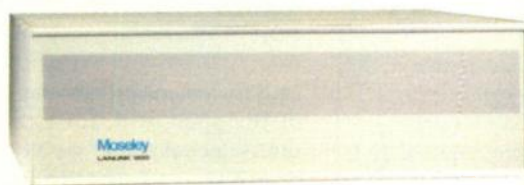
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USER REPORT

Link Research Scores at Super Bowl XLI

by Kurt Heitmann
Vice President of Sales and Marketing
CP Communications

NEW YORK

CP Communications specializes in the rental of state-of-the-art production communications equipment. This ranges from simple walkie-talkies to wireless microphones and wireless intercoms, and now the very latest high definition wireless camera systems.

My role in the company is to evaluate new technologies, making sure they work properly and seeing how well they fit in with the other work that CP is doing. This past year, we've been looking mainly at fiber optics and HD systems.

When I joined CP Communications seven years ago, they were primarily a rental company for radio and wireless mics. Since I've been with the company, they've branched out and expanded into complete audio systems, wireless cameras and wireless video. We currently own 10 wireless video systems. Most of these are from Link, and our latest purchases included two LinkHD systems.



Link-equipped cameras ready for action at the Super Bowl

CP has worked on some great events including X Games, Olympics, football, hockey and baseball games—all very visible events. We're involved in some level on every major sporting event held in the U.S. We've just completed the NFL AFC Championship game for CBS, using a Steadicam rig and a handheld.

SYSTEMS AT SUPER BOWL

We've also just put the wraps on the grand daddy of them all, Super Bowl XLI, where we had five systems. Two of these were

used on the pre-game set in the parking lot and then they went inside for game coverage. We already had the other three systems inside the stadium for coverage in the runways and stands, and of course, on the playing field.

We brought back all of the 2 GHz camera signals on fiber and then decoded them in our trailer, which doubles as a base of operations and technical work area. From there we distributed the signals to the CBS mobile units in 1080i video via fiber. The show was a huge success for us in terms of coverage area and video signal quality and we were very pleased with the overall system performance.

HD PERFORMANCE

We've owned four LinkSD systems for some time now and we

have been very happy with them. Because of that, and thanks to the good customer support we've received from Link Research, we chose to stay with the Link technology when we went to high definition. So, we now own two complete LinkHD transmit-and-receive systems with camera control. The Link wireless HD system is one of the most popular products in our inventory being used for sports production right now.

The Link systems are very easy to use and they come nicely packaged. I might mention that we mount the transmitter on the handheld cameras a little differently to the way they were designed to go, but that's what suits us best! It is all going very well for us with the wireless cameras and we've had a great start to 2007.

Kurt Heitmann is vice president of sales and marketing for CP Communications in New York. He may be contacted at kurt@cpcomms.com.

For additional information, contact Link Research at 978-671-5700 or visit www.linkres.co.uk.

USER REPORT

WTSP Relies on Frontline News Vehicles

by Eric Burks
News Operations Manager
WTSP

ST. PETERSBURG, FLA.

WTSP has been around for more than 40 years, first going on the air in July 1965 as WLCY. It's now the CBS affiliate for the Tampa Bay area and is owned and operated by the Gannett Co.

We're no stranger to Gulf storms, and with the hurricane activity of the last few years, particularly in 2004 and 2005, we've been keenly aware of the vulnerability of our community and our facility to storms. In the event of severe weather, traditional means of ENG become unusable as winds damage or



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NOT JUST FOR STORMS

Satellite trucks are not just about storm coverage, even though we've been through more of these than I

care to remember. On the other end of the spectrum, for example, on many occasions, we've been to Daytona and the International Speedway there to cover NASCAR races. Our truck just wrapped up a stint in Miami, covering the Super Bowl, where it served as a platform for three of the Gannett stations. After some routine maintenance, it went back to Miami to cover a local high-profile murder case that was moved from our area because of pretrial publicity.

As with most every television station now, ENG and satellite trucks are a way of life. Each of the vehicles in our fleet averages more than 25,000 miles per year and they have to be dependable.

We shopped around a bit before set-

ting on Frontline Communications to provide our current SNV truck, taking delivery back in 1994.

A SECOND TRUCK

For some time, we've realized the value of having a second satellite truck, as it would instantly double our capacity to reach viewers in times of storms and other emergencies when they rely upon us most. This year, that second truck will become a reality. Gannett considered individual station's requests for new ENG or DSNG vehicles this capital budget year and negotiated with Frontline directly for the entire group. Frontline's package of industry-leading products and competitive pricing

FRONTLINE, PAGE 45

Nucomm



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USER REPORT

Moseley Microwave Relays 'Bash' Aerials

by Robert Gunter

President

Island Century Media

MIAMI BEACH, FLA.

Island Century Media, a provider of high definition aerial camera systems, was invited to join the Fox Sports Show, "Best Damn Superbowl Bash," on Miami's South Beach for the perennial celebration of the NFL's best teams.

Our task was to provide a microwave feed from the camera-carrying aircraft to the production truck for the producer and director to use along with the other cameras on the show. In planning our aerial camera support, the production team noted that they would like the coverage to be in 1080i high-definition format. When providing a live high-definition wireless camera that will be integrated with other cabled cameras, image quality and minimal delay are key factors.

Our solution for this transmission path was a 45 Mbps 6.5 GHz microwave link, as it provides a large pathway for the encoded video. The

transmission link has to be very robust and capable of adjusting for multipath and variations in signal strength so common with the RF congestion in dense urban environments. Also, the system needed to be component-based, to allow for upgrades along the way.

HIGH BIT-RATE: GOOD HD

The microwave gear that we chose was Moseley's Event HD-6500 transmitter and receiver. Our past experience with these products indicated that they would handle the job of transmitting our HD images with a very high-encoded bit-rate.

The Moseley radios are a pleasure to use, and the setup and configurations are straightforward, giving the camera operator and engineers confidence that the transmission link is going to be dependable. With the Moseley transmitter we can encode the ASI stream at 45 Mbps and enjoy a very stable transmission path.

When we first tested the system in place, our aerial coverage was outstanding. We used a manned directional antenna on the ground and an omni-



The Moseley Associates Event HD microwave package.

directional antenna on the aircraft. We had freedom to travel over a large area of South Beach, providing many beautiful shots of the surrounding beaches and skylines. Sean Kelley, tech manager for Fox Sports, reported that the pictures we provided during the week were all excellent.

NO ISSUES WITH GEAR

During a full week of production with more than 20 hours of logged flight time, we never experienced any issues with the transmission gear; the Moseley gear just kept on working. Our services provide a very unique point of

view, and one that is ever more in demand. With our ability to transmit excellent quality images with low delay, production teams just can't get enough.

Our secret is simple—effective operation of the microwave equipment and solid support from the manufacturer. Sunil Naik, director of engineering at Moseley, has been very helpful, providing his keen insight and possessing a thorough understanding of our requirements. Throughout the planning and deployment of our system, his guidance was fundamental to our success. With Moseley, the end result was a wireless link that's very easy to operate and one that provides exceptional performance.

With the complexity of high definition, it's great to know that when you arrive you have a reliable microwave transmission system ready to go.

Robert Gunter is president of Island Century Media. He may be contacted at rob@icm4hd.com.

For additional information, contact Moseley Associates at 805-968-9621 or visit www.moseleysb.com.

USER REPORT

RF Central Makes a Difference in Memphis

by David Evans

Director of Engineering

WMC-TV

MEMPHIS, TENN.

Any urban area presents unique challenges to ENG and broadcasters, and downtown Memphis is no different. WMC-TV has always struggled with this demanding environment. Certain areas of the city were just difficult, and other parts were impossible to get a live shot from at all.

This led us to RF Central. We traveled to their Carlisle, Pa. facility to observe their diversity receive system in use. The system is made up of the RFX-RMR-X6 (six-way diversity receiver) and the RFX-PHT (portable high-power transmitter). We came away very impressed with the capabilities and possibilities that the system offered. As a result, we purchased the entire diversity receive system for our downtown hub location, along with a 13 GHz digital (RFX-13GL) backhaul link to go from the hub back to our studio. We also bought RFX-CMT (camera-mount transmitter) units and rack



David Evans and one of the WMC-TV news vehicles

mounted HPAs (RFX-RMAC) for our trucks. We chose the split system so that we could mount the CMT directly onto the photographer's camera and go completely wireless. We have a camera swivel mounted to the front window allowing us to shoot from both inside and outside the vehicles to get live moving shots in times of severe weather. We wanted to make the trucks both simple to operate and to have as much capability as possible.

FANTASTIC INSTALLATION

The complete receive system was installed by an RF Central team led by

Jim Malone and Jeff Daubert. Antennas paired on dual mounts were installed on the outside edge of the elevator shack atop the Memphis 33-story SunTrust Bank building. The RF Central team installed the system quickly and professionally. The six fan-beam antennas provide 360 degree coverage around the building and each antenna has approximately 140 degrees of beamwidth, so there's plenty of overlap. Back at the studio, they installed software allowing us to remotely control the receiver's channel switching and selectively turn off antennas in order to isolate interference from co-channel transmitters. As an added benefit, when we replace the 2 GHz radio in our helicopter, this site will become an auto-tracking receive site for the chopper.

RF Central's team also installed a Trango broadband wireless link to give us control of the receiver, as we wanted to have digital capability while keeping our old analog system operational. Quite honestly, we were being very cautious

with the new technology. The Trango equipment now gives us the capability to use that link (which operates at 40 Mbps) to bring back pictures from an IP camera installed at the bank building. We've also linked our new radar site with another 10 Mbps Trango wireless Ethernet bridge.

Thanks to RF Central's diversity receive system, what was once our toughest area for live shots is now our easiest. Our newly equipped trucks are able to go live while moving downtown and from anywhere in a five to seven mile radius around Memphis. The diversity receiver is ideal for the heavy multipath environment here, and has performed beyond our expectations. Our photographers and talent have both fallen in love with the ease and speed with which they can do live shots.

David Evans is currently the director of engineering at WMC-TV in Memphis. He may be contacted at devans@wmctv.com.

For additional information, contact RF Central at 717-249-4900 or visit www.rfcentral.com.

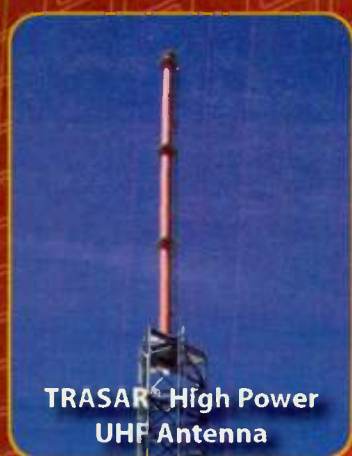
The Reference Guide is a selected sampling of current products. Specifications and prices are supplied by the manufacturer and are subject to change without notice.

REFERENCE GUIDE

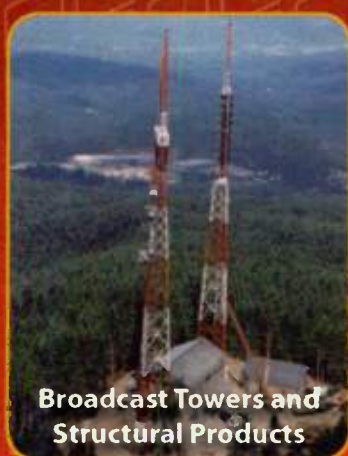
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IRTE (011) 39-0331-797 286 www.irte.it	Digilink	2.4 or 7 GHz	Analog and digital	+30 dBm	1 RU, 11 lbs.	CVBS, SDI in, on board MPEG codec, freq./space diversity,
Link Research 978-671-5700 www.linkres.co.uk	LinkXP; LinkHD	1.95-2.7 GHz; 3.4-3.58 GHz; 6.642-7.125 GHz	Digital	100 mW; 50 mW; 10 mW	4.7 x 2.4 x 8.1 inches 2.2 lbs.	COFDM reverse video, vehicle on-boards and other accessories available
Microwave Radio Communications 978-671-5700 www.mrcbroadcast.com	PTX-PRO	1.99-2.5 GHz; 2.3-2.7 GHz; 6.4-7.1 GHz	Analog and digital	Depends on digital modulation selected	9.25 x 4 x 12 inches 11 lbs.	Portable, mobile, or airborne applications
Nucomm 908-852-3700 www.nucomm.com	GoPac2	2-2.5 GHz; 6.5-7.2 GHz	Digital, COFDM	8 Watts	6.8 x 15 x 17 inches 10.8 lbs.	Multifunctional COFDM transmission system
RF Central 717-249-4900 www.rfcentral.com	RFX-DML	2, 7, 13, 18 and 23 GHz. Others available.	Digital	2 Watts (frequency/modulation dependant)	IDU: 1 RU ODU: 4.5 x 12 inches	Modular platform allows analog, ASI or SDI inputs and offers signal muxing

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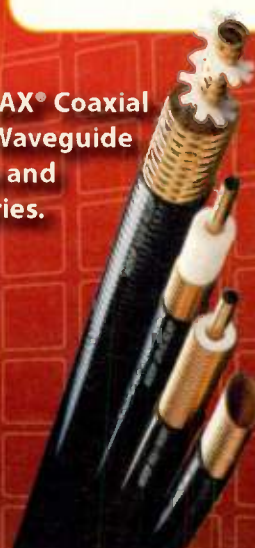
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USER REPORT

IsoTropic Uplinks With 9.5-Meter Patriot

by Lynn Salisbury
President
IsoTropic Networks Inc.

GENEVA, WIS.

I look for the best in everything. That's my attitude and that was the criteria when we began the search for a large aperture antenna with which to transmit our new iDirect Ku-band shared access service. IsoTropic Networks has long been an SCPC provider to multinational corporations in the Americas and believed it was time to host our own shared access network.

NO FINGER POINTING

Critical importance for the antenna decision was turnkey delivery from a manufacturer who was willing to take responsibility for the entire project. All too often you run into finger pointing and pride of authorship when it comes to a project involving



The Patriot Antenna Systems installed at the IsoTropic teleport in Geneva, Wis.

multiple vendors.

Patriot Antenna was willing to take on this project; however, a decision like this does not come lightly, so we went to the factory and witnessed the close manufacturing tolerances, accurate surface contours, the large hub and the experience of their design and build team. Based on what we observed, we were sold, and once the antenna was installed and operational,

we couldn't have been more pleased with the outcome.

Patriot took responsibility for the antenna, including integration, deicing, tracking control system and final turn-up in conjunction with the satellite owner. Never before have we witnessed a group of people so dedicated to the premier performance of a product and unparalleled satisfaction of their customer.

The Patriot 9.5-meter antenna is a first for them and also a first for us. Since installing the new antenna, operations at IsoTropic Networks have become extremely efficient. The four-port feed allows us to perform our own cross-pol testing, significantly enhancing our ability to activate remotes in a timely manner. This alone is a considerable competitive advantage in the shared access business.

With the installation of the antenna, IsoTropic has realized the primary benefits of lower capital outlay, easy migration to new technology, potential lower

cost of bandwidth for dollars spent, lessened strain on the in-house engineering staff—and from a more practical point of view—we did not need to enter into multiple contracts with various vendors. IsoTropic and Patriot got to know each other very well during the course of this project. The single point of contact with immediate answers allowed IsoTropic to acquire and deploy a significant network in a very short period of time.

The greatest testimonial to both of our companies is the philosophy of people, product, and service. This has greatly enhanced the prospects of our continuing and future success.

Lynn Salisbury is president of IsoTropic Networks Inc., a Global provider of satellite communications services located in Lake Geneva, Wis. He may be contacted at lynn@isosat.net.

For additional information, contact Patriot Antenna Systems at 800-470-3510 or visit www.sepatriot.com.

USER REPORT

Nucomm Relays Parade of Sail for WRAL

by Peter Sockett
Chief Engineer
WRAL-TV and WRAL-DT

RALEIGH, N.C.

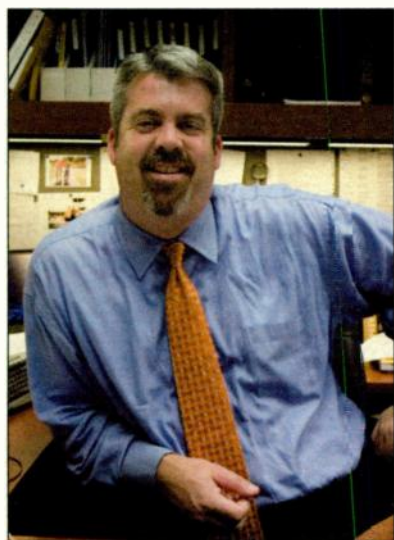
June 30 through July 5, 2006 was an exciting time for the historic town of Beaufort, N.C., when 12 tall sailing ships gathered along the coast there.

The WRAL Parade of Sail was the highlight of that weekend, when the ships sailed into the Beaufort harbor. We covered the entire two hour event in HD, airing programming on our own channel and Web site as well as on University of North Carolina public television stations.

Providing HD coverage of a live, moving event—especially one occurring over water—proved a challenge for the WRAL technical crew. Fortunately, we were able to draw upon Nucomm's new Campac2 Wireless Camera Transmitter and Newscaster DR Diversity Receiver to deliver outstanding HD camera feeds as the event unfolded.

FIVE LINKS

We required five live microwave feeds for the HD cameras. One was



Peter Sockett

positioned at Fort Macon, another was on a schooner, a third was located in a chase boat, a fourth transmitted from the Beaufort waterfront and the remaining link was with the WRAL Sky5 helicopter. The Fort Macon and two waterborne links used Nucomm Campac 2 camera-mount microwave transmitters, while the helicopter and waterfront used Channel Master TX1s and external JVC HD encoding.

The star of the show was the Campac 2 transmitter, which includes an integrated MPEG-2 HD encoder and variable bandwidth COFDM modulator. The transmitters were set up to occupy 16 Mhz of spectrum and this wide-bandwidth COFDM enabled us to transport and deliver 36 Mbps HD video using 16-QAM COFDM modulation.

Path links for the Campac 2 systems ranged from one-tenth of a mile to more than three miles. Despite limitations on antenna heights for the boat-based camera links and reflections, the Campac 2 systems set for 200 mW output provided near flawless video.

SINGLE RECEIVE ANTENNA

We established a single quad sector receive antenna system at our remote truck and satellite uplink site to capture the three live Campac 2 HD feeds simultaneously. We used LNAs and splitters to feed the Quad-Sector diversity receive antenna output to three Nucomm Newscaster DR diversity receivers on 2 GHz RF channels 2, 3 and 4. (This proved that adjacency should not be an issue after the BAS relocation).

The Newscaster DR quad-diversity

demodulators effectively combined the received energy from the four-sector antenna using maximum ratio combining. This technology lowers receive thresholds and provides amazing results, particularly at the higher orders of modulation such as 16- and 64-QAM. In addition, the Nucomm Campac2 has excellent RF characteristics with spectral re-growth in the 40 dB area and a modulation error rate greater than 30 dB, which is essential for high data rate HD transmission. During our test shots, we found the ideal height for the antenna was about 30 feet above the water.

As we move closer to the all-digital age, the ability to provide high data rate HD special event coverage is critical to WRAL. Using the Campac 2, Newscaster DR, and other microwave products from Nucomm, WRAL provided flawless live high-quality HD coverage of the 2006 WRAL Parade of Sail.

Peter Sockett is the chief engineer for WRAL-TV/DT and WILM television. He may be contacted at PSockett@wral.com.

For additional information, contact Nucomm Inc. at 800-968-2666 or visit www.nucomm.com.

BUYERS BRIEFS

The NuPod from N Systems Inc. is an automatic antenna system specifically designed for mobile operations.

The antenna reduces setup time by automatically aligning itself with the receive location. The unit provides automatic tracking in airborne applications and features high gain and a narrow azimuth beamwidth.

The NuPod is equipped with a low profile radome. A rotary-joint RF system allows panning without limits and also provides a higher rate pan than with traditional pan/tilt systems.

For additional information, contact N Systems Inc. at 410-964-8044 or visit www.nsystems.com.

The Codico E-1800 from Scopus Video Networks is a high-definition MPEG encoder for use in cable, satellite and telco applications.

The unit supports both 4:2:2 and 4:2:0 encoding for 720p and 1080i video, as well as for 480p. The E-1800 has a built-in color bar test signal and occupies 1 RU of space.

Up to five stereo audio pairs can be accommodated by the encoder and audio may be either AES/EBU or analog, and can be delivered either via balanced or unbalanced lines.

Encoding rates of up to 45 Mbps are supported. Control is accom-

plished via a 24-button keypad.

For additional information, contact Scopus Video Networks at 609-987-8090 or visit www.scopus.net.

The Advantage Series from Shook Mobile Technology are fully self-con-

tained mobile electronics platforms for outside broadcast and SNG purposes.

The vehicles are designed to provide an operational life of 15 to 20 years and are constructed with stainless steel belly boxes, belly-box doors and hardware to resist corrosion

from highway salt. Shook provides a three-year structural warranty against defects in material and workmanship.

For additional information, contact Shook Mobile Technology at 888-651-5775 or visit www.shook-usa.com.



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Frontline

CONTINUED FROM PAGE 40

won the bid.

We'll be taking delivery of our new DSNV van after the NAB2007 and are already counting the days and weeks until the new vehicle will be rolling into our parking lot.

Right now, in the event of a major news event—such as the deadly Lake County Florida tornado—we rely on First Coast News, our sister station in Jacksonville for deployment of their truck. It's a nice feeling knowing that very soon we'll have truck number two and this won't be necessary anymore.

The addition of the new DSNV van from Frontline will make a perfect companion for Star 10, our existing and very trustworthy satellite truck, and also to our existing fleet of vehicles, all supplied by Frontline.

Eric Burks is news operations manager for channel 10, WTSP, in Tampa-St. Petersburg, Fla. He may be contacted at eburks@tampabay10.com.

For additional information, contact Frontline Communications at 727-573-0400 or visit www.frontlinecomm.com.

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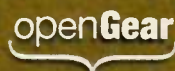
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USER REPORT

PSSI Global Services Encodes With Tiernan

by Brian Nelles
Senior Vice President
PSSI Global Services LLC

LAS VEGAS

PSSI Global Services LLC is one of the country's largest mobile satellite uplink providers, with 22 Ku-band, C-band, and international flyaway systems. Our clients consistently look to us for technical solutions to their satellite communications needs. To help us with those hardware solutions, we must partner with companies who understand the demands of working in a live television environment, which comes hand-in-hand with the satellite communications industry.

STARTED WITH MPEG-2

Our relationship with Tiernan Communications division of the Raydyne Corp. started when MPEG-2 digital transmissions began to gain popularity as a means to backhaul news, sports and entertainment programming. Our search at the time for a manufacturer to supply us with our

first digital encoding equipment led us to Tiernan Communications.

Several factors went into that original decision, including reliability, ruggedness, ease of use, service and support, and of course, price. Tiernan met those original requirements and still does today.

We deploy Tiernan encoders and decoders for many of our customers, including point-to-multipoint encryption services for pay per view and corporate events, utilizing the Tiernan PGCA conditional access system. The Tiernan PGCA system allows our staff at the origination point to control the access of programs to certain decoders by embedding the decoder addresses in the transport stream. Having this control at the uplink takes away a layer of operator error when entering authorization codes at various distribution headends. It also makes it more difficult to compromise security of the transmission via "leaks" of the authorization code. We also utilize BISS E conditional access systems with our Tiernan encoders as another secure choice for our clients.

As the industry has switched focus



Brian Nelles with Tiernan encoding equipment

from standard definition to high definition programming, we again looked to Tiernan Communications as a provider of HD encoding and decoding equipment. Our HE4000 encoders provide simultaneous encoding of SD/HD feeds into one MCPC transport stream, all contained in 2 RU. This allows us and other networks to deliver SD and HD content in one transport stream and on one transponder, thus reducing operating expenses.

48 AUDIO CHANNELS

A recent example of our working relationship with Tiernan Communications involved a request from a client to distribute 48 audio

channels from different remote locations throughout the year. Our engineering team, with the support of Tiernan Communications, deployed a system for NASCAR Images, which carries 48 channels of racing team communications to licensed end users.

Service is our number one goal with our customers, and we are therefore very concerned when we commit large amounts of capital towards equipment purchases to support our customer's needs. The customer service and support that we receive from Tiernan, along with their focus on technology and their willingness to listen to their clients' needs, is the reason we have purchased some 50 SD and HD and more than 140 decoders in recent years.

Brian Nelles is a senior vice president and partner at PSSI Global Services LLC. He may be contacted at bnelles@pssiglobal.com.

For additional information, contact the Tiernan Communications division of Raydyne Corp. at 858-805-7000 or visit www.tiernan.com.

USER REPORT

QNI Multitasks With Telemetrics Robotics

by Brady W. Dreasler
Director of Engineering, Capitol and Facilities
Quincy Newspapers Inc.

QUINCY, ILL.

The role of a broadcast facility director of engineering has probably never been confined to overseeing technology operations, and my position at Quincy Newspapers Inc. is no different in this respect. QNI is a family-owned group with 12 television stations, two newspapers, two radio stations and a video production company.

Along with the traditional technology responsibilities, I'm also charged with capital budgets and facilities and am expected to contribute to the quality and ongoing improvement of the product we offer. Telemetrics robotics systems have played a part in all of these areas and have helped QNI achieve our goals.

GOOD HELP HARD TO FIND

We were having problems in recruiting and retaining a competent crew for

early morning programming at WREX-TV, our NBC affiliate station, in Rockford, Ill. Competitive wage offers and other incentives proved to be ineffective. And even when we were successful in finding staff, the early morning start time of 5 a.m. often led to production miscues by a sleepy

operator, or the crew showing up late or not at all. We finally solved this problem by installing a Telemetrics robotics camera control system. Servo pan-and-tilt units were installed on tripods, providing adjustable, camera operator-like moves and programmable operation.

When QNI acquired five additional stations, one of our priorities was to implement Telemetrics. We've since outfitted several of our television stations. Along with reducing labor costs, the production quality has improved due to the consistency provided by the system's pre-programmed shot capability.

In the beginning it was a little rocky,



Telemetrics robotic head

but now if you ask our directors, they say they wouldn't go back to the old way. The same is true of the on-camera talent.

The control panel features dual proportional joysticks for pan/tilt and zoom/focus control. Up to eight cameras can be controlled with pre-programmable shots and we can also interface camera manufacturer's control panels.

We've taken the notion of remote robotic control a step further in two of our facilities by setting up studios at newspaper offices and bureaus. This approach helps our local newsgathering capability and has generated a strategic relationship with the newspaper. These newspaper studios are IP-connected with the television station where the camera control is done. The system makes it easy for reporters to quickly get on-air. They need only to clip on a microphone and fit their earpieces and

they're ready.

During the past six years, as we've continued to add robotics devices to our studios, we've looked at competitive products, but each time came back to Telemetrics. The Telemetrics product is rock solid. While it can be more expensive, it's still at a competitive price point. We've had consistent performance from Telemetrics, and very few operational or maintenance problems. Telemetrics, along with our systems integrator, Alpha Video of Minneapolis, have provided us with comprehensive control capabilities that have solved labor issues, kept our financial commitment to a reasonable level and provided the impetus for us to develop new and creative ways to deliver programming.

Brady W. Dreasler is director of engineering, capitol and facilities for Quincy Newspapers Inc. He may be contacted at bdreasler@qni.biz.

For additional information, contact Telemetrics Inc. at 201-848-9818 or visit www.telemetricsinc.com.

BUYERS BRIEFS

The Carry-Coder II from **Broadcast Microwave Services Inc.** is a portable COFDM transmitter for wireless television camera applications. It can be mounted directly on the back of a professional camera and is also supplied in a backpack version.

The unit has a 1 W power output and can provide non line-of-site linkage. The digital COFDM signal is resistant to multipath degradation and latency is less than 90 ms.

Audio, video and user-defined data can be transmitted with the Carry-Coder II. Models are available for use in the 2, 4 and 6 GHz microwave bands. The unit operates with DC input voltages between 11 and 32 V and weighs 5.5 pounds.

Options include a backpack, 10 W amplifier, battery mounts and antennas.

For additional information, contact Broadcast Microwave Systems, Inc. at 800-669-9667 or visit www.bms-inc.com.

The PRO-X1 from **Complex Corp.** is a camera adapter system for use with miniDV camcorders. It provides transmission of video, audio and tally functions to and from the camcorder and a remotely located console unit. It also serves as a power source for the camera.

The PRO-X1 works with either a single coaxial cable or triax, and can operate at distances up to 3,000 feet. It allows the camcorder to be used as a live production camera.

The console unit provided includes intercom functionality and has audio/video breakout connections.

For additional information, contact Complex Corp. at 620-342-7743 or visit www.complex.com.

The PAL2HLS14 from **Global Microwave Systems** is a microwave power amplifier specially designed for use in COFDM applications.

The amplifier operates between 1.7 and 1.85 GHz and has a power output specified at 40 W (P1dB), useful to 15 W with COFDM.

Input voltage may range from 12 to 13.5 VDC. Current drawn in operation is 11 A with a 12 V input. SMA-F connectors are used for the 50 ohm RF input and output connections and the amplifier VSWR figure is 1.5:1.

The PAL2HLS14 weighs less than 5.25 pounds and occupies a space of less than 24 cubic inches. The unit has a built-in linearizer and provides a gain of 56 dB.

For additional information, contact Global Microwave Systems at 760-496-0055 or visit www.gmsinc.com.

full range of microwave band switches. It is a single-pole, single-throw switch designed for use in the 1-18 GHz frequency range.

The N128B offers 60 dB of isolation and has an insertion loss of 3.2 dB. The switch presents a maximum

VSWR of 2:1 and draws 35 mA of current in operation.

Microwave switches from Miteq are available in several configurations for single- and multiple-throw requirements, with TTL or current switching control and with rise times of up to 2

ns. The switches are capable of handling up to 20 dBm with full performance and up to 30 dBm with no damage.

For additional information, contact Miteq at 631-436-7400 or visit www.miteq.com.

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The N128B from Miteq is one of a

USER REPORT

RTM Grows with Tandberg Encoding

by Robert Dutcher

President

RTM Remote Transmission Management

FRESNO, CALIF.

In 2003, I noticed that there were a growing number of HD production trucks and a lack of remote HD transmission facilities. This was the basis for the new niche company that I started, RTM Remote Transmission Management. The company provides HD encoders, decoders and onsite encoding services to networks for live sports and special events. Since our April 2003 inaugural Sunday Night Baseball transmission for ESPN-HD, RTM has provided encoding services or encoder rentals for more than 1,000 live events for everyone from ESPN and Fox to ABC, NBC, HBO—all with Tandberg Television encoders.

EASE OF USE

I had experience with Tandberg standard-definition encoders from several previous transmission projects and knew the quality and service the



One of the Tandberg Television encoder packages used by RTM Remote Transmission Management

company provided. We started with two legacy 5821 encoders and one technician—me. Now, four years later, we've upgraded to more than 20 E5788 series HD encoders, several staff techs and a network of quality freelancers.

As we use freelancers, ease of use is one of the main concerns in our selection. The 5788's menu structure makes training easy. Whether we're using the front panel or the Web browser interface, we can load configurations or change parameters in seconds. One of the convenient features

is the ability to upload and download configurations via a notebook and its Web browser. The encoder stores 16 profiles. However, with so many clients and so many MPEG settings, it is extremely helpful to store profiles on a laptop. This provides easy setup and ensures that all equipment has the right configuration.

The 5788 has an internal IF output that allows us to transmit either over satellite or to take one of its three ASI outputs to fiber. There are several options available with the units—one of these is an extra audio option card. We have found that this is extremely useful for clients who want to support more than four channels of audio and don't want to use Dolby E.

The 5788's 2 RU size makes it perfect for our remote kits. We package the encoder along with Tandberg's 1282 HD receiver/decoder in 4 RU kits with one rack unit to spare.

TANDBERG MEASURES UP

The true measure of Tandberg encoders is how well they withstand travel and less than ideal operating conditions. Our encoders easily log

100,000 flight miles a year, and temperatures at operating locations have ranged from -11 to 111 degrees. The equipment has held up far better than we could have imagined.

Although the need for service and support is infrequent, nonworking equipment is lost revenue. We have a Gold service contract with Tandberg that includes cold spares and advance exchange on equipment that needs repair. There's also a 24-hour Customer Support Network Operations Center.

Whether it's the Super Bowl, Academy Awards, or just one of dozens of live college events throughout the week, the true testament to Tandberg's quality and reliability of their HD encoders is that our clients, the networks, continue to request services utilizing Tandberg 5782 and 5788 encoders.

Robert Dutcher is the president of RTM Remote Transmission Management. He may be contacted at robert@rtmhd.com.

For additional information, contact Tandberg Television at 678-812-6300 or visit www.tandbergtv.com.

USER REPORT

WCVB-TV Gives MRC Receiver High Marks

by Rick Zach

Chief Engineer

WCVB-TV

BOSTON

WCVB-TV has been an early player in digital broadcast technology. Placing the safest bets often requires working with manufacturers to test and evaluate new products. MRC is one of those manufacturers. When they told us about their new MDR-2 portable diversity digital microwave receiver, we were very interested in deploying the unit to see what it could do. The results exceeded our expectations.

ENG operations here include five remote receive sites accessible from our studio in Needham, Mass. All five sites include steerable antennas requiring operator intervention to track the trucks or the helicopter. Our ENG trucks and our helicopter have been equipped with MRC COFDM transmitters since 1999, giving our operators a great deal of experience in getting digital signals back



WCVB-TV's MRC omnidirectional receive system is installed on a 100-foot tower at its studio location.

to the studio.

The new MDR-2 diversity receiver was designed to address portable applications, but we saw that it had potential in fixed applications as well. With omni antennas, the receiver supports operation with virtually no operator intervention, enabling our ENG control room to pick up signals automatically.

The plan was to install an MDR-2 receive system on a 100-foot tower at our studio. We were a little skeptical initially, as the our test installation used 11 dBi omnidirectional antennas, as opposed to the high gain steerable antennas at our normal ENG sites.

Knowing that our steerables have nearly twice the gain, we didn't know what to expect, but found that the performance was amazing. After a few simple operational tests, we ran the new receiver during live broadcast coverage.

SOLID HELICOPTER SIGNAL

In one case, our helicopter went to Provincetown at the end of Cape Cod, exactly 56 air miles away. It flew at only a 1,200-foot altitude, which is not that high, and the signal was solid from Provincetown to Needham. The clincher was that we were using the omnidirectional antennas at both ends of the path, because our airborne steerable antenna was out of service. We couldn't believe it worked so well.

Our ENG operators have really warmed up to this installation, as there is no adjusting required. They don't have to manually find the transmitter. The steerable antennas add more range, but you don't always need the range.

In the heat of a newscast, operators can simply check the diversity receiver monitor for incoming video. If they

have it, they have it. If they don't, they can usually switch to another site with a steerable antenna.

Diversity systems use multiple antennas, often on the same tower with no adjusting. When we use steerables, quite often the operators can be heard talking on their radios, coordinating between the trucks and the ENG control room. With the diversity system, there is nothing to talk about.

Aside from the way we're using it, the MDR-2 could be a logical choice for portable diversity applications, such as sports, news and outside broadcasts from ground locations, or from a moving vehicle. Recently, we tried it with a camera-mounted COFDM transmitter, and were pleased with the results.

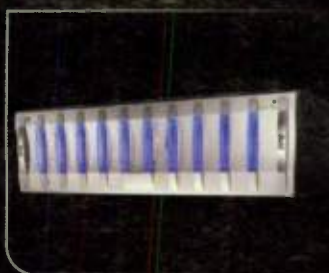
Rick Zach is chief engineer at WCVB-TV in Boston, Mass. He may be contacted at www.thebostonchannel.com/newscenter5/index.html.

For additional information, contact Microware Radio Communications at 800-490-5700 or visit www.mrcbroadcast.com.



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USER REPORT

KWWL Chooses Will-Burt D-TEC II Systems

by Dick Owens
Chief Engineer
KWWL Television

WATERLOO, IOWA

As chief engineer for the nation's 88th largest television market, part of my responsibility includes our three trucks that perform remote broadcasts. KWWL Television serves the Waterloo, Cedar Rapids, Dubuque and Iowa City areas. I started in the industry in 1965 and have seen many changes throughout the years. One that has impacted the broadcast industry is the development of proximity and alternating current detectors for remote broadcast truck masts.

PROXIMITY DETECTORS

When I came to KWWL, the station's trucks did not have proximity detectors atop their 50-foot telescop-

ing masts. Station management felt it necessary to move in that direction. Six months ago, the Will-Burt D-TEC II System was chosen for KWWL, and all three trucks were outfitted, with a service technician from Will-Burt coming to the station to install the D-TEC II units.

With Will-Burt on hand to do the installation, everything went smoothly. Our station photographers have now gotten used to working with the D-TEC II and it offers them a certain peace of mind while out on remote broadcasts.

The D-TEC II is equipped with Will-Burt's Emergency Bypass System, which provides a safe means for bypassing the D-TEC II in the rare event that a malfunction or false trip occurs and prevents extension of a truck's mast. Also, the built-in D-TEC II anti-collision system automatically stops mast extension, providing



One of the three KWWL Television remote vehicles equipped with Will-Burt's D-TEC II protective devices

added protection from overhead hazards for the operator and equipment.

THRESHOLD SENSING

The system features dual-threshold AC alert, E-Field (current) and H-Field (magnetic) detection, AC current and voltage sensing, enhanced collision detection, audible alerts, alphanumeric LED display, a built-in Emergency Bypass System and

expanded self-testing features. It's convenient that the D-TEC II System can be installed in both existing and new vehicles.

The station I was employed at before coming to KWWL did not use a Will-Burt D-TEC II System. Instead, we had a competitor's system, which required some amount of time in making adjustments. The reliability of the system was also questionable. I would recommend Will-Burt's D-TEC II System to other stations interested in AC field and proximity detection for their mobile broadcast vehicles.

Dick Owens is chief engineer for KWWL Television. He may be contacted at dowens@kwwl.com. The opinions expressed are those of the author alone.

For more information, contact Will-Burt at 330-682-7015 or visit www.willburt.com.

USER REPORT

Mohegan Sun Shines with Telecast Fiber

by Kevin Reilly
Manager of Production
Mohegan Sun Arena

UNCASSVILLE, CONN.

The Mohegan Sun is the premier entertainment destination in southeastern Connecticut. We pride ourselves on being cutting edge and in line with the most current developments in technology for the music, sports and entertainment industries. When new products come onto the market and prove worthwhile, we're quick to adopt them, so that any production truck rolling into our facility can take advantage of them to create a first-rate broadcast.

Our 10,000-seat Mohegan Sun Arena is a leader in the entertainment business, hosting acts such as Aerosmith, Rod Stewart, Jimmy Buffett and the Eagles. Our facility also boasts championship boxing, professional and college basketball, and our very own WNBA team, the Connecticut Sun.

PROBLEMS AROSE

Following our expansions here, which included construction of Mohegan Sun Arena, different types of fiber runs were made to accommodate



The 10,000-seat Mohegan Sun Arena

high-profile network productions. As our reliance on these pathways grew, we began experiencing recurring problems with external rental equipment. At the time, many of our existing connectors did not meet what is considered to be the broadcast standard. We spent a lot of time just trying to find adapters and changing out connectors.

Event crews also arrive in varied states of readiness—some with everything needed, and others who have to rent equipment. These issues were exacerbated by the rising demand from internal productions. It became clear that we needed to purchase and deploy our own industry-standard fiber solutions.

To ensure signal integrity and transmission flexibility during such events, we've worked with systems integrator

Conover Production Services to standardize our fiber network with one connector. This has provided easier setup and, in turn, established more reliable connectivity across Mohegan Sun venues. We chose Telecast, as the company represents the industry standard when it comes to broadcast fiber connectivity.

After purchasing and installing Telecast equipment, we're now equipped to manage both our fiber network and to offer first-rate facilities for visiting performers and networks. Our current Telecast gear includes Adder 322 audio, data and intercom multiplexers; DiamondBack II analog video multiplexers; Rattler HD/SDI links; and standalone POV video, audio and data transceivers.

Telecast equipment was installed to link four venues, including the arena, within Mohegan Sun to a central production and transmission area.

HIGH CONFIDENCE FACTOR

This installation has greatly improved our confidence in supporting broadcast productions of all types and sizes. During setup for any game or show, we know that we're providing the

visiting production team with familiar connectors, reliability and performance. And with extra Telecast modules on hand, we've established a rental inventory to supplement our internal equipment roster.

We've been so satisfied with Telecast and the company's products that we're planning to spec the company's gear for our \$740 million "Project Horizon" expansion. This will add a new 1,000-room hotel with 300 "House of Blues"-themed hotel rooms, along with a House of Blues Music Hall, restaurant, and exclusive, members-only House of Blues Foundation Room. In today's entertainment industry, fiber is really the only answer for high-quality signal transmission within facilities this expansive and when production takes place far from the transmission point. With Telecast's gear, we're able to maximize our use of existing fiber and guarantee the quality and flexibility of future fiber runs.

Kevin Reilly is manager of production at the Mohegan Sun Arena in Uncassville, Conn. He may be contacted at kreilly@mohegansun.com.

For additional information, contact Telecast Fiber Systems Inc. at 508-754-4858 or visit www.telecast-fiber.com.

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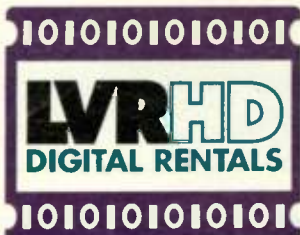
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(6) For-A CCS-4360 color correctors, \$1000/ea; Chyron Maxine w/Xform II, \$1500; Pinnacle DVExtreme 3-chnl SDI DVE, call for price; Pinnacle Lightning 2-chnl SDI stillstore, \$3500; Axon ARC-2000 aspect ratio converter, \$1800; Abekas DVEous, call for price; Sony DME-7000 dual chnl, \$7500; GVG-8500 w/8-8501 video DAs, BO; GVG 9520A sync gen w/TSG, BO; Sony PFV-L10 tray w/10-BKPF-L603 SDI DA 1x8, BO. 908-879-9590 or www.mccominc.com.

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Sony Beta SP deck, portable, in case, works well, shoulder strap & pwr sply inc, \$2500. 765-427-3633.

Sony UVW-1800 BetaSP, \$3500; Sony PVW-2800 BetaSP, \$4000; Sony PVV-3, \$2500; Panasonic AJ-SD93 DVCPR0 50, \$5299; Sony DSR-80 DVCAM, \$2800; Sony DSR-1 DVCAM, \$3500. 727-490-5057 or www.big10media.com.

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Chief Engineer- KFXA-TV, Cedar Rapids, Iowa seeks broadcast professional. Position requires strong hands-on transmitter experience. HD plant built and on-air. Digital master control complete. Letter and resume to: General Manager, KFXA-TV, 600 Old Marion Road N.E., Cedar Rapids, IA 52402. EOE.

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Maintenance Engineer: The Univision Network has an immediate opening for a Maintenance Engineer for its Network Operations Center in Miami, Florida. Candidates must have a minimum of three years experience in the repair and maintenance, down to the component level, of all types of TV broadcast equipment. Candidates should also have a Bachelor of Science degree with a major in Electrical Engineering or equivalent. Additionally, they must be well trained in computer systems, networks and associated applications and operating systems. SBE certification a plus. Qualified candidates may send their resumes and credentials to Jose Boveda, VP of Engineering at 9405 NW 41st Street, Miami, Florida 33178 or e-mail all documents to jboveda@univision.net. No phone calls will be accepted. Univision is an Equal Opportunity Employer.



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CBS Sells Seven TV Stations

NEW YORK

CBS Corp. last month announced the sale of seven of its 39 TV stations in four markets to New York City-based investment firm Cerberus Capital Management LP for \$185 million.

The stations in the deal include:

- KEYE-TV, Austin, Texas (CBS)
- KUTV (TV), Salt Lake City, Utah, and its sister station KUSG (TV), St. George, Utah
- WLWC (TV), Providence, R.I., (The CW)
- WTVX (TV), West Palm Beach, Fla., (The CW) and two low-power stations in the West Palm Beach DMA, WTCN-CA (MyNetwork TV) and WWHB-CA (TV Azteca)

As a group, these stations generated roughly \$70 million in revenues last year, according to BIA. Cerberus worked with TV veteran Dick Reingold on the transaction, which is subject to FCC approval.

Sinclair Revenues Up

BALTIMORE

Sinclair Broadcast Group which has had several run-ins recently with cable operators over retransmission fees, says it expects to generate

almost \$48 million in such fees, an almost 90 percent increase over the \$25.4 million it collected in 2006.

The Baltimore-based station group, which own 58 TV stations in 36 markets, made its predictions in its latest financial report, in which it announced quarterly revenues of \$198.1 million, an 11 percent increase over the \$178.8 million reported in the same quarter a year ago. Sinclair earned a profit of \$11.1 million, or 13 cents per share, compared with a loss of \$1.8 million, or 2 cents per share in the same time period last year.

A large contributing factor to the company's improved bottom line came from a \$32 million in political advertising, a record for the company during a non-presidential election year, as well as reduced operating expenses for the second consecutive year.

Sinclair has been on the forefront of demanding subscriber fees, and did so last summer when it went into negotiations with Mediacom, a 1.4 million subscriber cable operation based in Middletown, N.Y. Mediacom subsequently sued Sinclair to keep the broadcaster from pulling its stations, but the court did not intercede. Sinclair pulled its stations in early January, affecting about half of Mediacom's customers and firing up the Iowa legislature.

In the weeks that followed, Sinclair cut a retrans deal with Time Warner covering 35 TV stations and

6 million cable subscribers. On Feb. 2, Mediacom announced that Sinclair stations would "be immediately restored" on its cable systems.

Sinclair also announced that its board of directors approved a \$0.10 increase to annual dividend paid shareholders. Net income available to common shareholders for all of 2006 was \$54 million.

Azcar Awarded \$6.1 Million Sprint Nextel Deal

CANONSBURG, PA

Azcar USA Inc., a wholly owned subsidiary of Azcar Technologies Inc., has entered into an agreement with wireless telecommunications company Sprint Nextel to provide specialized training services to more than 900 U.S. television stations throughout the remainder of 2007 and all of 2008. The deal is valued at \$6.1 million, according to Azcar.

Azcar, an independent technology integration company, will provide a training solution to assist Sprint Nextel and U.S. broadcasters as they carry out a government-mandated spectrum relocation plan. The FCC has charged Sprint Nextel and incumbent licensees in the 1.9-2.1 GHz range with transitioning that spectrum to new uses under a new band plan. Azcar's training services will help U.S. broadcasters navigate the spectrum relocation and to understand the new equipment that is currently being installed around the country.

"We are delighted to be able to announce this services agreement, as we continue to grow and develop the range of services we offer in the U.S. marketplace," said Stephen Pumple, chairman and CEO of Azcar Technologies Inc. "This agreement will also generate new jobs in the Pittsburgh area and additional opportunities for Azcar as we go forward."

Tandberg Television Reports Latest Revenues

DULUTH, GA

Tandberg Television, a Norwegian-based provider of signal processing and compression equipment to the broadcast industry reported revenues of \$85.3 million in the fourth quarter ending Dec. 31, 2006, an increase of 9 percent over the \$78.5 million it earned for the same period in 2005.

The company reported that its gross margin was up 57.3 percent,

compared to 58.2 percent in the same quarter the year before. Operating profit came in at \$11.2 million compared to \$16.2 million in 2005 and pre-tax profits were \$14.5 million, compared to \$18 million for same period in the previous year.

In January, ARRIS, an Atlanta-based provider of telecommunications equipment for broadband networks said it would acquire Tandberg Television in a cash and stock deal worth \$1.2 billion. Shortly after Tandberg released its latest figures, ARRIS launched its tender offer.

The deal, which was unanimously approved by Tandberg's board of directors, will result in a combined company of more than 1,600 employees and more than 2,000 customers in more than 100 countries.

Tandberg Television reported the total number of shares outstanding at the end of the last quarter in 2006 were 80,529,876. Total assets were reported at \$568.8 million, with an equity ratio of 84 percent on Dec. 31, 2006.

Belo Releases Q4 And '06 Results

DALLAS

Belo, the Midwestern media company with 19 TV stations, several cable nets and four newspapers, reported net revenues of \$437 million for the final quarter of last year and \$1.59 billion for all of 2006.

Fourth quarter earnings represented a six percent increase over the same period a year before, and the full-year earnings—for the 12 months ending Dec. 31, 2006—were up 4.1 percent from 2005.

Earnings per share clocked in at 50 cents for the quarter and \$1.26 for the full year.

Revenues for the TV segment were \$223 million for the quarter, an increase of nearly 17 percent; and \$771 million for the year, up nearly 10 percent over 2005. EBITDA for the TV group was up 31 percent to \$106 million for the quarter, and 19 percent for the year, at \$326 million.

Belo Chairman and CEO Robert Decherd said, "In 2006, the Television Group achieved its highest spot revenues ever—both including and excluding political revenues—with an increase in total spot revenue of nearly 10 percent versus 2005."

Political advertising generated \$32 million in Q4 compared to \$3.3 million during the same period in 2005. Full year political ad revenues were \$47 million compared to \$7.3 million for 2005.

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Reliability:

- Elegant signal path design for high reliability
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- Front-loading, hot swappable cards
- Passive expansion modules

Performance:

- Industry-leading RF specifications

Flexibility:

- Future proof with 40-2250MHz operation
- 70/140MHz IF, L-Band & stacked L-Band in one platform

Ease of Expansion:

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- Expandable to 512x512

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